FO01-01
LIVE DONOR LIVER TRANSPLANTATION USING DUAL GRAFTS
ChuSoo Ahn, Shin Hwang, Ki-Hun Kim, DoekBok Moon, TaeYong Ha, GiWon Song, DongHwan Jung, GilChun Park and Sung-Gyu Lee
Asan Medical Center, Ulsan University, Korea

Introduction: Most important factor for the success of live donor liver transplantation (LDLT) is good size matching between donor and recipient. But some donor and recipient pair cannot progress to transplantation with usual single lobe graft due to various reasons. Dual donor LDLT which using two grafts for one recipient is a good alternative modality for these donor and recipient group.

Method: In Asan Medical Center, we performed 331 cases of dual graft LDLT from 2000 to 2011.

Results: Mean GRWR of dual graft LDLT was 1.03, which is similar with that of single right lobe graft (GRWR was 1.04). Though this method requires three operation simultaneously, if two left lobe grafts were used its overall donor complication rate is smaller than standard right lobe graft. Various combinations are possible between various grafts including left lateral segment, left lobe, right lobe and right posterior segment. This combination is decided by recipient’s requirement and donor liver condition and right-left proportion. Most common course of dual graft is cooperative regeneration but competitive regeneration can be occurred between two grafts. But atrophy of inferior graft occurred slowly and due to its gradual functional shift- ing to dominant graft, recipient’s condition was good without any complication. Acute cellular rejection rate after dual graft LDLT is similar to that of single lobe graft. It can be occurred in unilateral graft or bilateral grafts. Overall survival results for dual graft LDLT after learning curve is similar to that of single graft LDLT.

Conclusions: In conclusion, dual grafts LDLT is a good alternative option to the selective donor-recipient patients who cannot perform conventional single graft LDLT.

FO01-02
A SIMPLER, MORE POWERFUL DONOR RISK SCORE
Carlo Pulitano1, David Joseph1, Charbel Sandroussi1, Deborah Verran1, Michael Fink2 and Michael Crawford1
1Royal Prince Alfred Hospital, Australia; 2Austin Hospital, Australia

Introduction: An increasing number of patients are referred for liver transplantation (LT), but the number of available grafts remains stagnant. To compensate for this shortage, marginal deceased donors are more frequently considered as a potential sources of allograft. However, the use of such donors may influence outcomes after liver transplantation. In order to analyse the donor risk, different prognostic scoring systems have been proposed. However these scores lack practicability and have limited clinical utility. The objective of our study was to design a new simple donor risk index score and compare it to two recently proposed prognostic scores.

Method: Prospectively collected data from 1,168 patients, transplanted at two centers between January 2000 and December 2011 were included in the analysis. Data were analyzed with Kaplan–Meier and Cox regression models. The performance of our score was compared with the Donor Risk Index (DRI) developed within the Organ Procurement and Transplantation Network and the eurotransplant DRI (E-DRI). The discriminative abilities of the staging system were evaluated using Cox proportional hazard models and bootstrap corrected concordance index (c). Bootstrap techniques were used for internal validation.

Results: Overall survival of the cohort was 90% at 1 year and 85% at 3 years. After multivariate analysis the interaction among the variables donor age, cold ischemia time, and steatosis remained significant (p < 0.0001). These factors were used to create the Australian Donor Risk Index (A-DRI). The A-DRI score clearly stratified patients (p < 0.0001, c = 0.670) and identified clearly three distinct prognostic groups. DRI and E-DRI demonstrated poor-average discriminatory ability, c = 0.550 and c = 0.570 respectively.

Conclusions: The present study presents a simple score system that is practical, and easily applicable to everyday clinical practice. The A-DRI is superior to DRI and E-DRI for predicting the risk of graft failure after liver transplantation.

FO01-03
BILIARY ANATOMY IN LIVING DONOR LIVER TRANSPLANTATION
Chih-Chi Wang, Chao-Long Chen, Tsan-Shium Lin, Shih-Ho Wang, Chih-Chen Lin, Yueh-Wei Liu, Chee-Chien Yong, Ting-Lung Lin and Wei-Feng Li
Kaohsiung Chang Gung Memorial Hospital, Taiwan

Introduction: The incidence of biliary complication in living donor liver transplantation (LDLT) has been reported from 16% to 67%. Several factors have been reported related with biliary stricture. The number of graft bile duct opening and size of bile duct were the key factors to ensure good outcome of biliary reconstruction (BR). The aim of this study is to describe the biliary anatomy in donor and BR in recipient.

Method: From March 2006 to June 2012, 584 of BR were performed at Kaohsiung Chang Gung Memorial Hospital. Biliary anatomy was mapped by preoperative MRCP and intraoperative cholangiography at 2/3 parenchymal transection of donor hepatectomy.
Factor V Leiden homozygous mutation was diagnosed to be incompatible as the previously revised blood group of another donor was different. Two weeks pre-transplantation, one donor was convicted and imprisoned. Early pregnancy was discovered in one female donor, and late psychological instability in 2 donors. Withdraw consent in one donor, substance abuse in 2 donors and donor laparotomy due to macroscopic diffuse hepatic changes considering the liver unsuitable for donation.

Results: The number of graft bile duct opening and types of BR are shown as Table 1.

<table>
<thead>
<tr>
<th>Total no. of biliary reconstructions</th>
<th>584</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single duct opening in the donor graft</td>
<td>437 (74.89%)</td>
</tr>
<tr>
<td>No. of 1-to-1 reconstruction (%)</td>
<td>437 (65.18%)</td>
</tr>
<tr>
<td>1-to-1 duct-to-duct reconstruction</td>
<td>350 (52.61%)</td>
</tr>
<tr>
<td>1-to-1 duct-to-jejumnum reconstruction</td>
<td>87 (12.57%)</td>
</tr>
<tr>
<td>Two duct openings in the donor graft</td>
<td>134 (23.33%)</td>
</tr>
<tr>
<td>No. of 2-in-1 reconstruction (%)</td>
<td>50 (8.12%)</td>
</tr>
<tr>
<td>2-in-1 duct-to-duct reconstruction</td>
<td>43 (6.77%)</td>
</tr>
<tr>
<td>2-in-1 duct-to-jejumnum</td>
<td>7 (1.35%)</td>
</tr>
<tr>
<td>No. of 2-to-1 reconstruction (%)</td>
<td>6 (0.39%)</td>
</tr>
<tr>
<td>No. of 2-to-2 unmixd (%)</td>
<td>74 (11.03%)</td>
</tr>
<tr>
<td>2-to-2 duct-to-duct</td>
<td>66 (9.86%)</td>
</tr>
<tr>
<td>2-to-2 duct-to-jejumnum</td>
<td>8 (1.16%)</td>
</tr>
<tr>
<td>No. of 2-to-2 mixed (%)</td>
<td>4 (0.58%)</td>
</tr>
<tr>
<td>Three duct openings in the donor graft</td>
<td>9 (1.78%)</td>
</tr>
<tr>
<td>No. of 3-in-1 duct-to-duct</td>
<td>2 (0.39%)</td>
</tr>
<tr>
<td>No. of 3-to-3 duct-to-duct unmixed (%)</td>
<td>2 (0.39%)</td>
</tr>
<tr>
<td>No. of 2-in-1 duct-to-duct and 1-to-1 duct-to-duct unmixed</td>
<td>5 (0.77%)</td>
</tr>
<tr>
<td>Total no. of duct-to-duct anastomoses</td>
<td>657</td>
</tr>
</tbody>
</table>

Conclusions: Under microsurgical technique, biliary complication does not increase in BR with more than one bile duct.

FO01-04
LAST MINUTE DONOR EXCLUSION IN LIVING DONOR LIVER TRANSPLANTATION: IMPACT ON EVALUATION PROGRAM

Hany Shoreem, Hossam Eldene Soliman, Osama Hegazy, Wael Abdelrazeq, Nirmeen Fayed, Sherief Saleh, Taha Yassen, Tarek Ibrahim and Ibrahim Marwan
National Liver Institute, Egypt

Introduction: Minimizing the risk imposed to a healthy donor is one of the important aspects of LDLT and implies a highly scrutinized evaluation process. Nevertheless, late events could lead to exclusion of some of those evaluated donors. We investigated the late causes of exclusion of a potential LDLT donor and how far these reasons contributed to changing our donor evaluation program.

Method: Throughout 10 years more than 2,500 potential living donor had been evaluated for liver donation for about 1,500 recipients who presented for LDLT in National Liver Institute, Menoufia University, from them only 194 were transplanted. The evaluation records of those donors were retrospectively analyzed for causes of late exclusion.

Results: Only 15% of the evaluated potential donors were accepted for donation and only 7.8% were donated. Exclusion reasons included family pressure to withdraw consent in one donor, substance abuse in 2 donors and late psychological instability in 2 donors. Early pregnancy was discovered in one female donor 2 weeks pre-transplantation. One donor was convicted and imprisoned 2 weeks before LDLT. The pre-operatively revised blood group of another donor was discovered to be incompatible as the previously determined blood group was wrong. The presence of Factor V Leiden homozygous mutation was diagnosed in 2 donors. In four cases, LDLT was aborted after donor laparotomy due to macroscopic diffuse hepatic changes considering the liver unsuitable for donation.

Conclusions: Late pre-transplantation donor exclusion had its impact in donors, recipients and resources. Reassessment of the donor evaluation protocol should be a dynamic process, and it found to be greatly affected by these late exclusions.

FO01-05
UNUSUAL EVENTS IN DONOR SURGERY: THE “NEAR MISSES”

Neerav Goyal, Manav Wadhawan, Shaleen Agarwal, Ramdip Ray, Shishir Pareek, Giriraj Bohra, Muhammad Nayeem, Ravichand Siddhachari and Subash Gupta
Indraprastha Apollo Hospital, India

Introduction: Donor safety takes precedence in LDLT. Still donor hepatectomy can have life threatening complications and ‘near misses’. We are a high volume LDLT centre. Over years, we have had ‘near misses’ and potentially life threatening events in donor hepatectomy and learning from them our technique and decision-making has evolved and progressed to make donor hepatectomy safer. We share our experience with the same.

Method: From September 2006 to July 2013, 1,103 donor hepatectomies were performed. We retrospectively analyzed ‘near misses’ by dividing them into complications involving: hepatic veins and IVC; portal vein, hepatic artery; quality of graft; bowel injury; DVT and pulmonary embolism; anesthetic and metabolic. These donors were evaluated for errors in preoperative assessment, intra operative events, postoperative complications, remedial measures, repetitiveness of similar complications post event.

Results: Sixteen donors (1.5%) had ‘near miss’ events. Two donors had slippage of RHV clamp leading to torrential bleeding. One donor had cautery incision over IVC with excessive bleeding during transection of caudate lobe. Three donors developed limited thrombus of the RPV intraoperatively. Three donors developed intramal dissection of the RHA. One donor developed small bowel perforation peritonitis. Two donors developed DVT of lower limbs post operatively and one developed pulmonary embolism. One donor developed intra operative malignant hyperthermia from isoflurane. Another donor, had ventilator issues after intraoperative cholangiogram. One donor had postoperative hemolysis and high serum bilirubin of 9 mg/dl%. One donor developed an anaphylactic reaction to intraoperative administration of I.V Diclofenac sodium. Six donors of nineteen had a prolonged hospital stay but all were subsequently discharged and did well. Modifications were made in technique and monitoring after each of these instances, which have made donor surgery safer.

Conclusions: Safety in donor surgery is of prime importance. Technical modifications have led to making it safer and reducing morbidity and mortality.
FO01-06
USEFULNESS OF PROTHROMBOTIC SCREENING OF POTENTIAL DONORS IN LIVING RELATED LIVER TRANSPLANTATION
Kumar Palaniappan, Gomathy Narashiman, Srinivas Reddy, Vivekanandan Shanmugam, Ilankumaran Kallamoorthy, Olithselvan J, Joy Varghese, Dinesh Jothimani, Thomas Cherian and Mohamed Rela
Global Hospitals & Health City, Chennai, India

Introduction: Bleeding and thrombosis are major complications following LDLT. Donor selection and evaluation have become more pronounced, because donor health and safety are most important factors. To improve outcomes, we systematically screen our donors for prothrombotic & hemostatic factors. The aim of this paper was to describe the results of a screening for coagulation disorders, including prothrombotic factors in potential living liver graft donors and to evaluate thrombotic and bleeding events in donors and recipients, during and after the procedure.

Method: From Jan 2010 till July 2013, 164 LDLT were performed at our center. Total of 300 potential donors were screened & 164 found suitable for donation. Screening was done for prothrombotic factors in 164 potential donors. All donors were screened for Protein C, S, Factor V Leiden, Antithrombin III activity. 26 donors (15.8%) were detected to have at least one abnormality. All donor data were maintained in a prospective database & was analysed retrospectively.

Results: All donors were administered anticoagulation before surgery & intra op prophylaxis included mechanical compression therapy, and early aggressive mobilization in perioperative period. Protein S deficiency was commonest in 11 donors (42.3%), followed by Antithrombin III in 8 (30.7%), Protein C 5 donors (19.2%), Factor V Leiden 2 donors (7.6%). One donor (0.06%) developed deep vein thrombosis in postoperative period (Negative for thrombotic screening). Among recipients, HAT was found 2 pts, one donor had Prothrombin abnormality, PVT in 1 patient & no HVT

Conclusions: Systematic screening for prothrombotic factors is recommended in all potential donors to prevent more morbidity in a procedure which already has more chances of bleeding and thrombosis. A systematic protocol for donor management in the pre operative, peri operative period is recommended for reduced morbidity & early recovery.

FO01-07
RELEVANCE OF MALE-TO-FEMALE MISMATCH IN LIVER TRANSPLANTATION FOR PRIMARY BILIARY CIRRHOSIS
Michał Graźt1, Zbigniew Lewandowski2, Karolina Maria Wronka1, Karolina Graźt1, Joanna Ligocka1, Hanna Zborowska1, Waldemar Patkowski1 and Marek Krawczyk1
1Medical University of Warsaw, Poland

Introduction: As male-to-female transplantations are related to exposure to H-Y minor histocompatibility antigen present on biliary epithelial cells, sex matching may influence long-term outcomes after liver transplantation for cholestatic diseases. The purpose of this study was to evaluate the relevance of male-to-female mismatch in liver transplantation for primary biliary cirrhosis (PBC).

Method: Out of 1,277 liver transplantations performed in the Department of General, Transplant and Liver Surgery until June 2013, 97 (7.6%) primary transplantations in patients with PBC were identified. Study cohort comprised 82 female recipients with PBC as the only cause of liver disease and without hepatic malignancies. Female recipients of grafts procured from female and male donors were compared with respect to graft survival at 10 years (primary outcome measure). The relevance of several known risk factors for poor outcomes was evaluated separately for female-to-female and male-to-female transplantations.

Results: In general, graft survival was 80.8% at 5 years and 75.2% at 10 years. No differences with respect to graft survival were observed between female recipients of grafts procured from female or male donors (74.7% vs. 73.1% at 10 years, p = 0.676). However, duration of cold ischemia exceeding median (8 hours) and blood transfusions over median (4 units) were associated with significantly inferior outcomes after male-to-female (p = 0.0386 and p = 0.0390, respectively) but not after female-to-female (p = 0.843 for cold ischemia and p = 0.110 for blood transfusions) transplantations. Moreover, 10-year graft survival was lower after male-to-female as compared to female-to-female transplantations in subgroups of patients with blood transfusions exceeding 4 units (61.4% vs. 100.0%, p = 0.063) and duration of cold ischemia over 8 hours (54.7% vs. 75.8%, p = 0.418).

Conclusions: There are no major differences in long-term outcomes after male-to-female and female-to-female liver transplantations for PBC. However, the negative impact of cold ischemia and blood transfusions is more pronounced in case of male-to-female mismatch.

FO01-08
TECHNICAL ADVANCE IN HYBRID DONOR HEPATECTOMY IN LIVING DONOR LIVER TRANSPLANTATION
Akihiko Soyama, Mitsuhisa Takatsuki, Masaki Hidaka, Tomohiko Adachi, Amane Kitasato, Tamotsu Kuroki and Susumu Eguchi
Nagasaki University Graduate School of Biomedical Sciences, Japan

Introduction: We have reported hybrid donor hepatectomy with partly using laparoscopic procedure in living donor liver transplantation (LDLT), which is so-called hybrid procedure. For standardization with maintaining safety and quality of the procedure, we have improved several devices that have been already proved effective in conventional open procedure.

Method: Between 1997 and Aug 2013, 184 LDLTs were performed at Nagasaki University Hospital. Among them, recent 49 donors underwent hybrid donor hepatectomy. Twenty-seven donors underwent
left hemihepatectomy; 21 donors underwent right hemihepatectomy, and 1 patient underwent posterior sectionectomy. Eight centimeter subxiphoid midline incision was created for hand assistance. Under pneumoperitoneum, mobilization of the liver was achieved. Thereafter, the incision was extended up to 12 cm for the right lobe and posterior sector graft and 10 cm left lobe graft procurement. Management of vessels were performed under direct vision. Parenchymal transection was performed with liver hanging maneuver. For visualizing planned cutting point of the bile duct was done by encircling the bile duct using a radiopaque marker filament under real-time C-arm cholangiography. Hepatic vein was transected by a vascular stapler for preventing any risk of accidental declamping of the remnant end of hepatic vein.

**Results:** All the procedures have been completed without any extra subcostal incision. All the grafts were safely extracted through the upper midline incision. The median operation duration was 433 minutes. The median amount of blood loss was 600 g, and no donors required allogenic transfusion. All the donors have returned to the preoperative activity level. Morbidity was recognized in 4 cases (Clavien-Dindo classification I, n = 3, II, n = 1). Wound-related complaints were less seen during follow-up in out-patient clinic compared to conventional open procedure.

**Conclusions:** Our method of minimal invasive living donor hepatectomy was safely conducted without increasing morbidity, operation duration, and blood loss.

**FO02-02**

**COLORECTAL LIVER METASTASES: HEPATIC PEDICLE CLAMPING DURING HEPATECTOMY REDUCES THE INCIDENCE OF TUMOR RECURRENCE IN SELECTED PATIENTS. CASE-MATCHED ANALYSIS**

Alessandro Giacomoni, Stefano Di Sandro, Giacomo Concone, Plamen Mihaylov, Andrea Lauterio, Iacopo Mangoni and Luciano De Carli

**Niguarda Ca' Granda Hospital, Italy**

**Introduction:** Hepatic pedicle clamping (HPC) during Liver Resection (LR) is a vascular procedure designed to prevent bleeding from the liver during hepatectomy. Outgrowth of pre-existing colorectal micrometastases may occur 5–6 times faster in occluded liver lobes than in non-occluded lobes. We conducted a case-matched analysis at our Institution to assess the effects of HPC on overall and recurrence-free survival in highly selected patients, who underwent LR due to Colorectal liver metastases (CLM).

**Method:** From January 2002 to December 2010, 120 patients operated for CLM were included into this case matched study. Patients were allocated to two groups: Group-A patients who underwent HPC during LR; Group-B patients who underwent LR without HPC.

**Results:** HPC during liver resection was associated with better overall patient 5-year survival (47.2% in Group-A and 32.1% in Group-B) (p = .06), and significantly better 5-year recurrence free survival (49.9% in Group-A vs. 18.3% in Group-B) (p = .010) The Cox regression model identified the following risk factors for worse prognosis in terms of shorter recurrence-free survival and higher incidence of tumor recurrence: no HPC (Group-B) (p = .032) and positive lymph nodes at the time of LR (p = .018).

**Conclusions:** Lack of HPC in selected patients who underwent LR for CLM results to be a strong independent risk factor for higher patient exposure to tumor recurrence. We suggest that hepatic hilum clamping

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should be seriously taken into consideration in this patient setting.

FO02-03
TAILING THE SURGICAL STRATEGY OF LOW AND MIDDLE RECTAL CANCER WITH SYNCHRONOUS LIVER METASTASES REMAINS DIFFICULT. AN INTENTION TO TREAT ANALYSIS.

Jean-Marc Regimbeau, Charles Sabbagh, Tiana Ravololoniaina, Bruno Chauffert, Jean-Paul Joly and Francois Mauvais
Amiens University Hospital, France

Introduction: In rectal cancer, the incidence of synchronous liver metastases (SLM) ranges between 14% and 30%. The treatment of SLM combines neo-adjuvant treatment with surgical resection (rectum resection first, simultaneous resection or liver resection first). The aim of this study was to evaluate the success of each of these three oncological strategies in achieving complete (R0) resection and assesses predictive factors for complete resection.

Method: From January 2005 to December 2010, we included retrospectively all patients with low and middle rectal cancer (MLRC) and SLM operated on with curative intent. The endpoints were the proportion of R0 at both sites, the postoperative morbidity rate, the long-term outcome and risk factors for incomplete resection.

Results: Of the 49 included patients, 49% had undergone a rectum-first treatment strategy, 30.6% underwent a simultaneous resection strategy and 20.4% underwent a liver-first strategy. There were no differences in the incidence of R0 at both sites (p = 0.6). There was no difference in the overall complication rate after rectal resection (p = 0.1) or liver resection (p = 0.8). There were no differences in overall (p = 0.4) and disease-free survival (p = 0.1). Emergency surgery was the only risk factor for treatment failure.

Conclusions: None of the oncological strategies were associated with a low complete resection rate or a poor long-term outcome.

FO02-04
SYNCHRONOUS SURGERY FOR COLORECTAL CANCER AND LIVER METASTASES: LAPAROSCOPIC COLORECTAL RESECTION IMPROVES SHORT TERM OUTCOME. A COMPARATIVE STUDY.

Francesca Ratti, Luca Aldighetti, Marco Catena, Saverio Di Palo, Carlo Staudacher and Gianfranco Ferla
Saaffaele Hospital, Italy

Introduction: 30% of patients with colorectal cancer presents with liver metastases at diagnosis. Long-term survival is influenced by obtaining a complete removal of the primary tumor and liver metastases. Aim of this study was to assess short-term outcome of combined resection of left colon or rectum cancer and liver metastases, comparing the results of the primary tumor resection performed laparoscopically or by laparotomy.

Method: From January 2004 to July 2013, 106 patients underwent combined resection of colorectal cancer and synchronous liver metastases. 69 patients underwent laparoscopic colorectal resection (LPS Group), and were compared with 37 patients undergoing colorectal resection by laparotomy (LPT Group). Right colonic resections were excluded from the analysis. A further analysis was performed, including only the colonic resection.

Results: The groups resulted comparable in terms of patients and disease characteristics, extent of liver resection, lymphadenectomy and length of surgery.

Conclusions: Laparoscopic resection of colorectal cancer in patients undergoing simultaneous resection of liver metastases by laparotomy is associated with a reduction of blood loss, morbidity and postoperative hospital stay, without affecting the oncologic radicality. In simultaneous resections of colorectal cancer and liver metastases, postoperative morbidity and hospital stay are mainly conditioned by the type of approach to intestinal surgery (laparoscopic or open), rather than the extent of liver resection.

FO02-05
SURGICAL MANAGEMENT OF SYNCHRONOUS COLORECTAL LIVER METASTASES: SIMULTANEOUS VERSUS STAGED RESECTIONS.

Anton Burlaka, Andriy Lukashenko, Olena Kolesnik, Viktor Priymak and Ighor Shchepotin
National Cancer Institute, Ukraine

Introduction: Surgical treatment of metastatic colorectal cancer remains the only method that improves overall 5-year survival. But the optimal surgical strategy for resectable, synchronous, colorectal liver metastases remains unclear. This study aimed to compare the surgical outcome and survival benefit between synchronous and staged resection of liver metastases from colorectal cancer.

Method: Clinicopathologic data, treatments, and postoperative outcomes from 110 patients who underwent simultaneous (48 patients, group A) or staged (62 patients, group B) colorectal and hepatic resections at clinic of National cancer institute in period of 2008–2013 were reviewed.

Results: Postoperative complications in patients with simultaneous resections (group A) were observed in 13
cases (27.1%), including 5, 1, 4, 2, 0 and 1 of grades I, II, IIIa, IIIb, IV and V respectively. Similar results have been reported in group B after staged resections, where overall postoperative complications registered in 16 patients (25.8%), including 4, 3, 6, 3, 0 of grades I, II, IIIa, IIIb, IV respectively. Overall level of post-operative complications in the groups A and B after surgical stages finishing did not differ statistically (p = 0.96). Overall 3-year survival in the group of patients with simultaneous resections (group G) was 42% and in the group 55% (p = 0.22).

Conclusions: Analysis of our research indicated necessity of the development of differentiated approach in management of synchronous colorectal liver metastatic cancer. Simultaneous resections of colorectal cancer primary lesions and hepatic metastases were safe and could serve as a primary option for selected patients. Subsequent research should be directed towards study of prognosis factors and criteria for patients selection for surgical treatment groups, assessment of economic effect, and patients life quality.

FO02-06
COMPARABLE MORBIDITY, MORTALITY AND PATIENT LONG-TERM SURVIVAL CAN BE ACHIEVED IN PATIENTS WITH COLORECTAL LIVER METASTASES UNDERGOING 2 STAGE OR DOWNSTAGING LIVER RESECTIONS

Eugenia Ip1, Paul Bergamin1, Jasmine Wong1, David Goldstein1, Eva Segelov2, Morteza Aghmesheh3 and Koroush Haghighi1
1The Prince of Wales Hospital, Australia; 2St Vincent’s Hospital, Australia; 3The Wollongong Hospital, Australia

Introduction: Increasing numbers of liver resections (LR) are being performed for extensive colorectal liver metastases (CLM), including those requiring planned two-stage LR or downstaging chemotherapy. We audited morbidity, mortality and long term survival of patients undergoing LR in these groups.

Method: Patients were compared in 3 groups, CLM that did not require downstaging (G1), redo resections for CLM (G2) and downstaging or two-stage LR (G3). Prospectively collected database was analysed for patient demographics, postoperative complications (Dindo-Clavien classification) and long term survival (Kaplan-Meier curves). All LR were performed by KSH. All patients had PET scans prior to surgery.

Results: 144 patients underwent LR for CLM, with 60% (n = 86), 15% (n = 22) and 25% (n = 36) in G1, G2 and G3 respectively. Median age of 62 in G1, 63 in G2 and 64 in G3 was recorded. Males accounted for 65.1% (n = 56), 54.5% (n = 12) and 58.3% (n = 21) of patients in G1, G2 and G3. Extended LR accounted for 68.6% (n = 59) and 55.6% (n = 20) of G1 and G3, whilst only for 31.8% (n = 7) in G2. 7.0%, 9.1% and 22.2% required transfusions in G1, G2 and G3. Length of HDU/ICU and hospital stay was comparable with a median stay of 1 and 7–8 days. 4.5%, 0.9% and 5.6% patients experienced major complications in G1, G2 and G3 respectively. 90 day mortality was 1%, 0% and 5% respectively for G1, 2 and 3. Overall long term survival of all patients with CLM was 93%, 70% and 46% at 1, 3 and 5 years respectively. 5 year survival was 56%, 20% and 33% for G1, G2 and G3 respectively.

Conclusions: Long term survival can be achieved in recurrent as well as downstaged and two-stage liver resections for CLM, with acceptable morbidity and 90 day mortality.

FO02-07
SAFETY AND EFFICACY OF ALPPS PROCEDURE FOR RAPID LIVER HYPERTROPHY: A COMPARISON STUDY WITH PORTAL VEIN EMBOLIZATION

Tung Yu Tsui1, Oliver Stöltzing2, Emre F. Yekebas3, Andreas Koops4, Gerhard Adam1 and Jakob R. Izbicki1
1University Medical Center Hamburg-Eppendorf, Germany; 2Helios Hospital Berlin-Buch, Germany; 3Darmstadt Clinic, Germany; 4University Medical Center Hamburg-Eppendorf, Germany

Introduction: The in situ split of the liver and portal vein ligation/transection (ALPPS) represents an innovative surgical technique to induce rapid liver hypertrophy. The future liver remnant increased significantly after the procedure. In the study we compared the perioperative data of the new technique with the conventional portal vein embolization.

Method: we collected the data of the consecutive 36 patients underwent right trisegmentectomy from 2009 to 2012. Twenty of 36 patients received right portal vein and Seg IV portal vein embolization to induce the hypertrophy of future Seg 2 and 3 liver remnants (PVE). Sixteen of 31 patients received the in situ split and right portal vein transection after implementation of the new technique (ISS). The efficacy and outcome of two procedures were analyzed.

Results: There is no significant difference in terms of patient characteristics. In situ split induced comparable hypertrophy of future liver remnant (median: 526 mL in ISS group vs. 428 mL in PVE group) in significantly shorter interval (median 9 days vs. 30 days). The percentage of the volume of the future liver remnant was 35% of estimated standard liver volume (ESLV) that was higher than those in PVE group (26.8%). The delta% of ESLV was 16 in ISS group, which is significantly higher than those in PVE group (median 8.2%). Perioperative data showed that there was lower incidence of small-for-size syndrome in ISS group as compared with PVE group. In addition, there was no difference in terms of the rate of postoperative complications, hospital mortality and the one-year survival of patients after the surgery.

Conclusions: The ALPPS is a safe and feasible procedure to induce rapid hypertrophy of future liver remnant. The selection of patients might be of crucial to achieve the optimal outcome. Further studies should address on the oncological outcomes of ALPPS procedure.
ASSOCIATING LIVER PARTITION AND PORTAL VEIN LIGATION FOR STAGED HEPATECTOMY (ALPPS): THE BRAZILIAN EXPERIENCE

Orlando Torres1, Cassio Oliveira2, Cristiano Lima3, Eduardo Fernandes4, Fabio Waechter5, Jose Maria Moraes Junior6, Marcel Machado6, Marcelo Linhares7, Paulo Herman8 and Rinaldo Pinto9
1Federal University of Maranhao, Brazil; 2Federal University of Paraiba, Brazil; 3Federal University of Minas Gerais, Brazil; 4Hospital Silvestre Rio de Janeiro, Brazil; 5Santa Casa from Porto Alegre, Brazil; 6Hospital Sírio Libanês São Paulo, Brazil; 7Federal University of São Paulo, Brazil; 8University of São Paulo Medical School USP, Brazil; 9Hospital Santa Catarina Blumenau, Brazil

Introduction: Postoperative liver failure consequent to insufficiency of remnant liver is a feared complication in patients who underwent extensive liver resections. To induce rapid and significant hepatic hypertrophy, associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) has been recently developed for patients which tumor is previously considered unresectable. The aim of this study is to present the Brazilian experience with associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) approach.

Method: Were analyzed 39 patients who underwent hepatic resection using ALPPS approach in nine hospitals. The procedure is performed in two steps. The first operation is portal vein ligation (PVL) and in situ splitting (ISS). In the second operation the right hepatic artery, right bile duct and the right hepatic vein are then isolated and ligated. The extended right lobe is removed. There were 22 male (56.4%) and 17 female (43.6%). At the time of the first operation, the median age was 57.3 years (range: 20–83 years).

Results: The most common indication was liver metastasis in 32 patients (82.0%), followed by cholangiocarcinoma in three patients (7.7%). Two patients died (5.2%) during this period and did not undergo the second operation. The mean interval between the first and the second operation was 14.1 days (range: 5–30 days). The volume of the left lateral segment of the liver had increased 83% (range 47–211.9%). Significant morbidity after ALPPS was seen in 23 patients (59.0%). The mortality rate was 12.8% (five patients).

Conclusions: The ALPPS approach can enable resection in patients with lesions previously considered unresectable. It induces rapid liver hypertrophy avoiding liver failure in most patients. However still has high morbidity and mortality.

DOES ABERRANT ANATOMY OF THE HEPATIC ARTERY AFFECT RESECTION MARGIN IN PANCREATICODUODENECTOMY?

Patrick Casey, Rosanna Desouza, Snehal Lapsia, Kariem Elhadd, Zaria Ali, David Chang, Ambareen Kausar, Anton Krije, Joanne Thomas and Daren Subar
East Lancashire Hospital Trusts, United Kingdom

Introduction: Several studies have demonstrated that resection margin, tumour differentiation and adjuvant treatment affects survival after resection for pancreatic adenocarcinoma. This study aims to assess the association between the presence of abnormal arterial anatomy (in particular a replaced or aberrant right hepatic artery) and resection margin status.

Method: This is a retrospective study of all patients with pancreatic adenocarcinoma who underwent Pancreatectoduodenectomy procedure between 2007 and 2012. Patient demographics and pathology were analysed. Aberrant arterial anatomy as per Michels classification with identified and reported by a single Consultant Radiologist. Statistical analysis was conducted using SpSS (IBM) statistical program.

Results: Between January 2007 and December 2012 there were 148 pancreaticoduodenectomies of which 75 were for adenocarcinoma of the head of the pancreas. The male to female ratio was 45:30. The mean age was 65 years (range 39–84 years). Fifty-nine patients had a positive resection margin with 16 having negative margins. The medial (SMV) margin was the most commonly involved. Fifteen patients (21%) had aberrant arterial anatomy of the hepatic artery course. The presence of aberrant arterial anatomy did not have a statistically significant impact on the R Status (p = 0.67), involvement of the medial (p = 0.34), or Transection margin (p = 0.22). In concordance with other studies, R status correlated with overall survival (p = 0.02) suggesting that the presence of arterial variation does not affect survival in adenocarcinoma of the pancreas.

Conclusions: There appears to be no increased risk of a positive resection margin in pancreaticoduodenectomy in the presence of variant arterial anatomy of the right hepatic artery. Identification of vascular anomalies by pre-operative imaging will reduce the risk of intraoperative injury.

THE “TOTAL ARTERIAL DEVASCULARIZATION FIRST” TECHNIQUE FOR RESECTION OF PANCREATIC HEAD CANCER DURING PANCREATICODUODENECTOMY

Renyi Qin, Min Wang and Feng Zhu
Affiliated Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, China

Introduction: Integrated resection of the pancreatic head is the most difficult step in radical pancreaticoduodenectomy (RPD) in patients with the portal vein (PV) and
superior mesenteric vein (SMV) invasion or oppression by the tumor. Here we introduce a new idea and skill named the “total arterial devascularization first” technique and its applications on RPD.

**Method:** The principle is that four arterial blood supplies of pancreatic head were obstructed before veins dissection. The key steps were first exposure of the anterior surface of the abdominal aorta by completely transecting neural and connective tissue between SMA and pancreatic head, and transecting the mesoissues from the origin of SMA to the root of the celiac trunk. From January 2012 through May 2013, a total of 58 patients with PV/SMV invasion or oppression underwent RPD underwent pancreaticoduodenectomy using this technique.

**Results:** The median operative time was 5.1 hours (range, 4.5–8.1 hours). The median intraoperative blood loss was 450 mL (range, 200–900 mL). No intraoperative and postoperative bleeding of pancreatic head region. Among the 58 patients, 21 underwent vessel lateral wall angiectomy or angiorrhaphy. And 10 underwent angiectomy and end-to-end anastomosis. The incidence rates of postoperative bleeding, postoperative pancreatic fistula and biliary fistula were 5.2%, 6.8%, and 1.7%, respectively. No patients died after 3 months of operation.

**Conclusions:** The “total arteries devascularization first” technique is a new method for intricate pancreaticoduodenectomy. It could improve the security of surgery and reduce intraoperative bleeding, which is expected to become standardized surgical approach of pancreaticoduodenectomy.

**FO03-04**

RESULTS OF LONG TERM AFTER PANCREATICOGASTROSTOMY ANASTOMOSIS ON PANCREATICODUODENECTOMY

Yuko Mataki, Hiroyuki Shinchi, Kosei Maemura, Hiroshi Kurahara, Yota Kawasaki, Satoshi Ino, Masahiko Sakoda, Shinchi Ueno, Sonshin Takao and Shoji Natsugoe

**Kagoshima University, Japan**

**Introduction:** Pancreatic anastomotic leakage remains a persistent problem after pancreaticoduodenectomy (PD). We have reported pancreaticogastrostomy (PG) for the method of reconstruction. Especially, our method, what is called the transfixing suture method, has led to good results in the postoperative short period. (JHPBS 2012, J Surg Res 2011). In this paper, we examined the results in the longitudinal period of PG reconstruction after PD.

**Method:** This study retrospectively analyzed 50 patients who survived over three years among 88 cases receiving PD between 2005 and 2010. We inserted the pancreatic tube in the anastomosis of PG in all patients. The dilation of main pancreatic duct was defined as over 5 mm.

**Results:**

1. Change of weight of whole body: The body weight reduced to 89% compared with the preperation. The weight recovered gradually 6M, 1y, every other year after that, and it had increased to 95% after four years.

2. The period of release of pancreatic tube: The median time of release of pancreatic tube from the anastomosis after PD and the cumulative defecation rate at 1 year were 2.8 months and 87%, respectively.

3. In seven cases, pancreatic duct tube did not release from the anastomotic lesion for more than a year, but there were no characteristic factors such as hardness of pancreatic parenchyma, type of disease, type of operation, and pancreatic duct diameter.

4. 11 patients whose main pancreatic duct extended after surgery were observed. Among them, the preoperative extension was observed in six cases, non-extension was in five cases. Features of the five cases were early postoperative complications and soft pancreas.
5. Diabetes mellitus: Diabetes mellitus newly developed in 6 cases and glucose tolerance impaired in 2 cases. But we could not detect the predictive factor retrospectively.

**Conclusions:** PG anastomosis method in PD has a good result in the perioperative period and it may be acceptable in the longitudinal period.

**FO03-05**

**LAPAROSCOPIC PANCREATEICODUODENECTOMY ASSISTED WITH MINI-LAPAROTOMY**

Jun Suh Lee and Tae Ho Hong

*Catholic University of Korea, Seoul St. Mary’s Hospital, Korea*

**Introduction:** Pancreaticoduodenectomy (PD) is the treatment modality of choice for periampullary disease requiring resection. Even with the increasing number of successful reports from around the globe, laparoscopic pancreaticoduodenectomy (LPD) is still not fully accepted. We report the results of our experience of LPD assisted with mini-laparotomy.

**Method:** A retrospective review study was performed on 42 patients who received LPD assisted with mini-laparotomy, between March 2009 and March 2012. Clinical outcomes such as patient age, pathologic diagnosis, pancreas nature, operation time, conversion rate, hospital stay, postoperative complication, and mortality rate were reviewed.

**Results:** A total of 42 patients, aged between 42 and 70, received LPD assisted with mini-laparotomy. The mean incision length of laparotomy was 5.5 cm. Mean operative time was 420 minutes, and 3 cases required conversion to open surgery. Mean postoperative hospital stay was 15 days, and the thirty-day mortality rate was zero. There were 2 cases of pancreaticogastrostomy leakage, 2 cases of postoperative bleeding, 3 cases of delayed gastric emptying, 1 case of bile leakage, and 3 cases of pulmonary complications. Of the 3 patients with pulmonary complications, one patient died.

**Conclusions:** When performed by a surgeon with ample experience in laparoscopic surgery, LPD assisted with mini-laparotomy for selected cases is a safe, feasible alternative for conventional PD. With the method we have described, pancreaticoenteric anastomosis can be performed in the same manner as open PD, while taking advantage of the merits of minimally invasive surgery.

**FO03-06**

**DRAINAGE PROCEDURES FOR SMALL DUCT DISEASE IN CHRONIC PANCREATITIS: A FEASIBLE OPTION**

Venkatarami Reddy

*Assistant Professor, India*

**Introduction:** Surgery is the treatment of choice for intractable pain in chronic pancreatitis (CP). But the best results with surgery are seen in group of patients where the main pancreatic duct is dilated. Our aim was to assess prospectively the feasibility of drainage procedures in patients with CP with small duct disease.

**Method:** All consecutive patients with CP with small duct disease (diameter less than 5 mm) were included. All patients underwent surgical intervention (lateral pancreateicojunostomy with head coring). The primary outcome measures were pain relief and morbidity. These outcomes were compared with patients with CP with large duct disease (diameter more than 7 mm).

**Results:** 114 patients with CP underwent surgery. Of these 24 (21.05%) patients had CP with small duct disease and 90 (78.95%) patients had large duct disease. Demographic profile of the two groups was comparable. Mean pain scores were similar (47.75 ± 6.85 vs. 51.38 ± 7.40; p = 0.14). Patients with large duct disease had higher incidence of diabetes mellitus (44.44% vs. 8.33%; p = 0.02), but exocrine insufficiency was similar. All patients had calcifications in both the groups. Mean intra ductal pressures measured intra operatively were significantly high in patients with large duct disease (22.99 ± 5.65 vs. 18.33 ± 3.52; p = 0.001). Frequency of complications at presentation were similar in both the groups (p = 0.29). Surgery relieved pain in 21/24 (87.5%) patients with small duct disease and 82/90 (91.11%) patients with large duct disease. Mean post operative scores in small duct disease group (7.50 ± 9.61 vs. 51.38 ± 7.40; p < 0.001), and large duct disease group (5.14 ± 7.88 vs. 47.75 ± 6.85; p < 0.001) were significantly reduced, when compared to pre operative scores. Incidence of post operative complications was similar in both groups (16.66% vs. 14.44%).

**Conclusions:** Lateral pancreateicojunostomy with head coring is feasible for CP patients with small duct disease with good pain relief.

**FO03-07**

**THE COMPARISON OF SINGLE AND TWO LAYER PANCREATEICOJEJUNOSTOMY IN THE FREY’S OPERATION: THE RESULTS OF PROSPECTIVE RANDOMIZED STUDY**

Saulius Jurevičius, Audrius Šileikis and Kęstutis Strupas

*Vilnius University Faculty of Medicine, Lithuania*

**Introduction:** The duodenum-preserving pancreatic resection (Frey’s operation) is a standard operation for patients with complicated chronic pancreatitis. The pancreateicojunostomy is usually performed using two layer sutures. The aim of this study – to compare the results of single versus two layer the pancreateicojunostomy for Frey’s operation and to assess the changes of the quality of life 12 months after operation.

**Method:** The prospective randomised trial was performed in the Centre of Abdominal Surgery in Vilnius University Hospital „Santariskiu Klinikos” in 2010-2012. A total of 80 patients, age between 24 and 59 year, were enrolled in the clinical trial. They were randomly allocated into two groups: I group – 38 patients, for whom pancreateicojunostomy was performed using continuous single layer suture; II group – 42 patients, for whom pancreaticojejunostomy was performed using interrupted two layer suture.

**Results:** There were no statistically significant differences comparing the age, sex and the stage of chronic pancreatitis between the two groups. Complication rates were similar in both groups (16.66% vs. 14.44%). The prospective randomised trial was performed in the Centre of Abdominal Surgery in Vilnius University Hospital „Santariskiu Klinikos” in 2010-2012. A total of 80 patients, age between 24 and 59 year, were enrolled in the clinical trial. They were randomly allocated into two groups: I group – 38 patients, for whom pancreateicojunostomy was performed using continuous single layer suture; II group – 42 patients, for whom pancreaticojejunostomy was performed using interrupted two layer suture. The prospective randomised trial was performed in the Centre of Abdominal Surgery in Vilnius University Hospital „Santariskiu Klinikos” in 2010-2012. A total of 80 patients, age between 24 and 59 year, were enrolled in the clinical trial. They were randomly allocated into two groups: I group – 38 patients, for whom pancreateicojunostomy was performed using continuous single layer suture; II group – 42 patients, for whom pancreaticojejunostomy was performed using interrupted two layer suture. The prospective randomised trial was performed in the Centre of Abdominal Surgery in Vilnius University Hospital „Santariskiu Klinikos” in 2010-2012. A total of 80 patients, age between 24 and 59 year, were enrolled in the clinical trial. They were randomly allocated into two groups: I group – 38 patients, for whom pancreateicojunostomy was performed using continuous single layer suture; II group – 42 patients, for whom pancreaticojejunostomy was performed using interrupted two layer suture.
pancreatitis, preoperative pain and the results of SF-36 questionnaire. Overall time of the operation (208 ± 46 minutes and 255 ± 58 minutes) and the suturing time (19 ± 6 minutes and 51 ± 18 minutes) were significantly shorter in the single layer anastomosis group. Postoperative complications, the prevalence of pancreatic fistula, the length of stay did not differ in both groups. There was a statistically significant improvement of the quality of life 12 months after operation.

Conclusions: The continuous single layer suture reduces the suturing time of pancreaticojunostomy and overall time of the Frey’s operation when comparing to interrupted two layer suture. There was no statistically significant difference in the prevalence of the pancreatic fistula, postoperative complication rate, the length of stay between both methods. Frey’s operation is an effective surgical treatment of chronic pain caused by chronic pancreatitis and improves the quality of life of the patients.

FO03-08
SURGICAL UTILITY OF INTRAOPERATIVE DOPPLER ULTRASONOGRAPHIC GUIDED VESSEL NAVIGATION IN PANCREATICODUODENECTOMY

Kosei Maemura, Hiroyuki Shinchii, Yuko Matakii, Hiroshi Kurahara, Youta Kawasaki, Satoshi Iino, Masahiko Sakoda, Shinichi Ueno, Sonshin Takao and Shoji Natsugoe
Kagoshima University, Japan

Introduction: The color Doppler flow imaging has become one of the diagnostic methods for the delineation of the anatomy, identification of the vascular structures and the vascular invasion of the malignant tumor. We assessed the utility of intraoperative Doppler ultrasonographic vessel navigation for identifying critical arteries in order to improve safety during pancreaticoduodenectomy (PD).

Method: In all, 102 cases of pancreas head cancer (ampullary or periampullary) were separated into 2 groups based on perioperative imaging modality: the preoperative 3D-CT group (control group; n = 66), and the preoperative 3D-CT and intraoperative Doppler ultrasonography vessel navigation group (Dop-Navi group; n = 36). The latter technique was used to visualize the bifurcation of the inferior pancreaticoduodenal artery (IPDA) around the superior mesenteric artery (SMA) and performed real time tracing of these vessels during tumor resection. The operative status of the patients in the Dop-Navi group was compared with control group.

Results: Real-time Dop-Navi during surgery distinguished the IPDA from the SMA by its shorter waveforms and 3-times greater maximum flow velocity. The Dop-Navi patients had significantly reduced operation times (536 minutes vs. 629 minutes) and bleeding volumes (1,146 mL vs. 1,532 mL) than the control patients, without a significant difference in occurrence of postoperative complications. In the Dop-Navi group, only 3% (1/35) of patients had residual tumor (R1) tissue after surgery, compared to 25% (13/53) of the control group.

Conclusions: Doppler ultrasonography detection of artery surrounding pancreas head is effective approach for collecting useful information for performing PD. Vessel navigation surgery using intraoperative Dop-Navi is a safe and effective technique to perform PD and clearly identify vessels targeted for ligation while avoiding vessel injury.

FO04-01
TARGETED INHIBITION OF THE AKT PATHWAY IN CHOLANGIOCARCINOMA BY MK2206

Jacob Wilson, Selvi Kunnimalaiyaan, Muthusamy Kunnimalaiyaan and John Miura
Medical College of Wisconsin, USA

Introduction: Cholangiocarcinoma (CCA) is a rare but aggressive disease with an overall five year survival rate of only 5%. There is, therefore, an urgent need for identification of novel therapeutic strategies. The PI3K/Akt pathway represents an attractive therapeutic target due to its frequent dysregulation in CCA. MK2206, an allosteric Akt inhibitor, has reduced cellular proliferation in other cancer types. However, its effect on CCA cells and its mechanism of action are not fully understood. We hypothesized that MK2206 inhibition of Akt in human CCA cells would impact cell viability and sought to establish a dose and time correlate.

Method: Human CCLP and SG231 cell lines were treated with 0–2 μM MK2206. MTT assay was used to assess cellular viability at 96 hours. Expression levels of apoptotic markers and cell cycle proteins were determined via western blot post treatment.

Results: At 96 hours, CCLP viability was significantly reduced at MK2206 concentrations of 0.5 μM, 1 μM, and 2 μM by approximately 44%, 53%, and 64% respectively (p < 0.01). SG231 also demonstrated significant reduction in viability of 32%, 32%, and 42% respectively for the same treatment concentrations at 96 hours (p < 0.05). Western analysis revealed a strong decrease in phosphorylated AKT Thr473, while phosphorylated AKT Thr308 remained unchanged in both cell lines. In addition, cleaved PARP expression increased while pro-caspase 3 and 9 expression was reduced upon treatment. Interestingly, survivin expression increased with treatment in both cell lines.

Conclusions: Our study clearly demonstrates that by blocking phosphorylation of Akt at serine 473, CCA cellular growth is reduced. This growth suppression is mediated via apoptosis induction. Importantly, the concentrations needed for growth reduction in CCA are less than those needed in other cancer types. It is anticipated that these concentrations could be achieved in vivo with limited toxicity.
IMMUNOPROFILING BILIOPANCREATIC ADENOCARCINOMAS: CLINICOPATHOLOGICAL SIGNIFICANCE

Melroy D’Souza¹, Carlos Fernandez Moro ², Benedek Bozoky ², Oluf Danielsson², Qianni Zhang ³, Tomas Pietrik ³, Bengt Isaksson ¹ and Bela Bozoky ²

Introduction: Adenocarcinomas arising in the biliopancreatic system include intrahepatic cholangiocarcinomas (ICC), perihilar cholangiocarcinomas (PHCC), adenocarcinomas of the gallbladder (GBC), distal bile duct adenocarcinoma (DBC), pancreatic ductal adenocarcinomas (PDAC) and ampullary adenocarcinomas (AC). Immunohistochemistry (IHC) is used clinically to diagnose and subtype these tumours. This study was done to investigate the clinicopathological significance of immunoprofiling biliopancreatic tumors by IHC.

Method: Between 2002 and 2013 an extended IHC panel was used to analyse biopsies and operated specimens of patients with biliopancreatic tumors. In total 250 patients were prospectively included in the study and up to 26 antibodies were included in the IHC panel. 28 patients with hepatocellular carcinoma (HCC) were included as an internal control. A clinical database was maintained. Immunoreactivity was quantitatively scored based on the percentage of positive tumor cells. Using bioinformatic techniques, unsupervised cluster analysis was performed on the data and statistical significance testing was carried out on the resulting clusters.

Results: Unsupervised clustering classified these tumors into 2 distinct groups based on immunoprofile, “intrahepatic” and “extrahepatic”. The HCCs formed a distinct cluster separate from these groups. The “extrahepatic” group included the majority of PHCCs, GBCs, DBCs, ACs and also a significant fraction of ICCs. The “intrahepatic” cluster on the other hand was composed predominantly of ICCs. A minor subcluster of intestinally differentiated tumors was also found in the extrahepatic group. The significant IHC markers for the discrimination of these clusters were then identified by statistical methods. Based on these results, a computerized automated classification system has been developed using machine-learning techniques.

Conclusions: Biliopancreatic adenocarcinomas can be classified into two major immunohistochemical profiles: “intrahepatic” and “extrahepatic”. A significant fraction of ICCs however show an “extrahepatic” immunoprofile. The significance of this immunohistochemical classification has diagnostic implications and the potential in better understanding tumor biology, cancer prognosis and therapeutic possibilities.
dissection, 29 patients underwent sampling of the nodes in the hepatoduodenal ligament or in the lesser gastric curvature, and 53 patients did not undergo any nodal dissection.

**Results:** The 5-year survival rate of 24 patients with nodal metastasis was significantly lower than that of 76 patients without metastasis (49.9% vs. 0%, p < 0.01). In 86 patients with pathological or clinical N0, there was no difference among the three groups of nodal dissection (0.837). In 24 patients with N1, there was also no difference between the systematic dissection and sampling (p = 0.22).

**Conclusions:** Although this is a single institutional retrospective analysis, systematic nodal dissection does not appear to improve the survival of patients. Effective adjuvant chemotherapy would be required for patients with nodal metastasis.

**FO04-05**

**A NEW PROGNOSTIC NOMOGRAM FOR PERIHILAR CHOLANGIOCARCINOMA AFTER SURGICAL RESECTION: COMPARISON WITH THE CURRENT STAGING SYSTEMS**

Andrea Ruzzenente, Alessandro Valdegamberi, Calogero Iacono, Fabio Bagante, Francesca Bertuzzo, Tommaso Campagnaro, Simone Conci, Guido Mantovani, Michela De Angelis and Alfredo Guglielmi

_Unit of HPB surgery, Division of General Surgery A, University of Verona Medical School, Italy_

**Introduction:** Few prognostic classification for perihilar cholangiocarcinoma (PCC) are available in literature and their clinical application is limited due to complexity and poor performances.

Aims of this study were (1) to create an effective prognostic nomogram for resected patients with PCC and (2) to compare its performances with other available staging systems (TNM stage 7th edition, MSKCC staging system, JSBS staging system and Kaiser prognostic scoring system).

**Method:** Sixty-nine patients submitted to surgical resection with radical intent for PCC between 1990 and 2012 were included into this study. A prognostic nomogram was created based on prognostic factors from multivariate analysis and patients were stratified in low (<50%), medium (between 50% and 75%) and high risk (>75%) to die within 3 years.

The performance of the model was assessed by comparing the predicted versus observed survival rates. Bootstraps with 5,000 resamples were used for internal validation. The discriminatory ability of each staging system and of our nomogram was compared with Cox model on the basis of the Akaike Information Criterion (AIC).

**Results:** Significant prognostic factor for survival identified at multivariate analysis (Ca 19.9 > 500 U/mL, number of lymph node harvested, number of positive lymph node, caudate lobe resection and portal vein resection) were selected for nomogram. The performances of our nomogram was validated and we confirm good correlation between predicted and observed 3-years survival rates. Estimating different class of risk the observed survival between the three group of patients (low vs. medium risk) and low versus high risk was significantly different (p = 0.04 and p < 0.001, respectively).

Our proposed nomogram reached the greatest significant value in predicting survival compared to the other four staging systems (AIC 286.9).

**Conclusions:** Our prognostic nomogram resulted to be more accurate in predict survival for patients with perihilar cholangiocarcinoma submitted to surgical resection compared to current staging systems.

**FO04-06**

**SUGGESTIONS FOR IMPROVING PERIHILAR CHOLANGIOCARCINOMA STAGING BASED ON AN EVALUATION OF THE SEVENTH EDITION AJCC CANCER STAGING**

Wooil Kwon, Jin-Young Jang, Ye Rim Chang, Woohyun Jung, Mee Joo Kang and Sun-Whe Kim

_Seoul National University Hospital, Korea_

**Introduction:** Separate staging for perihilar cholangiocarcinoma (PHCC) was introduced for the first time. A retrospective review was done to identify some areas where progress can be made in future PHCC staging system by evaluating the seventh edition AJCC cancer staging system.

**Method:** Three hundred and seventy-eight patients underwent surgery for PHCC at a third referral center between 1990 and 2011. Pathologic report, radiologic studies, and operation records were reviewed to determine the TNM stages and R status of each patient. The survival status and durations were obtained from the registry of the Ministry of Public Administration and Security. Stagings for each of 6th and 7th edition were done. Survival analysis was done using Kaplan–Meier method and log-rank test.

**Results:** Although stages have been up-numbered from I to II and II to III, the 6th and 7th edition had corresponding stages providing nearly the same classifications. By the changes in the 7th edition, 9.8% were down-staged and 1.3% upstaged. Several points needing further discussion and investigations were identified. First of all, both editions failed to discriminate node-free locally advanced resectable disease group and node-positive resectable disease group. Secondly, stage IVA and IVB in the 7th edition seemed to demonstrate different prognosis and stage IVA may have been over-staged. Third, in the 7th edition, the prognosis of liver invading disease (T2b) seemed to resemble that of T3 more than T2a, warranting further investigation into down staging of liver invasion. Lastly, curative resections were possible in some Bismuth type 4 PCC allowing better survival, and so classifying them as unresectable disease (T4) should be revised.

**Conclusions:** A discrete staging for PHCC is necessary; however some points need further clarifications. However, a single center review has many limitations as PHCC is relatively uncommon. Therefore, a larger scale study on multicenter or multinational level is proposed to improve the current staging system.
FO04-07
PORTAL VEIN RESECTION IN PATIENTS WITH HILAR CHOLANGIOCARCINOMA (KLATSKIN TUMORS) – NOT ALWAYS BUT WHENEVER NEEDED
Katrin Hoffmann, Benjamin Göppert, Ulf Hinz, Markus W. Büchler and Peter Schemmer
Ruprecht Karls University Heidelberg, Germany
Introduction: Liver resection for hilar cholangiocarcinoma (HCA) is challenging because of the complex and variable anatomy as well as unanticipated vascular and longitudinal bile duct invasion. Surgical strategies to achieve negative resection margins vary in tertiary referral centers and especially the influence of portal vein resection (PVR) is discussed widely. The aim of this retrospective study was to investigate the influence of additional portal vein resection (PVR) on the outcome after liver resection.
Method: Data of 54 patients (37% with PVR) undergoing liver resection for HCA were collected. Analysis of overall survival, disease-free survival and multivariate analysis of prognostic factors were performed.
Results: 45% of resections were performed for Bismuth type III and 53% for type IV. All patients underwent major liver resection with 68.5% undergoing extended right or left hepatectomy. Tumor differentiation and negative resection margin were identified as independent prognostic factors for overall survival in multivariate analysis. The post-operative morbidity and mortality rates were comparable between patients without additional portal resection and patients undergoing liver resection with PVR. PVR was no independent risk factor for inhospital mortality (p = 0.346). The likelihood to achieve R0 resection margin was the same between patients undergoing liver resection only compared to patients with PVR. The median overall survival and 5-year overall survival rate were not statistically different in patients undergoing liver resection only compared to patients with PVR (21.8 months, 7.4% vs. 18.8 months, 6.3%), (p = 0.4650). Patients without vascular resection showed a median disease free survival of 17.3 months compared to patients with PVR (19.9 months (p = 0.6003).
Conclusions: liver resection with PVR is a safe treatment option in patients with HCA when necessary to achieve curative operative results. However, it does not improve overall and disease free survival or the likelihood to achieve R0 resection. Therefore, concomitant PVR should be applied only in well selected patients.

FO04-08
SURGICAL OUTCOMES ACCORDING TO THE TYPES OF HEPATECTOMY IN TYPE IIIA HILAR CHOLANGIOCARCINOMA
Huisong Lee, Dong Wook Choi, Jin Seok Heo and Seong Ho Choi
Samsung Medical Center, Sungkyunkwan University, Korea
Introduction: The aim of this study is to evaluate the bile duct margin and compare the survival according to the types of hepatectomy in type IIIA hilar cholangiocarcinoma.
Method: From October 1994 to July 2010, the patients who underwent major hepatectomy for the treatment of type IIIA hilar choangiocarcinoma were identified. The patients were divided by the different types of hepatectomy: right hemihepatectomy (RH) or right trisectionectomy (RTS) with or without caudate lobectomy (CL). The perioperative and survival outcomes were investigated retrospectively.
Results: Total 95 patients were included. In RTS group, more patients underwent portal vein embolization preoperatively (p = 0.012). There was no significant difference in morbidity and mortality according to the types of surgery. Both RTS and CL were associated with low margin positive rate (p = 0.018) (p = 0.041). After median 27 months follow-up, there was no statistically significant difference in disease free survival. However, the overall survival (OS) curves of RTS and CL were superior to the one of the opponent group (p = 0.020, p = 0.019).
Conclusions: Both RTS and CL contributed to the improvement of OS in type IIIA hilar cholangiocarcinoma.

FO05-01
PROSPECTIVE STUDY FOR THE EFFECTS OF PANCREATIC ENZYME SUPPLEMENT THERAPY ON QUALITY OF LIFE AND NUTRITIONAL ASSESSMENT AFTER PANCREAS RESECTION
Jae Woo Park1, Jin-Young Jang1, Dae Wook Hwang2, Mee Joo Kang1, Wooil Kwon1, Ye Rim Chang1, In Woong Han1 and Sun-Whe Kim1
1Seoul National University College of Medicine, Korea; 2Seoul National University Bundang Hospital, Korea
Introduction: After pancreas resection, impairment of pancreas exocrine function reported up to 68–80%. But there were not many studies about effects of pancreatic enzyme supplements (PES) therapy after operation. Aim of this study is to analyze the effects of PES therapy on nutrition and quality of life after pancreas resection.
Method: This study was prospective RCT (randomized controlled trial) comparing pancreatic enzyme supplement (lipase 25,000 unit/cap) group with placebo group. From 2009 to 2011, 222 patients with informed consent were enrolled. 64 patients were excluded from this study for recurrence, follow-up loss and medication protocol violations. Finally 158 patients (study group 99, placebo 59) were analyzed with body weight, triceps skin fold thickness (TSFT), serum albumin, protein, prealbumin, transferrin, questionnaire about quality of life and symptoms including diarrhea and steatorrhea. Follow-up schedules were prospectively planned; preoperative, postoperative, post-op 3 months and post-op 6 months.
Results: One hundred and nine pancreaticoduodenectomy (PD), 44 distal pancreatectomy (DP) and 5 other...
type operations were analyzed. Diarrhea symptom decreased in PES group (p = 0.063) but other symptoms and nutritional index were not different between two groups. As a result of subgroup analysis between preoperative and 6 months F/U, PES group showed increased albumin, prealbumin than placebo group in PD group (p = 0.075, 0.076), increased protein, prealbumin in chemotherapy group (p = 0.021, 0.065). In comparison between 3 months and 6 months F/U, PES group showed better body weight, relative body weight (RBW) than placebo group in cancer, cancer with PD, chemotherapy group (p = 0.028, 0.019, 0.059). PES group also revealed increased prealbumin in overall study populations (p = 0.048), increased protein in chemotherapy group (p = 0.021)

Conclusions: PES group showed marginal improvement trend in several nutritional factors and symptoms in PD group, not DP group, and chemotherapy group. But, study population number is relatively small and statistical power is not high enough. Additional clinical studies using higher-dose PES is needed.

FO05-02
PERIOPERATIVE RISK FACTORS FOR DELAYED GASTRIC EMPTYING FOLLOWING PANCREATICODUODENECTOMY

Kamran Idress, Paula Marincola, Julia Shelton, Nipun Merchant, Jamie Robinson and Alexander Parikh

Vanderbilt University Medical Center, USA

Introduction: Delayed gastric emptying (DGE) is a frequent complication of pancreaticoduodenectomy (PD) responsible for increased morbidity and prolonged hospital stay. We sought to further define the incidence of DGE after PD based on the International Study Group of Pancreatic Surgery (ISGPS) definition and evaluate the perioperative risk factors associated with DGE.

Method: Four hundred and twenty consecutive patients who underwent PD at our tertiary referral center were reviewed. Using a stepwise multivariate logistic regression model, perioperative factors as they correlate with the development of clinically significant DGE as defined by ISGPS grades B and C were assessed.

Results: Clinically significant DGE occurred in 24% of patients (n = 98) with Grades B and C occurring at 13.5% (n = 55) and 10.5% (n = 43), respectively. Those with Grade B or C DGE had a significantly longer mean hospital stay (20 vs. 9 days, p < 0.001) and a higher rate of 90-day readmission (32% vs. 18%, p = 0.004) than those without DGE. By univariate analysis, white race, increasing ASA class, BMI >35, OR length>6 hours, preoperative weight loss and octreotide use were associated with increased risk of DGE. By stepwise multivariable regression, BMI >35 (OR = 3.42), OR length >6 hours (OR = 2.97), preoperative weight loss (OR = 2.05), and use of octreotide (OR = 2.33) were independently associated with the increased risk of DGE.

Conclusions: DGE remains a significant cause of morbidity, increased hospital stay and readmission rates after PD. Our findings suggest patients with BMI >35,
FO05-04
MANAGEMENT OF DELAYED ARTERIAL HEMORRHAGE FOLLOWING PANCREATICODUODENECTOMY: A SINGLE-CENTER EXPERIENCE
Jaehong Jeong, Seong Ho Choi, Dong Wook Choi, Jin Seok Heo, Dong Hun Kim and Hui Song Lee
Samsung Medical Center, Sungkyunkwan University, Korea

Introduction: The mortality rate after pancreatic surgery in large-volume centers has decreased markedly over the last several decades less than 3%. However, morbidity rate still remains high. Postpancreactectomy hemorrhage (PPH) is a relatively rare complication but a lethal complication that makes patients lead to deaths. Especially, the formation of pseudoaneurysm after pancreaticoduodenectomy is a important cause of delayed PPH.

Method: The medical records of 1,905 patients who underwent pancreaticoduodenectomy between October 1994 and December 2012 were reviewed retrospectively. Of 1,905 patients, 40 (2.2%) patients with pseudoaneurysm were included in this study.

Results: Of 40 patients, 18 (42.9%) patients had pseudoaneurysms of gastroduodenal artery, 13 (31.0%) patients had those of common hepatic artery. Two patients underwent immediate re-laparotomy and 38 patients managed by radiologic intervention. Of 38 patients, three patients failed to be managed by radiologic intervention. A total 35 patients were managed by radiologic intervention successfully. 14 selective embolizations of pseudoaneurysm in nine patients were performed. 7 (50%) cases of 14 selective embolizations had rebleeding and one patients had subclinical liver infarct. Whereas, 17 total embolizations of in-out arterial flow in 17 patients were performed. Only 2 (11.8%) patients had rebleeding but, 2 (11.8%) patients had severe hepatic necrosis. Insertion of stent graft in 3 superior mesenteric arteries and 9 hepatic arteries was performed. 2 (16.7%) patients had rebleeding and 3 patients had stent occlusions.

Conclusions: Radiologic intervention is a best option for the management of pseudoaneurysm after pancreaticoduodenectomy. Stent graft is not superior to the total embolization of in-out arterial flow. Rebleeding and stent thrombosis are still problematic.

FO05-05
VALIDATION OF A PREOPERATIVE PREDICTIVE SCORING SYSTEM FOR POSTOPERATIVE PANCREATIC FISTULA AFTER PANCREATICODUODENECTOMY
Ti Zhang, Huikai Li, Yunlong Cui and Qiang Li
Tianjin Medical University Cancer Institute & Hospital, China

Introduction: Post operative pancreatic fistula (POPF) is one of the most common and severe complications after pancreaticoduodenectomy. It has been shown that POPF are not only closely associated with hardness of pancreatic parenchyma, diameter of pancreatic duct and tumor site, but also affected by surgeon’s experience and surgical techniques. A preoperative predictive scoring system may enable selection of high risk patients for POPF and devise counter measures.

Method: Data from 145 consecutive patients with periampullary tumor who underwent PD in Tianjin Medical University Cancer Institute and Hospital between October 2008 and August 2013 were reviewed. Factors potentially associated with POPF were analyzed. The sensitivity and specificity of a predictive scoring system established by Japanese clinicians were determined by receiver operating characteristic (ROC) curve analysis.

Results: The incidence of POPF was higher in male than in female (22/91 vs. 5/54, p = 0.028). The hard pancreas had the lowest POPF rate (0/22), while medium hard and soft pancreas accounted for the high POPF rate (7/60, 20/63) (p = 0.001). Patients with pancreatic cancer had lower POPF rate than non-pancreatic cancer (7/71 vs. 20/74, p = 0.01). Portal vein involvement was negative factor for the occurrence of POPF (11/92 vs. 16/53, p = 0.008). Anastomosis methods were also found to be associated with POPF. Traditional duct to mucosa pancreaticojunostomy (2/34) and Blumgart anastomosis (5/43) had lower POPF rate compared with End to End (12/50) or End to Side (8/18) anastomosis (p = 0.003). ROC curve analysis showed that the sensitivity and specificity of this system were 92.6% and 78.8%, respectively. The nomogram showed an area under the curve (AUC) of 93.1% (p = 0.000).

Conclusions: With satisfactory sensitivity and specificity, this scoring system can predict the occurrence of POPF and deserves wide clinical application. Surgical technique, like Blumgart anastomosis may be a good choice for preventing POPF.

FO05-06
WHICH ONE IS BETTER FOR PREDICTING PANCREATIC FISTULA AFTER PANCREATICODUODENECTOMY; DRAIN AMYLASE OR LIPASE?
Jae Keun Kim, Dong Sup Yoon and Joon Seong Park
Gangnam Severance Hospital, Yonsei University, Korea

Introduction: Pancreatic fistula is a main complication after pancreatic resection. ISGPF classification with postoperative drain amylase level has been considered as a standard of grading system. But the ISGPF classification has a critical limitation in prediction of clinical pancreatic fistula. This study analyzed postoperative drain pancreatic enzymes for predicting clinical pancreatic fistula and aimed to present the drain pancreatic enzyme which one is more specific for reporting clinical complication than the other.

Method: Data from 257 patients with pancreas resection were included in this study. Drain amylase and lipase level were measured after the operation. ISGPF grade B and C were considered a clinical fistula. Concentrations of amylase and lipase on
each postoperative day were compared with Receiver operation curves for predicting clinical fistula.

**Results:** Eighty one patients (35.0%) were identified pancreatic fistula under ISGPF classification. 68 patients (26%) were Grade A. 23 patients (9%) were clinical fistula. Each lipase concentration in drain during postoperative 3 days was more accurately predicted pancreatic fistula than amylase in concentration in drain.

**Conclusions:** Drain lipase more accurately predicted clinical pancreatic fistula than amylase in concentration in drain. Further investigations are needed to improve clinical relevant complication reporting system for postoperative pancreatic fistula with drain pancreatic enzymes.

**FO05-07**

**MULTICENTRE ANALYSIS OF A SCORE TO PREDICT PANCREATIC FISTULA FOLLOWING PANCREATODUODENECTOMY**

Keith Roberts¹, James Hodson¹, Jamil Ahmed², Sara Napetti³, Alex Navarro¹, Krashna Patel⁴, Nehal Shah⁵, Guy Shingler⁶ and Rowland Storey⁷

¹University Hospitals Birmingham NHS Trust, United Kingdom; ²Southampton University Hospitals NHS Trust, United Kingdom; ³Edinburgh Royal Infirmary, United Kingdom; ⁴Cambridge University Hospitals NHS Trust, United Kingdom; ⁵Royal Free Hospital, London, United Kingdom; ⁶Morriston Hospital, Swansea, United Kingdom; ⁷Leeds University Teaching Hospitals NHS Trust, United Kingdom

**Introduction:** Post operative pancreatic fistula (POPF) is the major contributor to morbidity and mortality following pancreatoduodenectomy (PD). A pre-operative score (based upon body mass index, BMI, and pancreatic duct width) to predict POPF has been designed. The aim of this study was to assess the performance of this score and risk factors for POPF based upon a multicentre patient cohort.

**Method:** Patients who underwent PD over an 18 month period at 7 centres (collaborating centres: Cambridge, Edinburgh, Leeds, Royal Free London, Southampton, Swansea and Birmingham, UK) were identified. Patient variables, preoperative blood tests, data from pre-operative CT imaging, intra- and post operative outcomes were assessed. The ISGPF definition of POPF was used.

**Results:** Five hundred and sixty five patients underwent PD with 126 occurrences of POPF (22.3%). BMI, perirenal fat thickness on CT, pancreatic duct width on CT and at operation, bilirubin, underlying pathology, T stage, N stage, R status and gland firmness at operation were all significantly associated with POPF. The nature of pancreatic reconstruction (PJ/PG, single/double layer anastomosis, dunking, or a separate pancreatic limb) did not affect the rate of POPF. The score predicted POPF (p < 0.001); the area under the ROC curve being 0.712 (95% CI 0.653–0.770). A higher predictive score was associated with increasing severity of POPF (p < 0.001). Multivariate analysis of pre-operative variables demonstrated that BMI and PD width as measured on CT were associated with POPF. The addition of intra-operative variables to this analysis showed that intra-operative duct width was independently associated with POPF.

**Conclusions:** This pre-operative predictive score of POPF has been successfully validated upon this multicentre patient cohort. A separate score could be created with the addition of intra-operative variables and this may improve the scores performance however this could only be performed at the time of operation. Prospective multicentre evaluation is planned.

**FO05-08**

**DIVISION OF THE SURGEON’S WORKLOADS IN PANCREATICODUODENECTOMY**

Dong Hun Kim¹, Seong Ho Choi¹, Dong Wook Choi¹, Jin Seok Heo¹, Jaehong Jeong¹, Huisong Lee¹ and Min Jung Kim²

¹Samsung Medical Center, Sungkyunkwan University, Korea; ²Jeju National University Hospital, Korea

**Introduction:** Many authors have suggested factors that affect pancreatic leakage after pancreatoduodenectomy (PD), but there was little report for surgeon’s factor to predominate in pancreatic fistula. We attempted to determine if surgeon’s workload of PD could impact on postoperative pancreatic fistula (POPF).

**Method:** The risk factors for POPF were analyzed retrospectively for 270 consecutive patients who underwent conventional pancreatoduodenectomy or pylorus-preserving pancreatoduodenectomy between January 2008 and June 2013 by a single surgeon. These patients were divided into those underwent PD totally by a single surgeon (Group 1) and just reconstructions after resection by secondary surgeons (Group 2). Duct-to-mucosa pancreaticojejunostomy was performed on all patients. The POPF was defined by the International Study Group on Pancreatic Fistula criteria.

**Results:** There were 157 patients (58.1%) in Group 1 and 113 patients (41.9%) in Group 2. Postoperative morbidity rate was comparable between the two groups (55.4% vs. 52.2%; p = 0.603), but clinical pancreatic fistula (grade B/C) rate was significantly different (10.8% vs. 2.8%; p = 0.011). Postoperative mortality was one patient (0.4%). A significant association with clinical pancreatic fistula was found for soft pancreas (p = 0.046), preoperative serum albumin levels ≤3.5 g/dL (p = 0.008), PD performed totally by a single surgeon (p = 0.011). A multivariate logistic regression analysis revealed that PD performed totally by a single surgeon [odds ratio (OR) 4.1, p = 0.029] was the significant predictive risk factor for clinical pancreatic fistula.

**Conclusions:** Division of the surgeon’s workloads in PD is associated with a lower rate of pancreatic fistula.
FO06-01
CLINICAL SAFETY AND EFFICACY OF EARLY ORAL FEEDING FOLLOWING PANCREATICOUDENECTOMY
Si Eun Hwang1, Baik Hwan Cho2, Jae Do Yang3, Hong Pil Hwang4, Sang In Bae5, Mi Jin Jung3 and Hee Chul Yu6
1Daejeon Sun Hospital, Korea; 2Chonbuk National University Medical School, Korea; 3Chonbuk National University Hospital, Korea

Introduction: Pancreatoduodenectomy (PD) has been associated with high postoperative morbidity and mortality rates, despite advances in surgical techniques and perioperative care. Although experimental studies have shown that early postoperative enteral nutrition improves postoperative outcomes, there is limited clinical information on postoperative early oral feeding (EOF) after PD. This study examined the clinical efficacy and nutritional effects of early oral feeding following PD.

Method: Postoperative outcomes were retrospectively investigated in 131 patients who underwent PD between October 2003 and April 2013, including 81 who commenced oral feeding within 48 hours (EOF group) and 50 who commenced oral feeding after 48 hours (late oral feeding, LOF group). Parameters measured included postoperative complications, energy intake and length of hospital stay (LOS) by nutritional discharge index (NDI).

Results: EOF and LOF group were homogenous in patient’s demographics. LOS (25.9 ± 8.5 days vs. 32.3 ± 16.3 days; p = 0.01) and LOS by NDI (22.2 ± 7.1 days vs. 28.5 ± 15.0 days; p = 0.01) were significantly shorter in the EOF than in the LOF group. The rates of wound infection, intra-abdominal abscess, upper gastrointestinal bleeding, pleural effusion, pneumonia, postoperative bleeding and small bowel obstruction were similar in the two groups, but the rates of delayed gastric emptying (37.0% vs. 94.0%; p = 0.00), anastomotic leak (1.2% vs. 16.0%; p = 0.00) and reoperation (3.7% vs. 20.6%; p = 0.01) were significantly lower in the EOF group. In the clinically acute postoperative phase, from days 1 to 5, the mean daily calorie intake (847.0 kcal vs. 745.6 kcal; p = 0.04) and mean protein intake (42.2 g vs. 31.9 g; p = 0.04) were significantly greater in the EOF than in the LOF group.

Conclusions: Postoperative EOF enhanced recovery after surgery without compromising the anastomotic safety of PD. Postoperative EOF is safe, feasible, and effective as a method of nutritional support following PD.

FO06-02
SINGLE INCISION LAPAROSCOPIC CHOLECYSTECTOMY-A SINGLE CENTRE EXPERIENCE USING CONVENTIONAL INSTRUMENT
Manash Sahoo1, Ved Bhaskar2 and Anil Kumar2
1Associate Professor, India; 2Post graduate, India

Introduction: Laparoscopic cholecystectomy with four ports is the standard operation for gallbladder diseases worldwide. The established use of 5 or 10 mm instruments and ports leads to small skin incisions in the upper abdominal wall. However, these scars are still visible and might be a potential risk factor for incisional hernia or adhesions. At the present time, it becomes more important for younger patients to undergo surgery with none or least scars. Our present study is to assess the feasibility of single-incision laparoscopic surgery using conventional laparoscopic instruments.

Method: From January 2009 to March 2012, 120 patients with symptomatic gallbladder disease chosen strictly as per criteria mentioned later underwent Single Incision Laparoscopic surgery (SILS) through a 2–2.5 cm umbilical incision using a three-port technique. For nearly all the patients, a 30 degree angled conventional scope was used. The gallbladder was retracted, with one suture placed over the fundus of gallbladder. These sutures were taken on the fundus and puppet technique was used to obtain a critical view of Calot’s triangle. The cystic duct and artery were well visualized, clipped, and divided. Cholecystectomy was completed, and the specimen was retrieved through the umbilical incision (11 mm port).

Results: In this series 85 females and 35 males (n = 120), average age 42.5 years (19–77 years) chosen by predefined criteria underwent SILS using conventional straight instruments. The mean operative time was 86.5 minutes (65–120 minutes). A three trocar single incision technique was feasible for 95% (n = 115) of the patients. For the remaining patients, conversion to standard 4 port approach was done. No conversion to open surgery was required. Patients have been followed up for a mean of 13 months (5–30 months) and till now no notable complications have been reported.

Conclusions: Single-incision laparoscopic cholecystectomy is safe, feasible, and quite reproducible in experienced hands.

FO06-03
A DOUBLE BLIND EVALUATION OF SUBDIAPHRAGMATIC PRE-EMPTIVE LIDOCAINE INSTILLATION TO CONTROL POSTOPERATIVE PAIN AND HEMODYNAMIC CHANGE IN LAPAROSCOPIC CHOLECYSTECTOMY
Sung Su Yun, Dong Shick Lee, Hwa Kyung Jung, Man Ki Kim, Hong Jin Kim, Heung Dae Kim and Sun Ok Song
Yeungnam University Medical Center, Korea

Introduction: One third of our patients still need opioids after laparoscopic cholecystectomy (LC) and hemodynamic changes (systemic vascular resistance: SVR ↑, cardiac index: CI ↓, blood pressure: BP ↑ etc) induced by CO2 pneumoperitoneum during LC can cause serious problems in patients with advanced cardiopulmonary disease. We designed this study to evaluate the efficacy of pre-emptive subdiaphragmatic lidocaine instillation in postoperative pain and hemodynamic changes during LC.

Method: Twenty patients (25–65 years old) were enrolled in this study with informed consent and protocol was designed with prospective, randomized, double blind method. Patients with cardiopulmonary disease...
(hypertension, COPD etc) were excluded. Ten minutes before CO₂ pneumoperitoneum, control group received normal saline 200 cc and lidocaine group received 0.2% lidocaine 200 cc in both subdiaphragmatic spaces (150 cc in right side, 50 cc in left side). Hemodynamic changes (SVR, BP, CI etc) were monitored every 5 minutes during LC with NICO system. Postoperative pain was monitored 1, 3, 6, 12, 18 and 24 hours after LC with visual analogue and numerical pain scale. We also observed adverse effects (nausea, vomiting, shoulder pain and bowel movement, etc).

Results: Pre-emptive lidocaine instillation attenuates adverse hemodynamic effects of CO₂ pneumoperitoneum. In lidocaine group, systolic blood pressure and SVR were lower but CI was higher than those observed in control group (data at 25, 30 minutes after CO₂ pneumoperitoneum were statistically significant, \( p < 0.05 \)). Pre-emptive lidocaine instillation also minimized the postoperative pain especially 1 and 3 hours after LC (\( p < 0.05 \)). No significant side effect was observed after lidocaine instillation. Nausea, vomiting and return of bowel movement were not significantly different between two groups.

Conclusions: Pre-emptive subdiaphragmatic lidocaine instillation before CO₂ pneumoperitoneum induction may help the patients with advanced cardiopulmonary disease to attenuate the adverse hemodynamic effects and to have less pain in LC.

FO06-04
THE COMPARISON OF LAPAROSCOPIC PARTIAL SPLENECTOMY AND LAPAROSCOPIC TOTAL SPLENECTOMY IN TUMOROUS LESION OF SPLEEN
Soo Ho Lee, Tae Ho Hong, Dong gu Kim, Young Kyoung You, Gun Hyung Na and Jae Hyun Han
Catholic University of Korea, Seoul St. Mary’s Hospital, Korea

Introduction: Laparoscopic partial splenectomy (LPS) has emerged as a surgical option for splenic mass, with the goal of reducing postoperative complication while preserving splenic function. The authors report on the surgical outcomes and postoperative complication of LPS compared with laparoscopic total splenectomy (LTS).

Method: The medical records of laparoscopic splenectomized patients who underwent a LPS and LTS in Seoul St. Mary’s Hospital between 2009 and 2013 were collected. The medical records of hematologic splenic disease were excluded and only 26 splenectomized patients with tumorous lesion of spleen were analyzed.

Results: There were no statistical differences in the operation time (LPS: 141.1 ± 49.7 minutes, LTS: 128.0 ± 50.3 minutes, \( p = 0.560 \)), intraoperative blood loss (LPS: 336 ± 348.9 mL, LTS: 376.4 ± 535.0 mL, \( p = 0.443 \)), transfusion rate (LPS: 1 of 9 patients, LTS: 7 of 17 patients, \( p = 0.190 \)), and hospital stay (LPS: 7.1 ± 6.9 days, LTS: 5.7 ± 4.2 days, \( p = 0.526 \)) between LPS group and LTS group. However, postoperative complications, postoperative pleural effusion (LPS: 0 patient, LTS: 7 of 17 patients, \( p = 0.016 \)) and postoperative splenic vein thrombosis (LPS: 0 patient, LTS: 6 of 17 patients, \( p = 0.030 \)), were significantly lower in the LPS group.

Conclusions: In comparison with LTS, the surgical outcomes are similar with LPS, but postoperative complications, such as postoperative pleural effusion and splenic vein thrombosis occur less in LPS group. Therefore, LPS is feasible and safe, could be a good alternative method for tumorous lesion of spleen.

FO06-05
LIVER TRANSPLANT COST IN PATIENTS WITH HIGH MELD SCORE: THE DIALYSIS IMPACT IN INTENSIVE CARE UNIT
Wellington Andraus, Luciana Haddad, Antônio Turri, Mário Diniz and Luiz Augusto Carneiro D’Albuquerque
São Paulo University, Brazil

Introduction: The liver transplant is a high cost procedure and it has a big impact in health economics. The aim of this study was to determine the components of liver transplant hospital costs, relating it with MELD score.

Method: Economic evaluation using micro cost analysis was performed in a series of liver transplantation during 2012 in a single center. The costs were related according to the facilities: surgical center (SC), intensive care unit (ICU) and ward. For each location, the cost components were discriminated (drugs, materials, human resources, laboratory exams, etc.).

Results: There were a total of 79 transplants, 75 deceased donors and 4 living donors. The average MELD was 27.2 ± 13.6 and the age, 49 ± 12. The most frequent etiology was HCV cirrhosis (27.8%) followed by alcoholic cirrhosis (11.4%). The average of day cost was $24,110 ± $28,354. The average of day cost was $1,128 ± $1,855. The ICU produced a significantly bigger cost than the surgical center and ward (ICU $10,804 > 20,789, SC $ 7,333 ± 2,254 and ward $5,926 ± 8,612, \( p < 0.001 \) – Kruskal-Wallis test). In the ICU, the main component of cost was dialysis, followed by human resources. There was a significant relationship between cost and MELD score (MELD <20: $15,248 ± 5,220, MELD 20-29: $18,364 ± 7,749, MELD> 29: $36,917 ± 43,526, \( p = 0.006 \) Kruskal-Wallis test).

Conclusions: Liver transplant costs are significantly higher in patients with MELD scores above 29. The budget impact is higher in intensive therapy, and occurs due to the increased need of dialysis in these patients.
FO06-06
COST-EFFECTIVENESS OF SURGICAL RESECTION VERSUS PALLIATIVE TREATMENT IN PATIENTS WITH LOCALLY ADVANCED PANCREATIC CANCER
Nishma Patel¹, Stephen Morris¹, Nicola Orell¹, Rachael Hunter¹, Brian Davidson² and Kurinchi Gurusamy²
¹University College London, United Kingdom; ²University College London and Royal Free Hospital, United Kingdom

Introduction: Standard management for resectable pancreatic cancer is removal of the tumour by resection and palliative treatment. This paper explores the cost-effectiveness of surgical resection versus palliative treatment in patient with locally advanced pancreatic cancer, from the perspective of the UK National Health Service.

Method: A decision model was used to calculate the costs and benefits of surgical resection and palliative treatment for patients with locally advanced pancreatic cancer. Benefits were measured in terms of quality adjusted life years (QALYs), and costs and QALYs were measured over a time horizon of 5 years. Model inputs were derived from published studies. Probabilistic sensitivity analysis was used to generate a cost-effectiveness acceptability curve.

Results: Surgical resection accrued mean costs of £20,576 (95% CI £9,008 to £60,028) and a mean benefit of 1.28 QALYs (95% CI 0.88, to 1.72) per patient. Palliative treatment produced lower mean costs (£7,583, 95% CI £2,812 to £25,363) and QALYs (0.57, 95% CI 0.25, to 0.91). The incremental cost per QALY gained was £18,347 (95% £7,861 to £52,885). Probabilistic sensitivity analysis showed that if the NHS was willing to pay an extra £20,000 for an additional QALY, the probability of surgical resection being cost-effective was 64%.

Conclusions: Surgical resection in patients with locally advanced pancreatic cancer is cost-effective compared with palliative treatment, offering extended survival for a modest increase in cost.

FO06-07
ASSESSING IMPACT OF SENIORITY ON OPERATIVE TIME IN LAPAROSCOPIC CHOLECYSTECTOMY IN TRAINING SURGICAL DEPARTMENT OF A DEVELOPING COUNTRY
Amine Benkabbou, Amine Souadka, Sayed Mohammed Naya, Badr Serji, Hadj Omar El Malik, Raouf Mohsine, Lahsen Ifrine and Abdelkader Belkouchi
Ibn Sina Hospital, Morocco

Introduction: Resident participation in laparoscopic cholecystectomy (LC) is the first step of laparoscopic training but seems to increase the time of operation. This time cost in training programs is not well defined especially in developing countries. This study aimed to compare and determine the effect of seniority on the operative performance of laparoscopic cholecystectomy.

Method: We underwent a retrospective study of all consecutive laparoscopic cholecystectomy for gallbladder lithiasis performed over two academic years in our Moroccan training program.
We compared Operations performed by junior (PGY 4-5) or senior (PGY 6) residents and attending surgeons, assisted by junior residents, none of whom had fellowship training in advanced laparoscopy.
All data concerning Demographics (ASA, ECOG score, body mass index and indications), surgeons, operative time (from skin incision to closure), conversion rate, and operative complications (clavien-Dindo classification) were recorded and analysed. ANOVA, Student’s t-test, and chi² tests were used as appropriate with statistical significance attributed to p < 0.05. Post hoc benferony test were used when needed.

Results: One hundred thirty for LC were performed. No differences were found on univariate analysis between groups in demographies or diagnosis category. The overall rate of operative complications or conversions and hospital stay were not significantly different between the 3 groups. However Mean Operative times were longer for junior (n = 27): 115 ± 24 minutes; than seniors (n = 37): 77 ± 35 minutes than attending surgeons (n = 66): 55 ± 17 minutes (p < 0.001).

Conclusions: Laparoscopic cholecystectomy performed by Residents is safe and feasible, however seniority influences operative time but not complications rate. This information may improve surgical educating programs in developing countries to assess the importance of early initiation to laparoscopic skills to reduce the time cost.

FO06-08
EFFECT OF MULTIDISCIPLINARY CARE ON THE TREATMENT OF SURGICAL PATIENTS
Johanna Tol, Els Nieveenvan Dijkum, Jean Klinkenbijl, Thomas Van Gulik, Olivier Busch and Dirk Gouma
Academic Medical Center Amsterdam, The Netherlands

Introduction: High volume hospitals and surgeons report the lowest mortality rates after complex surgery. There is an ongoing discussion about the impact of volume and experience on the high quality of care versus the role of hospital structure and process of care. Multidisciplinary approach is important in these processes to generate an optimal interaction between different physicians. The aim of this study was to evaluate the effect of weekly multidisciplinary approach during pre-operative and postoperative meetings.

Method: During a period of 15 weeks a consecutive group of patients with suspected periampullary tumors presented at the weekly preoperative multidisciplinary team (MDT) meeting, were prospectively registered. Simultaneously all patients at the postoperative MDT meeting at the surgical gastro-intestinal (GI) ward were registered. Preoperative alterations by members of the MDT of initial treatment strategies set by the referring
hospital and additions to the postoperative surgical treatment by members of the MDT were also scored.

**Results:** During the preoperative MDT meeting 128 patients were discussed. 41 patients were referred for a specific treatment strategy set by the referring hospital which was altered during the MDT meeting in 14 patients (34%). During postoperative MDT meeting additions to the initial treatment strategies set by surgeons were made after suggestions of the other members of the MDT in 42/149 patients (28%). Additions were based on treating existing co-morbidity in 18 patients and postoperative complications in 24 patients. Alterations in medication, infusion or additional diagnostics were mainly performed. There was no mortality among the study patients.

**Conclusions:** A multidisciplinary approach during pre and post-operative meetings on patients with complex GI pathology leads to alterations of the initial treatment strategy set by the referring hospital in 34% and additions to the postoperative surgical treatment in 28%. This shows a clear effect of MDT meetings on the treatment strategy of patients.

**FO07-01**

**LAPAROSCOPIC VS OPEN LIVER RESECTION FOR LARGE COLORECTAL LIVER METASTASES: OUTCOMES AND LONG-TERM SURVIVAL**

Joel Lewin1, Stephanie Huxley1, David Cavallucci2, Richard Bryant1, Ian Martin2, Leslie Nathanson1 and Nicholas O’Rourke1
1Royal Brisbane Hospital, Australia; 2Wesley Hospital, Australia

**Introduction:** Open liver resection for large (>5 cm diameter) colorectal liver metastases (CLM) is well accepted, with laparoscopic resection also becoming an increasingly accepted treatment modality for CLM. The international Position on Laparoscopic Liver Surgery (2008) recommends a laparoscopic approach for lesions 5 cm or less. This study is a retrospective analysis comparing long-term survival and outcomes between laparoscopic and open groups for resection of large CLM.

**Method:** Patients undergoing liver resection for large colorectal liver metastases (>5 cm) by 6 surgeons in 3 institutions between 2000 and 2013 were collected in a prospective database. Patient groups of open and intent to treat laparoscopic were matched using propensity scores, based on age, number of lesions, lesion size, pre- and post-Basingstoke Predictive Index (BPI) scores and major hepatectomy status. Survival analysis was carried out using Kaplan-Meier estimates.

**Results:** Patient groups were well matched post propensity score matching. The laparoscopic group consisted of 26 resections in as many patients, with a 5-year overall survival of 52% and 5-year primary disease free survival of 29%. The open group consisted of 31 resections in 28 patients with 5-year overall and primary disease free survival of 57% and 32% respectively. Log-rank comparison between laparoscopic and open groups in overall (p = 0.87) and disease-free (p = 0.43) Kaplan–Meier estimates were not significant. Mean blood loss (MD 69 mL, p = 0.52) and operating time (MD 41 minutes, p = 0.14) were less in the laparoscopic group but not statistically significant. Mean hospital length of stay in the laparoscopic group was 6.1 days in the open group 8.1 days (p = 0.06). No difference was determined between groups for mean marginal distance or frequency of positive margin.

**Conclusions:** For resection of large CLM, short term outcomes and long-term survival are comparable between laparoscopic and open groups, indicating large tumour size is not an absolute contraindication to laparoscopic liver resection.

**FO07-02**

**SURGICAL MANAGEMENT OF METASTATIC COLON CANCER IN THE ELDERLY**

Ponnandai S Somasundar1, Adam Olszewski2 and Hadi Khan1
1Roger Williams Medical Center, USA; 2Brown University, USA

**Introduction:** Increased emphasis is recently placed on the curative potential of surgery in selected patients (pts) with stage IV colon cancer. The objective of this study was to evaluate survival after resection of primary tumor and/or metastatic sites, by age and the extent of nodal spread, using the population-based SEER registry.

**Method:** We extracted data on pts ≥20 years old, diagnosed with adenocarcinoma of the colon between 2000 and 2010 (n = 232,640). We analyzed the extent of nodal involvement using current staging schema (N0-2) in cases with ≥12 lymph nodes examined (LNE) and identified stage IV pts with recorded resection of primary tumor or of metastases. Association of overall survival (OS) with metastatectomy was evaluated in multivariable Cox models, reporting hazard ratios (HR) and 95% confidence intervals (95%CI).

**Results:** Among 41,590 pts with stage IV cancer, 67% underwent primary surgery and 11% metastatectomy. Older pts were more likely to have <12 LNE, but also to have N0 status when adequately staged (Table, p < .0001).

Metastatectomy (n = 4,506) was less common in older patients. OS after resection was inversely associated with age, nodal involvement, tumor grade and suboptimal staging with <12 LNE (p < .0001). However, the OS benefit of metastatectomy was significant in all age groups except those ≥85 years old (Table) and was independent of the extent of nodal spread (HR, 0.71, 0.68 and 0.77 for N0, N1 and N2 cases, respectively) or tumor grade.

**Conclusions:** The survival advantage of metastatic site resection in colon cancer is present in ages up to 85 years. Adequate nodal resection favorably correlates with survival after metastatectomy, and older pts are more likely to be node-negative at resection with ≥12 LNE. These results support offering curative metastatectomy and resection of the primary tumor in this age group.
FO07-03
HEPATIC RESECTION IS SUPERIOR TO RADIOFREQUENCY ABLATION FOR THE TREATMENT OF SYNCHRONOUS COLORECTAL LIVER METASTASIS: A RETROSPECTIVE COHORT STUDY
Huising Lee1, Jin Seok Heo1, Yong Beom Cho1, Seong Hyeon Yun1, Hee Cheol Kim1, Woo Yong Lee1, Seong Ho Choi1, Dong Wook Choi1, Kyung Uk Jung2 and Ho-Kyung Chun3
1Samsung Medical Center, Sungkyunkwan University, Korea; 2Gangbuk Samsung Medical Center, Korea

Introduction: The size of CLM has been verified in many previous studies. CLM size is an important factor that determines the effectiveness of RFA. However, the importance of the location and number of CLM has not been evaluated.

The aim of this study is to compare the outcomes of radiofrequency ablation (RFA) and hepatic resection (HR) for the treatment of synchronous colorectal liver metastases (CLM) stratified by location, number, and size.

Method: Between January 2000 and December 2009, a total of 235 patients who underwent HR with curative intent or RFA were identified from a prospectively collected database. Patients were stratified according to the location, number, and size of CLM. Perioperative outcomes and survival were compared retrospectively between RFA (n = 46) and HR (n = 189) groups.

Results: The median follow-up period was 42.5 months (range, 4–158). There were no differences between the RFA and HR groups in perihepatic complication rates (p = 0.707). Local recurrence rate was 11% after RFA and 3% after HR (p = 0.042). Disease-free survival (DFS) at the 1 and 5 years was 42.3% and 37.5% after HR and 28.3% and 22.6% after RFA respectively (p = 0.122). The 3- and 5-year overall survival (OS) rates were 70.7% and 58.6% after HR and 57.2% and 42.0% after RFA respectively (p = 0.048). The OS of the HR group was superior to RFA group regardless of the location and number (p = 0.037, p = 0.030).

Conclusions: HR is superior to RFA and must be considered as the first line treatment if surgery is not contraindicated.

FO07-04
VALIDATION OF COMPUTER ASSISTED PERCUTANEOUS MICROWAVE ABLATION OF LIVER TUMOURS – FEASIBILITY AND SAFETY ASSESSMENT
Jennie Engstrand1, Henrik Nilsson1, Grzegorz Toporek2, Matthias Peterhans2 and Jacob Freedman1
1Karolinska Institut, Sweden; 2University of Bern, Switzerland

Introduction: For patients with liver tumours not treatable with open liver surgery due to comorbidities or where the tumour is not visible with ultrasound or in the situation with vanished lesions, an alternative could be CT-guided microwave ablation with computer assisted navigation (CAS-one, Cascination AG, Bern, Switzerland). Compared to standard CT-guidance, the addition of CAS-one could improve accuracy, reduce radiation dose and anaesthesia time.

Method: Stereotactic instrument guidance is provided based on previously acquired 3D image data. By relating the position of the image data to real-time measurements of the patient position and instrument tracking, the relative position of the needle and the target are visualized without requiring CT acquisitions during needle insertion.

General feasibility and safety of the navigated approach is assessed. Targeting accuracy is measured by calculations from control CT-scans.

20 patients scheduled for CT guided percutaneous microwave ablation, with 1 to 2 metastases, are selected from the Stockholm liver conference.

Results: From March until July 2013, 11 patients (4 females and 7 males) of the planned 20 patients have been treated. 7 with HCC and 4 with CRLM. Median number of lesions treated was 1 (1–3) with a median size of 28 mm (10–42). Patients were discharged after a median of 1 day (1–2) without complications, but one patient showing a thrombosis of the superior mesenteric vein at 30d follow-up. The accuracy of the navigated needle placement was 6.02 ± 3.58 mm. In the analysis two patients were excluded because of malfunctioning targeting system.

Conclusions: The procedure is feasible and continuing logistic and technical improvements have been accomplished. If this proves to be reliable a new group of patients could be offered a minimal invasive approach. It might even expand the indication for ablation in other organs like kidneys, spleen, lungs and pancreas.

FO07-05
RELIABILITY, SAFETY AND ONCOLOGICAL SUITABILITY OF INTRAOPERATIVE ULTRASOUND CRITERIA FOR HEPATIC VEINS SPARING ONCE IN CONTACT WITH COLORECTAL LIVER METASTASES AT THE CAVAL CONFLUENCE: VALIDATION ON
Fabio Procopio, Matteo Donadon, Matteo Cimino, Daniele Del Fabbro, Guido Costa, Andrea Gatti, Angela Palmisano and Guido Torzilli
University of Milan, Humanitas Clinical and Research Center, Milan, Italy

Introduction: Major hepatectomies are generally selected for tumors in contact-involving the hepatic vein (HV) at caval confluence (CC). Whenever a conservative approach is attempted, HV reconstruction is recommended. The use of criterion based on intraoperative ultrasonography (IOUS) may limit the need for extensive hepatectomy in these conditions. An intention-to-treat prospective study to validate this hypothesis has been conducted in a cohort of patients carrier of at least one colorectal metastasis (CLM) in contact with a HV at CC.

Method: Thirty-eight patients showing at preoperative imaging at least one CLM in contact with a HV at CC
were enrolled. Based on IOUS-findings, 3 patterns of presentation were recognized and respective surgical policies were established: Type A-HV in contact with CLM for <1/3 of its circumference, regardless of longitudinal extension: vein-sparing with tumor-detachment was planned; Type B-HV involvement ranging 1/3–2/3 of its circumference, regardless of longitudinal extension: vein-sparing with HV wall resection and reconstruction by direct-suture or patching was planned; Type C-HV involvement for ≥2/3 of its circumference with or without interruption of vessel wall at IOUS: vein-resection was planned.

**Results:** In 28 (74%) patients a J-shaped-thoracophrenolyaparotomy was performed. At IOUS exploration of the 38 patients, 25 included at least a Type A contact, 13 a Type B, while 9 a Type C invasion. No major hepatectomy was required. Tumor-detachment from HV was feasible in 30 (79%) patients, HV reconstruction with direct-suture was needed in 13 (34%), while HV-resection was performed in 9 (23%). Median operation and clamping time was 501 minutes (range 303–889), 121 minutes (range 56–279), respectively. Blood transfusions rate was 16%. Postoperative mortality was nil. Overall and major morbidity rate was 39%, 5%, respectively. No local-recurrences have been observed at a median follow-up of 13 months (range 6–34).

**Conclusions:** Preserving liver parenchyma in hepatectomy is the key-factor to ensure better postoperative results. This proposed tumor-vessel classification has been validated on an intention-to-treat perspective and in all patients was able to predict the proper surgical strategy. Adopting these criteria major hepatectomies can be avoided in favor of a surgical policy, which is safe and featured by acceptable oncological radicality.

**FO07-06**

PORTAL VEIN EMBOLIZATION AND STEM CELLS APPLICATION IN PRIMARY UNRESECTABLE COLORECTAL LIVER METASTASES.

Vladislav Treska, Tomas Skalicky, Jakub Fichtl, Daniel Lysak, Slafr Frantisek and Bruha Jan
University Hospital, Medicine Faculty, Czech Republic

**Introduction:** Only 20–25% of patients with colorectal liver metastases (CLM) can undergo a radical surgery. Insufficient future liver remnant volume (FLRV) is one of the causes of CLM unresectability. Portal vein embolization (PVE) together with administration of hematopoietic stem cells (HSC) may significantly expand resectability of primarily radically unresectable CLM.

**Method:** Authors report on 10 patients with primary unresectable CLM (FLRV <30%), who underwent PVE on the side of the CLM with a subsequent application of autologous HSC to the non-embolized branch of the vena portae on the other side.

**Results:** The PVE with application of HSC was without any complications. In all patients, the liver volume growth was sufficient after 3–4 weeks after HSC applications. R0 hepatectomy was performed in seven patients (70%). Exploratory laparotomy was performed in three patients (2- tumour progression, 1-severe adhesions). One and three years overall survival rate was 66.7, resp. 33.3%. Median of progression free survival was 9 months. One patient died 15 months after extended right hepatectomy due to disease progression. Other patients are between 3–12 months after the surgery and in good condition; one of them was diagnosed with pulmonary metastasis after nine months that was successfully treated with laser metastasectomy.

**Conclusions:** Combination of PVE with administration of HSC appears to be a promising method that stimulates growth of FLRV with a subsequent possibility of early radical liver resection. The issue is a danger of tumour progression in the liver parenchyma following the PVE with HSC. The current randomized study should answer this question.
DEFINING THE OPTIMAL CONVERSION CHEMOTHERAPY REGIMEN FOR PATIENTS WITH INOPERABLE LIVER ONLY METASTASES FROM COLORECTAL CANCER – A SYSTEMATIC REVIEW AND META-ANALYSIS

Stuart Robinson, John Moir, Ashraf Azzabi, Derek Manas, Ian Pedley and Steven White
Freeman Hospital, United Kingdom

Introduction: A significant proportion of patients with colorectal liver metastases present with inoperable disease. For these patients the only realistic prospect for achieving long term cure is through the administration of systemic chemotherapy with the goal of shrinking disease to facilitate surgery. The aim of the current study was to determine the most effective conversion chemotherapy regimen in patients with liver only metastases.

Method: MEDLINE, EMBASE and CENTRAL were searched to identify RCT’s reporting the proportion of patients with inoperable liver only metastases who were able to undergo curative intent surgery after systemic chemotherapy. Meta-analysis was performed using a fixed effects model with outcomes reported as relative.

Results: Ten studies reporting outcomes of 1,567 patients with liver only metastases were suitable for inclusion. The combination of 5-FU/Irinotecan appears to be less effective than 5-FU/Oxaliplatin in achieving conversion to operability (RR 0.19; 95% CI 0.04-0.83; p = 0.03).

The three agent regimen of 5-FU/Irinotecan/Oxaliplatin is more effective that 5-FU/Irinotecan alone in achieving conversion to operability (RR 3.02; CI 1.20–7.59; p = 0.019). There was insufficient data to be able to draw firm conclusions about the use of the biological agents Bevacizumab and Cetuximab.

A precise definition of operable disease was only provided in 3 out of 10 studies. Response rate and resection rate do correlate within the included studies although this association is week (r = 0.44; p = 0.046).

Conclusions: First line treatment with an Oxaliplatin containing regimen appears to be the most effective conversion chemotherapy regimen. Evidence to support the routine use of biological agents is lacking when resection rate is used as an outcome measure. Future studies should include a precise assessment of what constitutes operable/inoperable disease and conversion to operability as a primary outcome measure.

LIVER RESECTION IN PATIENTS WITH NUMEROUS (>7) COLORECTAL LIVER METASTASES. OUTCOMES AND SELECTION OF CANDIDATES FOR SURGERY

Luca Viganò1, Lorenzo Capussotti1, Pietro Majno2, Alessandro Ferrero1, Christian Tosò2, Giovanni De Rosa1, Laura Rubbia-Brandt2 and Gilles Mentha2
1Ospedale Mauriziano Umberto I, Torino, Italy; 2University Hospitals, Geneva, Switzerland

Introduction: Patients with numerous colorectal liver metastases (CRLM) are potential candidates for resection, but their benefit from surgery is unclear. Is there a numerical limit to resectability? To investigate outcome of surgery in patients with >7 CRLM.

Method: 849 patients undergoing resection for CRLM between 1998 and 2012 were analyzed. Patients were categorized into two groups: 743 with 1–7 metastases (Group A) and 106 with >7 metastases (Group B).

Results: Group B had more often synchronous (86.8% vs. 56.8%, p < 0.0001) and bilobar metastases (87.7% vs. 32.6%, p < 0.0001). Almost all group B had preoperative chemotherapy (95.3% vs. 60.2%, p < 0.0001).

Group B had higher proportion of major hepatectomies (52.8% vs. 33.6%, p < 0.0001; 2-stage hepatectomies (50.0% vs. 5.8%, p < 0.0001) and 0-mm margin recurrence-free survival 16.9 and 6.9 months versus 33.2 and 9.3 if one risk factor versus 54.3 and 22.2 if none, p < 0.05).

90-day mortality was 0.4% (3/849, all group A patients). Morbidity rates were similar. Group A had higher survival (median follow-up 36.8 months): 5-year overall survival 44.2% versus 19.7%, p < 0.0001; 5-year recurrence-free survival 29.2% versus 14.8%, p < 0.0001. Group B had more hepatic recurrences (58.1% versus 37.2%, p = 0.005). Overall and recurrence-free survival rates were similar for patients with 8-10 (n = 48), 11–15 (n = 40) or >15 metastases (n = 18).

In the group B, the multivariate analysis identified three adverse preoperative prognostic factors: rectal cancer (p = 0.005); extra-hepatic disease (p = 0.003); no response to chemotherapy (p = 0.028). Patients with >1 risk factor had no benefit from surgery (median overall and recurrence free-survival 16.9 and 6.9 months versus 33.2 and 9.3 if one risk factor versus 54.3 and 22.2 if none, p < 0.05).

Conclusions: Liver resection is safe and effective also for patients with >7 metastases. Their outcome is poorer than patients with 1–7 lesions, but long survivals are possible, independently from the number of metastases. Benefit from resection is lost only in patients with >1 negative prognostic factor (rectal cancer, extra-hepatic disease, no response to chemotherapy), for whom surgery should not be scheduled.
IMPACT OF POSTOPERATIVE COMPLICATIONS ON RECURRENCE IN LIVER RESECTION FOR COLORECTAL METASTASES

Miroslav Levy, Vladimir Visokai, Ludmila Lipska, Marek Mracek, Karel Veskrna and Jaromir Simsa
First Medical Faculty Charles University, Thomayer Hospital Prague, Czech Republic

Introduction: Liver metastases will appear approximately in 40% of patients with colorectal carcinoma, synchronous metastases are present at time of diagnosis of CRC in 15–20% of patients, in another 20% of patients will develop metachronous metastases (most often within 2 years) after resection of primary CRC. Surgery remains the only option for curative radical treatment for liver metastases for colorectal carcinoma. Aim of our study was to evaluate the impact of postoperative complications following radical surgery for colorectal cancer metastases on disease free interval.

Method: There were 185 liver resections in 155 patients operated for CRLM between 1996 and 2012 at our surgery. Fifty two patients were operated for metachronous, 103 patients for synchronous liver metastases, 80 of these operated simultaneously with colon or rectum resection. Postoperative complications occur in 37 operations.

We identified minor complications (Clavien-Dindo classification I, II): wound abscess, pneumonia, postoperative bowel obstruction and other in 22 patients (59.5%), moderate complications (Clavien-Dindo III): intraabdominal abscess, colon anastomotic leakage, severe bleeding in 8 patients (21.6%), and severe septic complications: sepsis, peritonitis, liver failure in 7 patients (18.9%).

Results: Median follow up was 2.1 year. Significantly worse disease-free interval was found in patients with severe septic complications. Other, less serious complications also increase the risk of recurrence, but not statistically significantly. In all patients, in contrary to simillar study in colon cancer resection, there is no statistical significance in recurrency in liver between patients with and without postoperative complications.

Conclusions: Severe septic complications have an adverse effect on the further course of the disease in terms of relapse. In addition, serious complications increases postoperative mortality, prolong hospitalization, increase the cost of treatment. Supported by grants: GAAV IAA500200917, IGA NT13424-4/2012, GACR P304/12/1585.

RECURRENCE PATTERN AND SURVIVAL IN PATIENTS UNDERGOING SIMULTANEOUS RESECTION FOR SYNCHRONOUS LIVER METASTASES FROM PRIMARY COLORECTAL CANCER

Rajay Kumar1, Sang-Jae Park2, Seong Hoon Kim2, Sung-Sik Han2, Young-Kyu Kim2, Seung-Duk Lee2, Sung Chan Park2 and Jae Hwan Oh2
1Fellow, India; 2National Cancer Center, Korea

Introduction: The optimal treatment strategy for patients with resectable synchronous liver metastases from colorectal cancer (SLMCC) is unknown, and the pattern of recurrence after simultaneous resection has not been well understood. In this study which is the largest series to date, the authors examined recurrence patterns and survival after simultaneous resection for SLMCC.

Method: Two hundred and forty-five consecutive patients with SLMCC who underwent complete simultaneous resection of both the rectal primary and liver metastases with curative intend between May 2001 and December 2010 were identified from a prospective database. Demographical and Clinicopathological factors were retrospectively analyzed to investigate initial recurrence pattern, overall survival and recurrence free survival. A review of literature was done and the results were compared with historical data.

Results: There was no mortality in our study. There was 86.5% 3 years/55.4% 5 years OS and 28.9% 3 years/ 25.9% 5 years RFS for the entire cohort with a median follow-up of 60.8 months for survivors. One hundred eighty one patients (73.8%) developed a recurrence. Most common site of the initial recurrence was the liver (50.2%), followed by the lung (25.9%) and locoregional (10.4%). Site of recurrence had a significant impact on survival and prognosis. Preoperative chemotherapy (p < 0.001), postoperative radiotherapy and lymphovascular invasion (p = 0.024) were significant factors affecting overall survival while hepatic resection margin (p=0.033), number of hepatic metastases (p=0.028) and PNI (p=0.051) were significant factors affecting RFS.

Conclusions: This study establishes the safety and oncological feasibility of simultaneous resection of SLMCC. All the results of this study were comparable to historical data available including recent large series, systemic recurrences were overwhelmingly more common than pelvic recurrences. Initial recurrence patterns were important to predict survival, evaluate prognosis and suggest treatment options. Neoadjuvant chemoradiotherapy to achieve local control in these patients might not be necessary routinely.
FO08-04

PROGNOSTIC SCORE FOR COLORECTAL LIVER METASTASES

Yuriy Kovalenko1, Alexey Zhao1 and Andrey Chugunov2
1Member of IHPBA, Russia; 2 Russia

Introduction: The multidisciplinary approach to treatment of patients with colorectal liver metastases has improved long-term results. The prognosis of recurrence depends on the individual complex assessment of the clinicopathologic and molecular factors having maximum “weight” for survival.

Method: 77 patients underwent liver resection for colorectal metastases were studied. The effect independent clinicopathologic and molecular predictors on outcome were tested using univariate and multivariate analyses by the Cox regression. This study evaluated immunohistochemical expression CK 20, β-cat, Ki-67 in 20 surgically resected specimens of liver metastases. The prognostic molecules were significantly associated with recurrence after hepatic resection. Our prognostic system based on calculation of number of the points corresponding to clinicopathologic and molecular factors. The data was applied to our proposed mathematical formulas.

Results: Survival was estimated using the Kaplan–Meier analysis. The overall and recurrence-free 5-year survival rates were 31% and 16%, respectively. Histological differentiation and molecular markers β-cat, Ki-67, CK 20 were the major determinants of survival and recurrence for total patient population. The univariate analysis indentified only histological differentiation as independent and clinically significant correlates of both survival and recurrence. The more patient gathered points, the prognosis was worse. The probability of recurrence for patient was 85% at 2 years. In 15 patients was moderate prognosis (recurrence from 12 to 24 months), in 5 patients – poor prognosis (recurrence to 12 months). In 88% patients calculated prognosis was confirmed within 2 years after operation.

Conclusions: Prediction of recurrence will allow have adequate follow up in long-term period and regimes of the neoadjuvant chemotherapy after liver resection.

FO08-06

THE BIOLOGICAL AND CLINICAL SIGNIFICANCE OF DIFFERENT MORPHOLOGIC TYPES OF COLORECTAL LIVER METASTASES

Pulathis Siriwardana1, Mohamed Ghazalay1, Tu Vinh Luong2, Jennifer Watkins3, Helen Turley3, Kevin Gatter4, Manlio Vinciguerra5, Adrian Harris3, Daniel Hochhauser6 and Brian Davidson1
1Royal Free Hospital and UCL medical school, United Kingdom; 2Royal Free Hospital, United Kingdom; 3University of Oxford, United Kingdom; 4Oxford University Hospital, United Kingdom; 5University College London, United Kingdom; 6University College London Cancer Institute, United Kingdom

Introduction: Colorectal cancer is the third commonest cancer in the world. A third of patients develop colorectal liver metastases (CRLM). Approximately 60% of patients who have had curative resection for CRLM eventually develop recurrent and/or metastatic disease and 80% are unsuitable for further resection. Understanding the morphology and biology of CRLM may lead to better prognostication and treatment.

Method: Microsections (5μM) of CRLM from n = 30 chemo-naïve patients were stained with Haematoxylin and Eosin (H&E) to study the tumour morphology. Immunostaining for Hypoxia-Inducible-Factor1α (HIF1α), Ki67 and CD31 was performed. HIF1α expression; percentage of stained nuclei and cytoplasm, tumour proliferative index (TPi); number of Ki67 stained cells per 1,000 cells, intra-tumoural microvascular density elucidate the prognostic implication of mucinous histology in resected CRCLM.

Method: The medical records of 118 patients who underwent resection of CRCLM during the period between 2000 and 2010 were reviewed. Clinicopathologic variables and outcome parameters were examined. Resected specimens were submitted to routine histological evaluation. Patients were grouped according to the metastasis mucinous content: >50%, mucinous adenocarcinoma (MAC); <50%, adenocarcinoma with inter-mediated mucin component (AIM); and without any mucinous component, non-MAC (NMA).

Results: Mean follow-up after resection was 38 months. Tumor recurrence was observed in 76 patients. Overall survival and disease-free survival (DFS) rates after hepatectomy were 62%, 56%, and 26%, 24% at 3-, and 5-years, respectively. Tumors with mucinous component (AIM and MAC) were related to proximal location of the primary tumor and were more frequently observed in females. Multivariate analysis revealed that MAC was an independent negative prognostic factor (HR 2.77, 95%CI 1.28–5.97; p = 0.009) compared with non-MAC (NMA and AIM). Also, AIM when compared with NMA was independently associated with worse OS.

Conclusions: AIM and MAC have an adverse prognostic impact compared with NMA which could have potential influences on therapeutic choices. It raises an important subject for discussion and future investigation.

FO08-05

PROGNOSTIC IMPLICATION OF MUCINOUS HISTOLOGY IN RESECTED COLORECTAL CANCER LIVER METASTASES

Marcos Perini1, Fabricio Coelho2, Evandro Mello2, Jaime Kruger2, Gilton Marques2, Renato Lupinacci2 and Paulo Herman1
1Attending surgeon, France; 2Attending surgeon, Brazil

Introduction: Colorectal mucinous adenocarcinoma is a subtype of colorectal adenocarcinoma with prominent mucin production associated with proximal location of tumor, advanced stage at diagnosis, microsatellite instability, and BRAF mutation. The prognostic implication of mucinous adenocarcinoma (MAC) in colorectal cancer liver metastases (CRCLM) is unknown. The purpose of our study was to determine the frequency and
(IMD); number of CD31 stained microvessels /25 mm² in a X200 field in a vascular-hotspot and intratumoural vascular pattern in the different morphological types were studied. Tumour morphology was collated with the overall survival (OS).

Results: There were three morphological types. ‘Desmoplastic’; (n = 10.33%), had fibrous tissue separating the metastasis from the surrounding liver parenchyma. Whilst peri-tumoural-hepatocytes were infiltrated in ‘Infiltrative’; (n = 12.40%), they were compressed in ‘Pushing’; (n = 1.3%). Seven tumours (24%) had a mixed morphology. The glandular structures in the Desmoplastic and Pushing types were large, complex and cribriform with micro-vessels confined to a fibrovascular stroma whilst in the Infiltrative type, glands were single, well-formed with micro-vessels between glands. The IMD was significantly higher in the Infiltrative type than in the Desmoplastic (Mean ± SEM = 33.5 ± 3.5 vs. 12.2 ± 1.6; p < 0.0001). Although the mean TPI (657 ± 57.5 vs. 533 ± 55.1) and HIF1α expression (High expression in 89% vs. 58% tumours) were higher in the Desmoplastic than the Infiltrative type respectively the difference was not statistically significant. The OS of patients with Desmoplastic type was significantly higher than those with the Infiltrative type (108 months vs. 72 ± 55; p < 0.036); log-rank.

Conclusions: Different types of CRLM have unique morphology, vasculature, biology and clinical. Further studies are needed to determine any causative interactions.

FO08-07
ISOLATED HEPATIC PERFUSION FOR OCULAR MELANOMA METASTASIS – REGISTRY DATA SUGGESTS A SURVIVAL BENEFIT
Per Lindner1, Jan Mattson2, Magnus Rizell1 and Roger Olofsson2
1Transplant institute, Sweden; 2Department of Surgery, Sweden

Introduction: Uveal melanoma is the most common primary intraocular malignancy in adults. Despite successful control of the primary tumor, metastatic disease will ultimately develop in approximately 35% of the patients with the liver being the most common site for metastases. These metastases are generally refractory to systemic chemotherapy and the median survival for patients with liver metastases is about 6 months. This phase II trial reports the experience of isolated hepatic perfusion (IHP) as a treatment option.

Method: A retrospective cohort study was performed on 76 patients undergoing surgery (n = 46) or other types of treatments (n = 30) for NELM from 1990 to 2012 at Peking Union Medical College Hospital (PUMCH). Relevant clinicopathologic data were analyzed using Kaplan–Meier and COX regression models.

Results: Pancreas was the origin in 65.8% of NELM patients. Synchronous hepatic metastasis was found in 85.5% of patients at the first diagnosis. Syn was positive in 95.5% of the IHC staining of the tumor tissues and CA199 was positive in 28.1% of the blood sample. Univariate analyses identified diagnostic age >50 (log-rank, p = 0.018), primary tumor resection (log-rank, p = 0.000), hepatic metastasis size >5 cm (log-rank, p = 0.013), positive vessel invasion (log-rank, p = 0.007) as worse prognostic factors of statistical significance. On multivariate analyses, Age >50 [HR = 2.6], Primary tumor size >3 cm [HR=4.6], non-resected primary tumor [HR = 10.4] remained predictive of poor survival (all p < 0.05). Among the 46 patients accepting primary tumor resection, median and 5-year survival were 120 months and 77% for hepatic metastatic tumor resection versus 78 months and 62% for other liver-directed therapies (But p > 0.05). Surgical resection of the primary tumor also provided a sur-

FO08-08
SURGICAL OUTCOMES AND CLINICOPATHOLOGIC CHARACTERISTICS OF GASTROENTEROPANCREATIC NEUROENDOCRINE TUMORS WITH HEPATIC METASTASIS: A SINGLE CENTER EXPERIENCE
Shunda Du1, ZI Wang1, Yilei Mao1, Xinting Sang1, Xin Lu1, Chunmei Bai1, Wenze Wang1, Hua Fan Minogue2, Shouxian Zhong1 and Jiefu Huang1
1Peking Union Medical College Hospital, China; 2Stanford University, USA

Introduction: Complete surgical resection has been used as a curative therapy for neuroendocrine liver metastasis (NELM) patients. However, the surgical outcome and clinicopathologic feature of NELM are still not determined. We aimed to identify prognostic factors and evaluate the outcome of surgery and other therapies.

Method: A retrospective cohort study was performed on 76 patients undergoing surgery (n = 46) or other types of treatments (n = 30) for NELM from 1990 to 2012 at Peking Union Medical College Hospital (PUMCH). Relevant clinicopathologic data were analyzed using Kaplan–Meier and COX regression models.

Results: Pancreas was the origin in 65.8% of NELM patients. Synchronous hepatic metastasis was found in 85.5% of patients at the first diagnosis. Syn was positive in 95.5% of the IHC staining of the tumor tissues and CA199 was positive in 28.1% of the blood sample. Univariate analyses identified diagnostic age >50 (log-rank, p = 0.018), primary tumor resection (log-rank, p = 0.000), hepatic metastasis size >5 cm (log-rank, p = 0.013), positive vessel invasion (log-rank, p = 0.007) as worse prognostic factors of statistical significance. On multivariate analyses, Age >50 [HR = 2.6], Primary tumor size >3 cm [HR=4.6], non-resected primary tumor [HR = 10.4] remained predictive of poor survival (all p < 0.05). Among the 46 patients accepting primary tumor resection, median and 5-year survival were 120 months and 77% for hepatic metastatic tumor resection versus 78 months and 62% for other liver-directed therapies (But p > 0.05). Surgical resection of the primary tumor also provided a sur-
vival benefit among patients with diffuse, unresectable hepatic metastases (p = 0.000).

**Conclusions:** Pancreas remains the most common origin of NELM. Young patients with smaller primary tumor size derive the greatest survival benefits from surgical resection of primary tumor, even when hepatic metastases are diffuse and unresectable. Surgical resection of hepatic metastases may possibly benefit survival, which needs further investigation.

**FO09-01**

**PRE-OPERATIVE CHEMOTHERAPY ADMINISTERED IN RECOMMENDED DOSES DOES NOT INCREASE MORBIDITY AND MORTALITY RATES IN LIVER RESECTIONS**

Jasmine Wong, Paul Bergamin, Eugenia Ip and Koroush Haghighi

*The Prince of Wales Hospital, Australia*

**Introduction:** Pre-operative chemotherapy can be administered to patients with resectable lesions as neo-adjuvant chemotherapy or to downstage inoperable disease. Current literatures suggest that pre-operative chemotherapy can increase postoperative morbidity and mortality in patients due to damage to hepatic parenchyma. This study compares the effects of pre-operative chemotherapy on the outcomes of liver resections.

**Method:** A retrospective analysis of prospective data collected on 364 patients undergoing liver resection between January 2007 and July 2013 in Prince of Wales and St. Vincents Hospitals in Sydney by a single surgeon (Haghighi KS). The outcomes of patients who received pre-operative chemotherapy (Group 1) were compared to patients who had surgery alone (Group 2).

**Results:** There are 113 patients in group 1 and 251 patients in group 2. There were 11.5% and 18.3% of patients ≥75 years old in group 1 and 2 respectively. 55.8% (n = 63) of patients in group 1 underwent extended resections compared to 50.8% (n = 120) in group 2. The mortality rates were 1.7% (n = 2) in group 1 and 0.4% (n = 4) in group 2. According to the Clavien-Dindo Classification, the major morbidity rates were 8% (n = 8) and 6.4% (n = 13) for group 1 and 2 respectively. The median length of ICU stay was 1 (range 0–7) for group 1 and 1 (range 0–5) for group 2. The median length of stay in hospital is 8 days (range 1–43) in group 1 and 7 days (range 3–27) in group 2. 14.2% (n = 16) of patients in group 1 received intraoperative blood transfusions compared to 15.5% (n = 39) in group 2.

**Conclusions:** Our study demonstrates that there is no significant increase in perioperative morbidity or mortality associated with pre-operative chemotherapy when administered appropriately in the recommended dose.

**FO09-02**

**A PREDICTIVE POWER OF PROTHROMBIN TIME AND SERUM TOTAL BILIRUBIN FOR POSTOPERATIVE MORTALITY AFTER MAJOR HEPATECTOMY WITH EXTRAHEPATIC BILE DUCT RESECTION**

Yukihiro Yokoyama, Tomoki Ebata, Tsuyoshi Igami, Gen Sugawara, Takashi Mizuno and Masato Nagino

*Nagoya University Graduate School of Medicine, Japan*

**Introduction:** In 2011, the International Study Group of Liver Surgery defined posthepatectomy liver failure using the prothrombin time international normalized ratio (PT-INR) and total serum bilirubin concentration (T-Bil). However, the data analyzing the clinical impact of PT-INR and T-Bil on postoperative mortality are still limited, especially for the cases of major hepatectomy with extrahepatic bile duct resection (HEBR).

**Method:** Prospectively collected data from 545 patients who underwent HEBR in a single institution from 2002 to 2011 were analyzed. Receiver operating characteristics (ROC) analyses of PT-INR and T-Bil on postoperative days (POD) 1, 3, and 5 were used to determine optimal cut-off values for predicting postoperative mortality.

**Results:** Most of the treated diseases were biliary tract cancers, including perihilar cholangiocarcinoma (n = 418), gallbladder carcinoma (n = 52), and intrahepatic cholangiocarcinoma (n = 27). The mean values for PT-INR and T-Bil on POD 1, 3, and 5 were significantly higher in the patients who died due to postoperative complications than in the patients who survived. On POD 5, the area under the ROC curve for predicting postoperative mortality and the optimal cut-off value for PT-INR were 0.876 and 1.68 mg/dL, respectively, whereas those of T-Bil were 0.889 and 4.0 mg/dL, respectively. A combination of PT-INR and T-Bil showed a strong predictive power (i.e., more than 40% of the patients with values beyond the cut-off value for both factors on POD 5 died).

**Conclusions:** We recommend monitoring both PT-INR and T-Bil to accurately predict which patients are at a high risk after HEBR.

**FO09-03**

**A SYSTEMATIC REVIEW AND META-ANALYSIS OF ISCHEMIC PRECONDITIONING IN HEPATIC RESECTION: PERSPECTIVE FROM TRANSLATIONAL MEDICINE**

Han Zhang¹, Xing Huang², Shu-Yang Dai², Yi-Nan Shen¹, Shou-Xin Yuan¹, Tian Yang¹, Meng-Chao Wu¹ and Feng Shen¹

¹Eastern Hepatobiliary Surgery Hospital, China; ²Second Military Medical University, China

**Introduction:** Hepatic ischemia/reperfusion injury (IRI) during major liver surgeries, especially those using vascular occlusion techniques, is a main contributing factor to perioperative morbidities and mortalities. The
beneficial effect of ischemic preconditioning (IP) to IRI has been proven in various organs. However, studies on the protective effect of IP on IRI of the liver in hepatic resection have yielded controversial results.

**Method:** A comprehensive retrieve for animal experiments reporting IP in hepatic resection, as well as clinical RCTs comparing IP with control for hepatic resections published prior to July 2013 were performed by searching Pubmed, Embase, OvidSP and the Cochrane Library. A total of 20 animal studies and 14 clinical investigations were analyzed. Reviews of each study were conducted and data were extracted. In meta-analysis, data pooling was done using Random effect methods.

**Results:** Five animal studies and 14 clinical investigations were included for systematic review. No significant baseline demographic different was found among human subjects. Data for meta-analysis were retrieved from 8 RCTs consisting of 464 patients. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) levels on the first postoperative day in the ischemic preconditioning group were significantly lower than that in the control group. No statistically significant differences were found in mortality, rate of liver failure, perioperative complications, perioperative transfusion, length of hospital stay and operating time.

**Conclusions:** In warm liver ischemia and hepatic resection in animals, IP is associated with an increased survival rate and decreased extent of liver injury. While despite decreased liver enzyme levels and a shorter hospital stay, beneficial effects of IP in surgery-related mortality and morbidities were not seen in the clinical setting.

**FO09-05**

**INTRAHEPATIC CHOLAGIOCARCINOMA: A SINGLE-INSTITUTION TWELVE-YEAR EXPERIENCE WITH 144 CASES**

Jin Ho Lee and Gi Hong Choi

**Yonsei University College of Medicine, Korea**

**Introduction:** Intrahepatic cholangiocarcinoma (ICC) is a rare primary malignant disease of liver. And surgical treatment is the only known cure for the disease. In this study, we examine the impact factor of tumor recurrence and recurrence pattern of tumor according to the tumor location of liver and nodal status. And we investigated prognostic factors of ICC which influence the survival.

**Method:** We reviewed the medical records of 144 patients diagnosed with intrahepatic cholangiocarcinoma from January 1995 to November 2012 retrospectively. Patient and tumor characteristics including oncologic outcomes were analyzed.

**Results:** Eighty-nine patients were male and 55 were female, with a mean age of 62.51 ± 9.8 years. During the follow up period 78 (54.1%) patients were recurrence of ICC. The median disease free survival (DFS) was 57.6 months. And the median overall survival (OS) was and 57.7 months and the 1-, 3-, 5 year survival rate were 68%, 57%, 43% respectively. Perineural invasion (PNI) (p = 0.023) and pathologic tumor size (pT) (p = 0.023) were statistically significantly correlation of survival. And pT stage was statistically significant correlation with recurrence (p = 0.014) and recurrence pattern was statistically significant correlation according to tumor location of liver (p = 0.043). If the tumor was on the left lobe of liver the intrahepatic and other organ recurrence were more common than right or central lobe of liver. In addition, DFS (5 year DFS of 17.7%, p = 0.048) and OS (5 year OS 68.5%, p = 0.026) were improved in LN negative patients groups but DFS and OS were not statistically significantly different among the pT stage and pTNM stage respectively. However, LN metastasis (p = 0.272) and tumor location of liver (p = 0.666) was not statistically significant correlation with recurrence.

**Conclusions:** The PNI and pTStage were associated with survival. Although LN metastasis provides no prognos-
tic information, active lymphadenectomy should be considered because up to 40% of patients will have LN metastasis.

**FO09-06**

**SHORT AND LONG TERM OUTCOME OF 74 LIVER RESECTIONS FOR POLYCYSTIC LIVER DISEASE**

Béatrice Aussihiou, Saïf Dokmak, Olivier Farges, Alain Sauvanet and Jacques Belghiti

*Beaujon Hospital, France*

**Introduction:** To analyse the short and long term results of a large unicentric series of partial liver resections for highly symptomatic polycystic liver disease (PLD).

**Method:** Since 1995, among 281 patients with PLD managed in our department, 74 including 70 females aged 31 to 80, underwent partial liver resection for highly symptomatic PLD. Exclusion criteria were severe renal insufficiency, ascites and/or marked denutrition. Patients were stratified in Gigot classification (GC): type I (12 = 16%), type II (32 = 43%) and type III (30 = 41%). Resections included 35 left hepatectomies, 23 right hepatectomies, 14 left lateral sectionectomies (LLS) and 2 limited resections. All were associated with unroofing of the cysts in the remnant liver.

**Results:** The mean operative duration (315 minutes) ranging from 200 to 375 was similar in all type of resections. The transfusion rate was related to the GC: type I (17%), type II (34%) and type III (47%), respectively, (p < 0.05). One patient died postoperatively (1.3%). The overall morbidity was observed in 51%, including ascites in 45% with 80% after right hepatectomy (p < 0.05), haemorrhage (15%), bilary fistula (14%), transitory liver insufficiency (12%) and fever (16%). No alteration of renal function was noted. The highest morbidity (ascites and liver insufficiency) was noted after right hepatectomy in Gigot III. After a mean follow-up of 48 months (3–278), excellent symptomatic relief was noted in 94% and 83% at 3 and 24 months, respectively. Recurrence of the symptoms was mainly observed in GC III who had LLS.

**Conclusions:** This large series confirms the excellent long-term outcome observed after partial liver resection for symptomatic PLD in highly specialized liver unit. Partial liver resection should be considered in priority before considering unroofing or discussing liver transplantation for this benign disease.

**FO09-07**

**ONE HUNDRED AND NINETY ONE LIVER RESECTIONS FOR HEPATOCELLULAR ADENOMA <5 CM: A MULTICENTER EUROPEAN STUDY**

Alexis Laurent

*Henri Mondor Hospital - Créteil France, France*

**Introduction:** Hepatocellular Adenoma (HCA) is a rare benign hepatic tumor (1/10^6 /an). Surgical resection is the recommended treatment for HCA > 5 cm. For HCA < 5 cm, surgical indications are still debated. This study aimed to investigate the safety of hepatectomies for HCA <5 cm.

**Method:** Data on 576 patients who underwent a liver resection for HCA between 2000 and 2012 were retrospectively collected in a multicenter European database. Among them, 191 patients had a HCA <5 cm.

**Results:** They were 169 females (88.5%) and 22 men; mean age 39.5 ± 10.4 years; mean BMI 24.9 ± 5.7. Twenty six patients (13.6%) had a ruptured HCA and among them, 2 were operated in emergency. Eighteen patients required major hepatectomies (13 right and 5 left), 28 left lateral sectionectomies, 14 other bisectionectomies, 32 monosegmentectomies and 99 wedge resections. In 89 patients (46.6%) a laparoscopic approach was performed. No patient died and 148 patients (77.5%) had uneventful postoperative course. According to Clavien classification, postoperative complications grade I, II, IIIa and IIIb occurred in 27 (14.1%), 8 (4.2%), 6 (3.1) and 2 (1%) patients respectively. Morbidity was similar in laparoscopy versus open surgery groups

**Conclusions:** Liver resection is a safe procedure in elective surgical setting for symptomatic AHC <5 cm.

**FO09-08**

**SURGICAL MANAGEMENT OF HEPATIC HEMANGIOMAS: AN INTERNATIONAL MULTICENTRAL EXPERIENCE**

John Miura1, Aijun Li2, Shishir Maithel3, Emily Winslow4, Mark Bloomston5, Timothy Pawlik6, Allan Tsung7, Kiran Turaga1, Thomas Gamblin1 and Mengchao Wu2

1Medical College of Wisconsin, USA; 2Eastern Hepatobiliary Surgery Hospital, The Second Military Medical University, China; 3Emory University School of Medicine, USA; 4University of Wisconsin School of Medicine and Public Health, USA; 5The Ohio State University Medical Center, USA; 6Johns Hopkins University School of Medicine, USA; 7University of Pittsburgh Medical Center, USA

**Introduction:** Management of hepatic hemangiomas remains ill defined. We sought to investigate the indications, surgical management, and outcomes of patients with hemangiomas of the liver.

**Method:** A retrospective review from 7 major liver centers identifying patients who underwent surgery for hepatic hemangiomas between 1994 and 2013 was performed. Clinico-pathologic, treatment and perioperative data were evaluated.

**Results:** Of 1,899 patients identified, the median age was 45 years (IQR: 39–52) with patients being predominantly female (69.9%). Majority of hemangiomas were solitary lesions (54.8%) with a median size of 8 cm (IQR: 6–10). Surgery was performed for abdominal symptoms (19%), diagnostic uncertainty (6%), increasing hemangioma size (31%), and patient preference (44%). Patients undergoing resection at western centers (W) were more likely to have symptomatic hemangiomas as compared to the eastern center (E) (66.4 vs. 9.7%, p < 0.01). Surgical resection requiring a hemihepatectomy or greater was performed on 535 patients (28.1%). Median length of
stay was 13 days (W; 5 vs. E: 14 days, p < 0.01). Clavien Grade 3 or higher complications occurred in 43 patients (2.3%). The 30 day mortality was 0.2% (n = 4) with no additional mortalities at 90 days. Final pathology revealed 13 patients (1%) harbored a concomitant malignancy within the resected hemangioma specimen; eight of the 13 patients underwent surgery secondary to radiographic uncertainty. Of patients with abdominal symptoms at the time of surgery, 75% reported improvement of symptoms postoperatively.

**Conclusions:** Surgery for hemangiomas can be safely performed at high volume institutions. Variable indications for liver surgery demonstrate a regional difference in approach to management.

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**FO10-01**

**PRIORITIZE POLICY OF ALLOCATION DECEASED LIVER IN PATIENT WITH HEPATOCELULAR CARCINOMA IN ARGENTINA. RESULTS IN A NEW LIVER TRANSPLANT PROGRAM**

Matías Ezequiel Morra, Marcos Garcia Ejarque, Nadia Daciuk, Eugenia Caggiano, Ezequiel Silberman, Diego Bogetti, Martín Fauda, Rafael José Maurette and Gustavo Luis Podesta

*British Hospital of Buenos Aires, Argentina*

**Introduction:** The policy of prioritize the hepatocellular carcinoma (HCC) in deceased liver donor allocation system has some differences around the world. Argentina since 2005 adopted the UNOS policy. The objective of this communication is to look the results of the Argentinean allocation system for HCC in a new liver transplant program.

**Method:** It is a retrospective analysis. Include patients referred for liver transplant (LT) between July 2010 and July 2013. They were divided into two groups (Non-HCC group and HCC group), excluding the acute hepatic failure (AHF). The variables analyzed were: destiny in the waiting list (WL) and the applicability of LT.

**Results:** Two hundred and thirteen candidates were evaluated for LT, 166 were placed in the WL, 43 were not (11 extended HCC, and 32 medical condition), 4 excluded because presented with AHF. The Non-HCC group comprised 111 patients: 22 drop out of the WL (17 deaths and 5 because co-morbidities) and 46 were transplanted (applicability 41.4%) with a median time in the WL of 111 days (1–552), 43 patients continue in WL. In the HCC group, 55 patients were placed in the WL (46 with the diagnosis of HCC, and 9 developed HCC in the WL). Of the 41 with supplemental MELD score: 35 were transplanted (applicability 85%) with a median time in WL of 164 days (14–575), 5 patients continue in the WL and 1 died. Of the 14 patients with no additional score: 5 were transplanted, 4 were removed (3 progression of disease and 1 death), 5 continue in the WL (1 waiting to receive extra point). The median time in the WL for these patients was of 184 days (1–530).

**Conclusions:** The policy of prioritize the HCC in the WL favor the applicability of LT for this group of patients, but do not reduce the waiting time in the list.

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**FO10-02**

**RIGHT LIVING DONOR VS WHOLE VS SPLIT LIVER TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA**

Alexis Laurent1, Denis Castaing2, Olivier Boilot3, Jacques Belghiti4, Olivier Soubrane3 and Daniel Azoulay5

1Henri Mondor Hospital – Créteil France, France; 2Paul Brousse Hospital – Villejuif, France; 3Hôpital Edouard-Herriot – Lyon, France; 4Beaujon Hospital, France; 5Saint-Antoine Hospital, France

**Introduction:** For cirrhotic patients with hepatocellular carcinoma (HCC), living donor liver transplantation (LDLT) reduces waiting time and dropout rates. The place of LDLT in this field is still debated in terms of indication and results compared to other types of graft.

**Method:** Seven hundred and eighty-eight consecutive cirrhotic patients with HCC were listed for liver transplantation over a 10 years period in 5 centers to receive whole (WLT), split (SLT) or LDLT. Tumor recurrence was the primary end point. Mainly due to tumor progression (82%), 89 patients (11.3%) dropped out.

**Results:** The dropout rate of patients waiting for LDLT was nil. The mean waiting time was shorter for LDLT (p < 0.001). At transplant, patients of the LDLT group showed significantly more severe tumor criteria for size and AFP level than those receiving WLT or SLT. The recurrence rates at 5 years were similar in the 3 groups (12.8%, 7.0% and 10.9% for WLT, SLT and LDLT respectively; p = 0.7). Overall (p = 0.5) and disease free survival (p = 0.7) were similar in the 3 groups. AFP score before transplant (C Duvoux, Gastroenterology 2012), macroscopic vascular invasion and differentiation according to Edmonson Grade on the specimen were independently associated with recurrence. Overall patients beyond the Milan and UCSF criteria, showed a trend towards worse outcomes

**Conclusions:** Despite more severe tumors in LDLT group, the recurrence and survival outcomes following LDLT, WLT or SLT are similar. Absence of dropout and shorter waiting time are additional advantages of LDLT. LDLT for HCC patients beyond validated criteria should be proposed with caution.

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**FO10-03**

**TREATMENT OF HCC MEETING MILAN CRITERIA BY LIVING DONOR LIVER TRANSPLANTATION OR LIVER RESECTION**

Kuan-Chun Hsueh1, Teng-Wei Chen2, Shung-Sheng Tsou1, Tzu-Ming Chang1, Chew-Teng Kor1 and Chung-Bao Hsieh2

1Tungs’ Taichung MetroHarbour Hospital, Taichung, Taiwan; 2Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan

**Introduction:** Liver resection (LR) and liver transplantation (LT) are considered curative treatments for early hepatocellular carcinoma (HCC). Owing to the shortage of donor organs, living donor liver transplantation (LDLT) has been administered widely in recent years. The study investigated the survival of patients with
Cattolica, Agostino Gemelli Hospital, Rome, Italy; 5Foundation Sapienza, Umberto I Hospital, Rome, Italy; 6University Hospitals St. Luc, Université catholique Louvain, Italy; 2University of Mainz, Mainz, Germany; 3Medical University Innsbruck, Austria; 4University Sapienza, Umberto I Hospital, Rome, Italy; 5Foundation PTV, University Tor Vergata, Rome, Italy; 6University Cattolica, Agostino Gemelli Hospital, Rome, Italy

Introduction: The efficacy of trans-arterial chemoembolization (TACE) and the impact of repetitive TACE are two controversial issues in the management of potential liver recipients presenting hepatocellular cancer (HCC) exceeding Milan Criteria (MC). The aims of the present study are: investigate the benefit of TACE in relation to intention-to-treat (ITT) survival and recurrence rate of HCC after liver transplantation (LT); analyze the role of repetitive TACE in reducing the risk of post-transplant HCC recurrence.

Method: Two hundred patients were listed for LT during the period March 1987–March 2012. Seventy nine were ‘directly transplanted’ and 121 had TACE at insertion on the waiting list. Their median follow-up was 3.5 years (IQR 1.0–7.2).

Results: At multivariate analysis, TACE before LT was protective against the risk of recurrence (HR = 0.55; p = 0.05). Downstaged patients displayed excellent 5-year ITT survival compared to ‘directly transplanted’ patients (77.5 vs. 43.8%; p = 0.003). Downstaged patients also had significantly lower recurrence rates (17.9 vs. 40.4%; p = 0.01). The higher the number of TACE procedures, the higher was the protection against HCC recurrence (>3 TACE: OR = 0.30; p = 0.008).

Conclusions: MC-OUT patients treated with TACE during the waiting time had excellent long-term ITT survival rates and significantly reduced recurrence rates. Repetitive TACE is useful and especially beneficial in this group of patients.

FO10-05
IMPACT OF GRAFT REGENERATION TO THE RECURRENTNESS OF HEPATOCELLULAR CARCINOMA AFTER LIVING DONOR LIVER TRANSPLANTATION
Su Hyung Lee, Dong Jin Joo, Myoung Soo Kim, Dae Hoon Han, Jung Jun Lee, Kyu Ha Huh, Gi Hong Choi, Jin Sub Choi and Soon Il Lim
Yonsei University College of Medicine, Korea

Introduction: It has been suggested that tumor recurrence after resection for hepatocellular carcinoma (HCC) was related with remnant liver regeneration. In living donor liver transplantation (LDLT), graft liver usually experience regeneration and this may stimulate the growth of microscopic HCC tumors. The aim of this study was to assess the changes in graft volumes after LDLT and its relations with the recurrence of HCC.

Method: A total 140 liver transplantations were performed for patients with HCC between September 2005 and December 2012. Of them, deceased donor and unavailable data were excluded. All patients were measured preoperative and postoperative at 1 week and 4 weeks graft liver volume by volumetric computed tomography (CT). The study patients were divided into two subgroups according to median value of graft-recipient weight ratio (GRWR) and increasing rate of graft liver at postoperative 1 week and 4 weeks.

Results: Of the 128 recipients, 16 recipients had a recurrence of HCC. Recurred patients showed significantly higher level or incidence of pre-transplant alpha-fetoprotein (AFP), Protein induced by vitamin K antagonist (PIVKA-II) and largest size of HCC, portal vein invasion, microvascular invasion, and satellite nodule in pathologic findings. Increasing rate of graft liver at postoperative 1 week and 4 weeks were significantly higher in lower GRWR group than those in higher GRWR group, respectively. There were no differences in preoperative GRWR and increasing rate of graft liver at postoperative 1 week and 4 weeks between the two groups. Recurred HCC patients showed more ‘beyond Milan criteria’ and higher tumor markers than non-recurred patients.
Conclusions: This study showed that the lower GRWR group has higher graft regeneration rate than those in higher GRWR group. However, this study could not find significant relation between the recurrence of HCC and graft regeneration.

FO10-06

SALVAGE TRANSPLANTATION FOR POST RESECTION RECURRENCE IN HEPATOCELLULAR CARCINOMA ASSOCIATED WITH HEPATITIS C VIRUS ETIOLOGY - A FEASIBLE STRATEGY?

Bhavin Vasavada¹, Andrzej Komorowski², Karan Julka¹ and Chao-Long Chan³
¹Fellow liver surgery and transplant, India; ²Fellow, liver surgery and liver transplant, Poland; ³Professor and Superintendent, Taiwan

Introduction: We analyzed feasibility of salvage liver transplant after liver resection in Hepatocellular carcinoma with HCV etiology.

Method: All the patients with HCC with HCV etiology who underwent living donor liver transplant from July 2002 to November 2012 were studied. Their recurrence rate, mortality, and prognostic factors were analyzed and compared between primary transplant and salvage transplant. Statistical analysis was done using SPSS version 21. (IBM).

Results: One hundred and nine patients underwent liver transplant for hepatocellular carcinoma associated with HCV etiology within UCSF criteria. 17 were post hepatectomy salvage transplants and 92 were primary transplants. Median follow-up time was 31 months. One, three and five year recurrence free survivals were 94%, 94%, 56% for salvage group and 96%, 82% and 60% for primary transplant group which were not statistical significant (p = 0.836). One, three and five year over all survival rates were 76%, 68% and 68% in salvage group and 92%, 82% and 82% in primary transplant group respectively. Thus survival rate were significantly lower in salvage transplant group (p = 0.031). Preoperative AFP levels were significantly associated with recurrence (p = 0.017). No antiviral treatment (p = 0.009 overall and p = 0.036 in primary transplant), pre transplant outside Milan criteria (p = 0.016 over all and 0.039 in primary transplant), recurrence month (p = 0.021) and waiting months for transplant (p = 0.001) were significantly associated with mortality. No factors were significantly associated with mortality in salvage transplant group. Multivariate analysis showed only recurrence months independently predicted over all mortality (p = 0.002). Microvascular invasion, histological grade of the tumor were not significantly associated with mortality or recurrence rate in any group.

Conclusions: Salvage transplant have inferior survival rates than primary transplant in hcc associated with HCV. Factors like early recurrence, out side Milan criteria, waiting time and no preoperative anti viral treatments are associated with worse outcomes. HCC with hcv etiology should be offered primary transplant rather than salvage transplant particularly within Milan criteria.

FO10-07

EARLY RECURRENT OF HEPATOCELLULAR CARCINOMA AFTER INITIAL LIVER RESECTION IS ASSOCIATED WITH POOR OUTCOME OF SALVAGE LIVER TRANSPLANTATION

Sanghoon Lee¹, Choon Hyuck Kwon¹, Jae-Won Joh¹, Jong Man Kim¹, Bong-Wan Kim², Hee-Jung Wang², Kwang-Woong Lee³, Kyung-Suk Suh¹ and Suk-Koo Lee¹
¹Samsung Medical Center, Sungkyunkwan University, Korea; ²Ajou University School of Medicine, Korea; ³Seoul National University College of Medicine, Korea

Introduction: Salvage liver transplantation (LT) is considered a feasible option for treatment of recurrent hepatocellular carcinoma (HCC), especially when living-donor LT is a possible option. We performed this multicenter study to assess the risk factors associated with recurrence of HCC and patient survival after salvage LT.

Method: Between 2000 and 2011, 101 patients who had previously received liver resection (LR) for HCC underwent LT in 3 transplant centers in Korea. After excluding 19 patients due to incomplete data collection and operative mortality, 82 patients' data were retrospectively reviewed for analysis.

Results: Thirty-three patients had recurrence of HCC during a median follow-up period of 27 months (range 2–189 months) after salvage LT. There were 29 deaths, 15 due to HCC recurrence. 5-year survival was 62%. The following factors were associated with reduced recurrence-free survival after salvage LT in univariate analysis: microvascular invasion (p < 0.001) and T stage (p = 0.003) of the HCC at primary LR, microvascular invasion (p = 0.003) and T stage (p < 0.001) of the HCC at the time of LT, cause of salvage LT (HCC recurrence vs. cirrhosis progression, p = 0.03), donor type (living vs. deceased, p = 0.048), and Milan criteria (within vs. outside, p = 0.009). In multivariate analysis, more progressed T stage of the HCC at primary LR and HCC outside of the Milan criteria at salvage LT (HR 6.064, p < 0.001) were significant risk factors for early recurrence after salvage LT.

Conclusions: Stage of the HCC at primary LR and LT for HCC recurrence outside of the Milan criteria were significantly associated with reduced recurrence-free survival following salvage LT. We have shown, through this multicenter analysis, that the biology of the primary HCC plays a role in the outcome after salvage LT. This data may help guide clinicians on their decision of whether or not to perform salvage LT in a patient who has HCC recurrence after LR.
FO10-08
SINGLE NUCLEOTIDE POLYMORPHISMS IN THE METASTASIS-ASSOCIATED IN COLON CANCER-1 GENE PREDICT THE RECURRENCE OF HEPATOCELLULAR CARCINOMA AFTER TRANSPLANTATION

Zhiyun Zheng, Sheng Gao, Zhe Yang, Haiyang Xie, Cheng Zhang, Bingyi Lin, Lin Zhou and Shusen Zheng

Key Lab of Multi-Organ Transplantation, The First Affiliated Hospital, Zhejiang University, China

Introduction: The newly identified metastasis-associated in colon cancer-1 (MACC1) gene is involved in angiogenesis, epithelial-to-mesenchymal transition (EMT), invasiveness, and metastasis in a variety of malignancies. Overexpression of MACC1 gene is a prognostic marker for poor outcome of hepatocellular carcinoma (HCC) patients. However, the association between genetic polymorphisms of MACC1 gene and poor outcome in HCC has not been performed. We therefore investigated the correlation of MCAA1 single nucleotide polymorphisms (SNPs) with tumor recurrence and overall survival in HCC patients undergoing liver transplantation (LT).

Method: Five polymorphisms in the MACC1 gene (rs1990172, rs3735615, rs4721888, rs2241056, rs975263) were genotyped in 183 cases of tumorous tissue sample and 117 cases of adjacent non-tumorous tissue sample using SNaP-Shot assays. The association of SNPs with tumor recurrence and overall survival was then analyzed by additive, dominant, recessive, and overdominant models in a cohort of 156 HCC patients.

Results: In terms of tumor recurrence, heterozygous of SNP rs1990172 and SNP rs975263 showed a significant high risk of relapse using univariate and multivariate analysis (overdominant, HR (95% CI) = 2.27[1.41–3.66], p = 0.001; HR (95% CI) = 2.16 [1.37–3.39], p = 0.001). But the difference between heterozygous of these two SNPs and overall survival did not reach a significance in all models. The other three investigated SNPs were not significantly associated with tumor recurrence and overall survival (p > 0.05). In addition, we found no significant difference in genotype frequencies between HCC and controls.

Conclusions: Our data suggest that SNP rs1990172 and SNP rs975263 in the MACC1 gene may be potential genetic markers for HCC recurrence in LT patients.

FO11-01
EARLY RESULTS OF IN VIVO ASSESSMENT OF THE LIVER MICROCIRCULATION: A NOVEL METHOD TO PREDICT THE OUTCOME OF LIVER RESECTION AND TRANSPLANTATION

Carlo Pulitano, Phong Ho, Leon Edwards, Charbel Sandroussi, David Joseph, Deborah Verran, Nicholas Shackel and Michael Crawford
Royal Prince Alfred Hospital, Australia

Introduction: The complex functions of the liver including metabolism, biosynthesis, and host defense are closely dependent on microcirculation. Ischemia reperfusion, or conditions associated with portal hyperperfusion such as extended liver resection or small for size syndrome are associated with microcirculatory damage. However, in vivo assessment of microcirculation by real time visualization has not been previously possible. The aim of this study was to evaluate the feasibility of studying microcirculation in situ by Sidestream dark-field (SDF), a new technology allowing direct visualization of microcirculation using a hand-held probe.

Method: Twenty-four patients undergoing major liver resection and liver transplantation were included. Images were obtained using SDF imaging on the surface of the liver after laparotomy and 20 minutes after liver transection in case of liver resection, and 20 minutes after reperfusion in case of liver transplantation. Haemodinamic parameters that may affect microcirculation were also considered. The microvascular parameters were compared with markers of liver function and serum level of endothelin-1.

Results: Hepatic perfusion, as given by the functional sinusoidal density, sinusoidal diameter, and postsinusoidal venular diameter, following major resection was found significantly reduced compared to baseline. Microcirculation findings significantly influenced postoperative transaminase release. The lower the microcirculatory perfusion, the higher the transaminase levels on postoperative day 2 (p < 0.05; r = 0.62) and day 3 (p < 0.05; r = 0.72), and bilirubin on on postoperative day 2 (p < 0.05; r = 0.69), and day 3 (p < 0.05; r = 0.70).

Conclusions: These data demonstrate that SDF imaging is a noninvasive method for accurate quantification of the microcirculatory parameters of the liver in situ. The use of SDF imaging intraoperatively may potentially be used to estimate the risk of postoperative liver failure or identify patients at risk of small for size syndrome who may benefit from therapeutic interventions.

FO11-02
AGGRAVATION OF POST-ISCHEMIC LIVER INJURY BY OVEREXPRESSION OF IGFBP-3

Jae Do Yang, Hee Chul Yu, Baik Hwan Cho, Sang In Bae, Byung Hyun Park and Hong Pil Hwang
Chonbuk National University Hospital, Korea

Introduction: Insulin-like growth factor binding protein-3 (IGFBP-3) is known to interfere NF-κB signaling
pathway in response to a diverse range of stimuli. Liver ischemia/reperfusion injury is associated with rapid activation of NF-κB signaling, but the role of NF-κB in hepatic ischemia/reperfusion injury remains controversial. The NF-κB signaling pathway mediates both protective and deleterious effects in the liver. Here, we examined whether IGFBP-3 inhibited or aggravated hepatic ischemia/reperfusion injury.

**Method:** We overexpressed IGFBP-3 in the liver of C57BL/6 mice. Mice underwent 45 min of partial hepatic ischemia and were then reperfused.

**Results:** Mice subjected to ischemia/reperfusion injury showed increased NF-κB activation, as evidenced by phosphorylation of IκBα and nuclear translocation of NF-κB. Prior infection with Ad-IGFBP-3 attenuated NF-κB activation. Serum aminotransferases, hepatocellular necrosis, and hepatic neutrophil infiltration were markedly increased compared to those of uninfected or control virus infected mice. In addition, IGFBP-3 mutant devoid of IGF binding affinity but retains IGFBP-3 receptor binding activity (Ad-IGFBP-3<sup>GOGG</sup>) also exhibited similar effects as Ad-IGFBP3 did, suggesting a ligand-independent effect of IGFBP3 on liver damage.

**Conclusion:** These results suggest that inhibition of NF-κB activation by IGFBP-3 aggravated partial hepatic ischemia/reperfusion injury. Understanding how the NF-κB pathway plays a role in directing a clinical outcome may lead to better prospects of more rational approaches to reduce post-ischemic liver injury.

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**FO11-03**

**ASPIRIN ENHANCES IFN-α INDUCED GROWTH INHIBITION AND APOPTOSIS OF HEPATOCELLULAR CARCINOMA VIA JAK1/STAT1 PATHWAY**

Xu-Ting Zhi, Tao Li and Zhao-Ru Dong

Qilu Hospital of Shandong University, China

**Introduction:** Interferon-α (IFN-α) has been reported to be effective in postponing recurrence and improving overall survival in patients after curative resection of hepatocellular carcinoma (HCC). Our previous study has demonstrated that low concentrations of Aspirin (1 mM) did enhance IFN-α induced apoptosis and anti-proliferation effect of HCC, which has been reported at ILCA2012. We will further illuminate the mechanism of this phenomenon.

**Method:** Human HC Bel-7402 cells were cultured. Western Blot was used to measure the change of JAKs-STAT1/3 signaling pathway in response to IFN-α stimulation with or without Aspirin at various time points. Q-PCR was further used to examine the regulation of ISGs after BEL-7402 cells were treated with IFN-α, Aspirin or the combination. Data are expressed as mean ± SEM. Student’s t-test and one-way ANOVA test were used for statistical analyses of the data.

**Results:** When IFN-α was combined with Aspirin, the duration and level of p-STAT1 were significantly enhanced than IFN-α treatment alone, but the expression of IFN-α induced p-STAT3 was still not changed significantly after 18 hours stimulation of Aspirin. When IFN-α was combined with Aspirin, the p-JAK1 and p-JAK2 was further elevated, as the p-TYK2 was significantly inhibited. After blocking the activity of JAK2 by AG490, the level of p-STAT1 in combined group was not significantly decreased, compared to the group in which JAK2 activity was not inhibited. Q-PCR analysis revealed that Aspirin increased the IFN-α induced transcription of XAF-1, and inhibited the transcription of GIP3.

**Conclusions:** Low concentration of Aspirin enhances IFN-α-induced growth inhibition and apoptosis of HCC via JAK1/STAT1 pathway, which induces the upregulation of proapoptotic ISGs of XAF1 and down-regulation of antiapoptotic ISGs of GIP3. These results may provide a new potential therapeutic strategy for patients with HCC or other cancers.

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**FO11-04**

**MIR-93 PROMOTES METASTATIC PROCESS AND CELL SURVIVAL BY REGULATING EPHA4-MEDIATED EPITHELIAL-MESENCHYMAL TRANSITION IN HEPATOCELLULAR CARCINOMA FOLLOWING LIVER TRANSPLANTATION**

Sheng Gao, Zhe Yang, Zhi Yun Zheng, Li Ming Wu, Zhi Kun Liu, Hai Yang Xie, Lin Zhou and Shu Sen Zheng

First Affiliated Hospital of Medical School Zhejiang University, China

**Introduction:** The function of miR-93 in human hepatocellular carcinoma (HCC) remains largely undefined. We investigated the roles and mechanisms of miR-93 in HCC following orthotopic liver transplantation (OLT).

**Method:** We used in situ hybridization and quantitative reverse transcriptase polymerase chain reaction to measure expression of miR-93 in human HCC tissues and cell lines. Human HCC cell lines were transduced with lentiviruses that expressed miR-93, its inhibitor sequence targeted miR-93 or a scrambled sequence (control); proliferation, metastasis, invasion and colony formation were analyzed. We analyzed growth of human HCC cells that overexpress miR-93 or its inhibitor in severe combined immune-deficient mice. Western blot, and luciferase reporter assays were used to measure expression and activity of Eph tyrosine kinase receptor (EphA4) and related signaling molecules.

**Results:** Human HCC tissues and cell lines had increased levels of miR-93 compared with the noncancerous corresponding tissues and cells. The expression of miR-93 was associated with overall survival and recurrence–free survival following OLT. Overexpression of miR-93 increased proliferation of HCC cells, metastasis, invasion and colony formation in vitro, whereas miR-93 depletion reduced these parameters. In severe combined immune-deficient mice, overexpression of miR-93 by HCC cells increased tumor growth and overexpression of the miR-93 inhibitor reduced it. The EphA4 was identified as the direct and functional target gene of miR-93. Knockdown of EphA4 phenocopied the effect of miR-93 and ectopic expression of EphA4 restored the effect of miR-93 on proliferation, migration, invasion and adhesion in HCC cells. We fur-
FO11-05
ANTICANCER EFFECTS OF EVEROLIMUS AND KU-0063794 ON HUMAN HEPATOCARCINOMA HEPG2 CELLS BY INHIBITING MTORC1 AND MTORC2
Say-June Kim and Jae Woo Park
Catholic University of Korea, Daejeon St. Mary’s Hospital, Korea

Introduction: Due to the frequent dysregulation of the PI3K/mTOR signaling pathway, modulation of mTOR expression has been a suitable therapeutic target in hepatocellular carcinoma (HCC). Everolimus, a rapamycin derivative, inhibits the mTOR pathway by acting on the mTORC1, and KU-0063794 is a potent and highly specific dual-mTOR inhibitor of mTORC1 and mTORC2. In this study, we investigated the contribution of mTORC1 and mTORC2 on the HCC carcinogenesis by treatment of mTOR inhibitors, such as everolimus, Ku-0063794, and the combination of them.

Method: Everolimus and Ku-0063794 were treated to human HCC cell line, HepG2, respectively or combination of both mTOR inhibitors. Proliferation of the cells was measured by EZ-cytox assay at 24, 48 and 72 hours after treatment. Also, cell cycle analysis and autophagy level analysis were performed by FACS and autophagy kit. Cell signaling effects of mTOR inhibitors were assessed in HepG2 cell by western blot.

Results: There was an improved increase in repression of cell proliferation with combined everolimus and Ku-0063794 compared with either drug alone. The combination treatment noticeably suppressed the phosphorylation of AKT, p70S6K and STAT3. Although the addition of the Ku-0063794 only slightly suppressed the phosphorylation of AKT induced by everolimus, and downstream signaling p70S6K is lowered in the combination. Also, autophagy is significantly inhibited by the combination of everolimus and Ku-0063794.

Conclusions: Our results demonstrate that dual targeting of mTORC1 and mTORC2 by use of everolimus and Ku-0063794 does effectively inhibit proliferation of HCC cell lines. These data suggest that combined treatment with everolimus and Ku-0063794 may be a promising therapy approach in the treatment of hepatocellular carcinoma.

FO11-06
THE ROLE OF EMT INDUCER PRRX1 ON THE ACQUISITION OF CANCER STEM CELL PROPERTIES IN HUMAN HEPATOCARCINOMA
Keishi Sugimachi1, Hidenari Hirata1, Yusuke Takahashi1, Tae Matsumura1, Yoshiaki Shinden1, Hitoshi Eguchi1, Tomoya Sudo1, Ken Shirabe2, Yoshihiko Maehara2 and Koshi Mimori1
1Kyushu University Beppu Hospital, Japan; 2Kyushu University, Japan

Introduction: Epithelial-mesenchymal transition (EMT) is an important process for the progression of hepatocellular carcinoma (HCC). EMT is known to induce the acquisition of cancer stem cell (CSC) properties of the cancer. The decreased expression of paired related homeobox 1 (PRRX1), the EMT inducer, is reported to be associated with CSC properties. The purpose of the study is to investigate the role of the aberrant expression of PRRX1 on the progression and stemness of human HCC.

Method: (1) The expression of PRRX1 was analyzed by quantitative RT-PCR in 62 cases of HCC who underwent hepatic resection, and clinicopathological parameters including long-term prognosis were studied. (2) PRRX1 gene was transfected into 2 HCC cell lines (HuH7, HepG2) using a lentivirus vector and PRRX1 stable expressing cell lines were established. The expression levels of cell surface markers related to CSC of HCC (CD13, CD133, EpCAM) were examined using flowcytometry and RT-PCR. Anchorage-independent growth related to the CSC was evaluated with sphere formation assay.

Results: (1) The 5-year overall survival of HCC PRRX1 low expression group (n = 34) was significantly lower than that of high expression group (n = 28) (49.8% vs. 80.3%, p = 0.014), and the PRRX1 low expression was an independent prognostic risk factor by a multivariate analysis (p = 0.026). (2) The PRRX1 expression induced EMT, which was independent of conventional EMT inducer Twist and Snail. The CSC markers (CD13, CD133, EpCAM) were significantly decreased in PRRX1 expressing HCC cells, which indicated that HCC cells acquired the CSC properties by the decreased expression of PRRX1.

Conclusions: The present study indicated that PRRX1 induced EMT and stemness through the pathway which was independent of the Twist/Snail. PRRX1 low expression was the independent prognostic factor and contributed to the progression of HCC by the acquisition of CSC properties in HCC.
FO11-07
MICRORNA-29A PROTECTS AGAINST ACUTE LIVER INJURY IN A MOUSE MODEL OF OBSTRUCTIVE JAUNDICE VIA INHIBITION OF THE EXTRINSIC APOPTOSIS PATHWAY

Ying-Hsien Huang
Kaohsiung Chang Gung Memorial Hospital and Chang Gung University College of Medicine, Kaohsiung, Taiwan

Introduction: Recent studies have shown that microRNA-29 (miR-29) is significantly decreased in liver fibrosis, as demonstrated in human liver cirrhosis, and that its downregulation influences the activation of hepatic stellate cells. In addition, both cleaved caspase-3 production and apoptosis play a role in cholestatic liver injury. However, it is unknown if miR-29 is effective in modulating the extent of injury.

Method: We employed miR-29a transgenic mice (miR-29aTg mice) and wild-type (WT) littermates to clarify the role of miR-29 in hepatic injury and fibrogenesis, using the bile duct-ligation (BDL) mouse model.

Results: After BDL, all 3 members of the miR-29 family were significantly downregulated in the livers of WT mice, and miR-29b and miR-29c were significantly downregulated in the livers of the miR-29aTg mice. Liver function, as measured by alanine transaminase and aspartate transaminase activity, was significantly improved in the miR-29aTg mice than in the WT littermates, following 1 week of obstructive jaundice. In addition, overexpression of miR-29a was associated with a significant downregulation of the expression of collagen-1α1, collagen-4α1, phospho-FADD, cleaved caspase-8, cleaved caspase-3, Bax, Bel-2, PARP, and nuclear factor-κB, as well as an upregulation of phospho-AKT expression. In addition, there were significantly fewer TUNEL-positive liver cells in the miR-29aTg group than in the WT littermates after BDL.

Conclusions: Our results indicate that miR-29a decreases cholestatic liver injury and fibrosis after BDL, at least partially, by modulating the extrinsic rather than intrinsic pathway of apoptosis.

FO11-08
BENEFICIAL EFFECTS OF LIPOPOLYSACCHARIDES-INDUCED POTENTIATION OF ADIPOSE-TISSUE DERIVED STEM CELLS ON HEPATIC RECOVERY IN PARTIALLY HEPATECTOMIZED MICE

Say-June Kim1 and Dong-Goo Kim2
1Catholic University of Korea, Daejeon St. Mary’s Hospital, Korea; 2Catholic University of Korea, Seoul St. Mary’s Hospital, Korea

Introduction: Adipose-tissue derived stem cells (ASC) secrete high levels of growth factors and cytokines valuable to hepatic recovery. As considerable aspects of ASC’s therapeutic potential are attributed to the secretome, the detection of optimizing secretome by adjusting culturing environment is getting attention.

Lipopolysaccharides (LPS) are large molecules consisting of a lipid and a polysaccharide joined by a covalent bond and elicit strong immune responses. Therefore, we were intended to validate the enhanced hepatic recovery prompted by LPS-treated ASC.

Method: We conditioned ASC with 24-hour treatment of 100 ng/mL LPS. After in vitro evaluations, including assessment of the ASC mRNA expression and the release of cytokines and growth factors, the therapeutic potentials of LPS-treated ASC were determined using partially hepatectomized mice.

Results: LPS-treated ASC effectively induced higher mRNA expression and extracellular release of IL-6, TNF-α, VEGF, and hepatocyte growth factors than control ASC. In vivo experiment comparing the mice -control, ASC, and LPS-treated ASC-, mice with LPS-treated ASC, showed the highest liver regenerating capacity estimated by BrdU, Ki67, and PCNA immunohistochemical stains. Also the significant reductions in serum alanineaminotransferase (ALT) and aspartateaminotransferase (AST) were noted in the LPS-treated ASC group. Through co-culture between injured hepatocyte and ASC with/without LPS treatment, the possible mechanism of LPS enhancing ASC function was proved to be mediated by IL-6 related STAT3 pathway.

Conclusions: In conclusion, these findings provide evidence for a crucial role of LPS treatment in enhancing the potential of ASC by inducing favorable secretome by way of IL-6 related STAT3 pathway.

FO12-01
COMPARISON OF INTRA ABDOMINAL PRESSURE WITH RANSON’S CRITERIA IN PROGNOSIS OF ACUTE PANCREATITIS

Mohanish Kumar Sinha1, Shantanu Kumar Sahu2, Prashant Kumar Singh3 and Sohaib Ahmad2
1M.B.B.S, MS (Final year), India; 2Associate Professor, India; 3Assistant Professor, India

Introduction: Intra-abdominal Hypertension (IAH) and Abdominal Compartment Syndrome have described in patients with severe acute pancreatitis, but its clinical impact remains unclear. The aim of study was to assess whether increased intra-abdominal pressure affects clinical course in patients with acute pancreatitis and compare Intra Abdominal Pressure with Ranson’s Criteria in prognosis of Acute Pancreatitis.

Method: The present study was conducted in Department of Surgery at Himalayan Institute of Medical Sciences, HIHT University, Swami Ram Nagar, Dehradun, India over period of 12 months. All patients admitted in hospital with confirmed diagnosis of Acute Pancreatitis were included in study and were followed up by measurement of intra abdominal pressure (IAP) by intra-vesicular method at time of admission and daily monitoring of IAP for one week. The incidence of IAH (defined as intra-abdominal pressure >12 mmHg), occurrence of organ dysfunction and outcome of disease was studied and compared with Ranson’s Score.

Results: The analysis included 65 patients, all patients were subjected Ranson’s score and IAP monitoring. IAH was found in 54 patient 83%. The incidence of
organ dysfunction was high in patients with IAH: respiratory failure 83%, cardiovascular failure 70%, and renal failure 85%. ICU stay and mortality in the patients with IAH was similar as in Ranson’s score. Five patients underwent surgery for abdominal compartment syndrome and infected pancreatic necrosis, three of whom died in the early postoperative course. **Conclusions:** IAH is frequent finding in patient of acute pancreatitis, associated with high occurrence rate of organ dysfunction. From Ranson’s scores of the patients, it seems that more severe the disease, the higher likelihood to develop IAH. But IAH itself may be an early predictor of severe disease. The IAP monitoring is useful, inexpensive, easy method and can considered independent prognostic marker for the evolution and complications of acute pancreatitis especially in developing countries like India.

**FO12-02**

**MINIMALLY INVASIVE APPROACH FOR INFECTED PANCREATIC NECROSIS**

Mariano Gimenez, Mariano Palermo, Dario Berkowski, Pablo Cordoba, Gary Duran, Jorge Cardoso and Eduardo Houghton

Hospital de Clínicas, Argentina

**Introduction:** Conventional treatment of infected pancreatic necrosis is the open necrosectomy. As alternatives, there are less invasive techniques as percutaneous drainage, the trans-gastric endoscopic drainage and the minimally invasive retroperitoneal approach.

The aim of this study is to present our experience in the step up approach, without initial necrosectomy of the infected pancreatic necrosis.

**Method:** 82 patients were treated with severe acute pancreatitis who followed infected pancreatic or peripancreatic necrosis that received, as a first step, a percutaneous drainage. Forty-nine patients were male and 33 female, the average age was 51.15 years. In 36 patients (43.9%) was observed, at the time of the initial drainage, one or more organ failure.

The percutaneous procedures were made under the CT scan control and followed by daily flushing with high volume fluid until we achieve the complete removal of the waste of the infected necrosis.

**Results:** In 59 patients (71.9%), was achieved the healing only with drains, new drains and antibiotics. In 9 opportunities (10.9%) was carried out the percutaneous video-assisted necrosectomy by persistence or recurrence of the SIRS despite the new drains. Performed open necrosectomy in 14 patients (17%). The mortality in the group with organ failure was 20% and in the group without organ failure 4%.

**Conclusions:** We conclude that the initial minimally Invasive handling with percutaneous drains of the pancreatic infected necrosis could solve the majority of the cases without necrosectomy, leaving this last when fails the initial treatment.

**FO12-03**

**EUS GUIDED NECROSECTION TEMPORARY CYSTOGASTROSTOMY WITH COVERED STENT FOR PANCREATIC NECROSIS**

Arunkumar Krishnan¹ and Ravi Ramakrishnan²

¹Research Associate, India; ²Senior Consultant, India

**Introduction:** Pancreatic pseudocyst with infected necrotic tissue is associated with a high rate of complications and death. Standard treatment is open necrosectomy but is associated with significant morbidity, mortality, and prolonged hospital stay. Endoscopic cyst drainage with necrosectomy is an alternative and less invasive technique.

**Aim:** to evaluate pseudocyst drainage with cystogastrostomy and endoscopic necrosectomy for infected pancreatic necrosis with fully covered self-expanding metallic stents (CSEMS).

**Method:** Twelve patients underwent endoultrasound guided endoscopic necrosectomy and temporary cystogastrostomy for infected pancreatic necrosis. Patient details, severity scores assessed at CT, treatment, and outcome were recorded. Patients proceed to intervention if infection is strongly suspected on clinical and radiological grounds or is confirmed bacteriologically. After the necrosis cavity had been accessed, with endoscopic ultrasound, a large orifice was created and necrotic debris was removed using special short fully covered 15 mm diameter SEMS with large flares was deployed across the tract under radiological control. Completeness of the necrosectomy procedure was ascertained by visualization of a clear pseudocyst cavity on endoscopy.

**Results:** A total of 12 patients (median age 39) who were treated successfully. Median APACHE-2 score on presentation was 11. Two patients presented with organ failure and needed intensive care. Necrosis was successfully treated endoscopically in all patients, requiring a median of 2 endoscopic interventions (range 1 ± 4). The tissue samples obtained at the first necrosectomy confirmed infection in 12 patients. Complication included superinfection in patient who made an uneventful recovery. After median of 5 weeks the metal SEMS was extracted by endoscopy. The patients have remained asymptomatic and median follow-up was 4 (2 ± 11) months.

**Conclusions:** Endoscopic necrosectomy and temporary cystogastrostomy with self-expanding metallic stent approach is feasible, safe, and effective in patient with infected pancreatic necrosis. The benefits of this endoscopic approach using fully covered self-expandable metallic stent in terms of less morbidity is conceivable and our report demonstrates that such an approach is feasible.
FO12-04

RISK OF RECURRENT PANCREATITIS AND PROGRESSION TO CHRONIC PANCREATITIS AFTER ACUTE PANCREATITIS

Usama Ahmed Ali1, Yama Issa1, Julia C Hagenaars1, Olaf J Bakker2, Harry Van Goor3, Bert Van Ramshorst4, Marc G Besselink1, Hein G Gooszen5, Fjalmar CVan Santvoort2 and Marja A Boermeester3
1Academic Medical Center Amsterdam, The Netherlands; 2University Medical Center Utrecht, Utrecht, The Netherlands; 3Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands; 4St Antonius Hospital, Nieuwegein, The Netherlands; 5Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands

Introduction: Patients with acute pancreatitis (AP) often achieve complete recovery, but certain patients may develop recurrences and even progress to chronic pancreatitis (CP). This study aims to evaluate this risk and its determining factors.

Method: A cross-sectional survey and retrospective review of an initially prospectively collected cohort of patients with a first episode of acute pancreatitis was performed. Primary endpoints were development of recurrent acute pancreatitis (RAP) and progression to CP. Risk factors for RAP and CP were evaluated using regression analysis, and cumulative risk was assessed using Kaplan-Meijer analysis.

Results: We included 670 patients that survived a first acute pancreatitis episode. Median follow-up was 5 years. RAP and CP were observed in 124 (19%) and 42 (6.3%) patients, respectively. RAP was observed in 13%, 24.8% and 25.8% of patients with alcoholic and idiopathic/other etiology, respectively. For progression to CP, these rates were 2.3%, 15% and 7.4%, respectively. Etiology, smoking and pancreatic necrosis were independent risk factors for both RAP and CP. APACHE-II score was an additional independent risk factor for RAP. Cumulative risk for RAP and CP depends highly on risk factors. For RAP, smoking seems to play an essential role with equal high rates in combination with alcoholic and idiopathic/other etiology. For CP, combined alcohol use and smoking results in the highest cumulative risk. The strong association of pancreatic necrosis with RAP and CP provides support for the ‘necrosis-fibrosis-sequence’ as a potential pathophysiological mechanism for disease progression.

Conclusions: The risk of developing RAP and CP depends highly on risk factors. For RAP, smoking seems to play an essential role with equal high rates in combination with alcoholic and idiopathic/other etiology. For CP, combined alcohol use and smoking results in the highest cumulative risk. The strong association of pancreatic necrosis with RAP and CP provides support for the ‘necrosis-fibrosis-sequence’ as a potential pathophysiological mechanism for disease progression.

FO12-05

ROLE OF FREY’S PROCEDURE FOR CHRONIC PANCREATITIS – OUR EXPERIENCE & INITIAL RESULTS

Mukund Joshi1, Anurag Dadu1, Sudhir Dube1, Shaila Jadhav1 and Ranjana Bhadbhade2
1B. J. Medical College, India; 2Joshi Clinic, India

Introduction: In India we have a mixed spectrum of tropical calcific Pancreatitis & Alcoholic Pancreatitis. We selected Frey’s head coring procedure for the patients with predominant disease in head of Pancreas.

Method: Frey’s procedure was performed in 28/86 cases that were associated with head mass. Frey’s procedure involves coring of the pancreatic head along with laying open of the pancreatic duct & lateral anastomosis. Male to female ratio was 4:1. Age group ranged from 24 to 60 years. The main complaint was epigastric pain and weight loss. 64/86 cases were those with features of Tropical calcific pancreatitis (TCP) with no history of Alcoholism & 22/86 gave history of Chronic alcoholism. Ultrasonography and CT scan were performed in all patients. 32/86 cases were shown to have complicated disease in the head. 28/32 patients underwent Frey’s procedure. Selection of patients for Frey’s procedure was made by radiological assessment in 21/28 & in 7/28 cases during Surgery. 6/28 patients were diagnosed to have diabetic status. Average blood loss was 350 cc. Mean operation time was 4:30 hours.

Results: There was no mortality. 2 patients had superficial wound infections. Six patients had melena for average of 5 days. Mean post-operative hospital stay was 14 days. 24/28 patients had excellent pain relief in the early post-operative period especially in the alcoholic group.

Conclusions: Frey’s procedure is more elaborate than classical longitudinal pancreatico-jejunalostomy. The diabetic status remained unchanged. Frey’s procedure offered better pain relief than with lateral pancreatico-jejunalostomy alone and appears less cumbersome than Beger’s procedure. Advantage of Frey’s procedure in the TCP group of patients needs to be assessed further. Frey’s Procedure seems ideal for the disease predominantly in the head of pancreas with H/O alcoholism.

FO12-06

RESULTS OF WITH CHRONIC PANCREATITIS SURGICAL TREATMENT FOR PATIENTS WITH FIXED OBSTRUCTION-COMPLICATED INTRAPANCREATIC PORTION OF THE DISTAL COMMON BILE DUCT

Alexey Shabunin, Vladimir Bedin and Alexey Gerasimov
Moscow Pirogov’s state hospital #1, Russia

Introduction: Improve the results of surgical treatment of patients with chronic pancreatitis complicated by fixed obstruction of the intrapancreatic portion of the distal common bile duct.

Method: From 2003 to 2012 there were treated 111 chronic pancreatitis patients with predominant lesions of
the pancreatic head. Fixed obstruction of the intrapancreatic portion of the distal common bile duct was detected in 35 (31.5%) patients, of which 30 (27%) patients demonstrated obstructive jaundice of varying severity.

In the presence of obstructive medium to severe jaundice, cholangitis, and severe comorbidity, as the first step to decompression of the bile duct, endoscopic retrograde cholangiopancreatography (ERCP) with retrograde endobiliary stenting was performed for 15 procedures. In the absence of conditions for retrograde decompression, percutaneously transhepatic biliary drainage method was applied for 10 procedures.

83 (74.8%) patients underwent the following types of surgical treatment: 18 (21.7%) - pylorus-preserving pancreatic duodenedectomy, isolated resection of pancreatic head – 65 (78.3%), Beger procedure – 7 (8.4%), Beger procedure in Berne modification - 58 (69.9%), of which 18 (21.7%) with intraparenchymal bilio-pancreatico-digestive anastomosis and 17 (20.5%) – with hepaticojejunostomy by Roux.

Results: The rate of postoperative complications was 18% (15 cases), with fatalities - 1 (1.2%). The results revealed that of the 18 (21.7%) patients who underwent the formation of internal bilio-pancreatico-digestive anastomosis, 6 (33.3%) patients were subsequently diagnosed with symptoms of biliary hypertension as a consequence of scar stricture of anastomosis. This required a re-surgery forming holedoheoyunostomy by Roux on a previously excluded section. In a retrospective analysis, the inner diameter biliopancreatic anastomosis formed in these patients was less than 8 mm.

Conclusions: Forming the inner bilio-pancreatico-digestive anastomosis diameter of 8 mm minimum, a high risk of its scar stricture development exists, which requires a consequential surgical re-treatment: forming of the hepaticojejunostomy by Roux.

FO12-07

COST-EFFECTIVENESS OF EARLY LAPAROSCOPIC CHOLECYSTECTOMY FOR MILD ACUTE GallSTONE PANCREATITIS

Steve Morris1, Kurinchi Gurusamy2, Nishma Patel1 and Brian Davidson2

1University College London, United Kingdom;
2University College London and Royal Free Hospital, United Kingdom

Introduction: A recent Cochrane review found that laparoscopic cholecystectomy performed within 3 days after onset of mild acute gallstone pancreatitis was safe and shortened overall hospital length of stay (LOS). We compared the cost-effectiveness of laparoscopic cholecystectomy performed within 3 days, after 3 days but during the initial admission or on a subsequent admission.

Method: Model based cost-utility analysis estimating mean costs and quality-adjusted life years (QALYs) per patient from the perspective of the UK National Health Service over a 1 year time horizon. A decision tree model was constructed and populated with probabilities, outcomes and cost data from published sources, including one-way and probabilistic sensitivity analyses.

Results: Laparoscopic cholecystectomy within 3 days of admission produced savings of £668–£842 per patient. Differences in QALYs were negligible compared to laparoscopic cholecystectomy beyond 3 days but within the same admission, the next best treatment option. Early laparoscopic cholecystectomy had a 91% probability of being cost-effective at a maximum willingness to pay for a QALY of £20,000 to £30,000.

Conclusions: Performing laparoscopic cholecystectomy for mild acute gallstone pancreatitis within 3 days of admission is cost effective. Adopting this within the NHS would result in an annual cost saving of approximately £2.9 million.

FO12-08

BENEFICIAL EFFECT OF GARLIC (ALLIUM SATIVUM) ON L-ARGININE INDUCED CHRONIC PANCREATITIS IN RATS

Surendra Kumar Sharma1, SatyaVati Rana1, Deepak Kumar Bhasin1, Surinder Rana1, Ritabhara Nada2 and Samir Malhotra2

1Post Graduate Institute of Medical Education and Research, India; 2Post Graduate Institute of Medical Education and Research, Sector-12, India.

Introduction: Protective role of Garlic (Allium sativum) has been reported in various chronic diseases in human as well as animals. However it’s role in chronic pancreatitis has not yet been studied.

Method: 36 Wistar rats of either sex were divided into 6 groups. Group 1 (Control): Rats were given IP injections of normal saline on day 1, 4, 7, 10, 13, 16 & 19 and water intragastrically daily 2 days before starting IP injections.

Group 2: L-arginine hydrochloride (250 mg/100 g bw/day) IP injections in 2 repeated doses of 1 hour interval on day 1 and single dose on day 4, 7, 10, 13, 16 & 19. Group 3–5: Rats received freshly homogenized Garlic in water intragastrically at different doses i.e. 0.1, 0.25, 0.50 g/kg b.wt daily 2 days before starting IP injections of L-arginine as per group 2. Group 6: Animals received freshly homogenized garlic alone at highest dose of 0.5 g/kg b.wt. Levels of serum amylase, lipase, TNF-α and pancreatic glutathione (GSH) & lipid peroxidation (LPO) were studied on day 21. H&E and Masson’s trichrome stain were used for histology.

Results: Levels of serum amylase & lipase were significantly higher in arginine group as compared to control group and they significantly decreased with supplementation of 0.25, 0.5 g/kg b.wt. of garlic. Levels of LPO in pancreatic tissue were significantly higher where as GSH levels were significantly lower in arginine group. In garlic treated groups, GSH levels were significantly increased (p < 0.05) while LPO decreased significantly (p < 0.05) as compared to L-arginine group. Histologically, fibrosis, fat infiltration and acinar atrophy scores were significantly higher in arginine group as compared to garlic treated group. Levels of serum TNF-α found significantly higher (p < 0.05) in L-arginine group as compared to garlic groups.

Conclusions: Garlic supplementation (0.25 g/kg bw/day) significantly reduced severity of chronic pancreatitis in experiment model of rats.
FO13-01
A SYSTEMATIC REVIEW AND META-ANALYSES OF HEPATIC ARTERY BASED THERAPIES FOR UNRESECTABLE INTRAHEPATIC CHOLANGIOCARCINOMA
John Miura, Lucas Boehm, Thejus Jayakrishnan, Kiran Turaga, Fabian Johnston, Susan Tsai and Thomas Gamblin
Medical College of Wisconsin, USA
Introduction: Intrahepatic cholangiocarcinoma (ICC) is a rare cancer that often presents as unresectable. Hepatic artery based therapies (HAT) are offered for these patients with potential impact on their survival. The present study is a systematic review and meta-analyses of current evidence on the comparative effectiveness of HAT – hepatic artery infusion (HAI), transcatheter arterial chemoembolization (TACE), drug-eluding bead TACE (DEB-TACE), and Yttrium$^{90}$ radioembolization (Y90) for unresectable ICC.

Method: A prospectively registered study protocol (PROSPERO International registry of systematic reviews ID CRD42013004830) utilized specific key words to find peer-reviewed, English language articles published in PubMed (1990–2013). Eligible articles were selected using predetermined inclusion-exclusion criteria. The primary outcome was median overall survival (OS), and the secondary outcome was tumor response (RECIST criteria).

Results: Of the 793 articles identified in our search strategy, 20 were selected for data extraction (n = 627 patients). Complete tumor response was reported in two patients (one TACE and one DEB-TACE). Partial response to therapy was highest with HAI (41.3%, range 12–100%, n = 63) vs. DEB-TACE (32.4%, range 4.2–90%, n = 34) vs. Y-90 (26.4%, range 10.5–35.3%, n = 121) vs. TACE (12.6%, range 0–45%, n = 333). Incidence of progressive disease was lowest in HAI (12.7%, 3.8–20%) and highest with TACE (25.5%, 0–75%). The rates were intermediate for Y-90 (14.9%, 4.5–21.7%) and DEB-TACE (20.6%, 0–29.1%). Median OS (calculated from the date of initiation of HAT) was highest for HAI (21, 11–31) months compared to Y-90 (14, 9–22) months vs. TACE (13, 6–16) months vs. DEB-TACE (12, 12–13) months.

Conclusions: In the present comparative effectiveness study of hepatic artery based therapies for unresectable ICC, hepatic artery infusion (HAI) reported best outcomes in terms of overall response to therapy and median OS. The comparative cost-effectiveness and optimization by patient and disease characteristics are a focus for future research.

FO13-02
HISTOLOGIC DETERMINATION OF THE PRIMARY SITE OF PERIHILAR CHOLANGIOCARCINOMA BASED ON MICROSCOPIC TUMOR INVASION OF THE VASCULO-BILIARY SHEATHS
Toshifumi Wakai, Jun Sakata, Yuki Hirose, Tomohiro Katada, Natsuru Sudo, Taku Ohashi, Kazuyasu Takizawa, Kabuto Takano, Takashi Kobayashi and Masahiro Minagawa
Niigata University Graduate School of Medical and Dental Sciences, Japan
Introduction: This study aimed to histologically characterize microscopic tumor invasion of the vaso-biliary sheaths in perihilar cholangiocarcinoma so as to determine the primary tumor site and to clarify clinicopathologic differences according to the primary site.

Method: A retrospective analysis was conducted of 52 patients who underwent resection for perihilar cholangiocarcinoma involving both the hepatic hilus and the liver, verified histologically. Histologic features of the vaso-biliary sheath invasion were evaluated by double staining with hematoxylin-eosin to assess general morphology and Victoria Blue to detect the elastic fibers of the vaso-biliary sheaths.

Results: In the present study, determination of the primary site of perihilar cholangiocarcinoma is possible in clinical cases, by using double staining with hematoxylin-eosin and Victoria Blue to discriminate between tumors of extrahepatic and intrahepatic origin. The perihilar cholangiocarcinomas were classified into extrahepatic-type (34 patients), featuring an extrahepatic component involving the liver through the vaso-biliary sheaths, and intrahepatic-type (18 patients), featuring an intrahepatic component involving the hepatic hilus through the vaso-biliary sheaths. Hemihepatectomy with extrahepatic bile duct resection was the most common surgical procedure. Tumor size (p = 0.002), pN classification (p = 0.005), and pM classification (p = 0.023) were significant independent prognostic factors. The primary site was not significantly associated with survival after resection (p = 0.214), as patients with extrahepatic-type tumors had a cumulative 5-year survival rate of 32%, compared with 28% for patients with intrahepatic-type tumors.

Conclusions: Double staining with hematoxylin-eosin and Victoria Blue permits histologic discrimination between tumors of extrahepatic and intrahepatic origin, and thereby determination of the primary tumor site in clinical cases of perihilar cholangiocarcinoma. Combining extrahepatic-type and intrahepatic-type tumors under the term perihilar cholangiocarcinoma is valid clinically, as these tumors show comparable surgical outcomes with similar clinical management.
FO13-03

CLINICOPATHOLOGICAL FEATURES AND SURGICAL OUTCOMES OF INTRADUCTAL PAPILLARY CHOLANGIOCARCINOMA: COMPARISON WITH FLAT-TYPE CHOLANGIOCARCINOMA

Sungho Jo and Sanghyun Song
Dankook University Medical College, Korea

Introduction: Despite a marked clarification for intraductal papillary neoplasm of the bile duct over recent several years, its malignant form, intraductal papillary cholangiocarcinoma (IPC), remains unknown and has been vaguely considered to have a good prognosis. This study was performed to evaluate clinicopathological features and prognosis of IPC, compared with conventional flat-type cholangiocarcinoma (FTC).

Method: Between July 1995 and June 2013, a total of 85 patients underwent surgical resections with curative intent for intrahepatic and extrahepatic cholangiocarcinoma at Dankook University Hospital. The patients were divided into two groups according to the permanent pathologic diagnosis; IPC and FTC group. The clinicopathological characteristics and long-term outcomes were compared between both groups.

Results: A total of 11 patients (12.9%) received surgical resection for IPC. Mean age of the patients with IPC was 57.7 (38–72 years) and male patients were dominant. Of them, two patients underwent surgery for recurrent lesions in a regional lymph node and remnant distal bile duct, respectively, and are now in disease-free status. One patient was postoperative mortality and two patients died of recurrent disease about 1 and 4 years after surgery. There were no statistical differences in age, gender, tumor location, hospital mortality, and disease-free survival between the groups. However, surgical radicality, stage, and overall survival were better in the IPC group. The overall 3-year and 5-year survival rates of the patients with IPC were 81.8% and 68.2%.

Conclusions: The patients with IPC showed an excellent prognosis compared to the patients with FTC. In addition, an aggressive surgery for recurrent IPC could prolong survival in selected cases.

FO13-04

BISMUTH-CORLETTE TYPE IV PERIHILAR CHOLANGIOCARCINOMA: IS THERE NO CLINICAL BENEFIT OF SURGERY?

Dae Wook Hwang, Yoo-Seok Yoon, Jai Young Cho, Young Ki Kim, Woohyung Lee, Hong Kyung Shin and Ho-Seong Han
Seoul National University Bundang Hospital, Korea

Introduction: According to the seventh edition of the AJCC Cancer Staging Manual, Bismuth-Corlette (BC) type IV perihilar cholangiocarcinoma is T4 and stage IVA, by itself, with the median survival of patients is 8 – 13 months. In this study, improved clinical outcomes could be obtained by aggressive surgical approach for the patients who were diagnosed BC type IV, preoperatively.

Method: A total of 19 patients underwent surgery for BC type IV hilar cholangiocarcinoma at the Seoul National University Bundang Hospital, from 2004 to 2012. Clinical, radiological, and pathological data were analyzed retrospectively. Concomitant hepatic resection was performed in 17 patients, but only staging laparotomy in two patients.

Results: The mean age was 65.8 ± 9.8 (range 46–80) years, and the proportion of gender was 3.75:1 (15 males and 4 females). For the type of hepatic resection in 17 patients received curative intent surgery, extended left hepatectomy was performed in 9 patients, extended right hepatectomy in 5 patients, and left hepatectomy / right hepatectomy / right trisectionectomy in 1 patient, respectively. The mean operative time was 442.2 ± 108.7 minutes, and the mean estimated blood loss was 1,183.7 ± 752.5 mL. The rate of R0 resection was 52.6% (10/19). The morbidity was 52.6% (10/19), and there was no in-hospital mortality. The median overall survival of patients was 24.0 months and 11 patients still survive more than 15 months after surgery.

Conclusions: Even aggressive surgical approaches, it is difficult to obtain R0 in BC type IV patients. However, some changes including active adoption of left-sided hepatectomy and multidisciplinary approach enhances the outcomes in BC type IV, Stage IVA perihilar cholangiocarcinoma.

FO13-05

SURGICAL TREATMENT OF PERICHILAR CHOLANGIOCARCINOMA WITH VASCULAR INVASION

Oleg Kotenko, Denis Fedorov, Alexander Grinenko, Alexander Korshak, Alexey Popov, Andrey Gusev and Marat Grigoryan
National Institute of surgery and transplantology, Ukraine

Introduction: Vascular invasion is a main cause irresectability of perihilar cholangiocarcinoma. However innovative surgical technologies allow resecting involved portal vein with acceptable mortality. Invasion of the hepatic artery, often combined with invasion of portal vein, still remains the most serious obstacle in resection of this disease.

Method: The aim of our study was to assess results of surgical treatment of perichilar cholangiocarcinoma with portal vein and hepatic artery invasion.

Results: We studied results of surgical treatment 136 patients with Klatskin tumor period 2003–2012 years. T2a TNM stage had 1.6% patients, T2b – 2.2% patients, T3 TNM stage had 38% patients, and most patients had T4 stage TNM (58% patients). Bismuth type B2 had 1 patient, B2a – 41 patients, B3b – 36 patients, B 4 – 58 patients. In patients with small remnant liver volume less than 40%, we did preoperative PV embolization of a resected part of the liver. PV resection was made 71 (52.2%) patients, Right HA resection and reconstruction we did for 8 cases, com-
bined PV and HA resection and reconstruction we did for 8 cases, hepatopancreatoduodenectomy for 7 patients. In all cases we made extended lymphadenectomy. Mortality was 8.1% (11 patients). 3 and 5 years recurrence-free survival was higher in group with R0 resection 33.3% and 20.8% respectively, for patients with vascular reconstruction – 14.6 and 6.3%, and was smaller for group with R1 resection. 3 and 5 years survival was higher in group with R0 resection 58.3% and 33.3% respectively, for patients with vascular reconstruction – 31.5% and 18.8%, and was smaller for group with R1 resection – 22.2% and 11.1%.

Conclusions: Aggressive surgical treatment for cholangiocarcinoma the confluence of bile duct with hepatic artery and portal vein resection can be performed safely with acceptable lethality and long term survival rate.

FO13-06
HILAR CHOLANGIOCARCINOMA IN CIRRHOTIC LIVER
Mohamed El Sorogy\(^1\) and Mohamed Wahab\(^2\)
\(^1\)Assistant lecturer of General and digestive surgery, Egypt; \(^2\)Professor, Egypt

Introduction: Despite great evolution in surgery and surgical techniques, resectional surgery for central cholangiocarcinoma remains a challenge especially in cirrhotic patients. Despite great evolution in surgery and surgical techniques, resectional surgery for central cholangiocarcinoma remains a challenge especially in cirrhotic patients.

Method: Between January 1995 and December 2010, 243 patients with central cholangiocarcinoma underwent surgical resection at gastro-enterology surgical center, Mansoura University. Of these patients, 102 were cirrhotic while 141 had normal livers. Their mean age was 54.2 years ± 9.6 for cirrhotic group and 52.5 years ± 10.2 for non cirrhotic group.

Regarding sex, 65% of cirrhotic group were males, 35% were females and 53% of non cirrhotic group were males, 47% were females.

All patients presented with jaundice while pain was present in 47% in cirrhotic group and 27% in non cirrhotic group, weight loss in 43% in cirrhotic group and 47% in non cirrhotic group.

Pre operative biliary drainage was done in 47% of patients in cirrhotic group and 42% in non cirrhotic group. Major surgical resection was done in 59.8% in cirrhotic group and 79.4% in non cirrhotic group. While segment 1 resection done in 26.5% in cirrhotic group and 53.2% in non cirrhotic group.

Results: Hospital mortality occurred in 3.9% of cirrhotic patients and 2.8% in non cirrhotic patients. Post operative complications included liver cell failure in 26.5% of cirrhotic patients and 8.5% of non cirrhotic patients, bile leak in 40.2% in cirrhotic and 29.1% in non cirrhotic patients, internal hemorrhage in 7.8% of cirrhotic and 5% in non cirrhotic patients.

Recurrence occurred in 44.1% in cirrhotic and 33.4% in non cirrhotic patients.

Conclusions: As a conclusion, hepatic resection for hilar cholangiocarcinoma in cirrhotic liver, although risky, can be achieved with good surgical technique and experienced surgical team.

FO13-07
HILAR CHOLANGIOCARCINOMA: PREOPERATIVE LIVER OPTIMIZATION WITH MULTIDISCIPLINARY APPROACH. TOWARDS BETTER OUTCOME
Francesca Ratti, Federica Cipriani, Fabio Ferla, Marco Catena, Michele Paganelli and Luca Aldrighetti
San Raffaele Hospital, Italy

Introduction: Klatskin tumour is a relatively rare disease with a poor prognosis: currently the only possible treatment is represented by the removal of the tumour associated with radical surgery, still associated with significant morbidity and mortality; short term outcome is therefore related to a proper preoperative optimization of the patient, consisting of staging laparoscopy, biliary drainage and portal vein embolization. The aim of this study was to evaluate the short-and long-term impact of preoperative optimization in patients affected by hilar cholangiocarcinoma.

Method: From January 2004 to May 2012, 94 patients with preoperative diagnosis of Klatskin tumours were candidates to surgery. The data of all patients were prospectively collected and retrospectively reviewed. The outcome was evaluated in terms of perioperative morbidity and mortality and overall and disease-free survival. Short term outcome of patients undergoing preoperative optimization was compared to outcome of patients who did not require it.

Results: Of 94 patients undergoing surgery, 80 underwent hepatic and biliary carrefour resection. Fourteen patients were considered unresectable due to the presence of peritoneal carcinomatosis or advanced disease seen during staging laparoscopy or at laparotomy and were therefore excluded from the analysis. Seventy-five (93.7%) patients underwent major liver resections: in 14 of these, surgery was performed at a distance of 30–40 days from PVE. In 55 patients biliary drainage was preoperatively placed for palliation of obstructive jaundice. The postoperative morbidity rate was 51.2% and mortality 6.2%. The most frequent cause of death was postoperative liver failure. 5 years survival rate was 29%. Patients undergoing preoperative optimization experienced a significant reduction of postoperative morbidity, especially in terms of infectious related events.

Conclusions: Klatskin tumour still remains a disease associated with poor prognosis, but a correct preoperative diagnostic and therapeutic management provides tools to perform this type of surgery with acceptable morbidity and mortality, improving long term results.
FO13-08

SURGICAL TREATMENT FOR RECURRENT BILIARY CARCINOMA: RESULTS OF 23 RESECTED CASES

Takehiro Noji1, Takahiro Tsuchikawa2, Yuma Ebihara2, Soichi Murakami2, Eiji Tamoto2, Toru Nakamura2, Joe Matsumoto2, Eiichi Tanaka2, Toshiaki Shichinohe2 and Satoshi Hirano2
1Yakumo General Hospital, Japan; 2Graduate School of Medicine, Hokkaido University, Japan

Introduction: Few reports have described surgical treatment for recurrent biliary carcinoma. The purpose of this study was to evaluate surgical treatment for recurrent biliary carcinoma.

Method: This case-control study was conducted to investigate the feasibility of surgical intervention for recurrent biliary cancer following radical operation. From February 2000 to February 2013, a total of 30 patients underwent laparotomy for recurrent biliary carcinoma. Seven patients underwent laparotomy alone, and the remaining 23 patients (14 men, 9 women; median age, 68 years; age range, 45-84 years) underwent resection.

Results: There were two cases (4 operations) of intrahepatic cholangiocarcinoma (IHC), 12 cases (14 operations) of extrahepatic bile duct cancer (ExHBDC), 7 cases (7 operations) of gallbladder carcinoma (GBC) and 2 cases (3 operations) of papilla of Vater carcinoma (PVC). Recurrent sites consisted of liver metastases (14 operations for 12 patients), local/istula recurrence (6 operations for 6 cases), bile duct recurrence (6 operations for 6 cases), lymph node recurrence (1 operation for 1 case) and lung metastasis (1 operation for 1 case). Median interval between primary resection and recurrent site resection (OI) was 19 months (range, 9-114 months). Overall 5-year survival rate was 32%. Median survival time was 20 months overall, 18.5 months for ExHBDC, and 11 months for GBC. Median survival times with liver metastasis, bile duct recurrence, and local recurrence were 33 months, 7 months, and 11 months, respectively. Median survival times for OI >19 months and OI <19 months were 18.5 months and 29.4 months, respectively. No significant differences were evident in survival between groups (p = 0.120). Five patients showed long-term survival (3 cases with liver metastases, 1 with lymph node recurrence, and 1 with locoregional recurrence).

Conclusions: Surgical treatment for selected patients with recurrent biliary carcinoma appears feasible.

FO14-01

PREOPERATIVE NEUTROPHIL-LYMPHOCYTE RATIO PREDICT SURVIVAL AFTER RESECTION FOR PANCREAS CANCER PATIENTS

Daisuke Ishii, Koichiro Uchida, Koji Imai, Mikako Gochi, Tomoyuki Seki, Kenji Watanabe, Masashi Miyamoto, Suguru Matsuoka and Masahiko Taniguchi
Asahikawa Medical University, Japan

Introduction: To select the candidates for resection for pancreas cancer (PC) via radiographic appearances, response to chemotherapy or biomarker provide favorable outcome due to their aggressive biological behavior and high perioperative mortality. Recently inflammatory response to cancer progression and recurrence had been reported in several cancer but few in PC. Aim of this study is to evaluate the impact of preoperative neutrophil-lymphocyte ratio (NLR) on outcome after resection for PC.

Method: From 2000 to 2010, 76 consecutive R0 or R1 resection were performed for PC. Follow up is until DEC 2012. The date were retrospectively corrected and analyzed.

Results: Median follow-up of 24 months. The 5-year overall survival (OS) and disease free survival (DFS) rate are 34.0% and 22.0% respectively. Lymphatic invasion, lymph node metastasis, portal vein invasion (PVI), preoperative NLR ≥5 (n = 5) and platelet lymphocyte ratio were associated with both poor survival and early recurrence in univariate analysis. Multivariate analysis showed that lymph node metastasis and also NLR ≥5 were independent factors associated with both early recurrence and poor survival.

Conclusions: High inflammatory circumstance, such as NLR ≥5, has significant impact on survival for resected PC patients. Preoperative NLR measurement provides simple method of identifying patients with the high biological activity of PC.

FO14-02

THE IMPLICATIONS OF PERITONEAL WASHING CYTOLOGY IN RESECTABLE PANCREATIC CANCER

Osamu Kainuma, Hiroshi Yamamoto, Akihiro Cho, Yorihiko Muto and Hiroo Yanagibashi
Chiba Cancer Center, Japan

Introduction: Positive peritoneal washing cytology (PWC) is a poor prognostic factor in resectable advanced-stage pancreatic cancer. However, the implications of PWC in resectable pancreatic cancer are still controversial. Strategy of treatment for PWC patients has not yet established. The aim of this study is to investigate the implications of PWC in patients with pancreatic cancer and efficacy of postoperative chemotherapy for PWC patients.

Method: Between January 2006 and December 2012, a total of 140 patients with pancreatic cancer were explored peritoneal washing cytology at the time of pancreatic resection. Malignant cells were identified in 19 patients (13.5%). Curative intent operation was performed irrespective of cytological status. The prognostic factors were evaluated in univariate and multivariate analysis. Adjuvant chemotherapy was ordinary performed for 6 months in negative cytology patients, but was administered as long as possible until recurrence was noticed in PWC patients. Log-rank test and Cox proportional hazards model was used for statistical analysis.

Results: Preoperative CA19-9 level (1.000 ≤ U/mL), tumor location (pancreatic head), blood loss (1.000 mL), and PWC were poor prognostic factors in univariate analysis. On multivariate analysis, tumor location (HR, 1.686; 95% CI, 1.038–2.806; p = 0.035),
blood loss (2.022; 1.230–3.292; 0.007), and PWC (2.044; 1.017–3.924; 0.045) were independently associated with overall survival. Median survival time of PWC patients including 2 five-year survivors was 15.6 months. Mean duration of postoperative chemotherapy was 18.2 months (1.9–62.5) in PWC patients. Peritoneal recurrence in patients with negative and positive was observed in 14 (12%) and in 3 (16%), respectively.

**Conclusions:** PWC was one of the poor prognosis factors in pancreatic cancer. However, curative intent operation followed by long-term postoperative chemotherapy could be useful for selected patients. We should not exclude all PWC patients from surgical treatment. 

**FO14-03**

**THE PROGNOSIS ANALYSIS OF PORTAL VENOUS INVOLVEMENT BY PANCREAS DUCTAL ADENOCARCINOMA; ACCORDING TO THE LOCATION AND EXTENT OF VENOUS INVOLVEMENT**

Ji Woong Hwang1, Song Cheol Kim2, Jae Hoon Lee2, Ki Byung Song2, Jeong Su Nam2, Jong Hee Yoon2, Kwang-Min Park2 and Young-Joo Lee2

1Hallym University Chuncheon Medical Center, Korea; 2Asan Medical Center, Ulsan University, Korea

**Introduction:** The aim of this study is to evaluate the surgical outcome in patients with pancreas head cancer according to the location and extent of venous involvement.

**Method:** From January 2003 to December 2010, 124 patients were included who underwent pancreaticoduodenectomy (PD) or pylorus-preserving pancreaticoduodenectomy (PPPD) with concomitant venous resection. We classified subgroups according to the location (portal vein [PV] group, portal vein confluence [PVC] group, and superior mesenteric vein [SMV] group) and extent (Group A, the tumor surrounded up to 2/3 the vessel perimeter; Group B, the tumor extended over 2/3 of the vessel perimeter) of venous involvement on radiologic finding.

**Results:** Among portal vein resection group, the median overall survival of PV (n = 9), PVC (n = 36), and SMV group (n = 79) were 17.1 (5.1–29.1), 14.0 (8.9–19.1), and 18.6 (15.2–22.0) months, respectively (p = 0.042). Also, the median overall survival of Group A (n = 96) and B (n = 28) were 18.2 (14.0–22.4) and 13.6 (11.9–15.3) months, respectively (p = 0.008). PV, SMV group, and Group A showed similar surgical outcomes compared with conventional PPPD.

At univariate analysis, the location and extent of venous involvement were determined as significant prognostic variables. At multivariate analysis, the location of venous involvement (HR, 1.581 [95% CI, 1.015–2.465]; p = 0.043), the extent of venous involvement (HR, 1.840 [95% CI, 1.141–2.896]; p = 0.012), LN involvement (HR, 1.587 [95% CI, 1.041–2.419]; p = 0.032), and adjuvant chemotherapy (HR, 0.531 [95% CI, 0.339–0.833]; p = 0.006) independently predicted overall survival.

**Conclusions:** The surgical outcomes of PV group, SMV group, and Group A were comparable with conventional PPPD. Thus, surgical resection and adjuvant chemotherapy should be performed in these patients. However, the tumor invaded portal vein confluence or extended over 2/3 or the vessel perimeter had poorer prognosis. Therefore we recommend that neoadjuvant chemoradiotherapy should be applied in such patients.

**FO14-04**

**BIOLOGICAL MARKERS FOR IMMUNOHISTOCHEMICAL DIAGNOSIS OF PANCREAS DUCTAL ADENOCARCINOMA**

Leyo Ruo1, Sherrie Orr1 and Jasim Radhi2

1Juravinski Hospital and Cancer Centre, Canada; 2McMaster University Medical Centre, Canada

**Introduction:** Pancreas ductal adenocarcinoma (PDAC) is a lethal malignancy for which histologic diagnosis may be required for palliative chemotherapy. The objective of this study was to evaluate several commonly investigated immunohistochemical markers to specifically distinguish PDAC from benign processes, such as chronic pancreatitis.

**Method:** Molecular biomarkers (EGFR, IGFP, Mesothelin, p53) previously shown to be overexpressed in PDAC were chosen. We assessed the immunohistochemical expression of each marker in tissue samples representing PDAC, chronic pancreatitis, and normal pancreatic parenchyma from almost 100 patients. Each marker was evaluated for its ability to diagnose PDAC in histologic specimens.

**Results:** The sensitivity (96%) and specificity (100%) for diagnosis of pancreas cancer was best for mesothelin, which was able to consistently identify PDAC in tissue samples and distinguish it from both chronic pancreatitis and normal pancreas. The positive likelihood ratio for mesothelin could not be determined as the calculated positive predictive value was 100% with a negative predictive value of 94%. IGFP was sensitive (95%) but not specific (31%), whereas p53 was less sensitive (71%) but retained high specificity (96%). EGFR had a sensitivity of 90% and specificity of 77% for diagnosis of PDAC. The positive likelihood ratio was 17 (95% CI 2.5–116) for p53 and 3.9 (95% CI 2.6–5.9) for EGFR. The negative likelihood ratio was best for mesothelin (0.044, 95% CI 0.02–0.12) with acceptable values for EGFR (0.13, 95% CI 0.07–0.25) and IGFP (0.16, 95% CI 0.06–0.44) that could also be applied to estimating the probability for diagnosis of PDAC.

**Conclusions:** Strong mesothelin expression in pancreatic ductal adenocarcinoma samples, but not in chronic pancreatitis or normal pancreas samples, confirms that this marker may have some diagnostic utility in discriminating between neoplastic and nonneoplastic pancreatic ductal epithelium.
FO14-05

CLINICAL EFFICACY OF STAGING LAPAROSCOPY IN PATIENTS WITH RADIOGRAPHICALLY-DEFINED LOCALLY ADVANCED PANCREATIC CANCER

Hironori Ryota
Kansai Medical University, Japan

Introduction: The aims of this study were to verify whether staging laparoscopy (stag-lap) is useful for detecting the presence of occult distant organ metastasis, and to find prognostic factors in patients with radiographically-defined (RD-LA) locally advanced pancreatic cancer.

Method: Stag-lap was performed in 58 patients with RD-LA pancreatic cancer, who were divided into 4 groups according to metastatic site: Group CY (peritoneal fluid or washing cytology positive and without any distant organ metastasis); Group P (peritoneal dissemination); Group L (liver metastasis); Group LA (pure locally advanced pancreatic cancer without positive cytology and any distant organ metastasis). Clinical backgrounds and survival curves were compared among groups, and prognostic factors were investigated for this population. All patients were followed up for at least one year.

Results: Exploration using stag-lap demonstrated positive cytology in 16 patients (CY, 25%), peritoneal dissemination in 13 patients (P, 20%), liver metastasis only or concomitant with peritoneal metastasis in 8 patients (L, 13%), and locally advanced disease in 27 patients (LA, 42%). Median survival time was 13 months in the CY group (including 2 resected patients) or 12 months in the LA group (including 1 resected patient), which was significantly better than 7 months in the P or L group, respectively (p < 0.05).

The rate of emergence of ascites in LA was significantly better than in CY or P group (Kaplan-Meier, p < 0.05). Multivariate analysis showed that the presence of partial response on CT scan and Gemcitabine and S-1 administration were significant independent prognostic factors.

Conclusions: Patients with pure locally advanced pancreatic cancer comprised only 42% of patients with RD-LA pancreatic cancer who underwent stag-lap. Gem/S-1 administration and responsiveness to chemotherapy were associated with favorable prognosis.

FO14-06

THE CLINICAL IMPACT OF PATHOLOGICAL SUBTYPE AND FACTORS PREDICTING SURVIVAL IN PATIENTS WITH AMPULLARY ADENOCARCINOMA

Keiichi Okano, Naoki Yamamoto, Minoru Oshima, Eisuke Asano and Yasuyuki Suzuki
Kagawa University, Japan

Introduction: Ampullary adenocarcinomas arise from the epithelium of the pancreas, biliary duct, or the ampulla itself. The aims of this study were to identify clinicopathological factors associated with survival and clarify the characteristics of 2 different pathological subtypes of ampullary adenocarcinoma.

Method: The medical records of 101 patients who were treated for ampullary neoplasms between 2000 and 2012 at 12 principal hospitals in Kagawa prefecture, Japan, were reviewed. The histological subtype was reviewed prospectively by a pathologist blinded to the clinical outcomes.

Results: The actuarial 1-, 3-, and 5-year postoperative survival rates for ampullary adenocarcinomas (94 patients) were 84%, 67%, and 63%, respectively. Preoperative biliary drainage, serum levels of CA19-9 (>36 U/mL) and total bilirubin (>1.0 mg/dL), pathologic grade (moderately to poorly), perineural invasion, vascular invasion, lymphatic invasion, pancreatic invasion, nodal metastasis, and pancreatobiliary subtype were predictor for poor survival. In multivariate models, only an elevated serum CA19-9 level predicted survival (HR 5.6; p = 0.023). Patients with pancreatobiliary type tumors presented with elevated serum CA19-9 and total bilirubin levels and lymphatic, perineural, and pancreas invasion more often than patients with intestinal type tumors; they also had an advanced overall stage. Preoperative endoscopy revealed a red coloration more frequently in intestinal type tumors.

Conclusions: An elevated serum CA19-9 level is an independent prognostic factor for ampullary cancer and is associated with pancreatobiliary type tumors. Pancreatobiliary type adenocarcinoma is characterized by aggressive invasiveness and poor survival.
tumors (2/26 vs. 21/45). In patients with small tumors, 5% had recurrent disease compared with 38% patients with large tumors (p < 0.05). After an average follow-up of 45 months, 11 patients died. Six patients died of disease progression, 2 patients with a small tumor.

Conclusions: Tumors size \( \leq 2 \) cm is associated with more tumor grade 1, lower risk of nodal metastasis in resected specimen and recurrent disease. However, there were no differences in overall survival. In patients with small tumors, intensive follow-up may be considered as an alternative for resection.

**FO14-08**

**PANCREATICODUODENECTOMY, VOLUME AND OUTCOME EFFECT: AN AUSTRALIAN INSTITUTION EXPERIENCE**

Olukunle Onasanya, Mark Boccola, Valery Usatoff, Marty Smith, Julian Choi, Nezor Houli and Stephen Chan

*Western Hospital, Footscray, Victoria 3011, Australia*

**Introduction:** Surgical resection remains the only potentially curative option in the management of pancreatic cancer. Although the inverse relationship between hospital volume and outcome following pancreaticoduodenectomy has been reported in many countries, there is a paucity of data concerning this in Australia. Our goal is to assess if better operative outcome is a function of high volume of resection. We consider our institution as a medium-high volume centre as we perform about 10 Whipple’s operation in a year.

**Method:** A retrospective review of the records of 86 patients that underwent pancreaticoduodenectomy (Whipple’s procedure) in Western Hospital between 2002 and 2012 was conducted. Data pertaining to procedure, histology, in-hospital mortality, length of admission, complications, follow-up and survival were analysed. Survival was established through hospital records, information from operating surgeons’ room and General Practitioners’ records.

**Results:** 97% of patients were successfully discharged from hospital with a mean hospital stay of 12 days. In addition, about 10% of our patients had grade 4 operative complications and above, while only 1% of our patients had grade C pancreatic fistula. The overall 5-year survival rate in patients with histological confirmation of carcinoma was 20%.

**Conclusions:** Our result is comparable to what obtains internationally, that high volume centres are linked with better outcomes. Is it time to consider centralization of pancreaticoduodenectomy in Australia?

**FO15-01**

**CONTRAST-ENHANCED INTRAOPERATIVE ULTRASONIC CHOLANGIOGRAPHY FOR REAL-TIME BILIARY NAVIGATION IN HEPATOBILIARY SURGERY**

Takeshi Urade, Takumi Fukushima, Motofumi Tanaka, Masahiro Kido, Atsushi Takebe, Kaori Kuramitsu, Masashi Chuma, Tetsuo Ajiki, Ippei Matsumoto and Yonson Ku

*Kobe University Graduate School of Medicine, Japan*

**Introduction:** Precise assessment of biliary anatomy during hepatobiliary operations is necessary to prevent biliary complications. Although radiographic intraoperative cholangiography (IOC) has been widely used, it has several drawbacks; it exposes patients and medical staff to radiation; it requires a large C-arm machine for fluoroscopy as well as an attendant to operate it; and it requires special techniques to generate 3D images. Contrast-enhanced intraoperative ultrasonic cholangiography (CE-IOUSC) can address these issues. In this study, we demonstrate the usefulness of CE-IOUSC using an ultrasound contrast agent (Sonazoid) as a tool for real-time biliary navigation.

**Method:** From April 2012 to August 2013, 25 patients were scheduled to undergo hepatobiliary surgery including open hepatectomy and/or bile duct resection. CE-IOUSC was performed using an ApioXG ultrasound imaging system with a 4D probe, a T-shaped intraoperative linear probe and a micro-convex probe (Toshiba Medical Systems). After temporary clamping of the common bile duct, diluted Sonazoid was injected via a 4Fr transcystic catheter. 3D CE-IOUSC using the 4D probe was performed to delineate the biliary tree. 2D CE-IOUSC of the entire liver was performed using the linear probe. If necessary, 2D CE-IOUSC of the hepatic hilum was also performed using the micro-convex probe.

**Results:** 2D and 3D CE-IOUSC clearly visualized the biliary tree from CHD to the peripheral branches. The detectability for CHD, LHD, RHD, and peripheral branches was 96%, 92%, 92%, and 96% in 2D and 84%, 88%, 88%, and 92% in 3D, respectively. No intraoperative or postoperative complications related to Sonazoid occurred.

**Conclusions:** CE-IOUSC is a feasible and valuable procedure that provides 3D mapping and 2D regional anatomy of the biliary tree for real-time biliary navigation. This novel technique has the potential to supersede radiographic IOC because it is a less invasive, convenient, real-time, repeatable modality for obtaining useful biliary information for hepatobiliary surgeons.

**FO15-02**

**4D FUSION IMAGING SYSTEM FOR ULTRASONOGRAPHY**

Yoshihiro Nagao, Michele Diana, Patrick Pessaux, Peter Halvax, Damien Metz, Sung woo Cho, Yu-Yin Liu, Didier Mutter and Jacques Marescaux

*IRCAD-IHU, University Hospital of Strasbourg, France*

**Introduction:** In this study, ACUSON S3000™, mounting a novel ultrasound technology called 4D fusion
FO15-04
DIAGNOSTIC VALUE OF A PANCREATIC MASS ON COMPUTED TOMOGRAPHY IN PATIENTS UNDERGOING PANCREATEODUODENECTOMY FOR PRESUMED PANCREATIC CANCER

Arja Gerritsen1, Thomas L. Bollen2, Yung Nio3, I. Quintus Molenaar1, Koert P.De Jong4, Erwin Van der Harst5, Michael F. Gerhards6, Casper H.Van Eijck7, Olivier R.C. Busch8 and Marc G.H. Besselink3

1University Medical Center Utrecht, The Netherlands; 2St.Antonius hospital Nieuwegein, The Netherlands; 3University Medical Center Groningen, The Netherlands; 4Maasstad Ziekenhuis Rotterdam, The Netherlands; 5Erasmus Medical Center Rotterdam, The Netherlands; 6OLVG, The Netherlands; 7Erasmus Medical Center Rotterdam, The Netherlands

Introduction: Some patients undergoing pancreatoduodenectomy for suspected malignancy are ultimately diagnosed with benign disease. We aimed to determine the diagnostic value of a pancreatic mass on computed tomography (CT) in patients with presumed pancreatic cancer and the additional value of reassessment by expert-radiologists.

Method: We performed a multicenter retrospective cohort study in 1,629 consecutive patients undergoing pancreatoduodenectomy for suspected malignancy (2003–2010). All patients with unexpected benign disease at postoperative pathological diagnosis were...
included in a 1:3 ratio with random patients with (pre)malignant disease. The preoperative CT scan was reassessed by two expert-radiologists separately and subsequently (after defining a mass as ‘a measurable space occupying soft tissue density, except for an enlarged papilla or focal steatosis’) in consensus.

**Results:** 86 patients with benign and 258 patients with (pre)malignant disease were included. A mass was reported in the original CT report in 66% of patients versus 48% and 50% on reassessment by the two expert-radiologists, respectively. Interobserver agreement among expert-radiologists was moderate (kappa = 0.47, 95% CI 0.38–0.56); they disagreed on the presence of mass in 29% of patients. The incidence of mass decreased to 44% after consensus reading (p < 0.001 vs. original report). 167/212 (79%) masses identified in the original report proved to be malignant after pancreatoduodenectomy versus 139/150 (93%) masses identified by expert-radiologists in consensus (p < 0.001). The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of masses identified in the original CT report were 68%, 42%, 79%, 30%, and 62%, respectively. For masses identified by expert-radiologists in consensus these were 54%, 87%, 93%, 39% and 62%, respectively.

**Conclusions:** In patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy. As in patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy. As in patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy. As in patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy. As in patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy. As in patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy. As in patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy. As in patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy. As in patients with presumed pancreatic cancer, expert-radiologists less frequently identified a pancreatic mass on CT as compared to the original CT report, with doubled specificity for malignancy.
FO15-07  
**GUIDE-WIRE-TYPE MANOMETER IS FEASIBLE FOR DIAGNOSIS OF SPHINCTER OF ODDI DISORDER**  
Arata Sakai, Saori Kakuyama, Kentaro Nobutani, Atsuhiro Masuda, Mamoru Takenaka, Hideyuki Shiomi, Maki Sugimoto, Yoshiyumi Arisaka, Takeshi Azuma and Hiromu Kutsumi  
*Kobe University, Japan*

**Introduction:** Sphincter of Oddi manometry (SOM) is recognized as the standard diagnostic modality for sphincter of Oddi disorder (SOD). However, SOM is not commonly performed because of its technical difficulty and the high incidence of post-procedural pancreatitis. To diminish post-procedural pancreatitis, we tried to develop a new method of SOM. We have reported that SOM using a guide-wire-type manometer is feasible for the clinical assessment of biliary SO motility. We examined by adding the feasibility of pancreatic SOM with a guide-wire-type manometer.

**Method:** A total of 43 procedures were performed in 9 patients with biliary SOD and 19 patients with other disease. We performed SOM using the guide-wire-type manometer, and measured amplitude, duration, frequency and the area under the curve (AUC) of SO contractions. This study protocol was approved by ethics review board of Kobe University and the online registry number is UMIN00003126.

**Results:** In 35 of 43 evaluations (81.4%), amplitude, frequency, duration and AUC could be analyzed easily. However, in 8 studies, such analyses were impossible owing to movement artifacts. Biliary SOM was performed in 18 cases, and Pancreatic SOM was in 6 cases. In this study, mild pancreatitis was observed in only one patient.

**Conclusions:** SOM using a guide-wire-type manometer is safe, reliable and easy to apply for the clinical assessment of SO motility.

FO15-08  
**INTRAOPERATIVE PANCREATOSCOPY – A NOVEL TECHNIQUE AND ITS CLINICAL APPLICATIONS**  
Mahesh Sundaram, Guduru Venkat Rao, Pradeep Rebela and Duvvuru Nageshwar Reddy  
*Asian Institute of Gastroenterology, India*

**Introduction:** Intra-operative pancreatoscopy (IOP) is a novel technique to study the pancreatic ductal abnormalities. We present here its potential applications in pancreatic surgery.

**Method:** The clinical, imaging and histological details of 7 patients who underwent IOP were analysed. After pancreatic transection, depending on the ductal diameter, the flexible 3.3 mm pancreatoscope or spyglass scope or the spyglass optical fibre was introduced into the remnant pancreatic duct and then the specimen both with and without narrow band imaging (NBI). Saline irrigation and video monitoring were utilized.

**Results:** The average age of the 7 patients was 52.3 years and 4/7 were female. All underwent contrast enhanced CT but endoultrasound was done as necessary. Indications for surgery were: main duct IPMN (4), side branch IPMN (1), carcinoma head of pancreas (1) and chronic pancreatitis (CP)-1. Complete examination of main pancreatic duct was possible in all without any procedural complications. The mean duration added to the surgery was 10.3 minutes. IOP led to a change in the operative plan of 3 patients none diagnosed on preoperative evaluation: in 2 IPMN patients, the resection margin which was negative on frozen section was revised due to identification of downstream skip lesion; in one CP patient who underwent distal pancreatectomy, a further stricture was noted proximally leadint to revised margin. Further in one patient with carcinoma head of pancreas, adequate resection margin could be confirmed and additional tumor was excluded. In 2 IPMN patients, skip lesions could be excluded. Overall 1 patient had post operative pancreatic fistula (grade A) and no mortality occured.

**Conclusions:** IOP is a novel technique that is safe and feasible in pancreatic ducts of various sizes. It is a promising technique to detect subclinical strictures, early lesions and skipped synchronous lesions especially in IPMN. It may help intraoperative decision making regarding the type and extent of pancreatic surgery in select patients.

FO16-01  
**COMPARISON OF SURGICAL OUTCOME BETWEEN MINIMALLY INVASIVE LIVER RESECTION AND CONVENTIONAL OPEN LIVER RESECTION FOR THE TREATMENT OF HEPATOCellular CARCINOMA: A PROPENSITY-SCORE MATCHED ANALYSIS**  
Dai Hoon Han, Eun Jung Park, Gi Hong Choi and Jin Sub Choi  
*Severance Hospital, Yonsei University, Korea*

**Introduction:** This study aimed to analyze operative and survival outcomes of minimally invasive liver resection (MILR) versus conventional open liver resection (COLR) for the treatment of hepatocellular carcinoma (HCC). Moreover, we attempted to reveal the role of the robotic system in MILR (HCC).

**Method:** From May 2002 to December 2012, 928 consecutive patients underwent curative liver resection of
HCC. Among these patients, 99 patients with MILR were matched to 198 patients with COLR by one-to-two propensity-score matched analysis. A multivariable logistic model based on age, gender, etiology of HCC, tumor size, multiplicity of tumor, the presence or absence of liver cirrhosis, tumor location, platelet count and extent of liver resection was used to estimate propensity score. Perioperative surgical outcomes and long-term survival were compared between two groups.

Results: The amount of blood loss during operation and postoperative complication rate were significantly lower in MILR groups. Mean length of hospital stay after operation was significantly shorter in MILR group (8.39 vs. 13.39 days, p < 0.001). There were 8 cases of open conversion from MILR and all cases were laparoscopic attempted liver resections. In MILR group, most of major resections were performed with robotic system (n = 10, p < 0.001). Anatomic liver resections were performed for 15 of 16 patients using robotic system. There was no difference in primary recur site between two groups. The 1-, 2-, 3-year disease-free survival rate of MILR were 86.1%, 64.4%, and 58.4% respectively, which were comparable to those of COLR (p = 0.810).

Conclusions: MILR showed better perioperative outcomes with comparable oncologic outcomes for the treatment of HCC. According to the complexity of procedures, the robotic surgery may expand the indication of minimally invasive liver resection in patients with HCC.

FO16-02
5 YEAR RESULT OF LAPAROSCOPIC LIVER RESECTION FOR HEPATOCELLULAR CARCINOMA

Long Tran Cong Duy, Bac Nguyen Hoang, Thuan Nguyen Duc, DatLe Tien and Viet Dang Quoc
Vietnam

Introduction: Laparoscopic surgery, with minimally invasive techniques, potentially brings benefits to patients who need liver resection for HCC. The aim of our study is to evaluate the effectiveness, safety and benefits of laparoscopic liver resection for HCC with long-term follow-up.

Method: This is a Cohort study with 5-year results of total laparoscopic hepatectomy for HCC in one center.

Results: From January 2008 to December 2012, we had 173 enrolled patients with HCC underwent laparoscopic liver resection. Mean of age: 56 Follow-up was fullfilled in 130 patients for 21.6 ± 16.0 months (0–60 months). Mean tumor size was 3.73 cm. Stage of HCC (according to BCLC): 0 (6%), A1 (59.5%), A2 (6.9%), A4 (2.9%) and B (27.2%). We had to convert to other techniques in 4 patients (2.3%). Type of resection: one segment (II,III, IV, V,VI,VII,VIII): 43.8%, two segments (posterior sector, anterior sector, segment V&VI and left lateral sector): 47.9%, three segments (left liver resection or central hepatectomy): 4.7% and right liver resection: 3.6%. Mean operation time: 112 ± 56 minutes. Median blood loss was 100 mL (20–1,200 mL). Mean hospital stay: 6.5 ± 2.0 days. There was no perioperative mortality. The overall survival at 1, 2, 3, 4, and 5 years were 94.2%, 87%, 72.9%, 72.9%, and 72.9%, respectively. The disease free survival at 1, 2, 3, 4, and 5 years were 79.1%, 60%, 57%, 52%, and 26.3%, respectively.

Conclusions: Laparoscopic liver resection for HCC is feasible, safe, and effective with good oncologic results.

FO16-03
LAPAROSCOPIC VERSUS OPEN LIVER RESECTION FOR HEPATOCELLULAR CARCINOMA AT A NORTH-AMERICAN CENTRE OF EXCELLENCE: A 2-TO-1 MATCHED PAIR ANALYSIS

John Jonghun Lee, John B. Conneely, Faizal Bhojani, Rory L. Smoot, Paul D. Greig, Steven Gallinger, Ian McGilvray, Carol-anne Moulton, Alice C. Wei and Sean P. Cleary
University of Toronto, Canada

Introduction: Laparoscopic liver resection (LLR) is growing in popularity. Whereas its role in treatment of benign and metastatic disease is well described, its application to primary hepatic malignancy is not well defined. Herein we describe our institutional experience with LLR for Hepatocellular Carcinoma (HCC). We compare our outcomes with LLR versus standard open liver resection (OLR) on a 2:1 case matched basis.

Method: We have evaluated all LLRs from 2006 to 2013. Each was matched to 2 open cases for age at operation, maximal tumor size, tumor number and number of segments resected. Non-parametric statistical analysis was used to compare surgical outcomes. This is one of the largest series in North America comparing LLR and OLR for outcomes of HCC.

Results: Forty-one patients underwent LLR for HCC. Demographic characteristics were similar between groups. The estimated blood loss was lower in the LLR vs. OLR at 529 mL and 866 mL respectively (p = 0.02). Also, the 30 day readmission rate was 0% and 27% for LLR and OLR respectively (p < 0.01). Operative time, overall survival, length of stay, admission to ICU, ER visits and complication rates were similar.

Conclusions: Our experience suggests that LLR is both safe and oncologically equivalent to OLR for HCC in the short and long term. Furthermore, LLR confers the widely-accepted benefits of laparoscopic surgery, namely reduced blood loss and lower 30 day readmission rates. Long-term outcome of overall survival was equivalent in both LLR and OLR groups. We propose that LLR for HCC should be considered for appropriately selected patients in centers with requisite volume and expertise.
**FO16-04**

**VARIOUS LAPAROSCOPIC LIVER HANGING MANEUVERS IN ANATOMICAL LIVER RESECTION**

Ji Hoon Kim  
*Chungbuk National University Hospital, Korea*

**Introduction:** Liver hanging maneuver (LHM) is a widely used novel technique for liver resection. However, the LHM during laparoscopic liver resection is not routinely used because this requires blind dissection of the retrohepatic space, anterior to the IVC. The aim of this study is to introduce various types of laparoscopic LHM in anatomical liver resection.

**Method:** The upper end of hanging tape is located along lateral side of the hepatic vein (the right side of the right hepatic vein during right hepatectomy or left side of the left hepatic vein during left hepatectomy). For this technique, it is not necessary to dissect between the right (or left) hepatic vein and the middle hepatic vein in right (or left) hepatectomy, like the traditional hanging maneuver or modified hanging maneuver. The retrohepatic approach on the right side of the IVC is usually assisted by a metal suction tip on laparoscopic view in right hepatectomy.

**Results:** From February to August 2013, this technique was used in 11 patients. Laparoscopic anatomical liver resections included 3 left lateral sectionectomies, 5 left hepatectomies, 2 right hepatectomies and 1 right posterior sectionectomy. The median resection time and blood loss were 50 minutes (range, 22–80 minutes) and 400 mL (range, 200–700 mL) respectively. There was no open conversion and no major morbidity or mortality.

**Conclusions:** This technique is simple and safe because blunt dissection of the retrohepatic space is not necessary for this maneuver. This method of LHM can be a useful technique for laparoscopic anatomic liver resection.

**FO16-05**

**RIGHT TRISECTIONECTOMY AND COMPLETE INFERIOR VENA CAVA RESECTION IN TWO-STAGE LIVER RESECTION WITH LIVER PARENCHYMA TOURNIQUET AND RIGHT PORTAL VEIN OCCLUSION (ALTPS)**

Ricardo Robles, Asunción López Conesa,  
Roberto Brusadin, Víctor López, Pilar Jimeno and Pascual Parrilla  
*Virgen de la Arrixaca University Hospital, Murcia, Spain*

**Introduction:** We present the results of right trisectionectomy (RT) and complete inferior vena cava resection (IVCR) in 2-stage, using an original method for achieving rapid hypertrophy of the functional liver remnant (FLR). In the first stage we only occlude the intrahepatic circulation placing a tourniquet on umbilical cisura (through the extra-Glissonian hepatic hilum) associating a right portal vein occlusion (ALTPS).

**Method:** Between September 2011–July 2013 we have performed ALTPS technique in 30 patients with a small FLR. In 7 cases we performed a ERT + IVCR in 2-stage, replacement IVC with a 2 cm ring goretex graft (in 1 case we resected portal vein and biliary duct with HJ). We occluded IVC lower left hepatic vein without by-pass venovenous. In the remaining 23 cases we performed ALTPS without IVCR (11 right hepatectomy and 12 RT was performed).

**Results:** Median age was sixty years. All patients had one nodule (median size 12 cm, range 7–22) of follow up. Median FLR was 410 mL, increasing at 7 days to 870 mL (112%). During first stage median blood losses were 0 mL (range 0–100), median surgical time 120 minutes (range 120–180 minutes). In the second stage median blood losses were 600 mL (range 300–1500), requiring a transfusion in three patients (43%) (median 0 UI; range 0–6), with a median surgical time of 300 minutes (range 150–360). IVC occlusion time was 58 minutes (range 44–70). No morbidity after the first stage, and 4 (57%) after the second one. One female with HJ stenosis died (14%) at 2 months. The median hospital stay was 20 days, without recurrence at 11 months (range 2–22) of follow up.

**Conclusions:** Our ALTPS technique gets hypertrophy of FLR in 7 days and achieves good results in extended hepatectomy with vascular resection.

**FO16-06**

**DOES ALPPS REGULARLY INCREASE THE FUTURE REMNANT LIVER AND PREVENT POSTOPERATIVE LIVER FAILURE?**

Safi Dokmak, Fanjantrainy Rasoaherinomenjanahary, François Cauchy, Béatrice Aussilhou and Jacques Belghiti  
*Beauparlais Hospital, France*

**Introduction:** ALPPS allows major liver resection without postoperative liver failure (LF) by sequential liver splitting with portal vein section followed latter by liver resection. Our aim was to study in a monocentric center the rate of future remnant liver (FRL) regeneration and the incidence of LF after each step. Signs of LF were defined according to 50/50 criteria or prolonged jaundice (>85 mmol/L) on POD 5.

**Method:** From April 2011–October 2012, eleven patients (10 men) with a median age of 59 years old (37–63) underwent ALPPS for CRLM (n = 6) and biliary cancer (n = 5). Underlying liver disease was present in 5 including one PSC and 4 with CRLM who received >12 cycles of chemotherapy. Patients underwent right trisectionectomy (6) or hepatectomy (5) and 4 had associated pancreaticoduodenectomy. All except one underwent the second step within a mean time of 10 days (6–20) with a mean blood loss of 300 mL (100–1,500) and operation time of 235 (75–480) minutes. Volumetric assessment was done on POD7.

**Results:** RLV increase from 408 mL (208–754) to 553 mL (320–821) with a median hypertrophy rate (HR) of 69% (8–175), including 4 with HR <25% (8–24). These 4 patients had a mean FRL volume at 21% (13–31) and 3 received >12 cycles of chemotherapy.
After the first step, four had signs of LF and one had portal thrombosis. After the second step, six (60%) showed signs of LF. Major morbidity (Clavien >III) was observed in 49% with an average hospital stay of 40 days (5–120). Mortality was observed in 3 patients (27%) who all had small FRL (<25%) and insufficient HR (<25%).

Conclusions: ALPPS do not regularly induce accelerated hypertrophy, especially in patients with small FRL and/or intense chemotherapy, with the high risk of postoperative mortality.

**FO16-07**

**LIVER RESECTION WITH HEPATIC VEIN RECONSTRUCTION IS A VIALBE OPTION IN SELECTED PATIENTS**

Rory Smoot, Pablo Serrano, David Cavallucci, John Conneely and Ian McGilvray
University of Toronto, Canada

**Introduction:** The morbidity and mortality associated with liver resection has continued to decrease while the experience with living donor liver transplantation has increased. These factors have facilitated the consideration of extended liver resection for tumors, which includes resection and reconstruction of the major hepatic venous outflow.

**Method:** Patients undergoing liver resection with major hepatic venous reconstruction between the years 2005-2013 were reviewed. Demographic, clinical, procedural, and follow-up data were analyzed.

**Results:** For the study years a total of 18 patients were identified. Median age was 49.5 years (24–67) for 11 men and 7 women. The pathology included colorectal cancer (7 patients), cholangiocarcinoma (6 patients), sarcoma (3 patients), hepatocellular carcinoma (1 patient), and perivascular epithelioid tumor (1 patient). Resection included the inferior vena cava in 8 patients, and 7 patients underwent reconstruction with ringed PTFE grafts. In situ cold perfusion was used in all patients. The venous outflow reconstruction included left hepatic vein (LHV) to graft (4 patients), LHV to cava (3 patients), Right hepatic vein (RHV) to graft (3 patients), RHV to cava (4 patients), middle hepatic vein (MHV) to cava (1 patients), RHV and MHV to cava (1 patient), MHV reconstruction with vein patch (1 patient), and LHV reconstruction with vein patch (1 patient). Perioperative mortality was 6% (1 patient) and a complication rate of 78% (14 patients). Complications included Clavien grade 5 (1 patient), grade 3b (4 patients), grade 3a (3 patients), grade 2 (5 patients), and grade 1 (1 patient). Six patients had died at the time of last follow-up, four of those patients with tumor recurrence. The cohort had a median overall survival of 15.4 months.

**Conclusions:** In selected patients resection and reconstruction of the major venous outflow can be completed with reasonable morbidity and mortality.
an interposition conduit or patch-plasty have been used to overcome size mismatch in PV reconstruction of these patients. We simplified a PV reconstruction technique without interposition graft in children with PV hypoplasia.

Method: Between Oct 2012 and Jun 2013, consecutive 7 pediatric recipients (median age; 8 months, 4 males) with PV hypoplasia underwent LTs (living donor LTs in 5, split LT in 3) due to biliary atresia. The median pre-transplant maximum main PV (MPV) diameter on the contrast CT scans was 2.89 mm (range, 1.66–3.69). Direct anastomosis was made in eliptoid appearance between donor left PV and recipient MPV without interposition graft (Figure). The MPV diameters and flow rates were serially measured on Doppler ultrasonography or contrast CT scans at 1- and 3-month after transplantation.

Results: All grafts and patients were survived. PV problem was not detected during a median follow-up of 198 (90–321) days. The post-transplant MPV diameter was 8.28 (range, 6.82–10.1) mm at one month and 8.70 (range, 7.90–11.60) mm at 3 months after LT.

Conclusions: This direct eliptoid anastomosis is simple and its short-term results are encouraging in pediatric LT with PV hypoplasia. PV patency should be closely monitored during long-term follow-up.

Figure. Xxxx

FO17-02
LONG-TERM OUTCOME OF DUCT-TO-DUCT BILIARY RECONSTRUCTION IN LIVING DONOR LIVER TRANSPLANTATION FOR SMALL PATIENTS WITH THE BODY WEIGHT LESS THAN 10 KG
Yukihiro Inomata1, Hidekazu Yamamoto1, Shintaro Hayashida1, Takayuki Takeichi1, Kwang-jong Lee1, Masaki Honda1, Takahiro Murakawa1, Masashi Kadohisa1, Mohammed Asar2 and Katsuhiro Asonuma1
1Kumamoto University, Japan; 2Al-Azhar University, Egypt

Introduction: In biliary reconstruction of pediatric living donor liver transplantation (LDLT), Roux-en-Y (RY) hepatojejunostomy is more popular than duct-to-duct (DD) anastomosis partly because the most common indication is biliary atresia. In our program, DD has been applied as the primary procedure for biliary reconstruction when it is possible even in small children or infants. In the present study, long-term outcome was evaluated for DD biliary reconstruction in pediatric recipients with the weight less than 10 kg at the time of operation.

Method: Sixty-three recipients weighing less than 10 kg at the time of LDLT have undergone LDLTs in our institution from 1998 to 2011. Of these, twenty consecutive patients who underwent DD biliary reconstruction were enrolled and analyzed by reviewing the clinical records. Mean age was 10.3 months, and fourteen were infants. Mean body weight was 6.9 kg, with minimum of 2.6 kg. The minimal follow-up period was 2 years. The anastomosis was performed using inter-rupted sutures of 6-0 polydioxanone absorbable monofilament under 2.5 times loupe. The knots were outside the lumen. External biliary stent (3 or 4 French polyethylene tube) was placed and kept around 4 months after the transplant.

Results: In all the cases, whole or reduced left lateral segment of the parents was used. Four patients died after the LDLT with DD reconstruction. Any death was not related to the biliary reconstruction. One patient developed biliary stricture six weeks after the transplant and underwent conversion from DD anastomosis to RY anastomosis eight months after the LDLT. The other 14 recipients have been doing well after the transplant.

Conclusions: Long term result of DD biliary reconstruction in pediatric LDLT for recipients with body weight less than 10 kg was quite satisfactory. DD reconstruction should be considered more in LDLT for such generation.

FO17-03
RECONSTRUCTION OF VENOUS OUTFLOW IN PEDIATRIC LDLT RECIPIENTS
Oleg Kotenko and Denis Fedorov
National Institute of surgery and transplantology, Ukraine

Introduction: Main problem of hepatic vein (HV) reconstruction in left lateral section (LLS) transplantation is donor variant anatomy with absence of common HV trunk.

Method: Forty-five pediatric recipients and their related living donors where evaluated.

Results: Nakamura and Tsuzuki (1981) classification is not suitable for LLS transplantation because it describes variants of left and middle HV. For this reasons we purpose modification of this classification based on LLS HV anatomy. We divide all described by Nakamura and Suzuki HV variants into 4 groups: Type A – normal anatomy with common LHV trunk, longer 5 mm; Type B – common LHV trunk, less then 5 mm length; Type C – separate inflow of Sg 2 and 3 HV with distance between them less then 5 mm; Type D – separate inflow of Sg 2 and 3 HV with distance between them more then 5 mm. Type A anatomy is acceptable for standard HV plastic, for type B, C and D we purpose non-standard HV reconstruction methods. From 45 donors 30 (66.6%) had normal type A anatomy, 4 (8.8%) had type B, 6 (13.3%) had type C and 5 (11.1%) had type D anatomy. Thus in 66.6% transplantations standard HV plastic was made. For other 33.3% we used one of HV reconstruction methods: (1) Circular plastic of common Sg 2-3 hepatic veins orifice by autovenous patch from recipient portal vein confluence, which was performed in 3 cases with type B anatomy; (2) Forming of common Sg 2-3 graft hepatic veins orifice from separate Sg 2 and Sg 3 veins. Used in 5 cases with type C anatomy; (3) Harvesting of left lateral section graft with common orifice of donor left and middle hepatic veins. Performed in 4 cases with type D anatomy.

Conclusions: Donor HV anatomy determinates HV reconstruction method in LLS LDLT.
FO17-04
SIGNIFICANCE OF PRIMARY POOR FUNCTION FOR THE PROGNOSIS AFTER LIVER TRANSPLANTATION

Gilles Uijtterhaegen, Ivo Haentjens, Roberto Troisi, Georges Van Maele, Hans Van Vlierberghe and Xavier Rogiers

University of Ghent, Belgium

Introduction: Primary poor function (PPF) is a term used to describe temporary malfunction of the transplanted liver. Over 20 different definitions of PPF can be found in the literature and there are only a few cases in which its impact on survival is described. In this paper we try to define the impact of different definitions of PPF on medium term patient and graft survival.

Method: Data of 90 transplantations performed between July 2007 and October 2009 at the University Hospital of Ghent were analyzed retrospectively. The transplantations were classified by 7 definitions of PPF and correlated with patient and graft survival.

Results: The main indications for transplantation were alcoholic cirrhosis (40.0%) and HCV cirrhosis (10.0%). Mean age of transplantation was 53.6 years. Mean follow-up duration was 33.8 months (range 24–47 months) The rate of PPF differed from 10.0% to 55.6% depending on the definition used. Of the 7 tested definitions only 2 (Strasberg et al. and Cieslak et al.) showed a significant correlation with graft- and patient survival according to Kaplan-Meier tests. The definition of Strasberg et al. (The presence of at least one of the following: AST or ALT >2000 IU/L on post-operative day 2, INR >1.6 or serum bilirubin >10.0 mg/dL on post-operative days 2–10) showed a very significant correlation (p < 0.001).

Conclusions: Our study shows that only two of the seven most used definitions of PPF show a significant correlation with short and medium term graft and patient survival. The definition of Strasberg et al. defines best the risk of the patient for graft loss and death and should therefore be used as the definition of choice.

FO17-05
PRETRANSPLANT MALNUTRITION PREDICTS POST TRANSPLANT RESPIRATORY COMPLICATION IN LIVING DONOR LIVER TRANSPLANTATION FOR BILIARY ATRESIA- SINGLE CENTER RETROSPECTIVE ANALYSIS OF 110 CHILDREN

Bhavini Vasavada1, Karan Julka1, Chao long Chen2 and Andrzej Komorowski3

1Fellow liver surgery and transplant, India; 2Professor, Taiwan; 3Fellow liver surgery and liver transplantation, Poland

Introduction: Biliary atresia is commonly associated with malnutrition and failure to thrive. Very few studies have been published on impact of preoperative malnutrition or growth retardation on post transplant outcome in these children.

Method: 110 children underwent living donor liver transplantation between January 2003 to March 2013. Pre transplant malnutrition was defined according to z scores for weight for age and weight for height as per who definition. Patients having both Z score of < -2 (moderate or severe malnutrition as per who definition) were compared with control group. Post operative complications, mortality rates were compared between two groups. Statistical analysis was done using chi square tests for categorical variables and Mann–Whitney U test for continuous variables. Statistical analysis were done using SPSS version 21 (IBM).

Results: Thirty-nine children out of 110 were having z score for weight for age < -2.There was no statistical difference between peld score, graft weight, grwr, intra-operative blood loss between to groups.22 out of 39 patients in malnourished group developed clavien grade 3, garde 4 complications and 32 patients out of 71 in control group developed clavien grade 3 grade 4 complications. Which was not significant statistically (p = 0.318). 3 patient in study group and 2 in control group died in follow up giving over all mortality rate of 4.5% and group specific mortality rates 7.69% and 2.81% respectively (p = 0.278). Total 14 patient developed post operative pulmonary complications which included ARDS, post operative pneumonia, post operative atelectasis. Out of 14 patients 10 were having pre-operative malnutrition and growth retardation and 4 were having normal preoperative z score. Which was highly statistically significant with p = 0.003 (odds ratio 5.603 and 95% confidence interval 1.623–19.351). Roc curve showed AUROC of 0.703.

Conclusions: Preoperative malnutrition is associated with high postoperative pulmonary complication rate in liver transplantation for biliary atresia.

FO17-06
ADULT LIVING DONOR LIVER TRANSPLANTATION FOR HIGH MELD (≥30): SINGLE CENTER RETROSPECTIVE STUDY

Gi-Won Song, Sung-Syu Lee, Shin Hwang, Ki-Hun Kim, Chul-Soo Ahn, Deok-Bog Moon, Tae-Yong Ha, Dong-Hwan Jung and Gil-Chun Park

Asan Medical Center, Ulsan University, Korea

Introduction: The operative risk to live liver donor can be justified by the acceptable outcome in recipient. Based on this background concept, therefore, the adult living donor liver transplantation (ALDLT) for patients with high MELD (≥30) has been criticized and regarded as a relative contraindication due to the concern about poor survival outcome in recipient.

Method: From February 2003 to February 2013, 3,100 liver transplantation (LT) have been performed. Among them, 2,520 ALDLTs were retrospectively reviewed after excluding 190 pediatric and 390 deceased donor LTs.

Results: Among 2520 ALDLTs, 619 (24.6%) patients had MELD over than 30. When we divided patients into two groups (group1: MELD <30, Group2: ≥30)
and compare 2 groups, the in-hospital mortality (IHM) of group 1 (12.6%) was significantly higher. The 3-month and 1-year patient survival rate of group 1 was 89.3 and 83.8% which was significantly lower than that of group 2. Excluding IHM, the 5 and 10-year patient survival rate, however, there was no significant difference. In univariate analysis for the risk factor to affect survival in group 1, risk factors are as following: donor age >50, pre-LT altered mentality, ICU stay, renal replacement therapy, ventilator care, the use of vaso-pressor, bacteremia, septic shock, HCV and recipient age >43. In multivariate analysis, recipient age >43, pre-LT altered mentality and septic shock were independently significant risk factors. And the number of risk factor was closely related with IHM: 0–1 (6.7%), 2 (16.1%) and 3 (26.8%).

Conclusions: ALDLT for patients with high MELD score showed inferior but acceptable IHM and patient survival rate. The long-term survival was not affected by MELD. But, recipient age, pre-LT mentality and septic condition were associated with high IHM rate. Therefore, we need more cautious patient selection and post-LT care to justify inevitable donor risk in ALDLT.

FO17-07
MASSIVE ASCITES AFTER LIVING DONOR LIVER TRANSPLANTATION
Muhammad Zakria Wahla, Chao-Long Chen, Bhavin Vasavada, Chee-Chien Yong, Chih-Chi Wang and Chih-Che Lin
Chang Gung Memorial Hospital Kaohsiung, Taiwan

Introduction: There is limited research on massive ascites after living donor liver transplantation. Prolonged ascites after living donor liver transplantation adds significantly to the morbidity of patients. Aim of this study was to find out important factors responsible for this complication. Massive ascites was defined as ascitic fluid more than 500 mL/day for more than 10 consecutive postoperative days.

Method: One hundred and eleven patients who underwent living donor liver transplantation in a calendar year 2010 were analyzed retrospectively. After applying the exclusion criteria patients were divided into two groups. Group 1, with massive ascites and Group 2, without massive ascites. Univariate, multivariate and Fisher exact tests were applied and ROC curves were prepared. Statistical analysis was done using SPSS Version 18(IBM).

Results: 71 out of 111 patients developed massive ascites as per our definition. In Univarient analysis pre-operative spleen size (p = 0.000), MELD (p = 0.009), Pre-operative renal insufficiency (p = 0.002), pre-operative presence of ascites (p = 0.000)(calculated as ascites on opening of abdomen), blood loss during surgery (p = 0.005), serum bilirubin(p = 0.002) and liver enzymes (ALT) (p = 0.004) at day 10 achieved statistical significance in predicting massive ascites after liver transplantation. However in multivariate logistic regression, only spleen size (p = 0.008) and ascites at opening (p = 0.000) were found to be significant factors in developing massive ascites. AUROC indicated >0.7 for both.

Conclusions: From this study we can conclude that although Pre-operative renal insufficiency, MELD, blood loss during surgery, serum bilirubin and liver enzymes (ALT) at day 10 are important predictors of massive postoperative ascites but preoperative spleen size and presence of ascites are independent predictors for postoperative massive ascites. As these factors are markers of degree of portal hypertension it seems that degree of preoperative portal hypertension is the main factor responsible for postoperative prolonged ascites.
OUTCOME OF 268 CASES OF BILIARY ATRESIA: A SINGLE – CENTER EXPERIENCE OVER SEVENTEEN YEARS
Ibrahim Marwan, Hosam Soliman, Sherif Saleh, Hany Shoreim, Osama Hegazy, Taha Yassen, Amr M. Aziz, Ahmed Sera and Khalid Abo Elella
National Liver Institute, Menoufeya University, Egypt

Introduction: We present the outcome and congenital anomalies associated with 268 case of BA from a single – center experience in Egypt.

Methods: From February 1995 to February 2013, 275 cases with preliminary diagnosis of BA were admitted to the Hepato-biliary Surgery Department, National Liver Institute, Menoufeya University. Seven cases were excluded after Intra-operative cholangiography (2.5%). Surgical management included: Hepatico-jejunostomy on Roux- en -Y. loop for type I, Hepatic portocholezystotomy for type II and Hepatic portoenterostomy Kasai operation for type III.

Results: There were 135 males and 133 females with mean age of 68 days. 90% (241) of the cases presented with type III BA. Six cases presented with type I BA (2%) while type II (21) represents 8% including one pair of male twins. Twenty four cases were above 100 days of age at operation (9%), while the remaining cases were between 45–100 days. Associated congenital anomalies with BA occurred in 10% of the cases including: polysplenia (5), malrotation with or without polysplenia (4), situs inversus totalis (4), pre-duodenal portal vein (6), hydrocephalus (1), liver haemangioma (3), Non-communicating choledochal cyst (7) and Bifid spleen (2). Hospital mortality was 9% (25 cases) including all cases of situs inversus totalis. 136 cases (56%) were clinically non-icteric with serum bilirubin level below 2 mg/dL after surgical correction. Five years survival with native liver was 49% while ten years survival was 12.6% (15cases). Nine cases with a failed Kasai operation were treated by Living Donor Liver Transplant (LDLT) with an overall survival of 80%.

Conclusions: Our results conclude that Kasai operation remains the best initial choice for BA patient’s in spite of the high mortality in cases with situs inversus totalis. Liver transplantation should be considered in cases with failed Kasai procedure or if life-threatening complications developed.

CORRELATIONS OF PORTAL PRESSURE IN POST CHOLECYSTECTOMY BENIGN BILIARY STRICURE
Hirdaya nag1, Asit Arora2, Ila Tyagi3, Dinesh Ramaswamy2, Nilesh Patil2, Puja Sakhuja2, Renuka Saha3 and Anil Agarwal6
1Associate Professor, India; 2 Senior Resident, India; 3Senior Research Associate, India; 4Professor, India; 5Assistant professor, India; 6Professor and Head, India

Introduction: Patients with post cholecystectomy benign biliary stricture (PCBBS) may have associated Portal hypertension (PH) which can adversely affect their outcome. Experimental studies showed that chronic bile duct obstruction leads to hepatic fibrosis, bile duct dilatation, bile duct proliferation and changes in portal hemodynamics, all these are responsible for the development of PH. These changes are reversible initially but delay in treatment may culminate into cirrhosis and irreversible PH. Study of portal pressure (PP) in PCBBS and its correlation with factors contributing towards development of PH in PCBBS, in human model, will help to prevent this complication.

Method: This prospective study was conducted from September 2010 to December 2012. Total 30 patients of PCBBS without overt PH were included. Portal pressure (PP), biliary pressure (BP), injury repair interval (IRI) and stage of hepatic fibrosis (FS) were recorded. PP ≥22 mmHg (omental vein pressure) was considered as PH. Appropriate statistical methods were employed for correlation and comparison, p ≤ 0.05 was considered as significant.

Results: Mean age was 37 ± 9.9 years, females 53.3% (16), mean PP, BP and median IRI were 19.4 ± 4.74 mmHg, 20.1 ± 3.89 mmHg and 145 days (range: 23–825) respectively. Incidence of PH was 33.3%. Correlation coefficients of PP to FS, IRI and BP were 0.50 (p = 0.04), 0.56 (p = 0.001) and 0.38 (p = 0.03) respectively. Patients with PH had significantly higher FS and IRI (p < 0.05).

Conclusions: Portal pressure in Post cholecystectomy benign biliary stricture has a positive correlation with hepatic fibrosis, injury repair interval and biliary pressure whereas correlation with former two (FS and IRI) is relatively stronger.

LIVER RESECTION IN PATIENTS WITH BILIARY STRICURE ON PRIMARY SCLEROSING CHOLANGITIS: AN OPTION THAT SHOULD BE CONSIDERED
David Fuks, Francois Cauchy, Saﬁ Dokmak, Giulia Boarini, Sebastien Gaujoux, Valerie Paradis and Jacques Belghiti
Beaujon Hospital, France

Introduction: While liver transplantation (LT) is the treatment of choice for selected patients with cholangiocarcinoma (CC) developed on primary sclerosing cholangitis (PSC), liver resection (LR) has long been considered as a contraindication. We therefore aimed to examine the results of LR in this subset of patients.

Method: Characteristics and outcomes of 15 patients with PSC undergoing hepatectomy with en-bloc resection of the extra-hepatic bile duct between 1997 and 2012 were retrospectively analyzed.

Results: Nine patients (60%) were males and median age was 62 years (14-74). Indication for LR was stenosis of either hilar confluence (n = 11) or intrahepatic ducts (n = 3) and gallbladder tumor (n = 1). Major resection was performed in 13 (87%) patients including 2 with associated pancreaticoduodenectomy. Median operative time and blood loss were 460 minutes (375–625) 850 cc (150–1,500) respectively. One (7%) patient died postoperatively and 14 (93%) patients experienced...
complications including 8 (53%) major ones (Clavien-Dindo ≥3). Severe (F3–F4) underlying fibrosis was observed in 8 (53%) patients on final pathological examination and was significantly associated with both increased rates of major complications (63 vs. 43%, p = 0.03) and longer hospital stay (26 vs. 12 days, p = 0.001). Among the 11 patients resected for hilar stenosis, those displaying CC were all ≥ increased rates of major complications (63 vs. 43%, p = 0.03) and longer hospital stay (26 vs. 12 days, p = 0.001). Among the 11 patients resected for hilar stenosis, those displaying CC were all <50 years. Five-year overall survivals were 100% in patients resected for benign disease and 45% in malignant disease (n = 8), respectively, including 2 patients undergoing pre-emptive LT.

**Conclusions:** Despite high complication rate, LR should not be discarded in patients with PSC, especially in patients >50 years considering the exceptional risk of malignancy.

**FO18-04**

**REVISED INTERNATIONAL GUIDELINES (TOKYO GUIDELINES 2013) FOR DIAGNOSIS, SEVERITY GRADING, FOR ACUTE CHOLANGITIS AND PROPOSAL OF NEW INTERNATIONAL PROJECT**

Toshijiko Mayumi1, Tadahiro Takada2, Seiki Kiriyama3, Takao Itoi4, Toshio Tsuyuguchi3, Harumi Gomi4, Sung Gyu Lee5, Myung-Hwan Kim5, Miin-Fu Chen8 and Masahiro Yoshida9

1University of Occupational and Environmental Health, Japan; 2Teikyo University School of Medicine, Japan; 3Ogaki Municipal Hospital, Japan; 4Tokyo Medical University, Japan; 5Graduate School of Medicine, Chiba University, Japan; 6Jichi Medical University, Japan; 7Asan Medical Center, Ulsan University, Korea; 8Kyung Hee University Medical Hospital, Korea

**Introduction:** Since the publication of the Tokyo Guidelines for the management of acute cholangitis and cholecystitis (TG07), diagnostic and severity assessment criteria for acute cholangitis have been extensively used as the primary standard all over the world. However, it has been found that there are crucial limitations in these criteria. Moreover, TG07 did not include the whole technique of standard endoscopic transpapillary biliary drainage.

**Method:** The updated Tokyo Guidelines (TG13) have been revised through clinical implementation and its assessment by means of multicenter analysis.

**Results:** The diagnostic criteria of the updated Tokyo Guidelines (TG13) have high sensitivity (87.6%) and high specificity (77.7%). TG13 has better diagnostic capacity than TG07. The severity assessment criteria of TG13 have been revised so as not to lose the timing of biliary drainage or treatment for etiology. TG13 include the whole technique of standard endoscopic transpapillary biliary drainage, for example, biliary cannulation techniques including contrast medium assisted cannulation, wire-guided cannulation, and treatment of duodenal major papilla using endoscopic papillary balloon dilation (EPBD). Furthermore, recently single or double-balloon enteroscopy-assisted biliary drainage (BE-BD) and endoscopic ultrasonography-guided biliary drainage (EUS-BD) have been reported as special techniques for biliary drainage.

**FO18-05**

**PREOPERATIVE [18F] FDG PET/CT MAXIMUM STANDARDIZED UPTAKE VALUE PREDICTS RECURRENCE OF BILIARY DUCT CANCER**

Min-Su Park, Yoon-Hwan Nam and Sang-Mok Lee

Kyung Hee University Medical Hospital, Korea

**Introduction:** [18F] Fluorodeoxyglucose positron emission tomography ([18F]FDG PET/CT) is an imaging technique based on the increased uptake of glucose characteristically seen in malignant lesions. The preoperative SUVmax of FDG PET/CT has been identified the powerful significant prognostic factor for predicting recurrence in malignant tumor. Therefore, the aim of this study was to determine whether FDG PET/CT imaging has prognostic significance in patients with biliary tract cancer after surgical resection.

**Method:** From April 2006 to February 2013, 64 patients who underwent curative resection for biliary tract cancer were reviewed. Demographics and tumor characteristics were evaluated retrospectively by review of a clinical database and review of pathologic reports.

**Results:** The study group comprised 42 men and 22 women, with a mean age of 61.3 ± 10.7 years. Clinical diagnosis of these patients were intrahepatic cholangiocarcinoma (n = 6), hilar cholangiocarcinoma (n = 6), extrahepatic cholangiocarcinoma (n = 22), gall bladder cancer (n = 14) and ampullar cancer (n = 16). Mean preoperative SUVmax values was 5.1 ± 4.7. Mean follow-up was 27 months. Recurrence-free survival at 1-, 2- and 5-years were 75.9%, 63.3% and 47.1%. In the univariate analysis, N stage, poor tumor differentiation, the presence of lymphatic invasion and high SUVmax (>5.0 mg/L) were significant risk factors for recurrence. The multivariate analysis showed high SUVmax (>5.0 mg/L) to be independent risk factors for tumor recurrence (p = 0.008, HR 4.124, 95% CI 1.459–11.661).

**Conclusions:** Preoperative FDG uptake by primary tumor showed a significant association with recurrence in patients with biliary tract cancer.
ROLE OF STAGING LAPAROSCOPY IN GALL BLADDER CANCER IN THE ERA OF 18F-FDG PET/CT

Ujwal Zambare, Thakur deen Yadav, Lileshwar Kaman, Vikas Gupta, Rajesh Gupta, Ashim Das and Bhagwantrai Mittal
Postgraduate Institute of Medical Education and Research, India

Introduction: Gall bladder cancer (GBC) is a rare neoplasm with poor prognosis. Most patients present in advanced stage. Staging laparoscopy is a recommended modality to prevent nontherapeutic laparotomy. PET/CT imaging has the potential to improve preoperative staging and identify unresectable cases. The present series studies the efficacy of PET/CT vis-a-vis staging laparoscopy vis-a-vis both in the management of GBC.

Method: Between January 2011 and August 2013, consecutive patients with suspected GBC who were deemed resectable on MDCT imaging underwent FDG PET/CT imaging. Thirty nine patients were staged using laparoscopy after excluding extra abdominal metastasis on PET/CT. Ascitic fluid, when present, was sent for malignant cytology. Biopsy specimens taken from peritoneum, omentum and liver nodules suspected metastasis were subjected to frozen section and histopathology. Standard lymph node dissection was done for resectable cases. Data were prospectively collected and analyzed. PET/CT and laparoscopy were assessed for their ability to detect peritoneal and liver surface metastasis. Role of PET/CT vis-a-vis MDCT was assessed in detection of lymph node metastasis.

Results: In detecting surface metastases PET/CT and staging laparoscopy had sensitivity, specificity and accuracy of 45.5%, 100%, 84.6% and of 75%, 100%, 94.7% respectively. When used in combination, sensitivity, specificity and accuracy was 81.8%, 100% and 94.9% respectively (p = 0.001). Their combined use detected unresectable disease in 9 out of 15 patients (60%) and prevented nontherapeutic laparotomy in 23% patients. MDCT accurately staged lymph nodes in 16 (66.7%) patients while PET/CT was useful in 19 (79.2%) of the 24 patients (n = 24) who underwent curative resection.

Conclusions: Staging laparoscopy and PET/CT have roles complementary to each other in the staging and management of GBC. PET/CT holds an edge over MDCT in detecting lymph node metastasis.

PROGNOSIS OF PATIENTS WITH PT1B/ T2 GALLBLADDER CARCINOMA WHO HAVE UNDERGONE LAPAROSCOPIC CHOLECYSTECTOMY AS AN INITIAL OPERATION

Youngin Yoon, Ye-Jong Park, Shin Hwang, Ki-Hun Kim, Chul-Soo Ahn, Deok-Bog Moon, Tae-Yong Ha and Gi-Won Song
Asan Medical Center, Ulsan University, Korea

Introduction: This study intended to analyze the prognosis of patients with pT1b/T2 GBC who have undergone Laparoscopic cholecystectomy (LC) and the outcome of extended re-operation.

Method: After analyzing the institutional profiles of 500 GBC patients who have undergone surgical resection, we selected 64 patients who underwent LC initially whose gallbladder pathology was confined to pT1b or pT2 lesions. Of them, 34 patients (53.1%) underwent extended reoperation.

Results: In the LC only group (n = 30), mean age of the 16 pT1 patients was 65.7 ± 12.5 years and mean age of the 14 pT2 patients was 66.7 ± 10.1 years. In the reoperation group (n = 34), mean age of the 8 pT1b patients was 52.6 ± 9.9 years and in 26 pT2 patients, mean age was 59.2 ± 7.9 years. The reoperation group showed a younger patient age pattern than the LC only group (p = 0.001). The types of reoperation were liver resection with lymph node (LN) dissection in 17, bile duct resection with LN dissection in 2, and hepatectomy and bile duct resection with LN dissection in 15. In the LC only group, the 5-year survival rate (5-YSR) was 70.3% in pT1b and 43.2% in pT2. In the reoperation group, 5-YSR was 62.5% in pT1b (n = 8) and 59.5% in pT2 (n = 26). A survival comparison between two groups showed no significant survival gain in pT1 patients (p = 0.69) and in pT2 patients (p = 0.14). Lymph node metastasis was identified in 11% of pT1b lesions. For pT2N0 lesions, overall 5-YSR was 62% after R0 resection, showing no survival difference between primary extended surgery and LC-redo operation (p = 0.45).

Conclusions: The survival gain of reoperation was not evident in pT1b lesions. In contrast, some noticeable but not statistically significant survival difference was observed in pT2 lesions. Thus, reoperation for pT1b/T2 GBC following LC is indicated for individualized reasons, especially in patients with pT1b lesions.

CLINICOPATHOLOGICAL FEATURES OF THE INTRADUCTAL PAPILLARY NEOPLASMS OF THE INTRAHEPATIC BILE DUCT

Wanjoon Kim, Gi-Woong Jang, Yong-Joo Lee, Ki-Hun Kim, Kwang-Min Park, Chul-Soo Ahn, Deok-Bog Moon, Tae-Yong Ha, Gi-Won Song and Dong-Hwan Jung
Asan Medical Center, Ulsan University, Korea

Introduction: This study is intended to investigate the clinicopathological features of the intraductal papillary neoplasms of the intrahepatic bile duct (IPNB), especially focused on malignant changes.

Method: From the institutional database of liver resection cases, 18 patients who met the definition of IPNB were selected. They had undergone liver resection between February 2002 and October 2006; thus, the follow-up period was more than 5 years.

Results: Of the 18 patients, 11 patients were male. Their mean age was 61.3 ± 6.7 years. There were no differences between the non-malignant and malignant lesions, in the comparison of the CEA levels (5.6 ± 2.7 vs. 12.6 ± 31.1 ng/mL, p = 0.439) and the CA19-9 levels (29.2 ± 34.7 vs. 31.9 ± 30.2 ng/mL, p = 0.871). The
common radiologic findings were: intraductal growing mass in 10; bile duct dilatation in 6; and saccular duct dilatation in 2. Left and right hepatectomies were performed in 15 and 3, respectively. Five patients showed benign lesions of IPNB, and 13 patients revealed malignant lesions of intraductal papillary adnocarcinoma or cholangiocarcinoma. All 4 patients with benign lesions survived for a mean period of 53 months without recurrence. In 13 patients with the malignant lesions, 1-year, 3-year, and 5-year survival rates were 100%, 84.6%, and 59.2%, respectively.

Conclusion: We concluded that intrahepatic IPNB is a rare type of biliary neoplasm which includes a histological spectrum, ranging from benign disease to invasive malignancy. The long-term survival was anticipated after complete curative resection.

FO18-09
SURGICAL OUTCOMES AND PROGNOSTIC FACTORS OF INTRAHEPATIC CHOLANGIOCARCINOMA
Shao-jun Zhou, Zhi-yong Huang and Xiao-ping Chen
Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, China

Introduction: Although curative resection was the only chance of cure in patients suffering from intrahepatic cholangiocarcinoma (ICC), the prognostic factors of ICC remains controversial. The purpose of this study was to analyze the surgical outcomes and prognostic factors of a cohort of patients with ICC undergoing curative resection.

Method: The clinicopathological data of 125 patients with ICC undergoing curative resection between January 2002 and May 2008 were retrospectively reviewed. The variables including age, sex, hepatitis B virus infection, cirrhosis, tumor marker, tumor size, number of tumors, vascular invasion, perineural invasion, bile duct thrombi, lymph node metastasis, tumor differentiation, AJCC 7th staging, blood transfusion and adjuvant therapy were analyzed by using the Kaplan–Meier method and Cox hazard models. The correlation between CA19-9 expression and clinicopathological factors was analyzed using the $\chi^2$ test and a logistic regression model.

Results: The cumulative 1-, 3- and 5-year survival rates of the entire cohort were 81.6%, 39.2% and 18.4% respectively, and the 1-, 3- and 5-year disease-free survival rates were 61.6%, 27.2% and 12.8% respectively. Univariate analysis revealed that CA19-9 level, AJCC 7th staging, tumor size, multiple tumors and lymph node metastasis were statistically significant factors. Multivariate analysis further showed that lymph node metastasis (RR: 3.939; p < 0.001), CA19-9 (>200 U/mL) (RR: 1.912; p = 0.001), and tumor size (>5 cm) (RR: 1.82; p = 0.005), multiple tumors (RR: 1.877; p = 0.010) were independent adverse prognostic factors. The rate of lymph node metastasis in the CA19-9 (>200 U/mL) group was significantly higher than that in the CA19-9 (<200 U/mL) group (OR: 3.208; p = 0.013).

Conclusions: Curative resection is the most effective treatment for ICC. CA19-9 (>200 U/mL), tumor size (>5 cm), multiple tumors, lymph node metastasis were independent adverse prognostic factors of ICC. High preoperative CA19-9 level (>200 U/mL) is significantly associated with lymph node metastasis.

FO18-10
A 5-YEAR EXPERIENCE OF GALLBLADDER POLYP SURVEILLANCE AND MANAGEMENT AT ADDENBROOKE’S HOSPITAL
Krashna Patel, Khaled Dajani, Saranya Vickramarajah, Raaj Praseedom, Asif Jah, Neville Jamieson, Simon Harper and Emmanuel Huguet
Addenbrooke’s Hospital, United Kingdom

Introduction: Recent literature shows active gallbladder polyp surveillance to be potentially cost effective at detecting and preventing gallbladder carcinoma. Polyp enlargement to more than 10 mm or symptomatic polyps warrants cholecystectomy. The aim of this study was to examine the surveillance programme at a large teaching hospital including uptake into the programme, change in polyp characteristics and detection of potentially malignant polyps.

Method: Data was collected retrospectively from all patients with ultrasonography detected gallbladder polyps between January 2008 and January 2013. Information obtained included patient demographics, polyp characteristics and histology of resected specimens using Meditech software, discharge summaries and clinic follow up letters.

Results: 558 patients had ultrasound detected one or more gallbladder polyps. Following initial ultrasonography, 46 patients were managed with an elective cholecystectomy. 304 patients went on to have further formal ultrasound surveillance, of which 43 underwent surgical management. The median time interval between ultrasound scans in those under active surveillance to facilitate early detection and management was significantly lower than for those not (205 days (176–364) vs. 514 (385–757), p < 0.0001). 16% of patients exhibited increase in number of polyps and 33% of polyps demonstrated enlargement in size over the surveillance period. From the cholecystectomy resected gallbladder specimens, 2.2% (2/89) demonstrated histological dysplastic changes.

Conclusions: Gallbladder polyp surveillance uptake was suboptimal at 62.7%. Polyps monitored demonstrated increase in size and number over surveillance time. Histological dysplasia and adenocarcinoma from resected gallbladders emphasizes the importance of polyp surveillance to facilitate early detection and management of potentially malignant and malignant lesions.
FO18-11
KAMPO MEDICINE “DAIKENCHUTO” PREVENTS BACTERIAL TRANSLOCATION AND HEPATIC FIBROSIS IN BILE DUCT LIGATED RATS
Keigo Yada, Hiroki Mori, Hiroki Ishibashi, Chie Takasu, Yu Saito, Tetsuya Ikemoto, Yuji Morine, Satoru Imura, Tohru Utsunomiya and Mitsuo Shimada The University of Tokushima, Japan

Introduction: Bile duct ligation (BDL) has been used as a model of biliary atresia. Bacterial translocation (BT) contributes to liver fibrosis via TLR2 signaling in BDL mice (Gastroenterology, 2012). We have previously reported that Kampo-medicine “Daikenchuto (DKT)” prevents BT in fasting rats (Dig Dis Sci, 2008). The aim of this study was to clarify the effect of DKT on BT and liver fibrosis in BDL rats.

Method: Male Wistar rats (250-300 g, 6 weeks old) were divided into the following three groups: Group1 (n = 5), control; Group2 (n = 5), receiving BDL only; Group3 (n = 5), receiving BDL and oral administration of DKT (300 mg/kg/day). In Group2 and Group3, rats were sacrificed at 3, 7 or 14 days after BDL. (1) Serum T-Bil, AST, ALT, hyaluronic acid (HA) and total bile acid (TBA); (2) bacterial culture of mesenteric lymph nodes; (3) number and height of villus of small intestine; (4) liver fibrosis with AZAN staining and activated hepatic stellate cells (HSCs) with a-SMA staining; were investigated, respectively.

Results: (1) Group3 had lower GPT on POD3 and lower serum HA on POD14 than Group1 and Group2, respectively (p < 0.05). (2) BT was observed 0% in Group1 and 100% in Group2 on POD3, 7 and 14. In contrast, it was detected 100% on POD3, 20% on POD7, and 0% on POD14 in Group3. (3) Number and height of villus in Group3 were preserved compared to Group2, in time dependent manner (on POD 7, 14, p < 0.01). (4) Area of liver fibrosis and positive a-SMA staining in Group3 were smaller than those in Group2 (p < 0.05).

Conclusions: These findings suggest that progression of liver fibrosis in biliary atresia might be caused by activation of HSCs through BT. DKT may improve liver fibrosis by suppressing the activated HSCs and maintaining intestinal integrity in patients with biliary atresia.

FO18-12
ENDOSCOPIC TARGETING OF MAGNETIC NANOPARTICLES FOR HYPERTERMIA AND LOCAL DRUG DELIVERY APPLICATIONS IN KLATSKIN TUMORS AND PANCREATIC CANCER
Anjali A. Roeth1, Ioana Slabu2, Martin Baumann2, Karsten Junge1, Joachim Conze1, Maximilian Schmedling1, Philipp Bruners1, Gernot Guentherodt1 and Ulf P. Neumann1
1RWTH Aachen University Hospital, Germany; 2Helmholtz Institute, Germany

Introduction: Drug carriers containing magnetic nanoparticles can be used for local cancer treatment to reduce the enormous side effects of systemic chemotherapy. After peripheral injection, the magnetic nanoparticles (MNP) are targeted at the tumor site by a magnetic field trap. Applying an alternating magnetic field generates heat that releases the drug locally and may additionally be used for hypertermia application. Until today, only tumors on the surface can be reached. To treat internal tumors, we aimed to target the MNP endoscopically. For this endeavor, the ideal magnetic field trap had to be found. Sample applications were Klatskin tumors and pancreatic cancer.

Method: The magnetic characteristics of the tumors and the surrounding organs were investigated in different species (human, pig, rat) by SQUID-analysis. Together with topographical characteristics they were used to establish a biophysical model of the tumor and its surrounding structures, in which different magnetic field trap formations could be simulated and optimized. Toxicity and interaction with different magnetoliposomes were investigated in human cancer and non-malignant cell lines in vitro (MTT, fluorescence microscopy, TEM). The optimized magnetic field traps and magnetoliposomes were then tested in vivo in a pig animal model.

Results: The programmed biophysical model closely mirrored the characteristics of the tumor and its environment. We could improve the targeting efficiency by 8fold with the simulation. In vitro, we could identify the best suitable composition of magnetoliposomes with the least toxicity and the highest magnetization. In vivo, we were able to target the injected MNP at the region of interest. The local accumulation could be detected directly by MRI and histology and indirectly by change in the magnetic characteristics of the tissue.

Conclusions: Local treatment of internal tumors is possible by endoscopic targeting of magnetic nanoparticles. Further experiments in tumor models are needed.

FO19-01
THE RELATIONSHIP BETWEEN ABERRANT PROMOTER METHYLATION OF MULTIPLE GENES AND PROGNOSIS IN HEPATOCELLULAR CARCINOMA
Jiang-ming Chen
The Secondary Affiliated Hospital of Anhui Medical University, China

Introduction: To study the relationship between the gene promoter methylation state of DAPK, FHIT and SLIT2 genes and the clinical pronosis of patient in hepatocellular carcinoma (HCC)

Method: The technique of methylation-specific PCR (MSP) was adopted to investigate the promoter hypermethylation of DAPK, FHIT SLIT2 genes in 50 HCCs after a curative resection.

Results: In all patients with HCC, the frequency of hypermethylation in DAPK, FHIT and SLIT2 were 82.0% (41/50), 68 .0% (34/50) and 54.0% (27/50), respectively. Those three genes have higer frequency
among the group of less than one year with tumor recrudescence. The frequency hypermethylation of FHIT gene is especially higher in the group of less than one year with tumor recrudescence ($p = 0.036$). There is a statistical prognosis difference between those cases with two or three promoters hypermethylation and those cases with none or one ($p = 0.006$).

**Conclusions:** The results strongly suggest that, Hypermethylation of multiple gene promoters are common events in HCC. In patients with HCC, aberrant DNA methylation is significantly associated with poor prognosis. Detection of multiple gene promoters hypermethylation in tumor tissue, especially FHIT gene, is therefore a useful index to predict the prognosis of HCC. FHIT maybe can serve as a biomarker for the prognosis, after a curative resection.

**FO19-02**
**EPIGENETIC REPRESSION OF MIR-132 EXPRESSION BY THE HEPATITIS B VIRUS X PROTEIN IN HEPATITIS B VIRUS-RELATED HEPATOCELLULAR CARCINOMA**

Zhongjun Wu, Xufu Wei, Cui Tan, Chengyong Tang, Guosheng Ren, Tingxiu Xiang, Zhu Qiu and Rui Liu

**The First Affiliated Hospital of Chongqing Medical University, China**

**Introduction:** Hepatitis B virus x (HBx) protein is involved in the initiation and progression of HBV-related hepatocellular carcinoma (HCC) by regulating host protein-coding genes. However, the role of HBx in the epigenetic repression of miRNAs, which play important roles in gene regulation during hepatocarcinogenesis, remains largely unknown.

**Method:** The expression of miR-132 in HCC cells, HBV-related HCC tissues, and serum were determined using real-time PCR. The level of DNA methylation on the promoter of miR-132 was examined using methylation-specific PCR (MSP). MiR-132 was functionally characterized in HCC cells with transiently altered miR-132 expression.

**Results:** HBx-induced DNA hypermethylation of the promoter of miR-132 was found to be more prevalent in HBx-expressing HepG2 cells than in control cells. Consistently, MiR-132 expression was also more frequently down-regulated in HBV-related HCC tissues than in adjacent noncancerous hepatic tissues and had a significant inverse correlation with HBx expression in HBV-related HCCs. Serum miR-132 levels were found to be significantly correlated with levels in tumor tissue. Finally, proliferation and colony formation of HCC cells were found to be suppressed by miR-132-mediated inhibition of the Akt-signaling pathway in miR-132 transfected cells.

**Conclusions:** Our study has demonstrated the epigenetic repression of miR-132 expression through DNA methylation induced by HBx. This work provides novel mechanistic insights into HBV-mediated hepatocarcinogenesis and suggests that miR-132 may be a promising biochemical marker and may have therapeutic applications in HBV-related HCC.

**FO19-03**
**MIR-216B SUPPRESSES TUMOR GROWTH AND INVASION BY TARGETING KRAS AND KLF17 IN HCC**

Fu-yao Liu, Zhi-yong Huang and Xiao-ping Chen

Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, China

**Introduction:** MiRNAs, critical mediators in post-transcription stage nearly in all types of tumors. This study aims to investigate the correlation between expression status of miRNAs in hepatocellular carcinoma (HCC) and proliferation, metastasis potential of HCC.

**Method:** Expression profile of miRNAs in plasma of peripheral blood between HCC patients with HCC family history and healthy people was contrasted by microarray. Then 14 miRNAs that had never been reported in HCC were found. By Real time-PCR, the expressions of 14 miRNAs were detected expression in the paired tissues from 50 patients with HCC who underwent liver resection. miR-216b was selected for further study. The relationship between miR-216b expression and the clinicopathological features of HCC was evaluated. With RNA interference technique, the correlation of miRNAs expression and metastatic potential was investigated by downregulating or upregulating expression in two HCC cell lines including SMMC-7721 and HepG2. Cell proliferation, migration, and invasion were analyzed. Furthermore, the correlation between miR-216b expression and the genes related to these biological characters were studied by western blotting.

**Results:** Of 50 HCC, 37 (75%) tumors showed reduced miR-216b expression, compared with their adjacent liver tissues. The decreased expression of miR-216b were significantly correlated with poorer tumor differentiation ($p = 0.033$) and vascular invasion ($p = 0.001$). MiR-216b overexpression in HepG2 cells resulted in decreased cell proliferation, aggregation, cell migration and invasion. And miR-216b down-regulation in SMMC-7721 cells resulted in opposite effect both in vitro and in vivo assays. Furthermore, miR-216b was found to bind to the 3’untranslatedregion (UTR) of KRAS and KLF17, and inhibit expressions of the KRAS and KLF17. And miR-216b exerts its tumor suppressor function through inhibition of the KRAS-related AKT and ERK pathways and down-regulating Id-1 expression.

**Conclusions:** miR-216b plays a key role in HCC progression. miR-216b suppresses proliferation, migration and invasion of HCC cells by regulating KRAS and KLF17 expression.

**FO19-04**
** EXPRESSION OF HNF1β AND CK7 IN CHOLANGIOCARCINOMA BY REAL-TIME RT-PCR**

Yongyut Sirivatanauksorn, Nichaporn Wongsirojkul, Chatchawan Srisawat, Ananya Pongpaibul, Patarabutr Masaratana and Vorapan Sirivatanauksorn

Siriraj Hospital, Thailand

**Introduction:** To date, the promising genes for cholangiocarcinoma (CCA) cells are still limited. HNF1β have
been suggested as an exclusive biliary epithelial cell transcription factor and CK7 have been previously reported to be highly expressed in CCA cell by immunohistochemistry. This study aims to identify genes that are constitutively expressed in CCA cell from formalin-fixed and paraffin-embedded (FFPE) tissue specimens using real-time RT-PCR and validate their expression in normal liver and CCA sections.

Method: Although RNA retrieved from FFPE tissue specimens is always degraded and cross-linked but still, it was particularly relevant for cDNA synthesis and real-time PCR applications. After RNA was isolated from 24 paired CCA and normal liver FFPE tissue specimens, its purity and yields were assessed by nanophotometer and amplification of reference genes.

Results: The detection rate of HNF1β in CCA sections was 95.83% (23/24) while in normal liver sections were 83.33% (20/24). Interestingly, the detection rate of CK7 in CCA sections were 83.33% (20/24) while in normal liver sections were only 16.67% (4/24). Moreover, CK7 showed significantly overexpression in CCA tumour compare to normal liver when normalised with ACTB. Also, we found no expression of these two candidate genes in white blood cell.

Conclusions: Both candidate genes could as well be further developed as markers for the detection of CCA in the variety of differentiation. Furthermore, the detection of these genes in the circulating blood and peritoneal fluid from CCA patients might provide the staging of the disease.

FO19-05
C-MYC DEREGULATION AS NEW PREDICTIVE FACTOR FOR EARLY RECURRENTENCE OF HCC AFTER SURGICAL RESECTION
Andrea Ruzzente1, Fabio Bagante1, Calogero Iacono1, Federica Pedici2, Matteo Brunelli2, Paola Capelli2, Alessandro Valdegamberi1, Simone Conci1, Aldo Scarpa2 and Alfredo Guglielmi1
1Unit of HPB surgery, Division of General Surgery A, University of Verona Medical School, Italy; 2FISH Molecular Laboratory, University of Verona, Verona, Italy

Introduction: Recurrence of hepatocellular carcinoma (HCC) after surgery is a critical issue and it decreases overall survival (OS). It is well known that c-Myc, as transcription factor, influences up to 15% of genes and that its deregulations determinate an aggressive tumor growth with poor prognosis.

Method: Sixty-five cases of HCC submitted to surgical resection with curative intent were examined by break-apart FISH probes to define c-myc status (disomic, polysomic, amplified). Statistical analysis were performed to find out clinical and molecular features for recurrence and overall survival.

Results: C-myc status appeared disomic in 26.1%, polysomic in 55.4% and amplified in 18.5%. The disease-free survival (DFS) and overall survival (OS) for disomic, polysomic and amplified groups were significantly different (p = 0.02 and p = 0.018, respectively). Multivariate analysis confirmed that number of nodules, AFP serum level, c-myc amplified status were significant prognostic factors for DFS with HRs of 2.62 (IC 95%, 1.21–5.65), 1.28 (IC 95%, 1.09–1.51) and 6.50 (IC 95%, 1.84–22.98), respectively.

Conclusions: C-myc gene amplification is significantly correlated with DFS and OS in patients with HCC after surgical resection. Our model based on c-Myc status may predict early recurrence helping the clinicians to offer a better tailored therapeutic choice.

FO19-06
EXPRESSION AND SIGNIFICANCE OF BMI-1 IN HEPATOCELLULAR CARCINOMA TISSUE AND PORTAL VEIN TUMOR THROMBUS
Hongqiang Yang1, Jingxia Tang2, Xinyu Peng1, Shijie Zhang1,Hong Sun3 and Xiaopin Chen3
1The First Affiliated Hospital of the Medical College, Shihezi University, China; 2The Medical College, Shihezi University, Shihezi 832000, China; 3Tongji Hospital, Huazhong University of Science and Technology, Wuhan 430030, China

Introduction: This study detect the mRNA and protein expression of Bmi-1 in hepatocellular carcinoma (HCC) tissue, pericarcinomatous tissue, portal vein tumor thrombus and normal liver tissue and to investigate the significance of Bmi-1 in the genesis and progression of HCC.

Method: Forty tissues of HCC were collected from 2005 to 2009. The mRNA and protein expression of Bmi-1 in HCC tissue (40 cases), pericarcinomatous tissue (40 cases), portal vein tumor thrombus (11 cases) and normal liver tissue (10 cases) were detected by immunohistochemistry, Western-blot and real-time PCR. The relationship between the expression of Bmi-1 and the clinicopathological features was analyzed.

Results: The median relative mRAN expression of Bmi-1 in the normal liver tissues, pericarcinomatous tissue, hepatocellular carcinoma and portal vein tumor thrombus were 0.96, 2.60, 7.51 and 29.95, respectively. The results of immunohistochemistry showed that the high protein expression rates of Bmi-1 in normal liver tissues, pericarcinomatous tissue, HCC tissue and portal vein tumor thrombus were 10.0%, 20.0%, 67.5% and 100.0%, respectively. The high protein expression rates of Bmi-1 in HCC and portal vein tumor thrombus, the expression of Bmi-1 protein was significantly higher than those in normal liver tissue and pericarcinomatous tissue (p < 0.05). High protein expression of Bmi-1 was also detected in 11 cases of HCC tissues with portal vein tumor thrombus. The results of Western-blot were consistent with those of the immunohistochemistry. The mRNA and protein expression of
Bmi-1 was correlated with Edmondson grade and the portal vein metastasis ($p < 0.05$), whereas they were irrelevant to tumor size, serum levels of AFP and hepatitis B surface antigen ($p > 0.05$). Patients with high expression of Bmi-1 had poor prognosis.

**Conclusions:** Bmi-1 is correlated with the genesis and progression of HCC as well as the formation of portal vein tumor thrombosis. Patients with high Bmi-1 expression have poorer prognosis when compared with those with low Bmi-1 expression.

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**FO19-07**

**CONTRAST-ENHANCED ULTRASOUND IN THE ASSESSMENT OF HEPATOCELLULAR CARCINOMA: COMPARISON WITH MULTIPHASIC MDCT**

Isidoro Di Carlo, Francesco Loria, Giuseppe Loria, Giuseppe Crea, Antonio Barone, Silvia Cantoni, Luciano Frosina, Salvatore Basile and Francesca Catanzariti

1 Hamad General Hospital - Doha Qatar, Qatar; 2 ASP 5 RC-Palmi Hospital, Italy; 3 ASL CHIAVARESE, Italy

**Introduction:** The aim of this study was to evaluate tumour vascularity in hepatocellular carcinoma (HCC) using contrast-enhanced ultrasonography (CEUS) with Sonovue and to compare performance with multiphasic MDCT.

**Method:** Between January 2008 and February 2013 we studied 118 nodules in 88 patients with HCC. HCC was diagnosed as a hyperenhancement lesion in the arterial phase with wash-out in the portal phase on multiphasic MDCT or by percutaneous biopsy.

We observed tumour vascularity at the early vascular phase (0–30 seconds after contrast injection) and Kupffer imaging at post vascular phase (after 10 minutes).

**Results:** Detection of vascularity at the early vascular phase was 88% in nodules that were found to be hypervascular on multiphasic MDCT or by percutaneous biopsy. The detection of vascularity was significantly lower in nodules >9 cm deep than in those <9 cm deep, but was not affected by tumour size. The detection of tumour at the post-vascular phase on CEUS was 83% in nodules with low density in the portal phase on MDCT and 82% in nodules with isodensity. The rate did not depend on the severity of underlying liver disease; rates decreased in nodules deeper than 9 cm, those smaller than 2 cm in diameter and in isoenhancing nodules at early vascular phase of CEUS.

**Conclusions:** CEUS with Sonovue is a useful tool for assessing the vascularity of HCC and is equal to that of multiphasic MDCT, however, the detectability of HCC vascularity is affected by location.
FO20-01
CONVERSION TO ENTECAVIR MONOTHERAPY FROM COMBINATION THERAPY WITH HEPATITIS B IMMUNOGLOBULIN FOR HEPATITIS B PROPHYLAXIS IN LONG TERM SURVIVOR AFTER LIVER TRANSPLANTATION: PROSPECTIVE SINGLE CENTER TR
Jeong-Moo Lee, Kyung-Suk Suh, Youngrok Choi, Suk-Won Suh, Tae You, Jose Benjamin Navarro Burgos, Angelica Garcia, Kwang-Woong Lee and Nam-Joon Yi
Seoul National University Hospital, Korea
Introduction: As a novel hepatitis B prophylaxis after liver transplantation, Combination therapy of intravenous Hepatitis B immunoglobulin (ivHBIG) and nucleoside (NA) analogue, has been the best method for HB related liver disease. However, because of many controversies of ivHBIG for prophylaxis, we evaluated efficacy of entecavir (ETV) monotherapy after discontinuation of ivHBIG in long term survivor after LT.
Method: Between February 2009 and December 2011, 20 candidates (12.9%) were prospectively enrolled among 154 consecutive LT recipients for HB related liver disease. All patient (1) had HB related liver cirrhosis, (2) Survived more than 2-years after LT, (3) (4) Underwent post-LT HB prophylaxis over one-year combination therapy with ETV (0.5 mg daily) and ivHBIG (10,000 IU per 5 weeks). Additional inclusion criteria was any one of the follows: (a) NA-naive patient, (b) If, have NA-treated history, Negative YMDD Mutation (c) Negative HBe antigen (HBeAg) and HBV DNA (<100 IU/mL), Primary endpoint was the 2-year recurrence rate of Hepatitis B ( reappearance of HBsAg or HBV DNA).
Results: All patients were followed up without HB recurrence during the second year. Only one recipient (5%) experienced HBV DNA titer elevation at 37.3 month after conversion to ETV monotherapy. But it was decreased spontaneously without any intervention. 1 patients (5%) were dropped out during the second year due to advanced gastric cancer with liver metastasis. Recurrence free survival rate of the 19 patients were 100% at two-year post-transplant. No side effects related with ETV monotherapy were noted during the follow-up period.
Conclusions: ETV monotherapy after discontinuation of ivHBIG combination therapy 2-year after liver transplantation was safe and effective in selected patient.

FO20-02
WHAT IS APPROPRIATE INDICATION TO INITIATE ISONIAZID PX FOR LATENT TUBERCULOSIS INFECTION AFTER LIVER TRANSPLANT RECIPIENTS IN EDEMIC AREA?
Hyung Hwan Moon, Jae-Won Joh, Jong Man Kim, Seung Hwan Lee, Jinyong Choi, Wantae Cho, Choon Hyuck David Kwon, Young Eun Ha and Kyung Ran Peck
Samsung Medical Center, Sungkyunkwan University, Korea
Introduction: The diagnosis and management of latent TB infection (LTBI) in liver transplant candidate are necessary because the reactivation of latent TB infection is the most common form of TB acquisition after transplantation. However, transplanted liver is believed to be more vulnerable to INH induced hepatotoxicity. The objective of this study was to identify the suitability of our LTBI treatment criteria, and to evaluate hepatotoxicity after INH Prophylaxis (Px) in a TB endemic area.
Method: From March 2008 to December 2012, we reviewed 276 patients who were received both Interferon (IFN)-γ release assay (IGRA) and Tuberculin skin test (TST) for LTBI before LT retrospectively.
Results: The number of positive results of IGRA was bigger than those of PPD tests (134/276 (48.5%) vs. 92/276 (33.3%)). Among 276 recipients, post-transplant TBs were detected on 6 recipients (2.17%). If two patients who were negative TST and IGRA without risk factor could be considered as not LTBI, but acquired from community. Interestingly, the others, all four recipients who were diagnosed as post LT TB had positive IGRA. When we analyzed 17 patients who received post-transplant INH Px, overall INH hepatotoxicity rate was 11.7% (2/17). There was no hepatic failure or death after INH treatment. The peak AST after INH prophylaxis was significantly lower with AST of lesser than 50 U/L at start of INH (p = 0.046).
Conclusions: Our study had shown INH hepatotoxicity on transplanted liver is not serious and it can be safe to start INH prophylaxis at less than 50 U/L of AST. In addition, only IGRA positivity without other risk factors deserve to be considered as INH Px criteria.

FO20-03
THE HEPATIC ENERGY FLOW DURING LIVER TRANSPLANTATION: SOMETHING MORE IMPORTANT BEYOND FLOW AND PRESSURE
An-Chieh Feng, Teng-Wei Chen, Hsiu-Lung Fan and Chung-Bao Hsieh
Tri-Service General Hospital, National Defense Medical Center, Taiwan
Introduction: The correlation between portal vein flow and portal vein pressure during liver transplantation, which greatly contribute to the surgical outcomes and also affect the need of performing graft inflow modulation, is not yet confirmed. This study was performed to
evaluate the correlations between mounts of hemodynamic parameters during liver transplantation by applying the law of energy conservation.

**Method:** The energy flow in the hepatic system could be explained by applying fluid mechanic theories including two inflows from hepatic artery and portal vein and one outflow of hepatic vein. The expected energy could be presented as flow x pressure. The energy consumed by liver which could be calculated as total energy inflow from hepatic artery and portal vein minus energy outflow from hepatic vein may correlate to the outcome of liver transplantation and subsequent liver regeneration. By using the published data, the energy indexes were calculated and the energy model was established.

**Results:** By applying the model of hepatic energy flow, we used the published data from literatures to simulate the energy status of normal condition, cirrhosis, cadaveric liver transplantation, and living donor liver transplantation. Energy from hepatic artery will drop significantly compared to normal or cadaveric liver transplantation after living donor liver transplantation. The average acceptable energy index is around 23,150 to 35,100 in normal condition and graft inflow modulations will be required if beyond or below this range.

**Conclusions:** By applying the concept of energy conservation, the relationship between portal vein, hepatic artery and hepatic vein systems can be clearly demonstrated. The energy consumed by liver graft and the ratio of the energy provided from the portal vein and hepatic artery can be considered as the indicators of performing graft inflow modulations to prevent early postoperative complications.

**FO20-04**

PORTAL FLOW IS THE MAIN PREDICTOR OF EARLY GRAFT DYSFUNCTION REGARDLESS OF THE GRWR STATUS IN LIVING DONOR LIVER TRANSPLANTATION- A RETROSPECTIVE ANALYSIS OF 147 PATIENTS

Bhavin Vasavada¹, Chao Long Chen² and Muhammad Zakaria³

¹Fellow liver surgery and transplant, India; ²Professor and Superintendent, Taiwan

**Introduction:** Sometimes it is seen that even in adequate GRWR settings even after ruling out all other causes recipients shows features of small for size syndrome. Purpose of this study was to evaluate all causative factors responsible for early graft dysfunction fulfilling the definition of small for size syndrome regardless of the GRWR status with particular emphasis on portal flow (mL/minute/100g). We also tried to establish weather high portal flow on Doppler study intraoperatively immediately after reperfusion can predict graft dysfunction.

**Method:** Early graft dysfunction was defined according to definitions given for small for size syndrome by clavien et al and Kyushu university group. Patients undergone living donor transplantation between January 2010 and December 2012 were analyzed. After applying exclusion criteria according to above definitions univariate, multivariate analysis and Fisher t test were applied to predict cut off value of portal vein flow in predicting graft dysfunction and ROC curves prepared.

**Results:** 19 patients out of 147 showed features of early graft dysfunction as per definition. In univariate analysis HCV and Portal vein flow immediately after reperfusion achieved statistical significance in predicting graft dysfunction. (p = 0.020 and p = 0.0001). In multivariate logistic regression Only portal vein flow after reperfusion achieved statistically significant value in predicting postoperative graft dysfunction. (p = 0.001); portal flow greater than 180 and 190 (mL/minute/100g) achieved statistical significance in predicting graft dysfunction (p = 0.0003 and p = 0.0001 respectively) with AUROC 0.711 and 0.799 respectively. GRWR was not significant at any step.

**Conclusions:** Portal vein flow immediately after reperfusion >180/mL/minute/100 g more reliably predict weather graft will behave like small for size or not regardless of grwr status. Portal vein flow is the most significant factor in predicting graft dysfunction rather then GRWR.

**FO20-05**

KINETICS OF ANTI-BLOOD ISOAGGLUTININ TITERS, B T, NK LYMPHOCYTES IN ABO INCOMPATIBLE LIVING DONOR LIVER TRANSPLANTATION WITH RITUXIMAB, PLASMA EXCHANGE, BASILIXIMAB, AND IVIG

Seung Duk Lee and Seong Hoon Kim

National Cancer Center, Korea

**Introduction:** A novel protocol for ABO incompatible living donor liver transplantation (ABO-I LDLT) has been performed using rituximab, plasma exchange, basiliximab, and IVIG. The aim of this study was to investigate the kinetics of anti-blood type isoagglutinin titer and the number of B, T, and natural killer lymphocytes in ABO-I LDLT with this protocol.

**Method:** Twenty patients underwent ABO-I LDLT without splenectomy and local infusion therapy with previous new protocol between January 2012 and July 2013, and data was reviewed retrospectively.

**Results:** The initial median antibody titer before plasma exchange was 1:32 (range, 1:4–1:256). Antibody isoagglutinin titers were lowered by several pretransplant plasma exchanges (range 1–4 times) to less than 1:8 in all patients. Titers were suppressed well until follow-up days. However, CD 19-positive lymphocytes in the blood rapidly disappeared after 2 weeks of rituximab treatment and began to recover about 6 months later. The number of CD3, 4, 8-positive lymphocytes were increased after rituximab and recovered approximately 6 months later. CD4/CD8 ration was depressed during 6 months after transplant. However, the number of CD16, CD56-positive NK cells were decreased in this period. And there was no antibody-mediated/acute
cellular rejection and serious viral or bacterial infection in these patients.

**Conclusions:** Anti-blood antibody titers were well suppressed with this protocol without antibody-mediated rejection. CD 19-positive B cells was well decreased during 6 months, however T and NK cells were increased. Especially CD4 helper T cells showed more increasing trend than CD8 cytotoxic T cell.

**FO20-06**

**PGC-1α ATTENUATES HEPATIC ISCHEMIA/REPERFUSION INJURY IN MICE: ROLE OF PEROXISOME PROLIFERATOR-ACTIVATED RECEPTORS α AND γ**

Yong Ma, Daewi Wang, Baolei Zhao, Lianxin Liu and Hongchi Jiang

*The 1st Affiliated Hospital of Harbin Medical University, China*

**Introduction:** Peroxisome proliferator-activated receptors (PPARs) α and γ have been shown to be protective in hepatic ischemia-reperfusion (I/R) injury. However, the precise role of PPARγ coactivator-1α (PGC-1α), which can coactivate both of them, in the hepatic I/R injury remains unknown.

**Method:** This study was designed to test our hypothesis that PGC-1α is protective during hepatic I/R injury by using a mouse partial hepatic I/R model. The in vitro effects of PGC-1α on hepatocytes anoxia/reoxygenation (A/R) injury were also tested.

**Results:** Our results show that endogenous PGC-1α is basally expressed in normal livers, and is mildly increased by I/R. Overexpression of PGC-1α protects against hepatic I/R and hepatocytes A/R injuries, whereas knockdown of endogenous PGC-1α aggravates such injuries, as convinced by detection of the levels of serum aminotransferase and inflammatory cytokine, apoptosis, histological examination and cell viability. The electrophoretic mobility shift assay (EMSA) shows that the activation of PPARα and PPARγ are increased or decreased by the overexpression or knockdown of PGC-1α, respectively, during hepatic I/R and hepatocytes A/R injuries. In addition, the administration of special antagonist of either PPARα (MK886) or PPARγ (GW9662) could effectively alleviate the protective effect of PGC-1α against hepatic I/R and hepatocytes A/R injuries.

**Conclusions:** These findings indicate that endogenous intrahepatic PGC-1α protein is protective during hepatic I/R injury in mice. Such hepatoprotective role of PGC-1α, at least in part, through the activation of PPARα and PPARγ. Thus, PGC-1α may be a new therapeutic target for the protection of the liver against I/R injury.

**FO20-07**

**RISKS OF LATE SURGICAL PROCEDURES IN LIVER TRANSPLANTATION**

Daniele Sommacale1, Ganesh Nagarajan2, Federica Dondero2, Tullio Piardi1, Alain Sauvanet2, Francois Durand2, Catherine Paugam-Burtz2 and Jacques Belghiti2

1Dune Pole, France; 2PMAD, France

**Introduction:** The number of patients with previous liver transplantation requiring future abdominal surgical procedures is significantly increasing. The postoperative risk of these patients is not known. We analyze our data on late surgical procedures after liver transplantation.

**Method:** From January 1997 to December 2011, we performed 1211 liver transplantations. 161 transplanted patients (154 with liver transplantation alone, 6 with liver/kidney transplantation and 1 with liver/lung transplantation) require 181 (16.5%) late abdominal surgical procedures, defined as >3 months surgery after the date of liver transplantation. All surgical procedures were classified into elective or emergency procedures and into major or minor procedures. Postoperative morbidity was graded according to the Dindo-Clavien classification. Retrospective analysis of prospectively collected data was performed. Chi-square analysis and Fisher test were used for statistical analysis.

**Results:** Late surgical procedures included abdominal wall surgery in 101 cases (54%), bilioenteric anastomosis in 44 cases (24%), intestinal surgery in 23 cases (12%), liver surgery in 6 cases (3%), others in 7 cases (4%). Late surgical procedures were classified as major in 64 cases (35%) and minor in 117 cases (65%). Emergency surgery was required in 19 cases (11%), while elective surgery was performed in 162 cases (89%). The overall postoperative morbidity and mortality were 29% (54/181 cases) and 1.1% (2/181 cases), respectively. According to Dindo-Clavien classification the commonest late surgical procedure was classified as grade III (46%), followed by grade II (40%). Morbidity was 36% (23/64) in major procedures, while it was 20% (24/117) in minor procedures (p = 0.02). Morbidity was 31% (6/19) in emergency surgery, while it was 29% (48/162) in elective surgery (p = ns). Overall mortality in late surgery after liver transplantation concerned patients underwent major and emergency surgical procedures (p = 0.02).

**Conclusions:** Late surgical procedures after liver transplantation are associated with a significantly higher risk of morbidity in patients underwent major and emergency surgical procedures.
FO20-08

USEFULNESS OF PIVKA-II AFTER LIVING DONOR LIVER TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA

Min-Su Park, Kwang-woong Lee, Suk-Won Suh, Tae You, YoungRok Choi, Nam-Joon Yi and Kyung-Suk Suh

Seoul National University Hospital, Korea

Introduction: z-Fetoprotein (AFP) and prothrombin induced by the absence of vitamin K or antagonist-II (PIVKA-II) are useful tumor markers for hepatocellular carcinoma (HCC). However, little is known about the clinical characteristics and prognosis of HCC with different levels of AFP and PIVKA-II. We evaluated the clinical value of perioperative AFP and PIVKA-II levels in predicting HCC recurrence after living donor liver transplantation (LDLT).

Method: One hundred twenty patients who were to receive LDLT for HCC from February 1999 to December 2010 and whose serum AFP and PIVKA-II had been measured sequentially before and after LDLT were included in this study. Patients were classified into four groups according to the level of AFP and PIVKA-II [Group I, normal AFP (<20 ng/mL) and PIVKA-II (<40 mAU/mL); Group II, elevated AFP and; Group III, elevated PIVKA-II; Group IV, elevated both AFP and PIVKA-II].

Results: Recurrence occurred in 27 cases (22.5%). The mean value of AFP and PIVKA-II at initial diagnosis was 3,256.7 ng/mL and 1,194.0 mAU/mL. Pre-operative PIVKA-II level tended to increase with increasing tumor size, number of nodule, presence microvascular invasion and poor differentiation. Group III and IV including elevated PIVKA-II showed higher recurrence rates (p = 0.000). Elevated PIVKA-II level was the first sign of recurrence after LDLT even if the level of PIVKA-II before LDLT was not high (62.5%). In 8 patients with preoperative normal PIVKA-II level, 87.5% patients showed elevated PIVKA-II level at recurrence. However, a transient increase in PIVKA-II levels without evidence of recurrence was observed in 14 patients; biliary obstruction (n = 9), unknown (n = 5).

Conclusions: Frequent measurement of PIVKA-II may be a useful follow-up marker for detecting HCC recurrence after LDLT.

FO20-09

OUTFLOW RECONSTRUCTION USING NATIVE LIVER VEINS: EXPERIENCE IN 210 CASES

Hossam Elddeen Soliman1, Tarek Ibrahim1, Osama Hegazy1, Hany Shoreim1, Sherif Saleh1, Taha Yasse1, Khaled Abuelella1, Khaled Yassen2 and Ibrahim Marwan1

1National Liver Institute, Egypt; 2National Liver Institute, Menoufia University, Egypt

Introduction: Living donor liver transplantation is a good alternative in areas without cadaveric transplants. Variation of the hepatic veins and portal vein are important factor in determining suitability of grafts for living donation especially as regard donor safety and difficulty in outflow reconstruction due to the lack of suitable vein grafts. We present our experience in vascular reconstruction of living donor transplants using vein grafts harvested from the native liver of the recipient in Rt lobe grafts harvesting.

Method: We had performed 210 living donor liver transplantation by the transplant team of the department of Surgery, National Liver institute, Menoufia University starting from 28th of April 2003 to the end of August 2013. They were 33 pediatric patients and 177 adult patients. We reviewed the preoperative patient’s data, graft characteristics, operative data, postoperative details including hospital stay, the in-hospital complications and early follow. Accordingly, we excluded 44 patients with tumors and 13 patients with portal vein thrombosis.

Results: In right lobe grafts we used vein grafts in 46 out of 120 patients. We tried to minimize the number of hepatic veins to a maximum of two anastomoses by this technique. Long grafts were obtained from the portal system and the hepatic veins in reconstruction of V5 and or V8 in 38 cases, middle hepatic vein in 5 cases, multiple inferior hepatic vein in 3 cases and anterior patch for the right hepatic vein in 16 cases. In ten cases these grafts were thrombosed postoperatively but the rest were completely functioning.

Conclusions: The native liver of the recipient can be used a source for vein grafts in living donor liver transplants in absence of portal vein thrombosis and malignancy.

FO20-10

CLASS II HLA ANTIBODIES CAN AFFECT GRAFT OUTCOMES IN LIVING DONOR LIVER TRANSPLANTATION

Jung Jun Lee, Dong Jin Joo, Myoung Soo Kim, Su Hyung Lee, A-Lan Lee, Jin Sub Choi, Gi Hong Choi and Soon Il Kim

Yonsei University College of Medicine, Korea

Introduction: Highly-sensitized organ recipients are at greater risk of acute rejection, vascular complications, and poor graft survival. Preformed circulating anti-HLA antibodies immunologically challenge vascular endothelium and the bile duct. This study was undertaken to analyze the outcomes of adult living donor liver transplantation (LDLT) according to the pretransplant panel reactive antibody (PRA).

Method: We retrospectively reviewed 219 LDLT patients’ records treated at our center between June 2006 and August 2012. We divided all recipients into three groups; PRA<10%, PRA 10–30%, and PRA ≥30% in HLA class I and II.

Results: Of the 219 patients, class I PRAs <10% were detected in 160 recipients, 10–29% in 19, and ≥30% in 31. Class II PRA <10% were detected in 192 recipients, 10–29% in 9, and ≥30% in 18. Of the recipients, 32 (14.6%) were donor specific antibody (DSA) + and 187 (85.4%) were DSA-. Class I DSAs were present in 18 patients, class II in seven patients, and both in seven patients. No differences were observed in donor sex or age, relation, recipient age, or model for end stage liver disease score in patients with or without DSAs. There
were no significant differences in graft survival rates with or without DSA. However, the recipients with multiple DSAs tended to have more acute rejection episodes and events of biliary stricture, and lower graft survival rates than did patients in the DSA− group. No significant differences in graft survival rates were found among the PRA percentage groups according to the PRA class I and II. However, class II showed more intervals among the groups.

Conclusions: In LDLT, the highly-sensitized recipient to class II HLAs can affect poor graft survival. Further large cohort study is necessary for confirming and analyzing this phenomenon.

FO20-11
SIMPLE AND SAFE ABO INCOMPATIBLE ADULT-TO-ADULT LIVING DONOR LIVER TRANSPLANTATION PROTOCOL
Toru Ikegami, Ken Shirabe, Yuji Soejima, Tomoharu Yoshizumi, Hideaki Uchiyama, Yo-ichi Yamashita, Takeo Toshima and Yoshihiko Maehara
Kyushu University, Japan

Introduction: The introduction of Rituximab has dramatically pushed down the hurdle of ABO incompatible living donor liver transplantation (ABOi-LDLT). Kyushu University is the first institute, which abandoned graft local infusion treatment and introduced Rituximab-based simple protocol.

Method: Four hundred and eight adult LDLT recipients, including ABOi-LDLT (n = 19) and Non-ABOi-LDLT (n = 389) recipients, were reviewed. The current ABOi-LDLT protocol in our institute s pre-transplant Rituximab and Plasma exchange (PE) based one.

Results: In ABOi-LDLT cases (n = 19), median isoagglutinin titer before PEIs, at LDLT and after LDLT (max) was x256, x32 and x32, respectively. Rituximab was given at 21.8 ± 6.1 days before LDLT and PE was performed 3.7 ± 1.6 times. We abandoned local infusion treatment after the initial 3 cases, resulting in no such treatment in the following 16 cases. Rescue or prophylactic high-dose intravenous immunoglobulin (IVIG, 0.6 g/kg/day) was given for 6 cases in total. Among them, the initial 4 cases were given IVIG for prophylaxis, and the other 2 cases were for possible AMR. The recipient and donor backgrounds, including primary disease, age, MELD score, graft type and graft volume, were not different between ABOi-LDLTs and Non-ABOi-LDLTs. Although ABOi-LDLTs had increased rate of splenectomy (89.4% vs. 44.9%, p < 0.001) and lower portal venous pressure at the end of surgery (13.8 ± 2.3 mmHg vs. 16.9 ± 4.4 mmHg, p = 0.003), other operative factors including graft ischemic time, operative time and blood loss were not different between the groups. Although ABOi-LDLTs had increased incidence of cytomegalovirus infection (52.6% vs. 23.2%, p = 0.003), other post-transplant complications including bacterial sepsis and acute rejection were not different between the groups. The 5-year graft survival rate was 87.9% in ABOi-LDLTs and 80.4% in non-ABOi-LDLTs (p = 0.373).

Conclusions: ABOi-LDLT could be safely performed under Rituximab-based protocol without the use of local infusion.

FO20-12
SINGLE CENTER MULTIMODAL TREATMENT OF HEPATOCELLULAR CARCINOMA, 10 YEARS OF EXPERIENCE
Cataldo Doria, Edward Podgorski and Edith Mitchell
Thomas Jefferson University Hospital, USA

Introduction: HCC is the fifth most lethal cancer in North America. This is a single center retrospective review, from 2003 to 2013, of patients diagnosed with HCC undergoing TACE, ablations, radio-sphere treatments, systemic chemotherapy, liver resection and transplantation alone or in combination.

Method: Three hundred ninety nine patients who underwent liver transplantation were reviewed. A treatment algorithm, which will be discussed at the presentation, was developed. The objective was to downstage patients into Milan criteria. Demographics, baseline disease, presence of liver cirrhosis at diagnosis, Child and MELD scores, location of the lesion/s, number of lesions, pre transplant treatment, vascular and or neural invasion seen at the explant, TMN before transplant and on the explant, post-transplant immunosuppressive treatment, post-transplant follow-up imaging, rate of recurrence after transplant, rejection rates, donors characteristics, pre-implantation biopsy results, surgical technique used, donor and recipients serology, hepatitis treatment pre and post transplant, chemistry, were all reviewed and analyzed. The details of the statistical analysis will be discussed at the time of presentation.

Results: Our patients and graft survival are comparable to the ones currently available in the medical literature. However, our study identified a cohort of patients who were at higher risk of recurrence because of HCC features at presentation and/or at the explant.

Conclusions: Our study shows that HCC pre transplant treatments are not curative. However, they are essential in increasing the number of patients eligible for transplant. We have developed a more aggressive treatment for patients presenting high risk features for recurrence. Our novel HCC adjuvant treatment has shown to be effective in improving disease free survival in patients with high risk HCC who underwent liver transplantation.

FO21-01
VALIDATION OF THE SELECTION CRITERIA FOR SAFE HEPATECTOMY FOR HEPATOCELLULAR CARCINOMA: ANALYSIS OF 312 CONSECUTIVE HEPATECTOMIES
Matteo Donadon, Fabio Procopio, Matteo Cimino, Guido Costa, Daniele Del Fabbro, Angela Palmisano, Andrea Gatti and Guido Torzilli
Humanitas Clinical and Research Center, Italy

Introduction: Hepatectomy is the treatment of choice in patients with hepatocellular carcinoma (HCC), and the
estimation of functional liver reserve is the stronghold to achieve good results. The aim of this study was the validation of the selection criteria for safe hepatectomy for HCC.

**Method:** Clinical, pathological and short-term data were reviewed in a prospective cohort of patients who underwent hepatic resection between 2004 and 2013. All consecutive patients were submitted to hepatectomy based on the same selection criteria, which included the value of bilirubin (BIL), the value of cholinesterases (CHE), the presence of ascites, the presence of esophageal varices, and the rate of residual liver volume. Univariate and multivariate analyses were performed.

**Results:** A total of 312 patients were analyzed. One hundred three patients (33%) had thoracoabdominal approach, but only 36 (12%) had major or extended resections. The median tumor number was 1 (range 1–33), while the median tumor size was 4.5 cm (range 0.8–28). BCLC classes resulted 0-A in 53%, B in 25%, and C in 22%. Of those patients, 94 (29%) had postoperative complications, of which 6% were graded as major (Dindo-IIIa). The 30- and 90-days mortality were 1.2% and 1.8%, respectively. The MELD, APRI, and CPT score were tested. None of these score were found to be statistically significant at the logistic regression analysis, while the use of the combination of BIL >1 and CHE ≤5.900 was the best combination to detect complications (p = 0.007), and specifically liver-related complications such as ascites (p = 0.000).

**Conclusions:** This study shows that our selection criteria that counts mainly on two simple, fast, and cheap parameters, BIL and CHE, leads to identify patients potentially at risk of postoperative complications after hepatic resection for HCC.

**FO21-02**

**SURGICAL OUTCOME OF HCC GREATER THAN 10 CM: SINGLE-CENTER EXPERIENCE OF 471 CASES**

Shin Hwang, Sung-Gyu Lee, Young-Joo Lee, Ki-Hun Kim, Kwang-Min Park, Chul-Soo Ahn and Deok-Bog Moon

_Asan Medical Center, Ulsan University, Korea_

**Introduction:** Tumor recurrence is common after hepatic resection of hepatocellular carcinoma (HCC) greater than 10 cm in diameter. This study evaluated the outcome of patients with such large HCC after primary resection and treatment of recurrent lesions.

**Method:** A retrospective review was undertaken of clinical data for 471 patients with huge HCC who underwent liver resection from January 2000 to April 2012 in Asan Medical Center.

**Results:** Underlying liver diseases were hepatitis B in 79%, hepatitis C in 2%, alcoholic liver disease in 8%, and others in 11%. Mean tumor diameter was 13.3 ± 3.0 cm (range: 10–26 cm); mean tumor volume was 618 ± 400 mL; 93% were single lesions. Systematic and non-systematic resections were performed in 91% and 9% of patients respectively, with tumor-free resection was achieved in 89%. Satellite nodules were detected in 17%. Micro- and macrovascular invasions were identified in 56% and 10%, respectively. More than 90% patients with recurrence underwent active tumor treatment. Multivariate analysis revealed that presence of satellite nodules, poor tumor differentiation and microvascular invasion were independent risk factors for patient survival. Extensive tumor necrosis >90% after preoperative transarterial chemoembolization and increased uptake on PET scan did not become significant prognostic factors. Overall 1-, 3-, 5- and 10-year survival rates were 69%, 47%, 36% and 19%, respectively. Perioperative mortality rate within postoperative 3 months was 1.5%.

**Conclusions:** In patients with large HCC >10 cm, hepatic resection combined with active treatment for recurrence resulted in longer-term survival. Frequent protocol-based follow-up appears to be beneficial for the early detection and timely treatment of recurrence.

**FO21-03**

**ENUCLEATION VERSUS ANATOMICAL RESECTION IN THE SURGICAL TREATMENT OF HEPATIC HEMANGIOMAS – A REPORT FROM 20 YEARS EXPERIENCE**

Muthukumarassamy Rajakannu1, Rene Adam1, Gerard Pascal1, Jean Yves Mabrut2, Vikram Karam1, Chritian Ducerf2 and Jacques Baulieux2

1_Hopital Paul Brousse, France; 2_Hopital Croix Rousse, France_

**Introduction:** Management of the most common primary tumor the liver, hemangioma, is still controversial. Surgery is usually indicated for the symptomatic and complicated ones. Enucleation is considered as the technique of choice as it is associated with lower morbidity and better conservation of normal liver parenchyma. In this study we compare the three techniques of resection namely partial hepatectomy, enucleation and anatomical resection.

**Method:** Sixty-one adult patients operated for hepatic hemangioma were identified from the prospectively maintained computer database from two specialized hepatobiliary centers in France. 21 patients had undergone enucleation (E), 32 have had anatomical resection (AR) and 7 had partial hepatectomy (PH). Patients who had liver transplant were excluded from the analysis. These three groups were compared with respect to the patient demographics, operative parameters, and peri-operative outcomes.

**Results:** Patient age, gender and distribution of hemangioma in the liver were similar between the three groups. Size of the hemangioma is smaller in PH and larger in E when compared to AR. Perioperative variables like operation time, type and duration of vascular control, blood loss and transfusion, and hospital stay were all comparable. Mortality was seen in the E and AR groups. No significant difference was observed in the postoperative complication. High-risk hepatectomy, vascular exclusion of liver, operation time >4 hours and blood loss >1.45 L were identified as risk for major complications.

**Conclusions:** Evaluating the experience of two specialized centers over a period of 20 years shows that the two operative techniques yield similar results. The
selection bias could explain the presumed benefit of the enucleation in the literature. Appropriate choice of technique should be done based on the site and size of the hemangioma. Prospective controlled study needs to be done to compare the two operative techniques.

**FO21-04**

**HEPATIC RESECTION AND PROGNOSIS FOR PATIENTS WITH SINGLE HEPATOCELLULAR CARCINOMA LARGER THAN 5 CM**

Yong Hoon Kim, Koo Jeong Kang, Keun Soo Ahn, Tae Jun Park and Tae Jin Lim

*Kyemyung University Dongsan Hospital, Korea*

**Introduction:** This study aims to determine the clinico-pathological factors that influence the prognosis of hepatic resection for single hepatocellular carcinoma (HCC) larger than 5 cm.

**Method:** Of the 340 surgically resected HCCs, 103 patients (30.6%) were single HCC larger than 5 cm. Clinical features and factors influencing the outcome of these patients were retrospectively analyzed.

**Results:** 55 (53.4%) of the patients underwent major anatomical resection, 26 (25.2%) patients underwent sectionectomy and 22 (21.3%) patients received non-anatomical tumorectomy. Perioperative morbidity was observed in 23 patients (22.3%) and 2 patients resulted in a postoperative mortality (1.9%). The disease-free survival and overall survival rate at 5 years was 21.5% and 46.4% respectively. Outcome was not significantly different between HCC smaller than 10 cm (5–10 cm sized) and that of larger than 10 cm. (p = 0.231 for disease-free survival and p = 0.085 for overall survival)

Multivariate analysis showed that the presence of microvascular invasion was the independent factor of worse outcome of disease free and overall survival rates in single HCC larger than 5 cm.

**Conclusions:** Hepatic resection is safe and is the preferred treatment for single HCC larger than 5 cm. Long term outcome was significantly influenced by the presence of microvascular invasion. However, larger than 10 cm sized HCC showed not worse prognosis compared to HCC between 5 and 10 cm sized.

**FO21-05**

**EXTENSION OF THE CONCEPT OF SALVAGE TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA PATIENTS WHO UNDERWENT LIVER RESECTION**

Francesco Tuci, Alessandro Vitale, Domenico Bassi, Enrico Gringeri, Francesco D’Amico, Daniele Neri, Riccardo Boetto, Francesco Enrico D’Amico, Giacomo Zanus and Umberto Cillo

*Chirurgia Epatobiliare e Trapianto Epatico, Italy*

**Introduction:** Liver resection for hepatocellular carcinoma (HCC) can be used both for patients suitable for liver transplantation (LT) as first-line therapy (FLT) and for non-transplantable patients beyond Milan criteria with a goal of downstaging (DW).

**Method:** The aim of this study is to compare the intention-to-treat survival rates of patients who are listed for LT, according to these two strategies. We analyzed a prospective database of 407 consecutive patients who underwent hepatic resection for HCC from 2000 to 2011 to identify patients on the waiting list with tumor recurrence.

**Results:** The study group consists of 42 patients (median age 59 years, 66% of HCV-positive, median MELD 9, median AFP 22), 28 in the FLT group (BCLC A) and 14 in the DW (BCLC BC). The 5-year intention-to-treat survival rate was comparable for the two groups, being 64% for FLT and 60% for DW (p > 0.05). Of the 25 patients (15 FLT and 10 DW) who underwent transplantation (17 are still on the waiting list for HCC with complete or partial response to bridge therapies), 7 had tumor recurrence, 4 in the FLT group (27%) and 3 in the DW group (30%).

**Conclusions:** Intention-to-treat survival rates are comparable to those seen in literature. The risk of HCC recurrence seems higher and this is explained by the center policy (LT only for stable HCC or progressive HCC). Hepatic resection is an efficient therapy both as an alternative to transplantation and as a downstaging strategy for intermediate-advanced HCC.

**FO21-06**

**SURGICAL MANAGEMENT OF PATIENTS WITH HEPATOCELLULAR CARCINOMA BEYOND BCLC RECOMMENDATION AND SURVIVAL ANALYSIS A SINGLE CENTER EXPERIENCE IN CHINA**

Yefan Zhang, Tao Yan, Hong Zhao, Xinyu Bi, Zhen Huang, Cong Li, Yuan Li and Jianqiang Cai

*Cancer Institute and Hospital, Chinese Academy of Medical Sciences, China*

**Introduction:** BCLC staging is commonly used in the treatment of hepatocellular carcinoma (HCC). However, there are few studies about the surgical management of HCC patients beyond BCLC recommendation. In this study, we intend to analyze the prognosis and risk factors of the patients with BCLC B or C stage after hepatectomy.

**Method:** 908 HCC patients who underwent surgical management in Cancer Institute & Hospital, Chinese Academy of Medical Sciences from 1999 to 2011 were included. Survival analysis was performed to evaluate the overall survival (OS) and disease-free survival (DFS).

**Results:** There were 149 cases with BCLC stage B or C in beyond BCLC group and 759 cases with stage A in control group. Both the median OS and DFS of beyond BCLC group were significantly shorter than the control group (OS: 26 months vs. 83 months; DFS: 12 months vs. 46 months). Survival analysis showed that even in beyond BCLC group OS was significantly associated with solitary mass, extrahepatic spread, vascular invasion and performance status and DFS was associated with extrahepatic spread. We further divided the beyond BCLC cases into two groups according to the risk factors and for the high-risk
group, the median OS was 21 months, and 1-, 3-, 5-year OS were 45%, 18% and 8%; the median DFS was 8 months, and 1-, 3-, 5-year DFS were 26%, 16% and 8%. Both were significantly shorter than the low-risk group (the median OS was 54 months, and 1-, 3-, 5-year OS were 69%, 54% and 27%; the median DFS was 14 months, and 1-, 3-, 5-year DFS were 41%, 38% and 24%). Large tumor size was more commonly seen in high-risk group.

Conclusions: On condition that the operation indication is strictly grasped, surgical management of HCC with BCLC stage B or C could bring favorable survival benefits.

FO21-07
THE TREATMENT STRATEGY FOR ADVANCED HCC USING SORAFENIB COMBINED WITH SURGICAL RESECTION
Yusuke Arakawa, Mitsuo Shimada, Shuichi Iwashashi, Mami Kanamoto, Hiroki Mori, Tetsuya Ikemoto, Yuji Morine, Satoru Imura, Tohru Utsumoniya and Hidenori Miyake
The University of Tokushima Graduate School, Japan

Introduction: Sorafenib is one of the standard therapy for advanced and unresectable HCC. However, its utilization as neoadjuvant therapy to convert complete resection has not been established. We herein report our result of new treatment option using sorafenib and the cases which allowed surgical resection in the patients with advanced HCC.

Method: Twenty-five adult patients with advanced HCC were enrolled in this study. Sorafenib therapy was initiated with dosage of 400 mg orally, twice a day. One week later, its dosage was increased to 800 mg/day for patient safety. The effect of sorafenib for HCC was evaluated by modified RECIST after three months administration of sorafenib.

Results: The median treatment period was 112 days. The incidence of hand-foot syndrome was 44%. The 1-year overall survival rate was 55%. The rate of partial response according to mRECIST was 8% (only two patients) and the rate of stable disease was 40%. These two patients were converted to the surgical resection. (Case 1) 60-year old male with huge HCC underwent initial right hepatectomy. Lung and lymph node metastasis occurred. Sorafenib was administered during 29 months, and metastatic lesions were disappeared. Intrahepatic metastasis still remained; therefore, hepatic resection was performed. (Case 2) 50-year old male with huge HCC in the right lobe of the liver had standard sorafenib therapy. Size decrease of main tumor, disappearance of intrahepatic metastasis and normalization of AFP allowed curative right lobectomy. Those patients are alive without any recurrence.

Conclusions: The therapy using sorafenib combined with surgical resection is safe and feasible option in advanced HCC patients. Sorafenib can be considered as neoadjuvant chemotherapy for unresectable HCC in limited cases.

FO21-08
LAPAROSCOPIC VS. OPEN LIVER RESECTION FOR HEPATOCELULAR CARCINOMA ON CIRRHOTIC LIVER: A CASE-CONTROL STUDY
Riccardo Memeo, Nicola De’Angelis, Gerard Pascal, Chady Salloum, Philippe Compagnon, Alexis Laurent and Daniel Azoulay
Hopital Henri Mondor, France

Introduction: Laparoscopic liver resection is considered a safe and feasible alternative to open surgery for malignant liver lesions. However, laparoscopic surgery in cirrhotic patients remains challenging. The aim of this retrospective case-control study was to compare morbidity, mortality and long-term patients’ survival between laparoscopic (LLR) and open (OLR) liver resections for hepatocellular carcinoma (HCC) in patients with histologically proven cirrhosis.

Method: Forty-five patients treated with LLR (mean age of 62 years; range 34–75) were matched by cause of cirrhosis, Child-Pugh score, type of surgical resection, tumour number, tumour size, value of alpha-fetoprotein with 45 patients treated with OLR (mean age of 60 years; range 43–80). Pre-, intra- and post-operative variables were compared between groups. The mean follow-up was 47.7 ± 7.7 months.

Results: Overall, hepatic resections were represented by bisegmentectomies (33%), unisegmentectomies (29%), and non-anatomical resections (38%). Compared to OLR, the LLR group showed a significantly shorter operative time (median duration of 140 minutes vs. 180 minutes; \(p = 0.02\)), shorter hospital stay (median duration of 7 days vs. 12 days; \(p < 0.0001\)), and lower postoperative complications rate (20% vs. 45% of patients; \(p = 0.01\)). Moreover, a higher rate of R0 resection was observed in LLR group compared with the OLR group (95% vs. 85%; \(p = 0.03\)). Postoperative mortality, overall and disease-free survival rates were similar between groups. One-year, 5-years and 10 years survival rates were respectively 88%, 59% and 12% in the LLR group, and 63%, 44% and 22% in the ORL group (\(p = 0.27\)).

Conclusions: LLR and OLR have similar overall and disease-free survival rates in cirrhotic HCC patients. However, significantly shorter operative time, better resection margins, lower postoperative complications, and shorter hospital stay were noted in the LLR group.
FO22-01
THE SPECIFIC GENES RELATED TO THE INVASION PROCESS IN PANCREATIC CANCER, AS DEMONSTRATED BY GENOME-WIDE EXPRESSION PROFILING – THE ROLE OF MUC16 AND MESOTHELIN
Atsushi Shimizu, Seiko Hirono, Masaji Tani, Manabu Kawai, Ken-ichi Okada, Motoki Miyazawa, Yuji Kitahata and Hiroki Yamaue
Wakayama Medical University, Japan
Introduction: The invasion process is the most crucial step for PDAC. However, genes associated with invasion of PDAC remain unclear. We used genome-wide expression profiling in an attempt to identify the specific genes that are differentially expressed between infiltrating cancer cells and pancreatic intraepithelial neoplasms(PanIN)-3 cells in patients with pancreatic ductal adenocarcinoma (PDAC).
Method: We performed expression profiling using Human Genome U133 Plus 2.0 GeneChips. Microarray data of 5 pairs of RNA samples with infiltrating components were compared to PanIN-3 cells, which were harvested from the same PDAC patients. Among the genes identified by expression profiling, immunohistochemical, coimmunoprecipitation, and invasion analyses of MUC16 and mesothelin were performed to confirm the biologic significance of these molecules for patients with PDAC.
Results: A total of 109 genes were differentially expressed between infiltrating components and PanIN-3. These included 87 genes that were up-regulated and 22 genes that were down-regulated in the infiltrating cancer. Immunohistochemical analysis revealed that MUC16 and mesothelin were expressed only in infiltrating cancer cells and not in PanIN-3 cells or normal pancreatic epithelial cells. Immunoprecipitation assay indicated that MUC16 and mesothelin can bind in PDAC. The down-regulation of MUC16 by short hairpin RNA and the blockage of MUC16 binding to mesothelin by antibody inhibited both invasion and migration of pancreatic cancer cell lines. MUC16 high/mesothelin high expression in PDAC was an independent factor predicting shorter survival.
Conclusions: We identified two specific genes, MUC16 and mesothelin, that are associated with the invasion process in patients with PDAC.

FO22-02
COMPREHENSIVE ANALYSIS OF MIRNA EXPRESSION SIGNATURES ASSOCIATED WITH PANCREATIC DUCTAL ADENOCARCINOMA USING MICROARRAY AND SEQUENCING
Junghyun Namkung¹, Yongkang Kim², Woori Kwon³, Yongwhan Choi¹, Selyeong Lee²; Minsoek Kwon², Dongyoon Park¹, Sun Whe Kim¹, Jin-young Jang³ and Taesung Park²
¹SK Telecom, Healthcare Group, Korea; ²Seoul National University, Korea; ³Seoul National University College of Medicine, Korea
Introduction: Altered pattern of miRNA expression is a typical feature of many cancers. Pancreatic ductal adenocarcinoma (PDAC) is one of the most lethal cancers with little improvement in the mortality rate for decades. Analysis of miRNA deregulations may be helpful for elucidating the mechanism of tumorigenesis that gives clues to discover effective therapeutics. In addition, this could provide a list of candidate biomarkers for early detection or prognosis of PDAC patients.
Microarray and massively parallel sequencing (MPS) are technologies popularly used for gene expression profiling. Since the MPS enables the analysis of expression patterns and mutations simultaneously, we applied the MPS for the validation of microarray results and mutations of miRNA sequences were also analyzed.
Method: We have obtained expression profiles of 1,733 miRNAs using microarray for 105 tumor tissues from PDAC patients and 16 normal pancreas tissues. Differential expression was tested using SAM and elastic net was used for modeling of multiple miRNAs and clinical factors simultaneously. Unsupervised clustering methods were applied for cancer subtype detection and association of the molecular subtypes with survival time was also analyzed. To determine biological characteristics of the identified differentially expressed miRNAs, pathway and network analyses were conducted. For validation of the expression profiles, 10 of the 121 samples were analyzed using massively parallel sequencing. Expression profiles and tumor specific mutations were analyzed with the sequencing results using our custom-built analysis pipeline.
Results: A total of 48 significantly differential expressed miRNAs were identified. Molecular subtypes having distinctive prognosis were also detected.
Conclusions: We have detected miRNAs deregulated in PDAC and they could be used as candidate diagnostic biomarkers of PDAC. The subtype analysis showed the feasibility of miRNA profiles can be used as prognostic markers. Further analysis is ongoing.
THE PROGNOSTIC VALUE OF STROMA IN Pancreatic Cancer
Katherine Bever, Elaine Bigelow, Elizabeth Sugar, Rajni Sharma, Daniel LaHeru, Christopher Wolfgang, Elizabeth Jaffe, Robert Anders, Ana De Jesus and Lei Zheng
1Johns Hopkins University School of Medicine, USA; 2Johns Hopkins University School of Public Health, USA

Introduction: The overall poor prognosis of pancreatic ductal adenocarcinoma (PDA) has been attributed both to detection typically at a relatively advanced stage as well as to lack of effective treatments. The majority of PDAs are comprised of stromal compartment, with only 10–40% of the tumor being PDA cells. Emerging evidence suggests that targeting depletion of the stromal compartment leads to an increase in the efficacy of chemotherapeutics or lymphocytes-mediated tumor necrosis in preclinical models of PDA. However, how stromal components should be assessed and how the stromal compartment determines the clinical outcome of the PDA patients remain unknown.

Method: Eighty-eight consecutive patients who underwent pancreaticoduodenectomy at Johns Hopkins Hospital between 1998–2004 and whose formalin-fixed paraffin-embedded (FFPE) resected PDA blocks were available with good tissue preservation were included in this retrospective analysis. FFPE slides were stained for pankeratin followed by counterstaining with aniline blue and then scanned for quantitative analysis using ImageScope Viewer. The stromal density was defined as the number of blue pixels divided by the sum of blue and brown pixels (blue staining for collagen plus brown staining for pankeratin) in the selected tumoral area.

Results: After adjusting for margin and tumor size >3 cm, high stromal density (≥0.8) was associated with a decreased overall survival compared to low stromal density (<0.8) (HR: 0.47, 95% CI: 0.28–0.76, p = 0.0018). High stromal density in resected PDA was significantly associated with longer disease free survival (HR: 0.39, 95% CI: 0.23–0.67, p = 0.0003).

Conclusions: In this study, a novel method for quantification of tumor stroma was employed by using computer-based image analysis. We found that the quantity of stroma in PDAs has a prognostic value for patients who underwent surgical resection of their tumors.

COMPARISON OF MUC4 EXPRESSION IN PRIMARY Pancreatic Cancer AND PAIRED LYMPH NODE METASTASES
Daniel Ansari, Carlos Urey, Chinmay Gundewar, Monika Posaric Bauden and Roland Andersson
Lund University, Sweden

Introduction: Mucin 4 (MUC4) is a transmembrane glycoprotein that is expressed in pancreatic ductal adenocarcinoma (PDAC), but not in normal pancreatic tissue. MUC4 has a proposed role in pancreatic tumor progression and metastasis. The purpose of this pilot study was to investigate MUC4 expression during PDAC metastasis by comparing the expression in the primary tumor and paired lymph node metastases from the same patient.

Method: Surgical specimens from cases of primary PDAC and paired lymph node metastases were immunohistochemically analyzed for MUC4 expression. The modified histochemical score (H-score) was used for staining assessment.

Results: Positive staining for MUC4 was detected in most primary and metastatic PDAC tumors (15/17 vs. 14/17). The concordance for MUC4 expression in primary tumors and corresponding lymph node metastases was 82%. In two cases, the primary tumor was MUC4-positive and the lymph node metastases were negative, while in one patient with a MUC4-negative primary tumor, the lymph node metastasis was positive. The distribution of H-score for expression of MUC4 significantly correlated (r = 0.615; p = 0.009) between primary tumors and paired metastatic lesions.

Conclusions: MUC4 was observed in both primary and matched metastatic tumors with a high level of concordance, suggesting that MUC4 expression is retained following PDAC metastasis.
EXTENDED Pancreatectomies after Neoadjuvant Chemotherapy for Locally Advanced Pancreatic Adenocarcinoma: Analysis of Postoperative, Pathologic and Survival Outcomes

Pietro Addeo, Edoardo Rosso, Elie Oussoultzoglou, Serena Langella, Vito De Blasi, Gael Simone and Philippe Bachellier

Hepato-Pancreateo-Biliary Surgery and Liver Transplantation, France

Introduction: Up to 40% of patients with newly diagnosed pancreatic cancer present with a locally advanced disease. Since this category of patients is currently considered as unresectable, the benefits of surgery after neoadjuvant treatment remains poorly investigated. The aim of this prospective study was to evaluate the early and medium-term outcomes of pancreatic resection after neoadjuvant chemotherapy for locally advanced pancreatic adenocarcinoma (LAPA).

Method: All consecutive patients with a biopsy proven LAPA referred to our center from January 2007 to January 2012 were evaluated for neoadjuvant chemotherapy. Standardized indications for pancreatectomy after the completion of neoadjuvant treatment were a performance status >70 according to the Karnofsky index, optimized comorbidities and no radiographic or intraoperative evidence of metastatic progression. The margin status, the histological grade of neoadjuvant treatment effect as well as early and medium-term outcomes were analyzed.

Results: Forty-three patients with a mean age of 60 ± 10 years underwent surgery. All patients had venous vascular invasion classified as Nakao B (14), C (20), D (9). Thirty-six (83.7%) had a superior mesenteric artery encasement >180° and four (9.3%) preoperative superior mesenteric vein thrombosis. Type of resection performed included pancreateicosudodenectomy (28), splenopancreatectomy (6) and total pancreatectomy (9). All patients underwent an associated venous resection and twenty (46.5%) underwent an arterial resection. Overall mortality and morbidity were 7.5% and 32.5%, respectively. Two patients (4.6%) had ypT0 tumors, twelve (28%) had N0 disease and twenty nine (67.40%) had a R0 resection. The rate of R0 resection significantly correlated with N0 status (p = .0486). Thirty one patients (72%) received postoperative adjuvant chemotherapy and overall median postoperative survival was 24 months.

Conclusions: In LAPA R0 resection can be achieved in up to 50% of patients who undergo surgery after neoadjuvant chemotherapy. For these patients survival rates are similar to those observed for initially resectable pancreatic cancer.
apy, perineural invasion and angioinvasion were analyzed using Cox regression. Outcomes were stated as hazard ratio (HR) with 95% confidence interval (CI).

**Results:** Median survival of patients with PDAC was 18.9 months. 39 patients (12%) were alive at end of follow up, 28 patients (9%) were actual 5-year survivors. 100 patients (32%) received adjuvant therapy. In univariate analysis tumor differentiation, resection margin, lymph node status, adjuvant therapy, perineural invasion and angioinvasion significantly influenced survival. Cox regression model showed patients with poor tumor differentiation (HR 2.7; 95% CI 1.5–4.7), tumor positive resection margin R1 (HR 1.6; 95% CI 1.2–2), R2 (HR 2.3; 95% CI 1.1–4.6) and tumor positive lymph nodes (HR 1.5; 95% CI 1.1–2.0) had an increased risk of dying during follow-up. Patients who received adjuvant therapy (HR 0.8; 95% CI 0.6–0.99) had a decreased risk of dying during follow up.

**Conclusions:** Median actual survival of patients with pancreatic ductal adenocarcinoma after surgery was 18.9 months with a 5-year survival rate of 9%. Poor tumor differentiation, R1 and R2 resection, tumor positive lymph nodes and, although not frequently administered until 2004, adjuvant therapy were prognostic factors for survival. Perineural invasion and angioinvasion were not independently associated with survival.

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**FO23-02**

**DOES PERIOPERATIVE ANESTHETIC MANAGEMENT PLAY A ROLE IN MORBIDITY AFTER LIVER SURGERY?**

Emilie Ulldry, Takashi Kokudo, Halkic Nermin and Demartines Nicolas

*University Hospital of Lausanne, Switzerland*

**Introduction:** The last 3 decades saw dramatical improvement in liver surgery with extended indication and improved outcome. However, even if mortality decreased, morbidity remains high (30–45%). The aim of our study was to correlate anesthesia management and postoperative morbidity.

**Method:** Between 2009 and 2012, the pre-, per- and postoperative data of 260 consecutive patients was collected prospectively and analyzed retrospectively by univariate analysis. The relation between various anesthetic parameters like hemodynamic status, use of epidural analgesia, fluids or transfusion, and postoperative complications was assessed.

**Results:** Overall complication rate (Dindo grade >2) was 25%. Univariate statistical analysis identified intraoperative hemodynamic instability (defined as use of NA >10) as risk factor for post-operative surgical and medical complications (p < 0.001), more specifically for bilioma, thromboembolic events and liver insufficiency (p = 0.03, 0.01 and 0.05 respectively). Total fluid balance (< or >2,000 mL) was also a significant risk factor for postoperative surgical morbidity (overall, bilioma and SSI (p < 0.05)) and medical morbidity related to liver dysfunction or infectious complications. No association to cardiac, pulmonary, digestive or renal complication was observed. Neither intraoperative central venous pressure of >5 mmHg during liver transection, nor the use of epidural anesthesia did significantly increase morbidity. However, grade of complication was higher (p = 0.03 and 0.01 respectively). Intraoperative blood transfusion was associated to higher both surgical (p > 0.05) and medical complication (p < 0.05). Patients with complications had a significant longer hospital stay (p > 0.0001).

**Conclusions:** The analysis of our single center series of 260 liver resections allowed to identify specific anesthetic factors associated to postoperative morbidity. Those were hemodynamic instability (use of NA >10), total fluid balance >2,000 mL and blood transfusions.
DIFFERENT RISK FACTORS FOR INCISIONAL AND ORGAN/SPACE SURGICAL SITE INFECTIONS AFTER LIVER RESECTION

Takashi Kokudo\footnote{Graduate School of Medicine, The University of Tokyo, Japan}, Emilie Uldry\footnote{University Hospital CHUV, Switzerland}

\textbf{Introduction:} Surgical site infection (SSI) is a common cause of major morbidity after liver resection. This study aimed to identify risk factors for incisional and organ/space SSIs after liver resection.

\textbf{Method:} Our liver surgery database was retrospectively analyzed for patients treated between January 2009 and November 2012 in a tertiary care Swiss hospital. Univariate and multivariate analyses were conducted on preoperative, intraoperative, and postoperative variables to identify risk factors for incisional and organ/space SSIs.

\textbf{Results:} SSI incidences were 12.8% (incisional), 4.0% (organ/space), and 1.8% (both). Univariate analysis showed that incisional SSIs were associated with high American Society of Anesthesiologists (ASA) scores ($p = 0.005$), preoperative anemia ($p = 0.03$), hypoalbuminemia ($p = 0.02$), low prothrombin time ($p = 0.002$), viral or alcoholic chronic hepatitis ($p = 0.02$), liver cirrhosis ($p = 0.008$), and prolonged operation times ($p < 0.001$). Organ/space SSIs were associated with high rates of red blood cell transfusions ($p = 0.02$), concomitant bowel surgery ($p = 0.01$), and prolonged operation times ($p = 0.02$). Multivariate analysis revealed that risk factors for incisional SSIs were anemia (odds ratio [OR] 2.81), high ASA scores (OR 2.88), presence of hepatitis or cirrhosis (OR 5.07), and prolonged operation times (OR 9.60). The only risk factor for organ/space SSIs was concomitant bowel surgery (OR 5.53). Hospital stays were similar in organ/space and incisional SSIs, but significantly longer for those with both organ/space and incisional SSIs ($p < 0.001$).

\textbf{Conclusions:} Preoperative compromised conditions and prolonged operations increased the risk of incisional SSIs; concomitant bowel surgery increased the risk of organ/space SSI. Specific precautions to prevent organ/space and incisional SSIs may shorten hospital stays.

EXAMINING ACTUAL HEPATIC FUNCTIONAL VOLUME USING TECHNETIUM-99 M GALACTOSYL SERUM ALBUMIN SCINTIGRAPHY IS USEFUL FOR EVALUATING INDICATION OF MAJOR HEPATECTOMY

Atsushi Nanashima, Takafumi Abo, Junichi Arai, Katsunori Takagi, Takashi Kudo and Takeshi Nagayasu

\textit{Nagasaki University School of Biomedical Sciences, Japan}

\textbf{Introduction:} The aim of the study is to evaluate the intrahepatic differences of hepatic functions by the single-photon emission computed tomography (SPECT/CT) imaging in terms of technetium-99 m galactosyl human serum albumin (99mTc-GSA) scintigraphy before major hepatectomy in various conditions. To this end, we emphasize the usefulness of hepatic functional volumetry by surgical records of 200 patients with hepatobiliary malignancies who underwent major hepatectomy.

\textbf{Method:} Liver functional parameters or functional volume was estimated by 99mTc-GSA scintigraphy in comparison with morphological volume measured by computed tomography. In case of a large difference of both volumes, functional volume was applied for evaluating estimated resected volume of the liver. Liver uptake ratio at 15 minutes (LHL15) of GSA scintigraphy was also referred for our criterion of hepatic functional tests.

\textbf{Results:} LHL15 was correlated with the indocyanine green retention rate at 15 minutes (ICGR15; $R = -0.56$, $p < 0.01$); however, 16 patients (7.1\%) had values outside this correlation. In these patients, LHL15 reflected actual clinical status and patient outcomes more. After applying GSA liver scintigraphy since 2004, rates of uncontrolled ascites or hepatic failure was significantly decreased and operative death by hepatic failure was nil. Although morphological and functional volumes in each hepatic segment were well correlated ($R = 0.71$, $p < 0.01$), functional volume was decreased in the diseased liver with portal vein tumor thrombus, portal vein embolization or biliary obstruction in 30 patients. By comparing morphological volume, the diseased functional volume was more significantly correlated with portal pressure, alkaline phosphatase level, platelet count and cholesterol level ($p < 0.05$). By measuring functional volume or LHL15, eight patients who were functionally borderline on the basis of the ICGR15 test safely underwent scheduled major hepatectomy.

\textbf{Conclusions:} Under the ICGR15 test as the standard for preoperative hepatic function, auxiliary application of LHL15 and functional volumetry of GSA liver scintigraphy provides useful information on patients with hepatobiliary malignancies undergoing hepatectomy.

DELAYED COMPLICATIONS OF LIVER TRAUMA – THE IMPORTANCE OF ROUTINE FOLLOW UP IMAGING

Matthew Mortimer and Nagappan Kumar

\textit{Cardiff Liver Unit, United Kingdom}

\textbf{Introduction:} Traumatic injury to the liver is a greatly feared entity for the general surgeon to manage, owing greatly to its difficult surgical access and the high percentage of cardiac output that runs through the liver. Surgeons are all too aware of the immediate risk to life caused by liver trauma, such as uncontrollable bleeding, but it is often not realised by the general surgeon that these patients can develop late complications which potentially can be just as catastrophic as the initial injury itself. The need for follow up imaging in patients with liver trauma is not very clear. However, problems detected on such scans can be potentially life threatening.

We reviewed the patients who were referred to our unit following liver trauma, identifying those patients who...
developed complications of their injury which weren’t apparent at the time of their initial injury.

**Method:** We reviewed the patients who were referred to our unit following liver trauma, identifying those patients who developed complications which weren’t apparent at the time of their initial injury. We describe these complications, and how they were subsequently managed at our unit.

**Results:** Five patients were identified. Two had developed pseudoaneurysms which were managed radiologically by embolization. One patient was found to have a biloma, which was drained radiologically followed by ERCP. They were stented with good effect. One patient developed necrosis of the right liver, ultimately requiring a right hepatectomy. One patient had a large bile leak.

**Conclusions:** Patients with traumatic liver injuries require follow up scanning to detect delayed complications. At our unit this is typically done on day 10 in asymptomatic patients with Grade 3 or greater liver injury. We feel that there should be a consensus on the need for, and appropriate timing of routine follow up scanning.

**FO23-06**

**READMISSION AFTER HEPATIC RESECTION AT A QUATERNARY ACADEMIC CENTER**

Gaya Spolverato, Aslam Ejaz, Donald Lucas, Rebecca Dodson and Timothy Pawlik

*Johns Hopkins Hospital, USA*

**Introduction:** Reducing readmission has become a key quality improvement target for policymakers. We sought to define the incidence and identify factors associated with readmission after hepatic resection at a quaternary academic center.

**Method:** Readmission within 30 days of discharge after hepatic resections between 2008 and 2012 at a major academic center was analyzed. Modified Poisson regression with a robust variance estimator was used to calculate risk ratios for readmission.

**Results:** Among 357 patients identified, median age was 59 years and 184 (51.5%) were men. Indications for surgery included colorectal cancer liver metastasis (42.6%), non-colorectal liver metastasis (35.3%), primary hepatic tumors (17.7%), and benign disease (2.8%). Comorbidities were common: 74.2% were ASA class 3-4; 22.1% patients experienced unplanned weight loss; 8.1% patients had a MELD score of >10. Operations included non-anatomic resection (69.5%), hemihepatectomy (17.1%), and trisegmentectomy (12.9%). Median length-of-stay was 5 days; 48.2% patients experienced at least one inpatient complication. Overall 30-day readmission was 11.8% (n = 42); an additional 4 (1.1%) patients died at home within 30-days of discharge. Interestingly, 41 out of the 42 readmitted patients (97.6%) had a surgical complication prior to readmission. Causes of readmission included abdominal infection (40.5%), liver dysfunction (7.1%), other gastrointestinal complication (31.0%), venous thromboembolism (7.1%), pulmonary complication (4.8%), and other (11.9%). Median length-of-stay for the readmission was 4 days. Factors associated with readmission included preoperative weight loss (RR-2.38, 95% CI 1.35–4.18), MELD score of >10 (RR-2.26, 95% CI 1.10–4.64), ICU length-of-stay >1 day (RR-2.02, 95% CI 1.14–3.58), total length-of-stay >5 days (RR-2.60, 95% CI 1.39–4.83), and any inpatient complication (RR-1.94, 95% CI 1.07–3.52) (all p < 0.05). On multivariable analysis, the strongest independent predictor of readmission was length-of-stay >5 days (adjusted RR-2.30, 95% CI 1.24–4.28, p = 0.009).

**Conclusions:** Readmission after hepatic resection occurred in roughly 1 in 10 patients. Risk of readmission was associated with patient- (weight loss, MELD score), surgical- (history of complication) and hospital-level factors.

**FO23-07**

**LONG TERM RESULTS OF HYDATID DISEASE OF THE LIVER MANAGED USING PALANIVELU HYDATID SYSTEM**


*GEM Hospital and Research Centre, Coimbatore, India*

**Introduction:** Surgical management of hydatid disease of the liver can be challenging. Both conservative and radical surgeries are being followed worldwide with merits and demerits in each approach. Aim is to review the presentation, management and long-term outcomes of patients who underwent laparoscopic surgery for the hydatid disease using Palanivelu Hydatid Trocar system (PHS) in a single institution over a 17 years period.

**Method:** A retrospective review of all patients who were managed from 1997 to May 2013 for hydatid disease formed the study group. PHS system is a 12 mm continuous suction irrigation apparatus, which minimizes spillage of contents and also facilitates intracystic visualization. Clinical presentation, surgical modalities, perioperative complications and outcomes were analyzed.

**Results:** 116 patients underwent surgery for hydatid disease over the study period of which 11 patients were excluded due to radical procedure done in these patients. Mean age is 32 years with male/female ratio of 76:29. The most common presentation was abdominal pain (58%), 16(15%) had multiple cysts of which 9 (8%) were in both lobes. 7(73.3%) cysts were uncomplicated. Out of 28 complicated cases 19(17%) had cysto-biliary communication, 2 were ruptured cysts (intraperitoneally, mediastinum and stomach) and 7 recurrent cysts. All of them underwent successful laparoscopic management using PHS trocar decompression and partial cystectomy. Postoperative infection was noted in 2, bile leak in 14 (all except one were managed conservatively). Mean hospital stay was 3.2 days and follow up was 5.2 years with 15 patients lost for follow up. The recurrence was seen in 2 patients.

**Conclusions:** PHS is a simple, safe and effective tool to treat hepatic hydatid cysts with excellent long term results which are comparable to radical surgery. Its closed suction and irrigation principle avoids intra peritoneal spillage thereby resulting in better outcomes.
FO23-08
A HYBRID SEMI-AUTOMATIC METHOD FOR LIVER SEGMENTATION BASED ON LEVEL-SET METHODS USING MULTIPLE SEED POINTS

Xiaopeng Yang1, Hee Chul Yu2, Younggeun Choi1, Wonsup Lee1, Jaedo Yang3, Hongpil Hwang3, Jisoo Song3, Baik Hwan Cho2 and Heechoon You1
1Pohang University of Science and Technology, Korea; 2Chonbuk National University Medical School, Korea; 3Chonbuk National University Hospital, Korea

Introduction: The present study developed a hybrid semi-automatic method to extract the liver from abdominal computerized tomography (CT) images. The proposed hybrid method consists of a customized fast-marching level-set method for detection of an optimal initial liver region from multiple seed points selected by the user and a threshold-based level-set method for extraction of the actual liver region based on the initial liver region.

Method: The performance of the hybrid method was compared with those of the 2D and 3D region growing methods implemented in Osirix using abdominal CT datasets of 15 patients.

Results: The hybrid method showed a significantly higher accuracy in liver extraction (similarity index, $SI = 97.6\%\pm0.5\%$; false positive error, $FPE = 2.2\%\pm0.7\%$; false negative error, $FNE = 2.5\%\pm0.8\%$; average symmetric surface distance, $ASD = 1.4\pm0.5\text{mm}$) than the 2D ($SI = 94.0\%\pm1.9\%$; $FPE = 5.3\%\pm1.1\%$; $FNE = 6.5\%\pm3.7\%$; $ASD = 6.7\pm3.8\text{mm}$) and 3D ($SI = 83.4\%\pm6.7\%$; $FPE = 16.5\%\pm7.9\%$; $FNE = 16.6\%\pm6.5\%$; $ASD = 20.0\pm5.9\text{mm}$) region growing methods. The liver extraction time per CT dataset of the hybrid method (77 ± 10 seconds) is significantly less than the 2D region growing method (575 ± 136 seconds) and slightly less than the 3D region growing method (103 ± 22 seconds). The interaction time per CT dataset between the user and a computer of the hybrid method (28 ± 4 seconds) is significantly shorter than the 2D region growing method (484 ± 126 seconds) and longer (but not statistically significant) than the 3D region growing method (9 ± 2 seconds).

Conclusions: The proposed hybrid method is found preferred for liver segmentation in preoperative virtual liver surgery planning.

FO24-01
TACE WITH BALLOON CATHETER COULD BE SAFELY AND EFFECTUALLY ADOPTED FOR PATIENTS WITH HYPOVASCULER LIVER CANCER, LONG-TERM RESULTS OF A RANDOMIZED, SINGLE-BLIND AND CONTROL TRIAL WITH 178 CASES

Yong-bo Yang1, Yu-fang Chen2, Dong Chen3, Xing-an Long4, Guo-liang Shao1 and Hong-yan Cheng1
1Zhejiang Cancer Hospital, China; 2Hangzhou First People’s Hospital, China; 3Eastern Hepatobiliary Surgery Hospital, China

Introduction: To investigate the safety and efficacy of TACE with balloon catheter for hypovascular liver cancer.

Method: This is a randomized, single-blind and control trial, and patients with hypovascular liver cancer were divided into the experimental group(receiving TACE with balloon catheter) and control group(conventional catheter) randomly. The enhanced CT or MRI examination and the laboratory tests were adopted to evaluate its safety and efficacy by the occurrence of adverse reactions and treatment response during the follow-up.

Results: A total of 178 patients were entered into the study cohort, 89 cases in either group, and were proved to be with balanced baseline. The dose of lipiodol used in TACE and the volume of intrapatic lipidol in the experimental group were significantly more than those in the control group ($p = 0.016, 0.035$). The time to partial remission in the experimental group was significantly earlier than that in the control group by the mRECIST ($p = 0.029$). The incidence of gastrointestinal adverse reactions in the control group was significantly higher than that in the experimental group ($p = 0.011$), which showed close relation to the bilateral embolization and drug reflux, but had nothing to do with the dose of lipiodol used in the TACE. There was no significant difference in the laboratory parameters and the liver function between the two groups in 1.5 months after the TACE. There were four independent prognostic factors during the univariate and multivariate analysis, PA less than 170 mg/L ($p = 0.014$) and BCLC stage C ($p < 0.001$) with significantly worse survival while adopting TACE with balloon catheter ($p = 0.042$) and other treatments afterwards ($p = 0.001$) with improved survival.

Conclusions: It was preliminarily proved that TACE with balloon catheter could result in significantly more lipiodol deposition in the hypovascular lesions, earlier partial remission and longer survival time. Therefore, it might be available and safe treatment for hypovascular liver cancer and have the value for further promotion.
FO24-02
CLINICAL CHARACTERISTIC OF NEWLY DEFINED CHOLANGIOLOCELLULAR CARCINOMA – SPECIAL REFERENCE TO IMAGING FINDINGS AND PROGNOSIS
Yuichiro Maruyama, Koji Okuda, Masafumi Yasunaga, Hiroyuki Horiiuchi, Katsuki Takagi, Takahisa Shirahama, Yohei Nakama, Yusuke Hirakawa and Hisafumi Kinoshita
Kurume University, Japan

Introduction: Cholangiolocellular carcinoma (CLC) was considered to be derived from hepatic stem cell carcinoma. In Japan, CLC was classified as an independent primary liver cancer from 2009. Although the reported cases are increasing, CLC is still rare event. Preoperative diagnosis and prognosis is not clear. In the present study, we reviewed our cases of CLC.

Method: Eight CLC resected cases were enrolled in this study.

Results: There were seven males and one female, 2 patients were chronic hepatits type C, Hepatitis B was not seen. Child-Pugh grades were A in all cases. A mean tumor size was 3.8 cm. A mean CEA level was 4.2, and a mean CA19-9 level was 59.7. In seven cases tumor located at the peripheral portion of the liver. In dynamic CT findings, the contrasting was classified in two patterns. Type 1; entire enhancement in the arterial phase, and persistent enhancement in the delayed phase. Type 2; peripheral enhancement in the arterial phase, and gradual enhancement in the delayed phase. The preoperative biopsy were performed in four cases, and CLC were confirmed in two. Postoperative recurrence were confirmed in seven. Recurrent site were at liver in five cases, lymph node in two and bone in one. Overall survival rate, one year, 3 year, 5 year were 80, 60 and 50, 25 percent respectively. Patient of type 1 had unfavorable prognosis in comparison with type 2. Conclusions: Preoperative exact diagnosis of CLC are difficult. The survival rate were equal to cholangiocellular carcinoma (CCC), and we believe that surgical treatment of CLC should be done in the same way as CCC.

FO24-03
IS TUMOR MARKER DOUBLING TIME BEFORE TREATMENT A RELIABLE PROGNOSTICATOR IN PATIENTS WITH HEPATOCELLULAR CARCINOMA?
Hiroshi Nakano, Nobuyuki Matsumoto, Masafumi Katayama, Shinya Kishi, Shinjiro Kobayashi, Satoshi Koizumi, Hiroki Ikeda, Tetsu Fukunaga and Takehito Otsubo
St. Marianna University Hospital, Japan

Introduction: Identifying reliable prognosticators is important for considering adjuvant therapies after hepatic resection (HR), radiofrequency ablation (RFA), or transarterial chemoembolization (TACE) in hepatocellular carcinoma (HCC). Despite some reports, it is still unclear whether doubling times (DTs) of alpha-fetoprotein (AFP) and des-gamma-carboxy prothrombin (DCP) were predictive markers. We therefore examined whether the DTs of AFP and DCP were predictive in HCC.

Method: Among 141 HCC patients undergoing HR between 2006 and 2011, 69 patients were selected because serum AFP and DCP levels were measured at least twice before surgery to calculate the DTs. In the same period, 151 HCC patients undergoing TACE and/or RFA were also selected because DTs were measured. We investigated whether the DT-AFP and DT-DCP could predict disease free survival (DFS) or overall survival (OS).

Results: Cut-off values of the DT-DCP and DT-AFP were 60 and 170 days, respectively, considering ROC curves. In HR patients, 5-y OS after HR was significantly shorter in the DT-DCP <60 days group than in the DT-DCP >60 days group (67% vs. 90%, p = 0.02), and 5-y OS was also significantly shorter in the DT-AFP <170 days group than in the DT-AFP >170 days (67% vs. 88%; p = 0.04, respectively). There were trends of shorter DFS in the DT-DCP <60 days group and in the DT-AFP <170 days group (p = 0.06 and 0.08, respectively). In the patients receiving RFA and/or TACE, the DT-DCP <60 days was the significant predictor of OS (p = 0.02), but the DT-AFP <170 days was not.

Conclusions: In HCC patients, the DT-DCP <60 days and the DT-AFP <170 days can be reliable predictors of poorer OS after HR, and the DT-DCP <60 days can be a reliable indicator of poorer OS after RFA and TACE.

FO24-04
RESULTS OF NEOADJUVANT HEPATIC ARTERIAL INFUSION CHEMOTHERAPY IN INOPERABLE HCC PATIENTS WITH CHILD-PUGH CLASS A
Sung Su Yun, Man Ki Kim, Hwa Kyung Jung, Dong Shick Lee and Hong Jin Kim
Yeungnam University Medical Center, Korea

Introduction: The prognosis of HCC patients with main portal vein tumor thrombosis (PVTT) or multiple intrahepatic lesions, or both is extremely poor and many surgeons regard them inoperable disease and also not suitable for liver transplant. We tried neoadjuvant hepatic arterial infusion chemotherapy (HAI) for them to improve their survival and convert operability.

Method: Between April 2003 to march 2013, 46 inoperable HCC patients with Child-Pugh class A were treated with neoadjuvant HAI chemotherapy. HAI was performed via a port inserted through femoral artery. The patients were treated with 5-FU (750 mg/m²) and cisplatin (25 mg/m²) from days 1 to 4. HAI was repeated every 4 weeks. We analysed the chemoresponse with RECIST (Response Evaluation Criteria In Solid Tumors) guidelines and survival rate. Cumulative survival was calculated using the Kaplan–Meier
method and all statistical analyses were performed with SPSS software (version 12.0; SPSS, Inc., Chicago, IL).

Results: Twelve patients who could not receive more than 2 cycles HAI chemotherapy were excluded in this study. We analysed chemoresponse rate and survival in remaining 34 patients; overall CR, PR, SD and PD were 11.8% (four), 26.5% (nine), 47.1% (sixteen) and 14.7% (five), respectively. The median survival were 10.0 months. The 6, 12, 18 and 24-month cumulative survival rate 70.0%, 67.6%, 52.9% and 34.6%, respectively.

We could do liver surgery in 8 patients (17.3%) and the median survival was 32.0 months. The 6, 12, 18 and 24-month cumulative survival rates were 87.5%, 65.6%, 65.6%, and 65.6%, respectively. Among of these patients, 3 patients live now and have no recurrence for 54 months, 51 months, 14 months, respectively. After 6 cycle, one patient who did not received surgery showed CR and survived 15 months without recurrence.

Conclusions: Neoadjuvant HAI chemotherapy can be another good option to treat inoperable HCC patients with good liver function.

FO24-05
INTERFERON-α AND 5-FUOROURACIL COMBINATION THERAPY FOLLOWING HEPATIC RESECTION FOR ADVANCED HEPATOCELLULAR CARCINOMA WITH PORTAL VENOUS TUMOR THROMBUS
Yoshito Tomimaru, Hiroshi Wada, Naoki Hama, Koichi Kawamoto, Shogo Kobayashi, Hidetoshi Eguchi, Koji Umeshita, Yuichiro Doki, Masaki Mori and Hiroaki Nagano
Graduate School of Medicine, Osaka University, Japan

Introduction: The prognosis of patients with advanced hepatocellular carcinoma (HCC) remains poor, particularly in patients with tumor thrombi in the major trunk of the portal vein. We have performed combination therapy of interferon (IFN)-α/5-fluorouracil (5-FU) for such advanced HCC. This report describes the results of the IFN-α/5-FU combination therapy for the advanced HCC.

Method: The combination therapy was performed in 60 patients with advanced HCC with tumor thrombi. 30 patients with HCC and tumor thrombi with multiple nodules in the whole liver received the combination therapy after palliative hepatic resection. The remaining 30 patients were treated with the therapy as a postoperative adjuvant following curative surgery. A cycle of the combination therapy consists of arterial 5-FU infusion (300 mg/m²/day, 5 days/week, for the initial 2 weeks) and IFN-α subcutaneous injection of (5 MIU, 3 times/week, 4 weeks), 3 cycles and at least 2 cycles of the combination therapy were performed for the patients after the palliative hepatic resection and the patients following the curative surgery, respectively.

Results: In the 30 patients with the therapy after the palliative surgery, 10 (33.3%) patients showed objective response [6 (20.0%) showed complete response, 4 (13.3%) partial response], 1 (3.3%) showed no response, and 19 (63.4%) showed progressive disease. The 1-, 2-, and 3-year survival rates were 40%, 29%, and 21%, respectively. The survival in patients with objective response was significantly better than that without objective response. In the remaining 30 patients with the IFN-α/5-FU adjuvant treatment group, the disease-free survival rates at 1-, 3-, and 5-year were 77%, 60%, and 39%, and the overall survival rates at 1-, 3-, and 5-year were 100%, 69%, and 44%. These were significantly higher than those in historical controls.

Conclusions: IFN-α/5-FU combination therapy may be a very promising postoperative treatment for advanced HCC with tumor thrombi.

FO24-06
USEFULNESS OF A MODIFIED INFLAMMATION-BASED PROGNOSTIC SYSTEM FOR PREDICTING POSTOPERATIVE MORTALITY OF PATIENTS UNDERGOING SURGERY FOR PRIMARY HEPATOCELLULAR CARCINOMA
Keiichi Kubota and Mitsuori Ishizuka
Dokkyo Medical University, Japan

Introduction: The Glasgow Prognostic Score (GPS), an inflammation-based prognostic score that includes only serum C-reactive protein (CRP) and albumin, is one of the most useful scoring systems for the prognostication of cancer patients. A hepatic version of the GPS, named the hepatic GPS (HGPS), was proposed to predict prognosis in patients with hepatocellular carcinoma (HCC).

Method: The HGPS was calculated as follows: patients with an elevated level of CRP (>0.3 mg/dL) were allocated a HGPS of 1 or 2 depending on the absence or presence of hypoalbuminemia (<3.5 g/dL), and patients without an elevation of the CRP level (≤0.3 mg/dL) were allocated a HGPS of 0. Univariate and multivariate analyses were performed. Kaplan–Meier analysis and log rank test were used to compare mortalities predicted on the basis of the GPS.

Results: Three hundred patients were evaluated. Univariate analyses revealed that the number of HCCs (p = 0.019), CRP (p = 0.003), AST (p = 0.006), PIVKA II (p = 0.039), CLIP score (0, 1/2) (p = 0.021) and hGPS (0, 1/2) (p = 0.010) were associated with postoperative mortality. However, multivariate analysis demonstrated that PIVKA-II, CLIP score (0, 1/2) and hGPS (0, 1/2) were not associated with postoperative mortality. Kaplan–Meier analysis and log rank test disclosed significant differences among the three groups, patients with a HGPS of 2 (663 ± 552, days) having a shorter survival period than those with a HGPS of 0 (1031 ± 729, days) and 1 (798 ± 708, days) (p < 0.001).

Conclusions: The HGPS is able to divide patients undergoing surgery for primary HCC into three independent groups, and is considered to be an important factor predictive of postoperative mortality in such patients.
FO24-07
COMPARISON OF CLINICOPATHOLOGIC CHARACTERISTICS BETWEEN NON-B NON-C HEPATITIS INDUCED HCC AND VIRAL HEPATITIS INDUCED HCC AFTER HEPATECTOMY; SINGLE INSTITUTIONAL EXPERIENCE DURING 25 YEARS

Ryounggo Kim¹, Sang Bum Kim¹, Eung-Ho Cho¹, Yong-bae Kim¹, Chang-sup Lim¹, Dong Wook Choi² and Eun bin Ryu¹
¹Korea Cancer Center Hospital, Korea; ²Samsung Medical Center, Sungkyunkwan University, Korea

Introduction: There is a substantial population of patients who had non-B non-C hepatitis induced hepatocellular carcinoma (NBNC-HCC). We compared the clinicopathologic variables between NBNC-HCC and Viral Hepatitis Induced Hepatocellular Carcinoma (H-HCC) after hepectomy.

Method: Between January 1986 and July 2013, 669 patients underwent hepectomy cause of HCC. NBNC-HCC patients accounted for 117 people among all patients. Clinicopathologic variables were retrospec-tively reviewed between NBNC-HCC group and H-HCC group after hepectomy.

Results: Proportion of NBNC-HCC among HCC has been slightly increasing during past 25 years. In NBNC-HCC, older age, larger tumor size, lower proportion of pathologic liver cirrhosis, favorable posthe-patectomy liver function were showed compared with H-HCC. There was not a difference of overall survival between NBNC-HCC and H-HCC. NBNC-HCC was slightly improved disease free survival than H-HCC but did not showed statistically difference (p = 0.096).

Conclusions: NBNC-HCC has been slightly increasing during past 25 years. Even though aggressive feature of HCC at diagnosis, NBNC-HCC seems to be better prognosis than H-HCC. Further study of management for NBNC-HCC was needed.

FO24-08
ESTABLISHING CLINICAL MANIFESTATION AND MALIGNANT RISK IN GENOTYPED HEPATOCELLULAR ADENOMAS

Bavahuna Manoharan¹, Nicholas O’Rourke¹, Richard Bryant¹, Catherine Campbell² and Andrew Clouston²
¹Royal Brisbane Hospital, Queensland, Australia; ²Envoi Specialist Pathologists, Australia

Introduction: Hepatocellular adenomas (HCAs) present a diagnostic challenge due to ambiguous histological and radiological profiles, potential for malignant transformation and bleeding. It is now established that there are at least four main HCA subtypes with different genotypic characteristics. The indication and implication of trucut biopsies and resection for these lesions is uncertain, as are their phenotypes, clinical manifestation and malignant risk. This paper aims to present the surgical experiences in stratifying risk of HCA malignant transformation into Hepatocellular Carcinoma.

Method: Patients with HCA diagnosis and stored tissue were identified via a HPB database at the Royal Brisbane and Wesley Hospital(s) between 2000-2012. Pathological techniques for identifying LFABP inactivation, nuclear beta-catenin activation & Glutamine Synthetase, Serum Amyloid A & C-Reactive Protein were applied to biopsied and surgically resected specimens. Clinical correlation data was obtained from patient records and follow-up surveys.

Results: Seventy-two patients (89% Female; Mean Age 39 years), were identified. 84 HCA specimens, from either surgical resection (39 laparoscopic, 14 open), wedge (8) or core biopsies (31) were re-classified according to the Bordeaux classification. Multiple sub-types verified the presence of a heterogeneous adenoma group; Inflammatory (42%; Type C), HNF-1 Alpha (27%; Type A) and beta-catenin (19%; Type B) and unclassifiable (18%; Type D). Published literature, representing 259 adenomas, suggest Type B proportions of 9%, however all other subtypes were equal. 15 HCAs were haemorrhagic, with 73% Type C, representing 32% of Type C lesions which was a significantly greater proportion than others (p < 0.05). Seven patients had adenomatosis, but none were Type B.

Conclusions: Literature suggests beta-catenin mutants predispose to malignant change (10–15% of HCAs transform) and our data verifies the presence of these mutations in HCAs, showing a heterogeneous group of tumours, however further validation required to assess HCA transformation to HCC and if a new diagnostic and management approach is warranted.

FO25-01
IMPACT OF PREOPERATIVE ERCP ON LAPAROSCOPIC CHOLECYSTECTOMY

Keun Soo Ahn, Yong Hoon Kim, Koo Jeong Kang, Tae Jun Park, Kwang Bum Cho, Eun Soo Kim and Tae Jin Lim
Kyemyung University Dongsan Hospital, Korea

Introduction: The aim of this study was to evaluate effects of ERCP on laparoscopic cholecystectomy(LC) in gallstone patients.

Method: From September 1, 2011 to May 30, 2013, among 722 patients who underwent LC for benign gall-bladder disease, 448 patients who had not shown acute cholecystitis or cholangitis preoperatively. These patients were divided into 2 groups; patients with pre-operative ERCP prior to LC (ERCP group, n = 81)) and patients who underwent LC without preoperative ERCP (Non-ERCP group, n = 367). Preoperative demographic factor, intraoperative finding for degree of inflammation and technical difficulty, and postoperative outcome were analyzed retrospectively.

Results: There were no difference of degree of preoperative inflammation between 2 groups. However, in ERCP, degree of intraoperative inflammation was severe and score of technical difficulty was higher than those of Non-ERCP group. Operative time was longer and rates of open conversion was higher in ERCP group. However, rate of bile duct injury and postopera-
FO25-03

FACTORS PREDICTING INTRA-OPERATIVE DIFFICULTIES AND CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY

Kam Wa Jessica Mok, Ramesh Reddy, Jeremy Ward, Kishore Pursnani, Paul Turner, Punnya Ghosh and Ravindra Date

Lancashire Teaching Hospitals NHS Trust, United Kingdom

Introduction: Conversion to open surgery used to be a marker of difficult cholecystectomy. With increasing experience conversion rate has reduced significantly, but the difficulties remain the same. Both, conversion and difficult cholecystectomy have impact on operation time. The aim of this study is to evaluate whether C-reactive protein (CRP) is a predictive factor for ‘difficult’ cholecystectomies (DC), which are either continued laparoscopically or subsequently converted (CO).

Method: A retrospective review of all the consecutive cholecystectomies performed in a single NHS Trust in the UK, from January to December 2012, was undertaken. Association of intra-operative difficulties or conversion to open surgery, with the following factors was studied- Age, gender, C-reactive protein (CRP), white cell count (WCC), history or previous pancreatitis, jaundice and endoscopic retrograde cholangiopancreatography (ERCP).

Results: During the study period 375 patients underwent cholecystectomy, of which 41 were in CO group (10.9%), while 47 (12.5%) were in DD group. Patients in the CO group were significantly older (61) compared to DD group (55) and laparoscopic cholecystectomy (LC) group (50). Mean CRP was significantly higher in the CO group (279) compared to DD group (104) and LC group (58), p < 0.01. Amongst patients with pre-operative CRP of more than 250, 74% patients were either in CO or DD group. Other predictive factors include previous cholecystitis (n = 158, 41.1% CO or DD), previous ERCP (n = 34), with 50% in either CO or DD group and male gender (16.8% CO, 22.1% DD compared to 8.6% and 9.3% in female).

Conclusions: Increasing age, high pre-operative CRP, previous ERCP, cholecystitis and male gender appear to be major predictors of difficult cholecystectomies/ conversion to open surgery. This ability to predict the difficulty have important implications for organising the operation lists more effectively and provide more accurate information and counseling taking into account of patient’s pre-operative details.
FO25-04
LAPAROSCOPIC COMBINED
CHOLEDOSCOPIC
CHOLECYSTOLITHOTOMY VERSE
LAPAROSCOPIC CHOLECYSTECTOMY,
A FIVE YEAR FOLLOW-UP
Guoxiang Yao¹ and Xiaoping Chen²
¹South Campus, University 6th Hospital, Shanghai Jiaotong University, China; ²Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, China

Introduction: Comparison of clinical outcome of Laparoscopic Combined Cholecystolithotomy (LCCC) and Laparoscopic Cholecystectomy (LC).
Method: A prospective and controlled observation were carried out. In patients with gallbladder stones, with 200 cases of LCCC and 200 cases of LC. Operative duration, postoperative inpatient days, symptoms and relapse were documented. Follow-up period is 5 years.
Results: The operative time of the LCCC was longer than LC (53.56 ± 15.22 vs. 29.43 ± 10.82 minutes, p < 0.05). No differences were found on postoperative time and other immediate complications. Patients were followed up 5 years, average 3.8 years. Under normal diet, 110 cases of diarrhea (55%) were found in the LC group in compare with none in the LCCC group (p < 0.01), patients have to eat low fat diet to ameliorate symptoms. At the beginning of the study (3 month) 4 cases (2%) of relapse and 4 cases (2%) of residual were found in the LCCC group in comparing with none in the LC group, but residual stone disappeared after chenodeoxycholic acid (CA) oral consumption, for those with relapse, stones remain the same after CA consumption. The cost of each group is the same.
Conclusions: LCCC group takes more time than LC group without difference on postoperative hospital stay and other clinical data. LCCC group has no diarrhea while LC group has a high percentage. LCCC preserves patient’s organ and deserve further study.

FO25-05
LONG TERM RESULTS OF
LAPAROSCOPIC COMMON BILE DUCT EXPLORATION BY
CHOLEDOCHOTOMY FOR
CHOLEDOCHOLITHIASIS: 15-YEAR EXPERIENCE FROM A SINGLE CENTER
Hyung Mo Lee, Hyeon Kook Lee, Seog Ki Min and Geun Hong
Ewha Womans University Mokdong Hospital, Korea

Introduction: The aim of this study is to assess the long term results of laparoscopic common bile duct exploration (LCBDE) and validate its effectiveness primary treatment modality for CBD stone.
Method: A retrospective review of the medical records of 157 patients who underwent LCBDE from 1997 to 2011 was conducted. All LCBDE were performed by choledochotomy. Clinical demographics, operative outcome, recurrence rate of CBD stones and long term bile duct complications were analyzed. A mean follow up period was 51.9 months.
Results: LCBDE was completed in 152 patients (96.8%) and 5 patients (3.2%) had open conversion. The male/female ratio was 78/79 and mean age was 67.3 years. Stone clearance was successful in 149 of 152 patients (98.0%). Non-lethal complications were noted in 11(7.2%) patients, including bile leakage in 6 patients (3.9%). Recurrent CBD stones developed in 9 of 152 patients (5.9%). Pre-operative endoscopic sphincterotomy (p = 0.492) and choledochotomy repair type (T-tube drainage vs. primary closure, p = 0.740) were not significantly related to stone recurrence. There were no signs of any type of biliary injury or stricture observed in any of the patients during the follow-up period.
Conclusions: LCBDE can be performed without increased risk of long term complications such as bile duct stricture and recurrent CBD stones. LCBDE is a safe and effective treatment option for choledocholithiasis in terms of long term outcome as well as short term outcome.

FO25-06
PRIMARY CLOSURE AFTER LCBD EXPLORATION COMBINED WITH FLEXIBLE CHOLEDOCHOSCOPY: MID TO LONG TERM FOLLOW UP
RESULTS
Hyeon Kook Lee, Hee Jung Yi, Seog Ki Min and Geun Hong
Ewha Womans University Mokdong Hospital, Korea

Introduction: Laparoscopic common bile duct exploration (LCBDE) is commonly used for treating choledocholithiasis associated with cholelithiasis. There are many studies that compare short term result of T-tube insertion versus primary closure after LCBDE. In this study, we compared the mid to long term (>18 month) complication of primary closure with that of T-tube insertion.
Method: This retrospective study included patient who underwent LCBDE with flexible cholecystoscopy in Ewha Womans University Mokdong Hospital between 1997 and 2011. Patient were divided into two groups: primary closure (P group) and T-tube insertion (T group) after LCBDE. We reviewed medical chart and analyzed clinical features, laboratory data, operative findings and post operative follow-up evaluation. And in case of “mid to long term” output, we confined the patient who visited hospital more than one and a half years since the operation day. Intraoperative cholangiography (IOC) was not performed in any case.
Results: A total of 156 patients(except open conversion cases) were included with a median age of 67.4 years (Range 25–92) A mean follow up period was 34.5 months(Group P 26.2 month, Group T 46.7 months). Among them, 79 patient were included in “Mid to long term” follow up group.(P group 44, T group 35). The incidence of immediate post operative complications had no significant difference between the
two groups. The mean operation time (172 vs. 214 minutes, p < 0.0001) and post operative hospital stay (8 vs. 14 day, p < 0.0001) is significantly shorter in the P group compared to the T group. P group had 3 (0.068%) recurrent CBD stone while T group had one (0.029%). And among the T group patient, one had stricture and the other one had cancer after 2 years after the operation.

Conclusions: This study shows that primary closure after LCBD is feasible according to the long term outcome as well as immediate post operative outcome.

FO25-07
SINGLE-INCISION LAPAROSCOPIC CHOLECYSTECTOMY IN ACUTE CHOLECYSTITIS: WHAT IS THE CONVERSION RATE?
Chee Wei Tay, Shridhar Ganpathi Iyer, Alfred Wei Chieh Kow, Krishnakumar Madhavan and Stephen Kin Yong Chang National University Health System, Singapore

Introduction: Acute cholecystitis is a relative contraindication to single-incision laparoscopic cholecystectomy (SILC). With the more matured development in SILC technique in recent years, we report our experience of managing acute cholecystitis with SILC.

Method: Two hundred and thirty-two benign gallbladder cases managed by SILC were retrospectively studied. Cases with clinical and histological features of acute cholecystitis were identified. Patient’s demographics, biochemical and radiological findings, operating time, degree of inflammation observed intraoperatively, conversion rate and complication during follow up were recorded and analysed. We further compared the operating time of SILC and conventional laparoscopic cholecystectomy (CLC) in acute cholecystitis cases and identify the minimal cases required to achieve similar operating time as CLC.

Results: 30 cases with acute cholecystitis were identified. 15, 3 and 12 cases with mild, moderate and severe inflammation to the gallbladder respectively. No significant difference in patient’s demographics, pre-operative biochemical and radiological results are found between the 3 groups. Operating time (91 minutes) and conversion rate (25%) are significantly higher in severe inflammation group. 3 (10%) cases required conversion to CLC, no open conversion required. 13 cases of SILC were required to achieve similar operating time as CLC in acute cholecystitis. No bile duct injuries, port-site hernia or wound infections were observed.

Conclusions: SILC is a feasible option for the management of acute cholecystitis. Severe inflammation is a predictive factor of conversion to conventional laparoscopic cholecystectomy but this is unforeseeable with pre-operative tests and imaging. 13 cases of SILC were required to achieve similar operating time as CLC in acute cases for surgeons who have more than 200 case experience in SILC for non acute cases. Conversion rate to CLC is 10%.

FO25-08
ROLE OF LIVER RESECTION FOR THE TREATMENT OF BILE DUCT INJURY
Giuseppina Ranucci1, Felice Giuliani1, Gerardo Sarno2, Maria Vellone1, Gennaro Nuzzo1 and Francesco Ardito1

1University Hospital Agostino Gemelli, Catholic University of the Sacred Heart, Rome, Italy; 2University Hospital “San Giovanni di Dio e Ruggi D’Aragona”, Salerno, Italy

Introduction: Late complications after treatment of complex bile duct injury following cholecystectomy such as recurrent cholangitis, intrahepatic abscess, liver atrophy, can represent a therapeutic challenge. In these cases vascular injury and stricture of main biliary confluence or of hepatico-jejunostomy, are often present. Liver resection in such cases can represent the only effective treatment.

Method: Between 1994 and 2012, out of the 166 patients treated at our Center for bile duct injuries, 6 (3.6%) underwent liver resection. Indication for surgery was recurrent cholangitis (more than 4 episodes) with radiological evidence of hepatic atrophy in all patients. The main biliary confluence was involved in 2 cases, the right hepatic duct in 2 cases and the right posterior biliary duct in 2 cases. In 2 cases (33.3%) there was an injury of the right hepatic artery. The median time between the bile duct injury and liver resection was 6 years. Two patients had previously undergone surgical repair by hepatico-jejunostomy, the other 4 patients had undergone endoscopic, percutaneous or conservative treatment.

Results: Type of liver resection was right hepatectomy in 4 patients, associated in 1 case with left-hepatico-jejunostomy, and right posterior sectionectomy in 2 patients. There was no postoperative mortality. Postoperative morbidity rate was 50.0% (3 patients): transient liver failure in 1 case; cholangitis in 1 case and pleural effusion with thoracentesis and cholangitis in 1 case. After a median follow-up of 6 years (range 2.5–10), 5 patients (83.3%) have excellent/good results without symptoms. One patient presented recurrent cholangitis 4 years following liver resection.

Conclusions: Liver resection represents an effective treatment in selected cases with complex bile duct injuries associated with symptomatic liver atrophy.

FO26-01
DEVELOPMENT OF THE USER-CENTERED PREOPERATIVE LIVER SURGERY PLANNING SYSTEM DR. LIVER
Hee Chul Yu1, Xiaopen Yang2, Younggeun Choi2, Wonsup Lee2, Hayoung Jung1, Jaedo Yang1, Jisoo Song1, Baik Hwan Cho1 and Heecheon You2

1Chonbuk National University Medical School, Korea; 2Pohang University of Science and Technology, Korea; 3Humanopia Co., Ltd, Korea; 4Chonbuk National University Hospital, Korea

Introduction: The present study is intended to develop a user-centered preoperative liver surgery planning sys-
FO26-01

THE APPLICATION OF INTERACTIVE QUANTITATIVE 3D SURGERY PLANNING IN PRECISION LIVER SURGERY

Xuedong Wang, Weidong Duan, Ying Luo, Wenbin Ji, Jiahong Dong and Zhiquiang Huang
Chinese PLA General Hospital, China

Introduction: The precision of the surgery planning is crucial in Precision Liver Surgery. The purpose of this prospective study is to evaluate the precision and efficiency of a real-time interactive and quantitative 3D planning approach.

Method: 221 consecutive cases were included in this prospective study. Surgery plans were made via a traditional 2D planning approach using PACS and a modern approach using a real-time interactive quantitative 3D planning system respectively. 2D and 3D surgery plans were compared and verified through the operation results. The territory analysis of 3D approach was further assessed regarding its clinical feasibility and reliability.

Results: 3D quantification, reconstruction and virtual resection were successfully performed in all 221 cases. 203 of 221 patients (91.9%) successfully underwent hepatectomies, of which 102 underwent uncomplex hepatectomies and 101 complex hepatectomies. In 102 cases in uncomplex hepatectomy cases, no significant difference was observed among different surgery plans; In 101 cases in the complex group, 2D and 3D surgery plans were different in 38 cases (38/101, 37.6%) and were classified into 3 grades: I. the lesions were regarded to be unresectable in 2D surgery plan but resectable in 3D surgery plan (5); II. 3D modified the operation procedure of 2D surgery plans (4); III. 3D modified the resection extent of 2D surgery plans (29), including extended resection (19), reduced resection (8) and combination with vascular reconstruction (2). The accuracy rate of 3D territory analysis was 92.8% (77/83).

Conclusions: The clinical precision and efficiency of the real-time interactive and quantitative 3D planning were validated. Compared with traditional 2D approach, the real-time interactive and quantitative 3D planning helped to significantly improve the determinacy, predictability and controllability of liver surgery and appropriately increase the resection rate of complex hepatectomy.
FO26-04
ELECTROMAGNETIC COMPUTER-ASSISTED NAVIGATION IN LIVER SURGERY
Shouichi Satou
Saitama Medical Center, Saitama Medical University, Japan

Introduction: In this study, a new navigation system for liver resection utilizing electromagnetic tracking system was developed, and the clinical use of the system is reported.

Method: The navigation system consisted of an ultrasound scanner, an electromagnetic tracking device, and a workstation. A sterilized magnetic sensor was attached to an intraoperative ultrasound probe, and the position of the probe was tracked by the system. Based on the positional information transferred to the workstation, images of CT and MR corresponding to the ultrasound image were immediately reconstructed and displayed adjacent to the intraoperative ultrasound image, which could be referred to by the surgeons. Furthermore, simulation images showing hepatic tumor or liver parenchyma to be resected in different colors could be overlaid on the CT images. Referring to the simulation image showing the highlighted tumor or liver parenchyma, the tumor could be easily identified and the liver resection plane could be navigated.

Because the navigation system utilized electromagnetic power in the operation room, a preliminary study was scheduled to confirm the safety and feasibility of the system. The system was used in 17 cases of liver resection.

Results: The feasibility and safety of the system were confirmed because the reference image was not skewed in the presence of metallic or electric surgical devices in the operation room, and it did not affect any of the biomarkers. Twenty-six out of 28 tumors (93%) scheduled for resection were successfully identified by the navigation system and extirpated. The other two tumors could not be detected by the system because of a registration failure. A significantly high correlation coefficient \( R = 0.993, p < 0.0001 \) was obtained between the estimated volume of the specimen and its actual weight.

Conclusions: The system should be useful for intraoperative tumor detection and navigation of liver resection.

FO26-05
OPHTHALMATE LEVELS FOLLOWING A PARACETAMOL CHALLENGE DURING LIVER SURGERY: A POTENTIAL TRANSLATIONAL MODEL OF LIVER FUNCTION
Simon Dello, Kim Van Mierlo, Mechteld De Jong, Hans Van Eijk, Theo De Kok, J. Briedé, Steven Olde Damink and Cornelis De Jong
Maastricht University Medical Center, The Netherlands

Introduction: Liver failure is a dreaded complication after extensive liver surgery and prediction of remnant liver function becomes increasingly important. Unfortunately, most liver function tests cannot predict dynamic capacity to react to challenge. We aimed to challenge the homeostasis of glutathione (GSH) with acetaminophen, to develop a predictive test for remnant liver function by using systemic ophthalmic acid (OPH) as biomarker.

Method: Patients scheduled for liver or pancreatic surgery were included in this prospective trial. PCM challenges occurred before transection (first challenge), 6 hours after first challenge and 6 hours after second challenge. Arterial blood samples were obtained at baseline, intraoperatively and postoperatively to quantify OPH, GSH and vitamin C radicals. Portal and hepatic venous blood was taken to calculate arteriovenous (AV) differences of OPH across gut, liver and hepatosplanchnic area. Liver biopsies were taken to measure OPH, GSH and thyl radicals.

Results: Nineteen patients scheduled for liver resection \( (n = 12) \) or pancreaticoduodenectomy \( (n = 7) \) were included. Six hours after first PCM challenge there was a significant decrease in arterial GSH concentration compared to baseline in the Whipple group, however also tendency towards a decrease in OPH level. In the liver resection group GSH and OPH levels measured 6 hours after first PCM challenge were significantly decreased in comparison to baseline. While GSH remained decreased, no difference in OPH levels was seen after next challenges. In both groups hepatic OPH and GSH levels did not differ significantly following PCM-administration.

Conclusions: This is the first human study which assessed plasma OPH as biomarker for hepatic GSH depletion. It showed that OPH was not inversely proportionally related to the GSH drop after PCM challenge, probably because the hepatic GSH protection system was not overwhelmed. Investigating OPH/GSH in GSH-depleted patients (e.g. sepsis) would be worthwhile to assess OPH as readout for hepatic GSH depletion and hereewith marker of liver dysfunction.

FO26-06
HEPATIC STAINING TECHNIQUES USING FLUORESCENCE IMAGING FOR ANATOMIC SEGMENTECTOMY
Akinori Miyata, Takeaki Ishizawa, Keigo Tani, Atsushi Shimizu, Junichi Kaneko, Taku Aoki, Yoshihiro Sakamoto, Yasuhiro Sugawara, Kiyoshi Hasegawa and Norihiro Kokudo
The University of Tokyo, Japan

Introduction: The aim of this study was to demonstrate technical details and advantages of hepatic segment staining using indocyanine green (ICG)-fluorescence imaging to complete anatomic hepatectomy.

Method: Following hepatic mobilization, mixture of indigocarmine \( (5 \text{ mL}) \) and ICG \( (0.1 \text{ mL}, 0.25 \text{ mg}) \) was injected into branches of the portal veins corresponding to the hepatic segment to be identified without any hepatic inflow occlusion. Fluorescence images of the liver surfaces were obtained using a commercially-available near-infrared light camera system following injection of ICG solution. Then, hepatic parenchyma was transected along a demarcation between fluorescing regions and non-fluorescing lesions.
Results: Fifteen patients underwent anatomic hepatectomy using the fluorescence-guided staining technique. Surgical procedures consisted of segmentectomy V (n = 1), VI (n = 5), VII (n = 1), VIII (n = 2), bisegmentectomy IV and VIII (n = 1), V and VIII (n = 1), VI and VII (n = 3), and trisegmentectomy IV, V, and VIII (n = 1). Fluorescence imaging enabled identification of the hepatic segments to be removed in all patients. Fluorescence of ICG was observed only in the hepatic segment with the injection of ICG, throughout the segmentectomy procedures. At all cases, demarcation lines were immediately identified by ICG fluorescent imaging after injection. Fluorescence imaging visualized clear demarcation of hepatic segments even in re-hepatectomy patients (n = 6), in whom staining of hepatic segments with indocarmine was not clearly identified because of adhesive tissues on the liver surfaces. No adverse reactions to the ICG were encountered.

Conclusions: Hepatic staining techniques using the injection of ICG mixed with indigocarmine solution into the portal veins enables clear identification of hepatic segments not only by visual inspection but also on fluorescence images. The ICG fluorescence imaging may be useful to complete anatomic segmentectomy, especially in patients undergoing secondary hepatectomy and in those with liver cirrhosis, in whom conventional staining technique using blue dye sometimes fails to visualize clear demarcation between the hepatic segments.

FO26-08
PREDICTING EPATIC FAILURE USING PREOPERATIVE REMNANT LIVER LU15 FROM FUSION IMAGES OF 99MTC-LABELED GALACTOSYL HUMAN SERUM ALBUMIN LIVER SCINTIGRAPHY AND COMPUTED TOMOGRAPHY

Naokazu Chiba, Motohide Shimazu, Shigeyuki Kawachi, Kiminori Takano, Toru Sano, Masaaki Okihara and Kiyoshi Koizumi
Tokyo Medical University, Hachioji Medical Center, Japan

Introduction: A novel index, total liver LU15, has been identified as a surrogate marker for liver function. We evaluated the ability of preoperative remnant liver LU15 values to predict hepatic failure following liver resection for any disease.

Method: Potential preoperative risk factors for postoperative hepatic failure (hepatic coma with hyperbilirubinemia, two patients; intractable pleural effusion or ascites, one patient) and remnant liver LU15 were evaluated in 98 patients undergoing liver resection for several diseases. We calculated the remnant liver LU15 value from the total liver LU15 value and the functional remnant liver ratio, using Synapse Vinsent workstation to perform image fusions of 99mTc-labeled galactosyl human serum albumin liver scintigraphy SPECT imaging and computed tomography. Prognostic significance was determined by univariate and multivariate analyses.

Results: Hepatic failure developed postoperatively in three patients, causing death in two. The remnant liver LU15 value did not correlate with any histological factors, and was significantly less than 13.0 in patients who developed postoperative hepatic failure than in those without failure (p = 0.03). Only the remnant liver LU15 index was an independent preoperative factor on the multivariate analysis (OR = 0.436, 95% CI: 0.198–0.961, p = 0.0395). Of the four patients who died of postoperative hepatic failure, all patients had a remnant liver LU15 value of less than 13.0.
Conclusions: Preoperative remnant liver LU15 values independently predicted hepatic failure following liver resection for any disease. Patients with a remnant liver LU15 value of 13 or less have a high risk of postoperative hepatic failure.

FO27-01
ULTRA-SHORT STAY LAPAROSCOPIC CHOLECYSTECTOMY IN A DAY SURGERY CENTER IN INDIA
Radhakrishna Patta
Apollo Hospitals, India

Introduction: Ambulatory laparoscopic cholecystectomy is being performed in the west for quite a while now with patients getting back home in less than 24 hours after surgery. This is generally not accepted in India for various reasons. Patients want to stay overnight in the hospital for fear of any sudden eventuality. We tried discharging patients in less than 6 hours after lap cholecystectomy after adequately controlling post operative pain, nausea and vomiting.

Method: We have chosen patients with symptomatic gall stones with ASA grade I and Iimand excluded others. In addition to general anaesthesia we gave all these patients TAP (transverse abdominis plane) block for post op pain control and dexamethasone for control of PONV. We discharged them the same day once the patient passed urine and is mobile.

Results: Between November 2011 and August 2013 we performed day care laparoscopic cholecystectomy on 278 patients. Of these 28 had acute cholecystitis, 32 underwent LC a day after ERCP and stone removal from CBD. 4 patients had completion cholecystectomy of which one had situs in versus totalis. No patient was hospitalised subsequently for any reason whatsoever. Two were discharged with a drain which was removed a day later. One patient had a mild wound infection and one other patient developed an abdominal wall hepatoma requiring aspiration. The mean hospital stay was 5.6 hours while the mean time to oral intake was 3.8 hours.

Conclusions: We believe that ultra-short stay laparoscopic cholecystectomy (less than 6 hour stay) is feasible in a country like ours with a proper selection of cases, good post operative control of pain and nausea in a dedicated day surgery Center where everyone is aware of this day surgery concept and work towards early discharge of their patients.

FO27-02
SINGLE INCISION LAPAROSCOPIC CHOLECYSTECTOMY USING CONVENTIONAL INSTRUMENTS VERSUS THREE PORT LAPAROSCOPIC CHOLECYSTECTOMY – OUTCOMES
Kumar Palaniappan
Global Hospitals & Health City, Chennai, India

Introduction: Transumbilical single incision laparoscopic surgery (SILS) is a new laparoscopic procedure in which only one transumbilical incision is made, demonstrated as a scarless procedure. Single incision laparoscopic surgery (SILS) represents the next step in laparoscopic surgery in further reducing the invasiveness of surgical procedures with cosmetic advantage. We report the outcomes of patients undergoing SILS Cholecystectomy versus Three port cholecystectomy.

Method: Between February 2010 and March 2011, 75 patients were operated for benign gallbladder diseases. 36 underwent SILS Cholecystectomy using conventional instruments (Group I) & 37 underwent Three Port Laparoscopic Cholecystectomy (Group II). Patients with BMI less than 30, benign diseases were included. Outcome measures included operative time, intensity of postoperative pain and consumption of painkillers, hospital stay, need for conversion, complications, and cosmetic effects

Results: Mean operating time in Group I was 69 min & in Group II was 41 minutes. Intensity of pain measured using Visual analogue scale (VAS) at 6 hours, 10 hours & at 24 hours were 3.9, 2.7 and 1.3 in Group I. In Group II, VAS scores were 4.3, 3.2 & 1.8. The need for pain killers were less in Group I compared to Group II. The mean hospital stay in Group I was 1.46 & in Group II 2.1. There were 2 conversions in Group I to Group II. No patient underwent conversion to open procedure. Wound infection was the major complication occurred in 1 patient in Group I & 2 patients in Group II.

Conclusions: Single-incision laparoscopic surgery cholecystectomy can be an alternative to three port laparoscopic cholecystectomy, especially with reference to young people with body mass index less than 30 kg/m2, without serious systemic diseases, operated on electively due to benign gallbladder diseases.

FO27-03
PERCUTANEOUS CHOLECYSTOSTOMY VERSUS CHOLECYSTECTOMY FOR ACUTE CHOLECYSTITIS IN OCTOGENARIANS
Chin Cheung Cheung, James Tak-kwan Fung, Wai Man Wong and Chak Fong Mak
Tuen Mun Hospital, Hong Kong, China

Introduction: For elderly patients with acute cholecystitis who are not responding to antibiotics treatment and considered to be too risky for early cholecystectomy, percutaneous cholecystostomy (PTC) is an alternative option. This study aims at reviewing the outcomes of octogenarians with acute cholecystitis treated by cholecystectomy or PTC.

Method: Patients aged 80 years or older who received cholecystectomy or PTC from January 2003 to December 2012 due to acute cholecystitis not responding to antibiotics were retrospectively reviewed. Comparison was made between patients who received cholecystectomy and PTC.

Results: Among the 1564 patients admitted for acute cholecystitis in the study period, one hundred and twenty-six octogenarians received cholecystectomy or PTC as treatment for acute cholecystitis. The median age was 83 years (range 80–96). There were 50 males. Thirty-four patients (27%) received PTC. When patients who received PTC were compared with those
who received cholecystectomy, there was no difference in age, gender and comorbidity between the two groups. The proportion of patients with high ASA grading (grade III or above) and the duration from symptom onset to intervention in the two groups was comparable. While there was no significant difference in 30-days mortality between the two groups, the one-year mortality was significantly higher for patients who received PTC (47.1%) instead of cholecystectomy (19.6%). Significantly more patients who received PTC had subsequent readmissions due to biliary sepsis (PTC vs. cholecystectomy: 20.6% vs. 2.2%).

**Conclusions:** Although PTC is effective in short-term palliation of sepsis and symptoms for octogenarians with acute cholecystitis; there is still a high chance of recurrent sepsis, leading to readmission and mortality in long-term. In patients who received PTC for control of biliary sepsis, cholecystectomy should be considered subsequently as a definitive measure to prevent recurrent sepsis and mortality.

**FO27-04**

**TOKYO GUIDELINES 2013 SEVERITY CHARACTERISTICS AS RISK FACTORS FOR CONVERSION TO OPEN SURGERY IN PATIENTS WITH ACUTE CHOLECYSTITIS**

Koji Asai, Manabu Watanabe, Hiroshi Matsukiyi, Tomoaki Saito, Hajime Kodama, Toshiyuki Enomoto, Yoichi Nakamura, Yoshihisa Saida, Jiro Nagao and Shinya Kusachi

**Toho university Ohashi medical center, Japan**

**Introduction:** The aim of this retrospective study was to identify whether Tokyo guidelines 2013 (TG 13) severity classifications serve as risk factors for conversion to open surgery in patients with acute cholecystitis (AC) who are undergoing management with laparoscopic cholecystectomy (LC).

**Method:** A total of 225 patients were enrolled. Patients were classified into one of two groups: the conversion group and the no-conversion group. Criteria for grade II AC, such as white blood cell (WBC) counts more than 18,000 cells/mm³, duration of symptom more than 72 hours, and marked local inflammation, were examined as risk factors for conversion to open surgery.

**Results:** Conversion to open surgery occurred in 29 patients (12.9%), including seven patients (6.7%) with grade I AC and 22 patients (18.5%) with grade II AC. Univariate analysis showed that risk factors for conversion to open surgery included duration of symptoms >72 hours, C-reactive protein (CRP) value, and Tokyo guidelines 2013 (TG 13) severity classification. Multivariate analysis showed that risk factors for conversion to open surgery included duration of symptoms >72 hours and CRP >11.5 mg/dL.

**Conclusions:** Duration of symptoms >72 hours and CRP >11.5 mg/dL were independent risk factors for conversion to open surgery.
FO27-06
INTRA-OPERATIVE ERCP VERSUS LAPAROSCOPIC CLEARANCE IN PATIENTS WITH CHOLEDOCHOLITHIASIS UNDERGOING EMERGENCY LAPAROSCOPIC CHOLECYSTECTOMY: A RANDOMISED TRIAL
Benjamin Poh, Chee Cheen Yeong, Mithra Sritharan, David Devonshire, Michael Swan, Malcolm Barnes, Paul Cashin and Daniel Croagh
Monash Medical Centre, Australia

Introduction: With the introduction of laparoscopic cholecystectomy and the subsequent advent of advanced endoscopic and laparoscopic techniques, minimally-invasive management of choledocholithiasis has become technically feasible and widely utilized. Both intra-operative ERCP and laparoscopic bile duct exploration are acceptable means of achieving bile duct clearance within a single session in a laparoscopic cholecystectomy population. We aim to compare the rates of bile duct clearance by endoscopic versus laparoscopic methods in a population undergoing emergency laparoscopic cholecystectomy.

Method: We designed a non-blinded, randomized controlled trial performed at our centre. Patients were randomized by simple randomization at the time of intra-operative cholangiogram upon demonstration of choledocholithiasis into either one of the two arms of the study, intra-operative ERCP, or laparoscopic common bile duct exploration. The latter could be performed transcystically or via a choledochotomy at the operating surgeon’s discretion. Duct clearance was noted upon procedure completion and patients were followed-up three-monthly for post-procedural complications, length of stay, and requirement for further procedures.

Results: Preliminary findings from patients accrued to date suggest that intra-operative ERCP may be more effective than laparoscopic common bile duct exploration in terms of duct clearance. Furthermore, the group randomized to laparoscopic clearance had increased morbidity rates and appeared to require greater numbers of related procedures in their episode of care. There were non-significant differences in length of stay between both groups.

Conclusions: The interim findings of our study suggest that intra-operative ERCP might be superior to laparoscopic common bile duct exploration in clearing the bile duct in patients undergoing emergency laparoscopic cholecystectomy.

FO27-07
MANAGEMENT OF HEPATICO-JEJUNOANASTOMOSIS STRICTURES SECONDARY TO BILIARY OPERATIVE INJURY REPAIR BY BIODEGRADABLE STENTS PLACEMENT
Mariano Gimenez, Mariano Palermo, Dario Berkowski, Pablo Cordoba, Gary Duran, Jorge Cardoso and Eduardo Houghton
Hospital de Clinicas, Argentina

Introduction: Once a biliary injury has occurred, especially in the case of complex lesions, repair is done by a hepatico-jejunoanastomosis. Success rates range is from 85% to 95%. The initial use of biodegradable stents was in the digestive tract, its first indications were for benign esophageal and colonic strictures. Biodegradable biliary stents should change the treatment of this complication.

Method: In a prospective study, since March 2011, 16 biodegradable stents were placed in 13 hepatico-jejunoanastomosis strictures secondary to bile duct repair of a biliary surgical injury. Average age was 38.7 years (23–67), 9 patients were female. In 9 patients, the hepatico-jejunoanastomosis stricture was treated with a high pressure balloon and in 4 patients, with failure of the balloon dilatation, with prolonged dilatation with 5 to 6 percutaneous plastic stents during 9–12 months. All cases had a percutaneous drainage at the time of biodegradable stent placement.

Results: 16 stents were placed in 13 patients. In one case, temporary hemobilia was present requiring blood transfusion, delaying hospital discharge for 24 hours. In another case, pain after stent placement required intravenous medication and delayed the discharge for 72 hours. In the rest 11 patients, hospital discharge was the next morning following stent placement. During the patients’ follow-up, none presented symptoms during the first 9 months. One patient presented significant alkaline phosphatase elevation 8 months after stent placement. Stricture recurrence was confirmed, a re-hepatico-jejunoanastomosis was carried out. Eleven patients (84.6%) continued asymptomatic with a mean follow-up of 20 months.

Conclusions: The placement of biodegradable stents is a safe technique. We have not observed strictures caused by the stent or its degradation. A long-term follow-up is necessary to establish the actual patency of the stricture. It could eventually substitute balloon dilation in the treatment of strictures of hepaticojejunoanastomoses.

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FO27-08

PRELIMINARY STUDY OF SURGICAL TREATMENT BASED ON THE CLINICAL CLASSIFICATION OF HEPATOLITHIASIS

Fu-bao Liu1, Jiang-ming Chen2, Guo-bing Wang1, Yi-jun Zhao1, Kun Xie1, Zhi-gong Zhang1, Yi-zhao Luo1 and Xiao-ping Geng1

1The First Affiliated Hospital of Anhui Medical University, China; 2The Secondary Affiliated Hospital of Anhui Medical University, China

Introduction: Hepatolithiasis (HL) is prevalent in Southeast Asia, especially in China. We have suggested a new type of classification according to the history and pathologic changes. The study aims to evaluate the efficacy the new classification and maybe to provide new guidance on clinical treatment for HL.

Method: This retrospective analysis includes 68 HL patients underwent Surgical operation in the first affiliated hospital of Anhui medical university from August 2011 and December 2012. All patients were completed by the same group of Surgeon. All patients had regular postoperative follow-up every 1 to 3 months by the same team of surgeons.

Results: The positive diagnosis rate of HL which correspond to intraoperative findings with B-ultrasonography, abdominal CT scan and MRCP is 97.1%, 91.9% and 95.0%. According to our clinical classification, there were 34 patients of Type I (50.0%), 25 of Type II (36.8%), 7 of Type III (10.3%) and 2 of Type IV (2.9%). A total of 52 cases received hepatectomy. A total of 48 cases given the external drainage and the other 20 cases received choledochojejunostomy group. Intraoperative biliary microscopy confirmed 20 cases who had sphincter of Oddi laxity and the immediate stone clearance rate is 73.5%. The positive rate of bile bacterial culture is 77.6%. 16 cases had postoperative complications (23.5%). There were no perioperative death in this group. The average follow-up time is 10.4 ± 4.3 month. There were 4 cases suffered cholangitis recurrence and 12 cases had occasional bile duct inflammatory.

Conclusions: The clinical classification proposed in this study has a certain sense to guide the surgical treatment. Comined with hepatectomy is the main measurement to improve efficacy and reduce the rate of residual stone and stone recurrence. Taking the biliary tract endoscopy can reduce postoperative biliary-enteric reflux and stones recurrence.

FO28-01

DIAGNOSTIC EFFECTIVENESS IN PERCUTANEOUS PUNCTURE OF PANCREAS GUIDED BY TAC

Marcos Diego García Ejarque1, Fernando Ignacio Iglesia1, Ursula Tamara Gitter1, Martin Costal1, Mariano Bregante1, Gustavo Castagneto1 and Eduardo Agustín Porto1

1British hospital of Buenos Aires, Argentina; 2Sanatorio Guemes of Buenos Aires, Argentina

Introduction: It has been suggested that for histological diagnosis of pancreatic mass lesions, the use of percutaneous fine needle punctures (PFNP) are well recognized regarding puncture with tru-cut needles due to their fewer complications and almost immediate recovery without hospitalization. However, the diagnostic value of PFNP in this disease is still unknown. There are no studies in our country that analyses this feature. Our objective is to evaluate the diagnostic effectiveness of PFNP in pancreatic tumors guided by computerized tomography (CT).

Method: Patients with unresectable pancreatic lesions with suspect of malignancy were included, in a period between January 2001 and July 2013. All the PFNP of pancreas made guided by CT were analyzed retrospectively. Spine needles of 21G were used in all cases. A pathologist was in the operative room at the moment of all punctions. The samples were informed as optimal for study. The diagnostic was them confirmed by the cytological examination.

Results: Thirty-six patients were included. Tumors size was from 40 to 120 mm. The differed cytological examination confirmed in all cases the suspect of malignancy. There were 4 cases of morbidity (two patients with epigastric pain and 2 wall hematomas). There was no mortality in the series.

Conclusions: Percutaneous pancreatic puncture with fine needles guided by CT is a well mini-invasive diagnostic method for unresectables pancreatic tumors, with a positive predictive value of 100% in our series and with low morbidity rate. So, despite of the need of randomized prospective studies, PFNP of pancreas could be an excellent alternative.

FO28-02

REAPPRAISAL OF MORPHOLOGICAL CLASSIFICATION OF IPMN; CLINICAL VALIDITY OF THE TERM ‘MIXED TYPE IPMN’ AND OPTIMAL THRESHOLD FOR CLASSIFICATION

Mee Joo Kang1, Jin-Young Jang1, Selyeong Lee1, Taesung Park1, Seung Yeoun Lee2, Kyoung Bun Lee1, Ye Rim Chang1, Wooli Kwon1, Woohyun Jung1 and Sun-Whe Kim1

1Seoul National University College of Medicine, Korea; 2Sejong General Hospital, Korea

Introduction: Current morphology classification of IPMN has a gray zone for mixed type IPMN that are vaguely defined without statistical evidence. The associ-
FO28-03
GENE EXPRESSION PROFILE ACCORDING TO THE HISTOLOGIC SUBTYPE (GASTRIC, INTESTINAL, PANCREATOBILIARY AND ONCOCYTIC TYPE) IN INTRADUCTAL PAPILLARY MUCINOUS NEOPLASMS OF PANCREAS

Ye Rim Chang1, Jin-Young Jang1, Mee Joo Kang1, Selyeong Lee2, Taesung Park2, Seung Yeoun Lee3, Junghyun Namkung3, Sangio Han4, Kyoung Bun Lee1 and Sun-Whe Kim1

1Seoul National University College of Medicine, Korea; 2Sejong General Hospital, Korea; 3Sejong University College of Natural Sciences, Korea; 4SK Telecom, Korea

Introduction: Intraductal papillary mucinous neoplasms (IPMN) represent a spectrum of tumors that range from low-grade dysplastic tumors to invasive cancer. Recently histologic subtype has been reported to be related with prognosis and morphologic type. However gene expression pattern and tumor biology according to histologic subtype of IPMN have not been extensively evaluated.

Method: We used Affymetrix oligonucleotide microarrays to compare the gene expression profile of 30 IPMN samples including LG IPMN (n = 6), moderate-grade (MG) IPMN (n = 17), high-grade (HG) IPMN (n = 12), invasive cancer with IPMN (IPMC; n = 15). We also compared data with W/D pancreatic ductal adenocarcinoma without IPMN (PDA; n = 5). According to histologic subtype, there were 15 Gastric type, 9 intestinal type, 7 PB type, 2 Oncocytic type.

Results: 386 mRNAs were differentially expressed in according to the malignancy of IPMN. By DEG and clustering analysis, we could select highly expressed 100 genes differently expressed in malignancy IPMN. Hierarchical clustering demonstrated that 56 mRNAs was significantly different between gastric, intestinal and PB type. For example, 25 mRNAs were differentially expressed between pancreatobiliary and gastric/intestinal type. Hierarchical clustering demonstrated gene expression profile was significantly different according to histologic subtypes of IPMN, suggesting that different pathways are involved in those types.

Conclusions: This study demonstrates that different mRNAs are involved in the development and progression of IPMN according to the subtype and malignancy. Using this finding, we could explore potential targets for cancinogenesis, diagnosis, prognostication, and treatment of IPMN.

FO28-04
CLINICAL IMPLICATION OF CEA AND CA19-9 FOR THE PREDICTION OF MALIGNANCY IN INTRADUCTAL PAPILLARY MUCINOUS NEOPLASM OF PANCREAS

Jae Ri Kim1, Mee Joo Kang1, Jin-Young Jang1, Selyeong Lee1, Taesung Park1, Seung Yeoun Lee2, Kyoung Bun Lee1, Woool Kwon1, Ye Rim Chang1 and Sun-Whe Kim1

1Seoul National University College of Medicine, Korea; 2Sejong General Hospital, Korea

Introduction: Several malignancy predictors are suggested for intraductal papillary mucinous neoplasm (IPMN). However, little is known about prognostic significance of serum carbohydrate antigen (CA) 19-9 and carcinoembryonic antigen (CEA).

Method: We analyzed 375 surgical biopsy proven IPMN patients in order to explore malignancy predicting power of tumor markers. Cut-off value of tumor markers for malignancy prediction of IPMN was statistically drawn.

Results: Of the patients, 117 (31.1%) patients had malignant pathology (high grade dysplasia and invasive IPMN). Serum CEA was elevated (>5 μg/L) in 4.4%, and serum CA19-9 was elevated (>37 U/mL) in 16.1% of the patients. Elevated serum CEA was not significantly different according to malignancy or ductal type. Serum CA19-9 was significantly elevated in malignant IPMN (34.2% vs. 7.6%, p < 0.001) and main duct type IPMN (40.0% vs. 14.3%, p = 0.001). Furthermore, invasive IPMN had more frequent elevated serum CA19-9 than high grade dysplasia (47.9% vs. 11.4%, p < 0.001). Multivariate analysis revealed main pancreatic duct >5 mm (p = 0.047), mural nodule (p < 0.001), and elevated serum CA19-9 (p < 0.001) as independent malignancy predictors.
Conclusions: Unlike serum CEA, serum CA19-9 level was significantly higher in malignant IPMN and main duct type IPMN. Invasive IPMN had more frequently elevated serum CA19-9 than high grade dysplasia. Serum CA19-9 level can be used as a malignancy predictor of IPMN.

FO28-05
SOLID PSEUDOPAPILLARY TUMOR OF THE PANCREAS: ANALYSIS OF CLINIOPATHOLOGICAL FEATURES AND SURGICAL OUTCOMES
Ahmed Elgendi¹, Saba Elgendi² and Mohamed Elgendi³
¹Lecturer of Surgery, Egypt; ²Assistant Professor of Pathology, Egypt; ³Professor of Surgery, Egypt
Introduction: Solid-pseudopapillary tumor (SPT) of the pancreas is an uncommon pancreatic neoplasm with a low-grade malignancy that occurs mainly in young women. This study was undertaken to analyze the clinico-pathological characteristics of the disease and to evaluate the outcome of surgical intervention in a tertiary referral cancer centre.
Method: A prospectively maintained database of the characteristics of 14 patients (13 females and 1 male), with a mean age of 21.6 years (range 17–34 years) who underwent surgical resection in our institution with a mean age of 21.6 years (range 17–34 years) who underwent surgical resection in our institution with a definitive histological and immunohistochemical diagnosis of SPT between 2002 and 2012 was developed and analyzed.
Results: Five cases (37%) presented with dull aching pain, palpable mass in 3 cases (21%), with incidental detection in 3 cases (21%). The tumor was located in the body/tail in 12 cases and in the head in 2 patients. Mean tumor diameter was 10.7 cm (range 5–21). Tumors of the head were smaller (average 6.3 cm) but more symptomatic than those in the body-tail (average 13 cm). None of the patients had metastases at presentation. 2 cases underwent pancreaticoduodenectomy, 2 enucleations, while 10 patients had left pancreatectomy. All cases were positive for nuclear β-catenin, and negative for membranous E-cadherin immunoreactivity. Overall morbidity rate was 22% with no mortality. At a median follow-up of 62 months (range 15–110), all patients are alive without evidence of local recurrence, metastasis, but one case of diabetes developed.
Conclusions: SPT is an indolent neoplasm with characteristic macroscopic, microscopic, and immunohistochemical features. The low grade biological aggressiveness makes surgical resection possible despite its large size and patients can survive a long period after the operation.

FO28-06
PROGNOSTIC FACTORS AFTER SURGERY FOR Pancreatic Neuroendocrine Tumors: A SINGLE CENTER EXPERIENCE
Simona Olimpia Dima, Vlad Herlea, Traian Dumitrascu, Cezar Stroescu, Florin Botea, Raluca Purta, Adina Croitoru, Cristian Gheorghe and Irinel Popescu
Fundeni Clinical Institute, Romania
Introduction: Several classifications such as the World Health Organization 2010 and European Neuroendocrine Tumor Society (ENET) were proposed to predict prognosis for pancreatic neuroendocrine tumors (PNET). The aim of the present study is to assess potential prognostic factors after surgery for PNETs in a large single centre experience.
Method: The study group included 98 consecutive patients with PNETs submitted for surgery at the Center of Digestive Diseases and Liver Transplantation of Fundeni Clinical Institute, Bucharest, Romania, between 2000 and 2012. All patients were diagnosed using immunohistochemistry. Uni- and multivariate analyses for potential prognostic factors for overall survival were performed.
Results: The patients had mainly non-functional PNETs (60 patients – 61.2%). Eighteen patients (18.4%) presented with lymph nodes metastases while 24 patients (24.5%) presented with synchronous distant metastases (stage IV ENET). The median follow-up time was 39 months (range, 1–227). For the entire cohort of patients the 1, 5 and 10-year overall survival rates were 89.4%, 76.9% and 67.8%, respectively. It was observed a significant difference in survival between patients with and without primary tumor resection (p < 0.001). Furthermore, patients with stages I, IIA, IIB ENET appears to have a better survival compared with those with stage III and IV (p = 0.05). Tumor size was found to positively correlate with ENET stage (p < 0.01) and presence of distant metastases (p < 0.01); a negative correlation with the functioning syndrome was also noticed (p < 0.01).
Conclusions: Resection of the primary tumor, loco-regional lymph nodes status and ENET staging system appears to have an impact on overall survival in patients with PNETs. Thus, routinely sampling of loco-regional lymph nodes might potentially be used for better assessment of prognosis in these patients. Resection represents the most important therapeutical tool in order to obtain a long-term survival in patients with PNETs.

FO28-07
CONTEMPORARY ASSESSMENT OF PANCREATICODUODENECTOMY BASED ON A SINGLE INSTITUTIONAL EXPERIENCE
Jin He, Neda Rezaee, John Cameron, Martin Makary, Kenzo Hirose, Michael Choti, Matthew Weiss, Nita Ahuja, Timothy Pawlik and Christopher Wolfgang
The Johns Hopkins Hospital, USA
Introduction: To evaluate current status and trends of the indications and outcomes for pancreaticoduodenectomy (PD).

Method: Patients undergoing PDs for any indication between 1990 and 2010 were retrospectively reviewed from a prospectively maintained database.

Results: This cohort includes 3,661 PD with a median age of 66 years (range 12–103) and a median length of stay (LOS) of 10 days. The morbidity rate is 48% while the 30 and 90-day mortality rates are 1.3% and 3.5%, respectively. The most common indication for resection is pancreatic ductal adenocarcinoma (41%), followed by ampullary adenocarcinoma (11%), cholangiocarcinoma (8.2%), pancreatic neuroendocrine neoplasm (5.2%) and duodenal cancer (4.1%). The most common benign indication for PD is chronic pancreatitis (6.2%). The most common complications include delayed gastric emptying (15%), post-operative pancreatic fistula (POPF) (14%), and wound infection (12%). When evaluated by 10-year intervals, the proportion of patients over 80 years old undergoing PD increased from 7.5% (1990s) to 10.4% (2000s) (p = 0.004) while LOS decreased from 13 days (1990s) to 9 days (2000s) (p < 0.001). There is an increase in both the number (55–267) and proportion (4.6–11%) of patients undergoing resection of benign cystic neoplasms – the majority of these being intraductal papillary mucinous neoplasm (IPMN) (193, 5.3%). Non-invasive IPMN increased from 1% to 7% (p < 0.001), while MCN decreased from 1.4% to 0.2% (p < 0.001). Autoimmune pancreatitis increased from 0 to 1.6% while chronic pancreatitis decreased from 10.1% to 4.3% (both p < 0.001). The 5-year survival for patients undergoing resection of benign cystic neoplasms was 86% and did not change over time nor did the survival for any of periampullary adenocarcinomas.

Conclusions: PD is a safe operation. More PDs were done for benign pancreatic lesions. Outcome of PD depends on the disease biology.

FO28-08

HOW TO OPERATE DUODENOPANCREATIC NEUROENDOCRINE TUMOURS IN MEN1. A SYSTEMATIC REVIEW

UMC Utrecht, The Netherlands

Introduction: Duodenopancreatic neuroendocrine tumors (pNETs) are the main cause of death in Multiple Endocrine Neoplasia 1 (MEN1). Surgical strategies in MEN1 related pNETs are controversial. We investigated the type of surgery required to treat pNETs in MEN1 patients.

Method: A systematic literature search (Pubmed, Embase and Cochrane library) was performed up to the 15th of October 2012. Included studies reported surgical technique and related patient outcomes i.e. complications, re-operations, recurrence, metastasis and survival. Surgical techniques were compared and related to patient outcomes. For gastrinomas operation strategies including total duodenectomy were compared with other types of resections. For insulinomas and non-functioning tumors enucleations were compared with other operation strategies.

Results: Data from only 13 studies of high risk of bias including 195 operated MEN1 patients were analysed. For gastrinomas, operation strategies including duodenectomy were associated with less biochemical recurrence (6/40 vs. 23/42). For insulinomas, enucleation was associated with more recurrence (8/15 vs. 5/38). No differences in survival were seen in the investigated groups. There is insufficient data for comparing the rates of complications, re-operations and metastasis.

Conclusions: Only scarce literature is available on operation strategies for MEN1 related pNET. For gastrinomas, operation strategies including total duodenectomy were associated with biochemical cure of patients. Furthermore literature shows that larger pancreatic resections were associated with less biochemical recurrence of a MEN1 related insulinoma. No benefit for survival was found.

FO29-01

IMPACT OF HEPATIC RESECTION FOR HEPATOCELLULAR CARCINOMA INVADING THE HEPATIC VEIN

Yong Keun Park, Bong-Wan Kim, Weiguang Xu and Hee Jung Wang
Ajou University School of Medicine, Korea

Introduction: Hepatic venous invasion (HVI) of hepatocellular carcinoma (HCC) is not common, but representing advanced tumor stage. Hepatic resection (HR) is considered as a curative modality, but there is limited data on the outcome after HR. The current study is conducted to evaluate the outcomes of HR for HCC with HVI, and prognostic significance of HCC with HVI on outcomes after HR.

Method: We retrospectively analyzed 27 consecutive patients with HCC with HVI who underwent HR between 1994 and 2011. Surgical outcome and prognostic factor after HR for this condition were analyzed.

Results: Main tumor size was mean 8.7 (±4.4) cm, and mean serum alpha-fetoprotein level was 9,822 (±19,212) ng/mL. Patients who had HCC with HVI demonstrated a median disease-free survival of 5.5 months and 1-year survival rate of 60.5% after HR. The extent of tumor thrombus in hepatic vein did not significantly correlated with oncological outcomes. However, the disease-free survival was significantly higher in patients without portal vein tumor thrombus (PVTT) (n = 14, group A) than in patients with PVTT (n = 13, group B) (p = 0.013). All patients in group B had tumor relapse within 1 year after HR. The overall 5 year survival rates were 69.2% in group A and 33.8% in group B, respectively.

Conclusions: The results of HR for HCC with HVI remain poor, but better than what were reported in similar patients with non-surgical therapy. Concomitant PVTT affect the oncological outcome, so HR is justified in selected patients with HVI, especially without concomitant PVTT.
FO29-02
HEPATIC VEIN TUMOR THROMBUS OF HEPATOCELLULAR CARCINOMA IS NOT CONTRAINDICATION FOR SURGERY
Takashi Kokudo, Kiyoshi Hasegawa, Yasuhiko Sugawara and Norihiro Kokudo
Graduate School of Medicine, The University of Tokyo, Japan

Introduction: The presence of hepatic vein tumor thrombus (HVTT) in hepatocellular carcinoma (HCC) has been regarded as extremely poor prognosis. However, little is known about the significance of surgical treatment for HVTT.

Method: Our prospective database of surgical resection for HCC between October 1994 and December 2011 in a tertiary care Japanese hospital was retrospectively analyzed. We statistically compared tumor thrombus in the peripheral hepatic vein (pHVTT) and tumor thrombus in the major hepatic vein (mHVTT). Patients with tumor thrombus in inferior vena cava (IVCTT) were also analyzed separately.

Results: Among 1,525 hepatic resections, 153 pHVTT cases, 21 mHVTT cases, and 13 IVCTT cases were identified. Compared to the pHVTT group, the mHVTT group had higher alpha-fetoprotein (AFP) level (AFP [ng/dL] 49,666 vs. 5,508; p < 0.0001), higher incidence of portal vein tumor thrombi (95 vs. 56%; p = 0.0005), and higher incidence of major hepatic resection (67% vs. 42%; p = 0.037). The median survival time (MST) was 5.27 and 3.95 years respectively (p = 0.77), and median time to recurrence (TTR) was 1.06 and 0.41 years respectively (p = 0.74). Univariate analysis did not show mHVTT as risk factor in MST or TTR. On the other hand, MST and TTR for IVCTT patients were 1.39 years and 0.25 year respectively. The most frequent location of recurrence was intrahepatic in all types of HVTT (pHVTT 76%, mHVTT 56%, IVCTT 45%).

Conclusions: Hepatic resection for mHVTT has good prognosis as well as pHVTT and is good indication for surgery with acceptable MST. IVCTT can also be considered for surgery in selected cases.

FO29-03
SURGICAL STRATEGY AND OUTCOME OF HEPATOCELLULAR CARCINOMA PATIENTS WITH BILE DUCT TUMOR THROMBUS
Deok-Bog Moon, Sung-Gyu Lee, Shin Hwang, Ki-Hun Kim, Chul-Soo Ahn, Tae-Yong Ha, Gi-Won Song, Dong-Hwan Jung, Gil-Chun Park and Yo-Han Park
Asan Medical Center, Ulsan University, Korea

Introduction: Less than 10% of icteric hepatocellular carcinoma was related to obstruction of bile duct by the tumor. Some patients could be treated by hepatectomy with provision of adequate preoperative management. This study was to examine the outcome of HCC patients with bile duct tumor thrombus who underwent operation.

Method: From October 1994 to August 2010, 53 HCC patients (1.6%) having bile duct tumor thrombus involving minimum 2nd order branches were treated surgically. These were the first surgical treatment of HCC, and the patients were followed up more than 18 months. Clinical data were reviewed retrospectively and the primary end point was survival after surgical treatment.

Results: Common chief complaint was abdominal pain (33.3%) and then jaundice (29.6%). Child A was 77.4% and 12 patients (22.6%) had cirrhosis. Mean total bilirubin level on admission was 9.8 mg/dL. Biliary drainage was performed in 32 patients (60.4%). Portal vein invasion was accompanied in 24 patients (45.3%). Duration of preoperative management was 44 days and portal vein embolization was performed in 6 patients and 9 patients underwent TACE. Hepatic resection was performed in 49 patients (92.5%). Bile duct resection combined with hepatectomy was performed in 17 patients (32.1%). 5-year overall and disease survival rate were 30.7% and 17.5%. R0 resection of HCC was a significant factor affecting on the overall and disease free survival. When R0 resection was performed, bile duct resection was not affected on the survival, but R0 resection was very difficult in Ueda type III patients without bile duct resection.

Conclusions: Preoperative biliary decompression made us to perform hepatectomy in HCC with bile duct tumor thrombus. R0 resection is very important for good prognosis and hepatectomy with bile duct resection should be performed actively in Ueda type III patient, similar to Klatskin’s tumor.

FO29-04
CLINICOPATHOLOGIC FACTORS ASSOCIATED WITH EARLY LIVER REGENERATION AFTER RIGHT HEPATECTOMY IN PATIENTS WITH HEPATOCELLULAR CARCINOMA
Jeongsu Nam, Kwangmin Park, Youngjoo Lee, Songcheol Kim, Jaehoon Lee, Kibyung Song, Jonghee Yoon, Jungwoo Lee and Dongjoo Lee
Asan Medical Center, Ulsan University, Korea

Introduction: This study was conducted to evaluate liver regeneration by comparing preoperative computed tomographic (CT) volumetry and CT volumetry on postoperative day (POD) 7 after right hepatectomy in patients with hepatocellular carcinoma. We sought for clinicopathologic factors that could be correlated with liver regeneration.

Method: Between January 2008 and October 2012, 74 patients with hepatocellular carcinoma underwent right hepatectomy in our division. All but 1 patient were Child-Turcotte-Pugh (CTP) class A. Volumes of liver were measured for future liver remnant (FLR), and liver remnant (LR). Early regeneration index (ERI) was defined as \( [(V_{LR}-V_{FLR})/V_{FLR}] \times 100 \), where \( V_{LR} \) means volume of the liver remnant and \( V_{FLR} \) is volume of the FLR. Clinicopathologic factors that could be linked to liver regeneration were assessed retrospectively.

Results: Age, prothrombin time, bilirubin did not influence early liver regeneration. Patients with higher preoperative serum albumin (cut off value as 3.5 g/dL) level
showed higher early regeneration index. (ERI 0.55 vs. 0.34 p = 0.007). Also, remnant liver volume to body weight ratio (RLV-BWT ratio) (cut off value as 0.5%) was significantly correlated with early liver regeneration. Interestingly, patients with low RLV-BWT ratio (≤0.5) ratio showed higher ERI compared with those who had high RLV-BWT ratio (>0.5) (ERI 0.95 vs. 0.41 p = 0.001).

In subgroup analysis (total of 20 patients), after excluding patients with large tumor (≥10 cm), right portal vein thrombus or history of transarterial chemoembolization (TACE) that might induce compensatory hypertrophy of the remnant liver, serum albumin and RLV-BWT still significantly linked to the ERI. (p < 0.05).

Conclusions: Remnant liver volume to body weight ratio (RLV-BWT ratio) and preoperative serum albumin level were significantly correlate with early liver regeneration. To avoid postoperative liver dysfunction, these parameters can be used as a reference measure in major hepatectomy.

FO29-05
CLINICAL IMPACT OF ANATOMICAL LIVER RESECTION FOR HEPATOCELLULAR CARCINOMA WITH MICROSCOPIC PORTAL VEIN INVASION
Takatsugu Matsumoto, Junji Kita, Yukihiro Iso, Masato Kato, Mitsugi Shimoda and Keiichi Kubota
Dokkyo Medical University, Japan

Introduction: Hepatocellular carcinoma (HCC) is frequently complicated with portal venous invasion (PVI). We aimed to investigate the benefit of anatomical liver resection (ALR) for HCC complicated with PVI.

Method: 97 consecutive patients who underwent initial curative hepatectomy for single nodule HCC accompanied with PVI were enrolled to this study. Patients were divided into 2 groups, Group A (n = 74); patients who received ALR, Group B (n = 23); patients who received non-ALR. Clinical and pathological factors were compared between both groups. Data were expressed as a mean ± standard deviation (SD) of Group A versus that of Group B.

Results: There were no significant differences in age (year) (65.6 ± 9.7 vs. 64.4 ± 9.6; p = 0.825), gender, alpha-fetoprotein (AFP) level (ng/dL) (14,629.5 ± 80,754.3 vs. 2,249.3 ± 4,848.8; p = 0.955), protein induced by vitamin K absence or antagonist-II (PIVKA-II) level (mAU/mL) (10,280.4 ± 28,587.5 vs. 1,542.8 ± 3,073.9; p = 0.674), intraoperative bleeding amount (mL) (802.6 ± 873.4 vs. 1,395.7 ± 2,510.0; p = 0.052) (mL), operation time (minutes) (303.6 ± 105.2 vs. 307.6 ± 105.4; p = 0.593), total Pringle time (minutes) (57.0 ± 22.9 vs. 47.9 ± 25.9; p = 0.207) and tumor size (cm) (7.0 ± 5.3 vs. 4.2 ± 1.7; p = 0.207). On the other hand, there were significant differences in prothrombin time (%) (86.4 ± 11.3 vs. 78.7 ± 11.0; p = 0.001), total bilirubin level (mg/mL) (0.7 ± 0.4 vs. 0.9 ± 0.3; p = 0.201), platelet count (×10⁹/μL) (18.0 ± 8.4 vs. 11.9 ± 5.9; p = 0.001) and ICG R15 (%) (13.7 ± 6.2 vs. 24.5 ± 13.2; p = 0.96).

Both 5-year survival rate and disease-free survival rate of Group A were significantly higher than those of Group B (46.1% vs. 14.3%; p = 0.002 and 33.8% vs. 0.0%; p = 0.001), respectively.

Multivariate analysis revealed that ALR (absent/ present), age (≤65/>65) (years), Alpha-fetoprotein level (AFP) (≤20/>20) (ng/mL), were associated with postoperative survival.

Conclusions: ALR has a survival benefit for HCC patients with PVI.

FO29-06
COMPARISON OF LIMITED AND ANATOMIC HEPATIC RESECTION FOR HEPATOCELLULAR CARCINOMA WITH HEPATITIS C
Masaki Kaibori, Kosuke Matsui, Morihiko Ishizaki, Tatsuma Sakaguchi, Hideyuki Matsushima and Masanori Kwon
Kansai Medical University, Japan

Introduction: The long-term outcome after resection of hepatocellular carcinoma is influenced by factors related to the tumor and the underlying liver disease. The prognosis of hepatocellular carcinoma is worse in hepatitis C virus antibody-positive patients than in hepatitis B surface antigen-positive patients. In patients with hepatitis C virus infection and hepatocellular carcinoma, the optimum extent of surgical resection, i.e., limited versus anatomic, is still controversial.

Method: Among 326 patients with hepatitis C virus infection who underwent curative resection of hepatocellular carcinoma between 1992 and 2006, 271 patients received limited resection and 55 patients had anatomic resection of at least two Couinaud subsegments with complete removal of the portal territory containing the tumor. The clinical characteristics, operative results, and long-term survival of these two groups were compared.

Results: Although the patients receiving limited resection had significantly worse preoperative liver function than the patients undergoing anatomic resection, the postoperative liver function of the limited resection group was significantly better. The mortality and morbidity rates were not significantly different after limited and anatomic resection. Disease-free survival and overall survival were similar after both types of resection, as were the incidence and pattern of intrahepatic tumor recurrence.

Conclusions: In patients with hepatitis C virus infection and hepatocellular carcinoma, anatomic resection does not provide any significant benefit and should not be performed unless it is technically necessary. In patients with a limited hepatic functional reserve, removal of the tumor with preservation of the liver parenchyma may take priority over wide resection.
FO29-07
SURGICAL OUTCOMES FOR HEPATOCELLULAR CARCINOMA IN PATIENTS WITH NONALCOHOLIC FATTY LIVER DISEASE
Yuki Hirose, Jun Sakata, Tomohiro Katada, Natsuru Sudo, Taku Ohashi, Kazuyasu Takizawa, Kabuto Takano, Takashi Kobayashi, Masahiro Minagawa and Toshifumi Wakai
Niigata University Graduate School of Medical and Dental Sciences, Japan

Introduction: The present study investigated outcomes following surgical resection of hepatocellular carcinoma (HCC) in nonalcoholic fatty liver disease (NAFLD).

Method: Of 538 consecutive Japanese patients undergoing curative liver resection for HCC, 25 patients had NAFLD. Clinicopathological characteristics and surgical outcomes of patients with NAFLD-related HCC were analyzed.

Results: There were 13 men and 12 women, with a median age of 73 years (range 54–83 years). The median value of BMI was 25.6 kg/m² (range, 19.3–38.3 kg/m²). Using the NAFLD activity scoring system of Kleiner et al., the median score was 4 (range, 2–7). Nonalcoholic steatohepatitis (NASH) was verified histologically in 14 patients. Cirrhosis was verified histologically in 12 patients with NASH. The incidence of postoperative morbidity was 60% (15/25 patients). The most common complication was hepatic insufficiency (n = 6), followed by biliary fistula (n = 4), portal vein thrombosis (n = 2), ascites (n = 1), paralytic ileus (n = 1), and acute respiratory insufficiency (n = 1). The incidence of postoperative 30-day mortality was 8% (2/25 patients). Two patients giving the postoperative 30-day mortality were NASH-related cirrhosis and had undergone right hemihepatectomy. The causes of deaths were hepatic failure and multiple organ failure. The cumulative 5-year survival rate and cumulative 5-year disease-free survival rate of 25 patients with NAFLD were 69% and 55%, respectively.

Conclusions: Surgical resection may provide a survival benefit for patients with NAFLD-related HCC. Patients undergoing resection for NAFLD-related HCC have an increased risk of postoperative morbidity and mortality. Patients with NAFLD-related HCC, especially underlying NASH-related cirrhosis, should be treated carefully to avoid postoperative complications.

FO29-08
HEPATOCELLULAR CARCINOMA WITH BILE DUCT THROMBI IN NON CIRRHOTIC LIVERS: IS AGGRESSIVE SURGERY WORTHWHILE?
Ashwin Rammohan, Jeeswanth Sathianesan, Anbalagan Pitchaimuthu, Kamalakannan Rajendran, Senthil Kumar Perumal, Kesavan B, Ravi Ramasamy, Ravichandran Palaniappan and Manoharan Govindan
Govt. Stanley Medical College Hospital, India

Introduction: Obstructive jaundice due to bile duct tumour thrombus (BDTT) is an unusual clinical entity and an uncommon presenting feature of Hepatocellular carcinoma (HCC). There is a paucity of studies which have examined the outcome of hepatectomy in this subset of patients. The objective of this study is to evaluate the outcome of hepatectomy for HCC with obstructive jaundice due to BDTT in non-cirrhotic livers.

Method: From 1997 to 2012, out of 426 HCC patients, 39 with non fibrolamellar type HCC with obstructive jaundice due to BDTT in non-cirrhotic livers, who underwent hepatectomy at our tertiary care referral centre were analysed. In all the patients, demographic, clinicopathological and investigative (biochemical, radiological) data were noted.

Results: The patients comprised of 28 men and 11 women whose age ranged from 32 to 71 years. Their serum total bilirubin, serum transaminase levels, Serum alkaline phosphatase level and serum AFP were in the range of 3.6–22 mg/dL, 45–210 IU/L, 256–1,020 IU/L, 146 to 12,000 ng/mL respectively. All BDTT were confirmed intraoperatively. The operative procedures included right hepatectomy with thrombectomy through choledochotomy and tube drainage (n = 16), extended right hepatectomy combined with extrhepatic bile duct excision (n = 10), left hepatectomy(n = 9), extended left hepatectomy(n = 2) and left lateral segmentectomy(n = 2). Average blood loss and median operative time were 420 mL and 186 minutes respectively. The diameter of primary tumour ranged from 5 to 18 cm and the length of the thrombi ranged between 3 and 7.5 cm. Postoperative morbidity was 28.2% (n = 11) which included bile leak in 4 patients. Two patients died of post hepatectomy failure (mortality 5.1%).The 1, 3, 5 year survival rates were 81.09%, 48%, 10.5% respectively with a median survival of 28.6 months.

Conclusions: The mere presence of BDTT in HCC does not indicate an advanced or inoperable lesion. When technically feasible, formal hepatic resection is the preferred first-line treatment option in these patients.

FO30-01
PREOPERATIVE SELECTIVE BILE DUCT PORTAL VEIN DOUBLE LIGATION (PSBPL) SHORTEN THE WAITING SPAN AND GIVES RISE TO GREATER TOLERANCE TO EXTENDED HEPATECTOMY THAN PVL IN RATS
Weizheng Ren, Ai-Qun Zhang, Xiaofeng Zhang, Chonghui Li and Jiahong Dong
Chinese PLA General Hospital, China

Introduction: Extended hepatectomy is often the only curative treatment for many liver diseases. Confronting insufficient FLR, PVE/PVL has been established as routine procedure. Yet the potential of malignancy progression during the waiting period and the insufficient responsiveness in cases calls for a groundbreaking method to benefit more.

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FO30-02

CHEMOTHERAPY ASSOCIATED LIVER INJURY AND MAJOR HEPATIC RESECTION FOR COLORECTAL LIVER METASTASES: ROLE OF APRI SCORE AND ENDOTHELIN-1 LEVELS. A PROSPECTIVE STUDY

Francesca Ratti, Federica Cipriani, Annalisa Gagliano, Marco Catena, Michele Paganelli and Luca Aldrighetti
San Raffaele Hospital, Italy

Introduction: Chemotherapy associated liver injury (CALI) is a risk factor for development of liver failure (LF) following hepatic resection. APRI score, based on AST level and platelet count, has been proposed as a marker of oxaliplatin induced parenchymal damage in patients with metastases. Endothelin-1 is a vasoconstrictor peptide which might play a role in PLF pathogenesis, as a mediator of acute phase shear stress. Aim of this study was to evaluate correlation between APRI score and Endothelin-1 level in pre- and postoperative period.

Method: Patients who required major liver resection for CLM between 1st January 2011 and 31st June 2013 with oxaliplatin based CT entered this prospective study. In all of them preoperative APRI score was calculated. In all the patients liver function tests including AST, ALT, bilirubin and PT were dosed preoperatively and in POD1, 2 and 5, as well as ET-1 serum levels.

Results: 26 patients entered the study. They received meanly 6 ± 2 cycles of CT. 14 of the whole series (53.8%) underwent right hepatectomy, 4 (15.4%) right trisectionectomy, 6 (23.1%) left hepatectomy and 2 (7.7%) left trisectionectomy. 12 (46.2%) patients underwent portal vein occlusion before surgery. Mortality was nil. Morbidity was 38.5%. 4 patients (15.4%) showed signs of LF. Patients developing PLF had a significantly higher APRI score (0.66 ± 0.11 vs. 0.49 ± 0.12, p < 0.05), number of CT cycles (9 ± 2 vs. 5 ± 2, p < 0.0) and baseline ET-1 levels (18 ± 4.4 vs. 9.7 ± 3.2, p < 0.05). Pearson analysis showed correlation of APRI score with preoperative and POD2 ET-1 levels and POD5 ET-1.

Conclusions: Correlation of APRI with pre and postoperative ET-1 may reflect parenchymal damage induced by CT, resulting in a higher baseline risk of LF. Patients with elevated APRI and ET-1 levels should therefore be evaluated with caution when a major resection is planned.

FO30-03

HOW SHOULD WE CLASSIFY R0 RESECTION IN PATIENTS UNDERGOING LIVER RESECTION FOR COLORECTAL LIVER METASTASES? SHOULD MORE THAN 1 MM BE THE NEW CRITERIA?

Anna Powell-Chandler, Adam Christian, Huw Jones, Zsolt Kaposztas and Nagappan Kumar
University Hospital Wales, United Kingdom

Introduction: R0 is defined as resection margin greater than 0 mm. This institution uses R0 to mean a margin greater than 1 mm. We present a case for redefining R0 margin.

Method: We analysed patients undergoing resections for colorectal liver metastases (CRLM) from January 2003 to December 2012 at Cardiff Liver Unit. Prospective database recorded demographics, type of resection, blood loss, transfusion, hospital stay, mortality and morbidity. Pathology was reported in standard form using Royal College of Pathologists Dataset. Peri-operative chemotherapy was not routine. Data on neoadjuvant chemotherapy (a small proportion of patients) is being collected. Follow-up data was from our records and General Practitioners. We followed patients up to 30 June 2013. We used SPSS ver 20 for statistical analysis. Means were compared using Chi Square test. We used Kaplan Meier method to measure survival and Log rank test to compare various factors. p < 0.05 was considered significant.

Results: Two hundred and fifteen resections for CRLM over 10 years; 146 males, 69 females, median age 67 years (range 34–86). Overall mortality 2.7% (6/215). Operations performed; right hepatectomy (56), left hepatectomy (15), left lateral sectionectomy (13), central hepatectomy (6), segment 6/7 resection (8), caudate lobectomy (1), combined hepatectomy and metastatec- tomy (22), other metastatectomy/segmentectomy (94). Overall actuarial survival at 1, 3, 5 and 10 years was...
93%, 64%, 43% and 21% respectively. 5 year actuarial survival in patients who had resection with a margin of 0 mm, 0-1 mm and >1 mm were 31%, 31% and 46% respectively (p = not significant). However median survival of patients with 0, 0–1 mm and >1 mm were 4.1, 1.8 and 4.6 years. The group with margin between 0 and 1 mm performed poorly (p = 0.024).

Conclusions: R0 resections have traditionally been defined as histological margin of more than 0 mm. However, survival in patients who have margins 0–1 mm was poor. We conclude that margin greater than 1 mm should be used as criteria for R0 resection for CRLM.

FO30-04
LIVER FAILURE IN PATIENTS TREATED WITH CHEMOTHERAPY FOR COLORECTAL LIVER METASTASES: ROLE OF CHRONIC DISEASE SCORES IN PATIENTS UNDERGOING MAJOR LIVER SURGERY. A CASE-MATCHED ANALYSIS

Francesca Ratti, Federica Cipriani, Michele Paganelli, Marco Catena and Luca Aldrighetti
San Raffaele Hospital, Italy

Introduction: An accurate and non-invasive tool to predict preoperatively histopathologic chemotherapy induced liver injury still lacks. Objective of this study was to evaluate the role of chronic liver disease scores as Postoperative Liver Failure (PLF) predictors in Colorectal Liver Metastases (CLM) surgery for patients treated with Oxaliplatin-based chemotherapy and undergoing major liver resection.

Method: Data regarding 8 patients who developed PLF after major hepatectomy (Group B) were compared to those of 24 patients who did not develop PLF (Group A) in a case-matched analysis for baseline and disease characteristics and liver resection extension. Pearson coefficient was calculated to assess chronic liver disease scores association with biochemical data. ROC curves analysis was performed too.

Results: In Group A median number of CT cycles was lower, even without significant difference (6 vs 9, p NS), interval between treatment and surgery was longer (11 vs 7 weeks, p < 0.05) and bevacizumab was more frequently administered (66.7% vs 37.5% of patients, p < 0.05). In Group B the median APRI score was 0.53 (range: 0.86–4.26) whereas in Group A median score was 0.30 (range: 0.06 – 2.21), with a statistically significant difference (p < 0.05). Median FIB-4 score was 2.46 (range: 0.86–13.65) in Group B and 1.58 (range: 0.27–7.68) in Group A (p < 0.001). Multivariate analysis showed a significant correlation between APRI and the onset of PLF. A good accuracy of APRI score was evident in ROC curves with an area under the curve of 0.72 (p 0.003).

Conclusions: APRI score is calculated considering both liver damage and platelet count, it is costless and easy available. This study demonstrates that it has in a good accuracy in PLF prediction and consequently in CT induced liver damage evaluation.

FO30-05
SCORING MODEL TO ASSESS MORBIDITY OF SURGERY LIVER HYDATID CYST

Hadj Omar EL Malki1, Amine Souadka2, Badr Serjii2, Amine Benkabbou1, Raouf Molsine2, Laheen Iffine2, Redouane Abouqal2 and Abdelkader Belkouchi2
1University Mohammed Vth Souissi, Rabat, Morocco, Biostatistical, clinical research and epidemiological laboratory LBRCE, Medical School, Morocco; 2University Mohammed Vth Souissi, Rabat, Morocco Medical School, Morocco

Introduction: Surgery is the mainstay of liver hydatid cyst (LHC) treatment. It’s still associated with high morbidity and mortality because of specific postoperative complications (bile leaks, bilomas, deep bleeding, and deep suppurations). The aim of this study was to develop a scoring model to identify occurrence of morbidity after LHC surgery.

Method: We conducted a retrospective study of 672 patients with LHC treated at the Surgery Department “A” at Ibn Sina University Hospital, Rabat, Morocco. Specific morbidity and 30 variables were assessed. Multivariate logistic regression was performed to develop a scoring model to predict morbidity after LHC surgery. We calculated sensitivity (Sn), specificity (Sp), positive predictive value, and negative predictive value at the best cut-off point identified as that which maximized Sn+Sp.

Results: Five independent predictive factors of morbidity after LHC surgery were retained, ie, presence of cyst preoperative complications, 3 or more cysts in the liver, thick pericyst, biliary fistula, and capitonnage alone as residual cavity management. Multivariate model showed a good fit. Discriminating ability of the model was fair. In theoretical risk, scores ranged from 0 to 5. When the score was 2 or more, sensitivity of the scoring model was 80.3%, specificity was 58.5%, positive predictive value was 30.3%, and negative predictive value was 93%. Our scoring-developed model can predict morbidity occurring with 80.3% Sn and 58.5% Sp when the score is 2 or more.

Conclusions: Our model has a good negative predictive value (93%) if the score is 0 or 1. Based on another cohort of patients, a new study would assign the validation of this risk scoring system.

FO30-06
ASSESSMENT OF FUTURE REMNANT LIVER FUNCTION IN HILAR CHOLANGIOCARCINOMA USING HEPATOBILIARY SCINTIGRAPHY

Kasia P. Cieslak, Jimme K. Wiggers, Roel J. Bennink, Oliver R.C. Busch, Dirk J. Gouma and Thomas M. Van Gulik
Academic Medical Center, Amsterdam, The Netherlands

Introduction: Assessment of future remnant liver (FRL) function is crucial in resectable hilar cholangiocarcinoma (HCCA). Complete biliary drainage of the FRL is considered essential for postoperative function in extended resections. Hepatobiliary scintigraphy (HBS)
using $^{99m}$Tc-mebrofenin provides segmental, quantitative information on parenchymal function in the uptake phase, while the excretion of $^{99m}$Tc-mebrofenin depends on drainage of the biliary system. Preoperative HBS therefore, accounts for parenchymal function as well as for quality of biliary drainage. The aim of this study was to evaluate the value of HBS in the preoperative work-up of patients undergoing resection for HCCA.

**Method:** From August 2008 to August 2013, 69 patients suspected of HCCA underwent resection. Preoperatively, HBS was applied according to the planned resection using time-activity curves generated from regions of interest (total liver and FRL). A validated HBS cut-off value of 2.69%/minute/m$^2$ was used to indicate sufficient FRL function. Postoperative morbidity (Clavien-Dindo ≥ 3a) and mortality were assessed.

**Results:** HBS was performed in 52 of the 69 patients (75%). Preoperative biliary drainage was performed endoscopically or by percutaneous transhepatic biliary drainage (PTBD) in 45/52 patients. Based on HBS, 31/45 patients were considered resectable (group A), whereas 14/45 patients required additional procedures (group B), consisting of portal vein embolization (n = 2), revision of biliary drainage (n = 8), or a modified (parenchyma sparing) technique (n = 8). Overall morbidity and in-hospital mortality were 40.6% and 7.2%, respectively. Morbidity was 48.4% and 42.9% in group A and B, respectively (p = 0.76). Liver failure related mortality was not different (1 of 31 patients in group A, and 1 of 14 patients in group B, p = 0.53).

**Conclusions:** Preoperative HBS accounts for parenchymal liver function as well as quality of biliary drainage, and identifies patients who require additional or modified procedures for resection of HCCA.

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**FO30-07**

**ROLE OF TRANS-ARTERIAL EMBOLIZATION IN DOWNSTAGING HEPATOCELLULAR CARCINOMA TO FIT UCSF CRITERIA IN PATIENTS UNDERGOING LIVING DONOR LIVER TRANSPLANTATION FOR HEPATITIS C RELATED LIVER DISEASE**

Karan Julka, Bhavin Vasavada, Andrzej Komorowski, Chao-long Chen and Chih-chi Wang

**Kaohsing Ching Gung Memorial Hospital, India**

**Introduction:** Transarterial embolization (TAE) is a well-established modality of treatment for patients suffering from hepatocellular carcinoma (HCC) while on the waiting list for deceased donor liver transplantation (LT). However, the outcome in patients undergoing living donor LT (LDLT) for Hepatitis C virus (HCV) related HCC is arduous because of the almost universal recurrence of HCV post transplantation and the risk of the transplanted liver undergoing subsequent fibrosis. Hence to address this issue, we evaluated the impact of TAE on downstaging HCV related HCC to fit UCSF criteria for LDLT.

**Method:** We retrospectively analyzed the outcome in patients undergoing LDLT for HCV related HCC, who were initially outside the UCSF criteria and received TAE intervention and compared them with those who fit the criteria and did not receive TAE. The overall patient survival and the HCC recurrence free survival were compared between the 2 groups. The tumors were downstaged in the TAE group to fit the UCSF criteria.

**Results:** From 2002 to 2010, a total of 82 patients having HCV related HCC underwent LDLT at Kaohsiung Chung Gung Memorial Hospital, Taiwan. For the entire cohort study, the mean duration of follow-up was 4.37 ± 2.29 years. The 2 groups were well matched except for the Childs score, which was more in non-TAE group (p = 0.034). Post TAE, 40 patients were within UCSF criteria and 4 were within UCSF but outside Milans criteria. The overall survival in the TAE group at 1 and 3 years was 82% and 72% and in the non-TAE group was 92% and 70% respectively. The recurrence rate was 13.15% (5/38) in the non TAE group and was 6.81% (3/44), in the TAE group (p = 0.416).

**Conclusions:** TAE was effective in downstaging HCV related HCC to fit UCSF criteria with outcomes comparable to those presenting initially within the criteria and without TAE.

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**FO30-08**

**INTRAOPERATIVE ABLATION FOR SMALL HCC NOT AMENABLE FOR PERCUTANEOUS RADIOFREQUENCY ABLATION IN CHILD A CIRRHOTIC PATIENTS**

Ahmed Elgend1, Mohamed Elshafei2, Fatma Abdel Azizi3 and Essam Bedewy4

1Lecturer of Surgery, Egypt; 2Lecturer of Radiology, Egypt; 3Professor of Tropical Medicine, Egypt; 4Lecturer of Tropical Medicine, Egypt

**Introduction:** Radiofrequency ablation (RFA) was initially started by radiologists as a percutaneous treatment, but surgeons started to use RFA by surgical approach for patients with tumors at locations difficult for the percutaneous procedure. The aim was to evaluate the results of intraoperative RFA for small hepatocellular carcinomas (HCCs) (<3 cm) in locations difficult for a percutaneous approach.

**Method:** Two hundred forty-seven patients with small solitary HCC (<3 cm) were treated; 196 via percutaneous RFA while 51 patients presented at sites not amenable for percutaneous route. Twenty-seven out of 51 patients underwent surgical resection, while 24/51 patients underwent intraoperative RFA.

**Results:** The location and depth of the tumor from the liver capsule was the only significant factors in the choice of the surgeon between resection and RFA. RFA was successful in all tumors (complete ablation rate of 100%). In the surgery group, all patients achieved R0 resection. Complication rate was comparable (p01.0). After a median follow-up of 37 months (range, 10–45 months), no tumors showed neither local recurrence nor distant recurrence and no significant difference was observed between two groups as regards early recurrence and number of de novo lesions (p00.49). One-year and 3-year survival rates were 93% and 81%, respectively, in the resection group compara-
FO30-09
REGRESSION OF LIVER INJURY AFTER BILIARY DECOMPRESSION IN EXTRAHEPATIC CHOLESTASIS
Adianto Nugroho and Toar Lalisang
Division of Digestive Surgery, Indonesia

Introduction: Liver injury secondary to extra-hepatic cholestasis may be found in severe obstructive jaundice patients. Bile acid and hepatocyte apoptosis play an important role in this condition. We did an experimental study to see the regression in liver injury after biliary decompression in obstructive jaundice patients.

Method: We evaluate pre- and post-decompression liver biopsy specimens from 21 patients with severe obstructive jaundice due to peri-ampullary malignancy. Liver morphology was assessed with regard to fibrosis, periporal inflammation, ductal proliferations and cholestasis. Each of the items was graded 0 (none was observed) to 3 (severe). The sum of all items was regarded as the liver injury score.

Results: Regression of liver injury score after biliary decompression was seen in all cases. Changes in morphologic features were followed by a significant improvement in improvement in serum liver function as direct consequences of the liver regeneration. This improvement is very important since well functioning liver is associated with a lesser rate of morbidity and mortality following definitive surgery for periampullary malignancies.

Conclusions: Biliary decompression leads to a significant reduction in liver injury score and normalization of serum liver functions, which is necessary to allow a safe definitive surgery in periampullary malignancies.

FO30-11
MULTICENTRE FRENCH STUDY OF SURGICAL MANAGEMENT FOR RUPTURED HEPATOCELLULAR CARCINOMA – HAVE WE IMPROVED PROGNOSIS DURING THE LAST 20 YEARS?
Michel Scott1, Lilian Schwarz2, Yves Patrice Letreut2, Alexis Laurent3, Astrid Herrero3, Fabrice Muscarati3, Christian Ducerf3, Christian Letoublon4 and François Lacaine5
1Rouen University Hospital, France; 2Hopitaux de Marseille, France; 3Henri mondor Hospital, France; 4Hôpitaux de Toulouse, France; 5Hôpitaux de Lyon, France; 6Hôpitaux de Grenoble, France; 7French, France

Introduction: Spontaneous rupture of hepatocellular carcinoma (HCC) is a life-threatening complication of HCC, with an incidence of 12–15% in Asiatic surgical series. In Europe, limited data are available related to a lower incidence of 2–3%. The aim of this study was to report the French multicentric experience of surgically treated patients with ruptured HCC and to evaluate survival improvement during 3 successive periods.

Method: This study was a retrospective analysis of patients surgically treated for ruptured HCC, by resection at emergency surgery or staged hepatectomy between January 1995 and March 2012 in 22 French teaching hospitals. 3 successive periods were determined, before 2000, between 2000 and 2006, and after
Results: A cohort of 148 patients (120 male and 28 female), with a median age of 68 years, was identified. Eighty one (54%) patients had histologic evidence of underlying liver disease, and the related etiologies were alcohol (30 patients), NASH (27 patients), hepatitis C (20 patients), hepatitis B (12 patients) or, hereditary hemochromatosis (5 patients). The mean tumor size was 65 mm (20–250). Curative HCC treatment was provided by emergency hepatectomy (36%) or staged hepatectomy (64%) with pre-treated bleeding by transarterial embolization in 57% of such cases. The cumulative 1-, 3-, and 5-year overall survival (OS) rates were 62, 26, and 9%, respectively. The corresponding disease-free survival rates were 40, 18 and 6%, respectively. No difference was found between the 3 periods of time, concerning clinical presentation, patient’s management or long term survival.

Conclusions: No improvement in survival after curative surgery for ruptured HCC have been observed during the last twenty years. Despite a poor survival rate, surgical resection remains the only chance for cure, even in the area of interventional radiology or target therapies.

FO30-12
LAPAROSCOPIC VS ROBOTIC MINOR LIVER RESECTION OF LESIONS LOCATED IN THE POSTERO-SUPERIOR SEGMENTS: A COMPARATIVE ANALYSIS
Roberto Montalti1, Alberto Patriti2, Vincenzo Scuderi1, Aude Vanlander1 and Roberto Ivan Troisi1
1Hepato-Biliary Surgery, Liver Transplantation Service, Belgium; 2General, Minimally Invasive and Robotic Surgery – Spoleto, Italy

Introduction: Laparoscopic liver resection (LLR) is worldwide accepted as safe treatment option for anterior lesions of the liver. The approach of lesions located in the postero-superior (PS) segments (I-IVa-VII-VIII) is more difficult and usually associated to a higher conversion rate and intraoperative complications. It has been speculated that robotic assistance can facilitate the approach to these segments.

Method: From 2005 to 2013, 122 minor liver resection were performed in PS segments: 91 of whom with pure laparoscopic approach (LAP-Group) and 31 with robotic assistance (ROB-Group). We analyzed retrospectively data coming from a prospective kept database looking to pre-intra and postoperative parameters in both groups.

Results: No perioperative mortality was recorded. Mean age was of 58.6 ± 15.6 vs. 63.7 ± 12.7 years, respectively (p = 0.12), male rate was 54.9% vs. 61.3% (p = 0.68). Contemporaneous colic resection was performed in 4.4 vs. 22.6% (p = 0.006). Type of resection were: bisegmentectomy in 19% and 16%; monosegmentectomy 24% and 16%; wedge 37% and 42%; mixed 20% and 26%, respectively for Lap and ROB (p = 0.8). Previous liver resection were 11% vs. 7.4% (p = 0.73), mean surgical time 286 ± 103 vs. 301 ± 135 minutes (p = 0.54), blood loss 292 ± 404 vs. 380 ± 381 cc (p = 0.35) respectively. Pringle maneuver was 13.2% vs. 58.1% respectively for LAP and ROB (p < 0.01). Conversion rate was 11% vs. 16.1% (0.53). Histology revealed that the mean nodules number was of 1.6 ± 0.9 vs. 1.9 ± 1.3 (p = 0.2), total lesions dimension was of 44.4 ± 28.2 vs. 42.9 ± 31.1 mm (p = 0.8) and R1 margins 15% vs. 11% (p = 0.55). Overall complication rate was of 18.2 vs. 14.8% (p = 0.6), mean hospital stay 5.6 ± 4.1 vs. 8.6 ± 8 days (p = 0.01).

Conclusions: Pure laparoscopic and robotic liver resections for lesions located in PS segments have a similar outcome and conversion rate. A trend for higher blood losses could be related to differences in operative techniques and resection devices (surgical aspirator in LAP vs. crush clamping technique in ROB).
FO31-02
PREOPERATIVE HYPERGLYCEMIA AS A PROGNOSTIC FACTOR IN PANCREATIC CANCER

Woohyung Lee, Ho-Seong Han, Yoo-Seok Yoon, Dae Wook Hwnag, Jai Young Cho, Young Ki Kim and Hong Kyung Shin
Seoul National University Bundang Hospital, Korea

Introduction: The present study was for clarifying the effects of preoperative hyperglycemia on the prognosis and recurrence patterns of pancreatic ductal adenocarcinomas.

Method: Between September 2003 and June 2012, 126 patients who were diagnosed as pancreatic cancer underwent operation in Seoul National University Bundang Hospital. We retrospectively analyzed survival outcomes and recurrence patterns according to the preoperative glucose level.

Results: The patients were divided into two groups according to the preoperative glucose level (BG): less than 200 mg/dL or higher: BG < 200 mg/dL (n = 96); and BG > 200 mg/dL (n = 30). There were no differences in age, presence of jaundice, preoperative biliary drainage, tumor site, tumor size, cancer stage, and complication rate between two groups (p > 0.05). The 3-year disease-free survival rates showed that BG > 200 mg/dL group (6.7%) were significantly lower than BG < 200 mg/dL group (36.4%; p = 0.026). The multivariate analysis revealed that preoperative hyperglycemia (p = 0.027; RR = 1.850; 95% confidence interval [CI] 1.071–3.196), venous invasion (p = 0.016; RR = 1.830; 95% CI 1.121–2.986), T stage (p = 0.004; RR = 0.039; 95% CI 0.005–0.322), and N stage (p = 0.029; RR = 0.568; 95% CI 0.342–0.942) were independent factors of disease-free survival. Concerning recurrence patterns, preoperative diabetic patients tended to recur tumor more distant site than preoperative non-diabetic patients (p = 0.020).

Conclusions: Preoperative hyperglycemia affects prognosis in patients with pancreatic cancer after operation.

FO31-03
AVAILABILITY OF NEW BIOMARKER ONCO-PDT-PANCTM FOR PANCREATIC CANCER

Takefumi Niguma, Toru Kojima and Tetsusige Mimura
Okayama Saiseikai General Hospital, Japan

Introduction: Pancreatic cancer is one of the incurable cancers since early cancer biomarkers have not been found. Recently, various new biomarkers were developed by next-generation sequencing and mass spectrometry analysis. Oncomics Co. developed techniques which score the presence of pancreatic cancer, based on proteome analysis in blood plasma. We verified the usefulness of Onco-PDT-PanC™ (OPP).

Method: We examined 32 invasive ductal carcinoma of pancreas, 8 other pancreatic-biliary tract cancer (3 carcinoma of ampulla, 2 bile duct carcinoma, 2 gallbladder carcinoma, 1 pancreatic acinar cell carcinoma) and 6 autoimmune pancreatitis, and 13 non-cancer pancreatic disease (5 pancreatic neuroendocrine tumor (NETG1), 4 pancreatic-benign cyst, 2 IPMA, 1 MCA, 1 chronic pancreatitis) as control. All patients were pathologically diagnosed after surgery, except for autoimmune pancreatitis.

Results: The median OPP of invasive ductal carcinoma is 56.0 ± 7.7 whereas non-cancer is 48.0 ± 6.6 (p = 0.003). ROC curve showed the cutoff value is 50.5, with 75% sensitivity and 62% specificity. In patients with invasive ductal carcinoma, OPP did not correlate with known biomarkers. Although size and local extent of cancer did not correlate with the OPP, lymph node metastasis showed high OPP significantly. (n0 vs. n1–3; 53.0 ± 7.6 vs. 58.0 ± 6.5, p = 0.047). 9 invasive ductal carcinoma patients showing OPP over 50.5 before surgery were measured OPP and CA19-9 after surgery. CA19-9 decreased after surgery, in contrast, OPP did not change. The median OPP of other pancreatic-biliary tract cancer is significantly high (59.5 ± 8.6, p = 0.004). The median OPP of autoimmune pancreatitis is also significantly high (58.5 ± 5.0, p = 0.005).

Conclusions: OPP is the first unique new biomarker of pancreatic cancer developed by proteome analysis in Japan, however it is necessary to verify the usefulness and significance in more numerous clinical settings.

FO31-04
IMPACT OF LYMPH NODE RATIO ON SURVIVAL IN RESECTED PERIAMPULLARY MALIGNANCIES

Young-Dong Yu1, Dong-Sik Kim1, Sung-won Jung1, Pyoung-Jae Park2, Sae-Byul Choi2, Tae-Jin Song3, Sang-Yong Choi2 and Sung-Ock Suh1
1Korea University Anam Hospital, Korea; 2Korea University Guro Hospital, Korea; 3Korea University Ansan Hospital, Korea

Introduction: As in other gastrointestinal malignancies, it has been suggested that lymph node ratio (LNR) may be associated with survival in patients with periampullary malignancies. Although LNR has been studied in pancreatic adenocarcinoma, it has been infrequently demonstrated in other periampullary malignancies. The purpose of this study was to determine the relation between LNR and survival in different types of periampullary malignancies.

Method: A retrospective review of 253 pancreaticoduodenectomies (PDs) performed between 2002 and 2012 was undertaken. Clinicopathologic data were collected, and LNR was calculated. Patients with positive lymph node (LN) status were placed into the following groups: (1) LNR = 0; (2) LNR ≤ 0.2; (3) LNR = 0.4; and (4) LNR > 0.4.

Results: Of the 253 malignancies identified, there were 80 (31.6%) pancreatic adenocarcinomas, 23 (9%) duodenal adenocarcinomas, 75 (29.6%) ampullary adenocarcinomas, and 75 (29.6%) cholangiocarcinomas. Median follow up was 18 months. Tumor size, positive resection margin, and nodal involvement affected patient survival in all malignancies studied. Although the absolute number of positive LNs obtained during resection did not significantly change prognosis,
increasing LNR was associated with decreased survival (p < 0.05) in all types of periampullary tumors except duodenal adenocarcinomas.

Conclusions: Positive LN status in all patients with periampullary malignancies is associated with worse survival rates than in those with no evidence of disease. LNR is inversely associated with survival rates in almost all types of periampullary malignancies.

EVALUATION OF TAXANE EFFECTS ON PANCREATIC CANCER CELLS
Matej Kočík¹, Marie Ehrlichová², Veronika Brynychova³, Iwao Ojima¹, Martin Oliverius¹ and Pavel Soucek²
¹IKEM, Czech Republic; ²National Institute of Public Health, Czech Republic; ³State University of New York at Stony Brook, USA

Introduction: Taxanes present an attractive alternative to the generally used gemcitabine treatment which has limited clinical benefits to pancreatic cancer patients. Our study investigates mechanisms of taxane action in pancreatic cancer cell line models in vitro.

Method: Pancreatic carcinoma cell lines MiaPaCa-2, BxPc-3 and PaTu8902 were used for in vitro analyses of effects of traditional taxane paclitaxel and experimental second generation taxanes SBT-1214 and SBT-1216. Taxane efficacy was evaluated by MTT test and apoptosis was assessed by flow cytometry.

Results: For pancreatic carcinoma cell lines MiaPaCa-2, BxPc-3 and PaTu8902, paclitaxel IC₅₀ ranged from 15 to 42 nM; SBT-1214 and SBT-1216 IC₅₀ ranges were from 18 to 83 nM and 20 to 65 nM respectively. Concentrations close to IC₅₀ (10 or 30 nM) of paclitaxel or SBT-1214/1216 induced apoptosis and 100 nM concentrations produced complete G2/M cell cycle block in PaTu8902 cells. On the other side, paclitaxel but not SBT 1214/1216 induced apoptosis in MiaPaCa-2 cells. In BxPc-3 cells, paclitaxel and SBT-1214 but not 1216 produced G2/M block at 100 nM concentration. Moreover, solely SBT-1216 induced apoptosis at this concentration and G2/M block at 300 nM.

Conclusions: Our data show that both traditional taxane paclitaxel and second generation derivatives are highly cytotoxic in pancreatic cancer cells but mechanisms of their action substantially differ most probably due to the different expression of apoptotic pathways. Considering recent data demonstrating preliminary evidence of activity of nab-Paclitaxel in patients who progressed on gemcitabine-based therapy, underlying mechanisms of taxane action should be further studied.

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PATHOLOGICAL COMPLETE REMISSION OF PANCREATIC CANCER FOLLOWING NEOADJUVANT CHEMORADIATION THERAPY; NOT THE END OF BATTLES
Chang Moo Kang, Jin Ho Lee, Ho Koung Hwang, Sung Hoon Choi and Woo Jung Lee
Yonsei University College of Medicine, Korea

Introduction: In spite of controversial issues, pancreatectomy following neoadjuvant chemoradiation therapy (NeoCRT) has been applied in treating advanced pancreatic cancer. Cases of pathological complete remission (pCR) following NeoCRT is rare, and its long-term follow up data is still lacking.

Method: From January 2000 to December 2012, medical records of the patients who underwent pancreatectomy for pancreatic ductal adenocarcinoma were retrospectively reviewed. Characteristics of the patients with pCR were summarized and their long-term follow up data were analyzed.

Results: Among 86 patients with pancreatic cancer who underwent radical pancreatectomy following NeoCRT, 10 patients (11.6%) were reported to pathological CR. Seven patients were female and 3 were male, with median age, 64 years. Median tumor size was measured 2.8 cm in greatest diameter. Median pre-NeoCRT serum CA 19-9 was 313.5 U/mL, and post-NeoCRT serum CA 19-9 was 9.9 U/mL shown to be significant difference between two serum CA 19-9 level (p = 0.005). Pylorus-preserving pancreaticoduodenectomy was done in 8 patients, the others received distal pancreatectomysplenectomy. Combined vascular resection was performed in 5 patients. Median 5 lymph nodes were noted to be retrieved and no tumor metastasis were observed. Postoperative chemotherapy was received in 6 patients. Overall disease specific survival rate of patients with pCR was analyzed as 72.9%. When comparing with patients without pCR following NeoCRT, disease-free survival was statistically superior in patients with pCR (p = 0.042). However, five patients experienced cancer recurrence and recurrence risk was still increasing until 10 months, postoperatively. Three patients developed peritoneal seeding and 2 were found to have liver metastasis.

Conclusions: pCR is rarely reported following neoCRT, and this condition is not telling the cure of the disease. Early recurrence in the pattern of liver metastasis and peritoneal seeding can be expected. However, long-term survival could be maintained in patients without recurrence. Further investigation is necessary for predicting failure of treatment.
FO31-07
PROSPECTIVE EVALUATION OF GEMOX BASED NEO-ADJUVANT RADIO-CHEMOTHERAPY FOR BORDERLINE AND LOCALLY ADVANCED PANCREATIC ADENOCARCINOMA. ANALYSIS ON 66 PATIENTS
Safi Dokmak
Beaujon Hospital, France

Introduction: To evaluate the results of induction treatment by gemcitabine + oxaliplatin (GEMOX) based chemotherapy and radiotherapy for borderline (BPA) and locally advanced pancreatic adenocarcinoma (LAPA).

Method: From 2007 to 2012, 66 pts were prospectively evaluated. Histology was obtained (100%) and patients received a mean of 5 (4–8) cycles of chemotherapy and 54 Grays of radiotherapy. Radiological evaluation was mainly done by CT scan. Surgery was proposed except if the pancreas had a soft parenchyma. Adjuvant chemotherapy (93%) was delayed >3 months in 52%. Mean tumour size was 25 (10–110), with necrosis>50% in 33%; lymph node were present in 48% and R0 resection in 82%. Median (months) and 5 year of OS and DFS were 16 (7–75), 41%, 14 (4–61), and 22%, respectively for the entire population; survival was better in resected compared to non resected patients: median = 23 vs. 13 months, p = 0.004) and 5- y = 41 vs. 0%, log rank = 12.869).

Conclusions: This strategy was associated with favourable rates of resectability, tumor necrosis, and R0 resection. However, PO morbidity is high and delayed adjuvant treatment. After resection, survival seems similar to that obtained for resectable disease at diagnosis.

FO31-08
RETROSPECTIVE ANALYSIS OF 125 PATIENTS FOLLOWING A WIPPLE PROCEDURE BY MONTENEGROS TECHNIQUE
Roland Montenegro Costa and Lucio Lucas
IHPBA, Brazil

Introduction: During the last 30 years pancreatic surgery has seen a dramatic improvement in the post-oper-

ative period primarily due to the improvement of ICU care for post-Whipple patients. Despite these improvements the morbidity remains the same today as in the 1970s, 55%. Moreover, the mortality has decreased from 35% to an acceptable 0–6%. The central reason for mortality is pancreatic fistulas, considered the “Achilles Heel” of the procedure. This complication is the trigger for the development of delayed gastric empting, intra-abdominal abscesses, bleeding, sepsis, multiorgan failure, and death.

Method: The authors analyzed retrospectively 125 patients with various pathology of disease involving the periampullary regions. A Whipple procedure was performed binding the pancreaticogastrostomy using an isoperistaltic tube originating from the great curvature. In this technique, a gastric tube was connected from the great curvature of the stomach, binding the residual pancreas by using 2.0 PDS to tie a purse string. For most of the operations a pancreatic ductal stent was used if the main duct had a diameter less than 5 mm or if the pancreas had a soft parenchyma.

Results: Today, the rate of fistulas after a Whipple procedure ranges from 10 to 29%. With our technique the rate of pancreatic fistulas was 2.4%. Such fistulas did not occur due to the breakdown of the pancreaticogastric anastomosis, but due to the mechanism of cutting, originating during the process of tying the purse string suture in a soft pancreas.

Conclusions: The authors have shown that by binding the pancreaticogastric anastomosis using this method, it is both safe and reliable and necessitates more trials in order to be accepted and used in these complex operations. This technique has reduced the fistula rate, thereby decreasing the mortality rate and length of hospital stay.

FO32-01
DIFFUSION-WEIGHTED MR IMAGING OF GALLBLADDER ADENOCARCINOMA:
DIFFERENTIATION FROM ADENOMA AND ANALYSIS WITH EMPHASIS ON HISTOLOGIC GRADES
Sung Pil Yun, Hyung-Il Seo and Suk Kim
Busan National University Hospital, Korea

Introduction: Generally, histologic grades of gallbladder adenocarcinoma correlate with survival. However, it is difficult to differentiate histologic grades of gallbladder adenocarcinoma by imaging. The purpose of our study was to investigate the value of DWI for differentiating gallbladder adenocarcinoma from adenoma, and differentiating gallbladder adenocarcinoma according to histologic grades.

Method: Forty-three patients with gallbladder adenocarcinoma and 8 patients with adenoma who had undergone MR with respiratory-triggered DWI were included in this retrospective study. Signal intensity of gallbladder adenocarcinoma and adenoma was analyzed on DWI (b = 800s/mm²), in comparison with spleen signal by Chi-square test. ADC value of adenocarcinoma and adenoma were compared separately for 1.5-T and 3.0-T by Mann–Whitney U test. Gallbladder
FO32-02
THE ROLE OF IN-VIVO PROTON MAGNETIC RESONANCE SPECTROSCOPY IN GALLBLADDER CANCER PATIENT: A METABONOMIC APPROACH
Surender Kumar¹, Devendra Singh¹, Anit Parihaar³, Nuzhat Hussain² and Paarijat Suryavanshi¹
¹King George’s Medical University, Lucknow, India; ²Dr Ram Manohar Lohia Institute of Medical Sciences, India, ³King George’s Medical University, Lucknow, UP, India

Introduction: Gall bladder cancer is not an uncommon malignancy in northern Indian females with an incidence of 5–7 per 100,000 women. The clinical presentation is vague and in spite of several new available diagnostic modalities most of the cases are detected in late stage. Local biochemical and metabolic changes are expected to be evident in malignant lesions much before the disease is morphological or radiologically evident. The present study was aimed to assess the diagnostic role of metabolomics using in-vivo Proton nuclear magnetic resonance spectroscopy (MRS) in gall bladder cancer patients.

Method: A total of 30 patients including 10 cases of advanced gallbladder cancer, 10 cases gall stones and 10 normal gall bladders were subjected to magnetic resonance imaging and MRS and the findings were correlated with the FNAC/ biopsy findings. The MRI and MRS sequences was performed at 1.5 Tesla, GE, excite machine (WI, US). Axial and coronal T1 FSE sequence was done. T2 FSE sequence was obtained in three orthogonal planes and subsequent MRS was done with PRESS (point resolved spectroscopy) sequence.

Results: The in-vivo MR spectra of all the gallbladder cancer patients were dominated by choline containing compounds (TCho) at 3.2 ppm while no such finding was observed in patients of gall stones and normal gall-bladder. Raised TCho levels were also found in involved portion of liver and metastatic lymph node (s). Overall the technique had a sensitivity and specificity of 100%.

Conclusions: TCho detected by in-vivo NMR is a sensitive and specific non invasive tool for diagnosing gall bladder cancer. However, the potential clinical uses of this technique in the management of a gallbladder cancer require further multicentric large sample size studies involving early gallbladder cancer patients.

FO32-03
ROLE OF FDG PET/CT IN DECIDING RESECTABILITY IN GALL BLADDER CANCER
Thakur Deen Yadav, Ajeet Prapat Maurya, Ujwal Zambare, Rahul Parghane, Anish Bhattacharya, Anupam Lal and Gurpreet Singh
Postgraduate Institute of Medical Education and Research, Chandigarh, India

Introduction: Gall bladder cancer (GBC) is a rare disease with dismal prognosis. Most patients of gall bladder cancer present in advanced stage. Surgery does not offer any survival benefit in the presence of metastasis. Preoperative imaging is critical. MDCT is inseparable part of preoperative work up. While PET/CT has a potential to change the course of management in many cancers, its role in GBC is being defined. This study aimed to determine role of PET/CT in deciding resectability of GBC.

Method: From July 2009 to August 2013 consecutive patients suspected to be suffering from GBC underwent routine work up including MDCT. Only those patients who were deemed resectable on MDCT included in the study. All such patients underwent F18-FDG PET/CT after ruling out diabetes mellitus. Patients with evidence of distant metastasis were subjected to FNAC for confirmation of the diagnosis. Data were prospectively collected. PET/CT assessed for determining malignant nature of disease and for distant metastasis. Results of PET/CT analyzed in comparison with MDCT.

Results: Eighty three patients were included in the study. Fifty seven (68.7%) patients explored with intent of curative resection. Resection could be completed in 43 (51.8%) patients. Twenty six (31.3%) patients did not undergo exploration due to identification of metastases. Diagnosis was confirmed using histopathology or cytology as gold standard. In determining malignant nature of disease, PET-CT had sensitivity, PPV and accuracy of 97.3%, 92.2% and 90.4% respectively. PET-CT findings resulted in change in management in 31.3% patients deemed resectable by standard work-up.
Conclusions: PET-CT is important in detecting distant metastasis which is missed by conventional imaging. Thus PET-CT has an impact on the management of gall bladder cancer.

FO32-04
INCIDENTAL GALL BLADDER CANCER (IGBC) ERRONEOUSLY INCLUDES BOTH ‘TRUE IGBC’ AND ‘PSEUDO-IGBC’!

Satyajit Godhi, Shivendra Singh, Raja Kalayaranan, Amit Javed and Anil Agarwal
GB Pant Hospital & MAM College, India

Introduction: IGBC is defined as gallbladder cancer (GBC) detected on histopathological examination (HPE) with no pre or intraoperative suspicion of malignancy, however in the literature, the term is loosely applied to all GBC detected in patients operated with a benign diagnosis i.e. includes those suspected intraoperatively and on examination of the removed GB. Hence this study, to analyse & compare ‘true IGBC’ with ‘labeled IGBC’ with features suggestive of malignancy on preoperative imaging & intra-operative examination.

Method: The prospective study of patients “labeled” as IGBC and managed between May 2005–September 2012. Patients with insufficient details were excluded. Review of preoperative imaging and operative notes were done to ascertain any suspicion of malignancy in retrospect. Resectability rate, type of surgery and survival of true IGBC (GroupA) were compared with missed GBC (GroupB).

Results: Of 103 patients, USG reported diffuse thickening (n = 17), not suspicious of malignancy in 10 & suspicious thickening in 7. Focal thickening or mass suspicious of malignancy was present in 33. Preoperative CT/MRI was done in 15 patients for suspected malignancy. Intraoperatively 47 had focal thickening/GB mass suspicious of malignancy. In the overall analysis 53 had preoperative imaging or intraoperative findings suggestive of malignancy. Majority (96%) had T1b/T2 disease in GroupA while 79.2% had T2/T3 disease in GroupB. Overall resectability rate was significantly higher in the GroupA vs. GroupB (76% vs. 41.5%, p = 0.001) and adjacent organ resection was significantly lower in Group A (10.5% vs. 40.9%, p = 0.009). Median survival in GroupA was significantly higher than groupB (60 months vs. 28 months, p < 0.001).

Conclusions: Only 50 of 103(58.33%) patients “labeled” as IGBC were found to be true IGBC. True IGBC patients have early stage disease, better resectability rate, require limited resection and better survival compared to unsuspected/unexpected & missed GBC. In the published literature (IGBC) includes both – true IGBC and Pseudo-IGBC i.e. missed and unsuspected GBC, hence use caution in interpreting results!

FO32-05
SURGICAL APPROACH FOR ADVANCED GALLBLADDER CANCER DEPENDS ON PROGNOSTIC FACTORS

Ryota Higuchi1, Takehiro Ota1, Tatsuo Araida2, Hideki Kajiyama1, Takehisa Yazawa1, Mimi Okano1 and Masakazu Yamamoto1
1Tokyo Women’s Medical University, Japan; 2Tokyo Women’s Medical University Yachiyo Medical Center, Japan

Introduction: To evaluate factors associated with prognosis and unresectability in advanced gallbladder cancer (GBC).

Method: A retrospective review of 300 consecutive cases of advanced GBC, not included early gallbladder cancer with cancerous invasion up to subserosa, treated surgically in a single institution.

Results: On multivariate analysis, JSBS T4 classification was the only independent prognostic factor (HR 3.07; p = 0.0014). R0 resection was also important, although significance was borderline (HR 2.01; p = 0.0031, significance level 0.0023). There were no long-term survivors among patients with multiple liver metastases (2-year survival rate 0%) and dissemination (3-year survival, 0%). There were few long-term survivors (5-year survival, 3%) among patients with invasion through the hepatoduodenal ligament (B1f3). Five-year survival with para aortic lymph node metastasis was 14.8%. There was no difference in long-term survival rates between patients who underwent bile duct resection or pancreatectoduodenectomy (PD) and those who did not, or with respect to the type of hepatectomy performed. However, in patients with T2R0 and lymph node metastasis without liver metastasis or dissemination, there was a difference in survival rate between those who underwent PD (92%) and those who did not (68%, p = 0.024). The rate of lymph node or local recurrence was 0% in patients who underwent PD and 32% in those who did not (p = 0.034).

Conclusions: Surgery may not be indicated for patients with multiple liver metastasis, dissemination, B1f3, and visible para-aortic lymph node metastasis. R0 surgery is important and PD may improve survival in selected patients.

FO32-06
REGIONAL LYMPHADENECTOMY FOR GALLBLADDER CANCER: RATIONAL EXTENT AND PATIENT OUTCOMES

Jun Sakata1, Taku Ohashi1, Yuki Hirose1, Tomohiro Katada1, Natsuru Sudo1, Kazuyasu Takizawa1, Kazuto Takano2, Takashi Kobayashi2, Masahiro Minagawa1 and Toshimori Wakah1
1Niigata University Graduate School of Medical and Dental Sciences, Japan; 2Nisit Medical Center Hospital, Japan

Introduction: This study aimed to define the rational extent of regional lymphadenectomy for gallbladder cancer and to clarify its effect on long-term survival.

Method: A total of 152 patients with gallbladder cancer who underwent a minimum of “extended” portal
lymph node dissection (defined as en bloc removal of the first- and second-echelon nodes) from 1982 to 2010 were retrospectively analyzed. Based on previous studies, regional lymph nodes of the gallbladder were divided into first-echelon nodes (cystic duct or pericholedochal nodes), second-echelon nodes (node groups posterolateral to the head of the pancreas or around the hepatic vessels), and more distant nodes.

**Results:** Among the 152 patients (total of 3,352 lymph nodes, median of 19 per patient), 79 patients (52%) had 356 positive nodes. Among node-positive patients, the prevalence of nodal metastasis was highest in the pericholedochal (54%) and cystic duct (38%) nodes, followed by the second-echelon node groups (29% to 19%), while more distant node groups were only rarely (5% or less) involved. Disease-specific survival after R0 resection differed according to the nodal status (p < 0.001): most node-negative patients achieved long-term survival (median, not reached; 5-year survival, 80%), whereas among node-positive patients, 22 survived for more than 5 years (median, 37 months; 5-year survival, 43%).

**Conclusions:** Gallbladder cancer first spreads to the first-echelon nodes (cystic duct or pericholedochal nodes) and then to the second-echelon nodes located posterolateral to the head of the pancreas or around the portal vein/hepatic arteries. The rational extent of lymphadenectomy for gallbladder cancer should include the first- and second-echelon nodes. Such aggressive lymphadenectomy can achieve an acceptable rate of long-term survival even in patients with nodal metastasis, provided that a potentially curative (R0) resection is feasible.

**FO32-07**

**MINIMALLY INVASIVE VS. CONVENTIONAL OPEN SURGICAL APPROACH OF RADICAL CHOLECYSTECTOMY FOR GALLBLADDER CANCER: A COMPARATIVE STUDY.**

Anil Agarwal, Raja Kalayarasan, Amit Javed, Puja Sakhuja and Rajeev Uppal

*GB Pant Hospital & MAM College, India*

**Introduction:** Traditionally laparoscopic surgery has been contraindicated in patients with suspected gallbladder cancer (GBC); however a few recent studies have advocated minimal invasive approach in GBC. This study was undertaken to determine the safety and feasibility of laparoscopic radical cholecystectomy (LRC) for GBC and to compare with open radical cholecystectomy (ORC).

**Method:** Prospective study performed between June 2011 and December 2012. Patients of primary GBC with limited liver infiltration and incidental GBC (IGBC) following laparoscopic cholecystectomy were considered for LRC. Extensive liver infiltration, extrahepatic adjacent organ involvement and IGBC following open cholecystectomy were excluded. Patients who fulfilled the study criteria and underwent ORC during the period formed the control group. A standard radical cholecystectomy (resection of segments IVB and V with lymphadenectomy) was performed. All port sites were excised in IGBC patients.

**Results:** Of the 25 patients with suspected GBC who underwent laparoscopic segment IVb, V resection, 19 had GBC (15 primary, 4 IGBC) and underwent LRC (Group A). On comparison with 36 patients who underwent ORC (Group B), the median operating time (minutes) was more in Group A (300 vs. 270, p = 0.035), however, the median blood loss (mL) was less in Group A (150 vs. 200, p = 0.016). Postoperative mortality and morbidity was comparable (p = 1.000). In LRC group, the pathological T stage in primary GBC patients was T1b (n = 1), T2 (n = 6) and T3 (n = 8). One of the 4 IGBC patients had residual tumor in gallbladder fossa. All underwent a R0 resection. The median lymph node yield was 8 (4–24) and was comparable between the two groups (p = 0.951). During a median follow up of 14 (8–26) months 1 patient in Group A and 3 in Group B developed recurrence. None of the patients in Group A developed port site recurrence.

**Conclusions:** Laparoscopic radical cholecystectomy (LRC) is safe and feasible in selected patients of GBC and results are comparable to Open radical cholecystectomy (ORC).

**FO32-08**

**CAN DEATH RECEPTOR -5 PREDICT THE PROGNOSIS OF GALLBLADDER CARCINOMA?**

Ji Eun Sung, Chang Woo Nam, Hye Jung Choi and Yang Won Nah

*Ulsan University Hospital, Korea*

**Introduction:** Gallbladder adenocarcinoma (GBC) is one of the most lethal cancers that tends to present at an advanced stage. There are approximately 5,600 newly diagnosed cases per year in Korea, and seventh common cancer with female predominance. The proapoptotic death receptor DR5 has been studied extensively in cancer cells recently, because of the ability of the apoptotic receptor ligand Apo2L/TRAIL to kill malignant cells selectively. We investigated the expression of DR5 by immunohistochemistry and its prognostic significance in 105 cases of resected gallbladder carcinomas.

**Method:** The 102 cases of adenocarcinomas of gallbladder of Ulsan university hospital, from 2002 to 2012 were included. The paraffin embedded formalin fixed tissue of representative block of tumor was selected from each case and immunohistochemical stain of DR5 was performed.

**Results:** The patients were made up of 45 males and 57 females. Age group was the 40–82 age band and the mean age was 62.82 ± 10.56 years. Stages, existence of lymphovascular and perineural invasion, status of resection margin, and lymph node metastasis were made a through investigation. 58 cases (56%) revealed DR5 high expression in cytoplasm and nucleus and 34 cases showed endothelial expression in the tumor. But the tumor cell nor endothelial expression are not correlated with clinical characteristics or survival.
Conclusions: DR5 expression is relatively common in gallbladder adenocarcinoma cells and endothelial cells in the tumor. Their potential of therapeutic target should be elucidated through further prospective study.

FO33-01
BENEFITS OF PET/CT IN DIAGNOSTICS OF PANCREATIC TUMOURS
Jiri Kysucan¹, Dusan Klos¹, Martin Lovecek¹, Katherine Vomackova¹, Cestmir Neoral¹, Pavel Koranda² and Roman Havlik¹
¹Surgeon, Czech Republic; ²Nuclear medicine, Czech Republic

Introduction: Treatment of pancreatic tumours is interdisciplinary, but surgery remains the only potentially curative method. Pre-operative imaging methods are by default provided by conventional methods as CT and EUS. Nevertheless, only a minority of patients after extramural investigation are indicated to radical treatment and of those patients, local inoperability or generalization of the disease is often discovered peroperatively. Implementation of PET/CT seems to be able to simplify and specify pre-operative staging.

Method: In the past 3 years, PET/CT was performed in 172 patients with suspicion of pancreatic tumour, as well as CT and EUS. Agreement or disagreement of PET/CT results was compared with surgery findings and definitive histology in TNM modalities. Then, PET/CT findings were compared with CT and EUS.

Results: CT was performed in 146 patients, EUS in 125 patients. 103 patients were not indicated to surgery, because of generalization of disease, local inoperability or exclusion of the tumour. In our study, specificity and accuracy of PET/CT is significantly higher than EUS in tumour detection. Sensitivity and accuracy of the method are higher than CT, as well. Sensitivity and specificity for affection of regional lymph nodes are low, but higher than CT. High specificity in detection of distant metastases makes PET/CT an effective tool in assessment of resectability of pancreatic tumour.

Conclusions: The implementation of PET/CT to the pre-operative algorithm notably improves diagnostics of pancreatic tumours and indications to operation. It’s main contribution is better selection of patients who would otherwise uselessly undergo poorly indicated surgical revision, which brings profit for the patient and has indispensable economic impact as well. PET/CT could be considered as the standard of patients with equivocal findings by conventional methods and also with borderline resectable pancreatic cancer.

FO33-02
APPLYING WGS-BASED PERSONALIZED GENETIC MARKER DISCOVERY FOR MONITORING A PATIENT WITH PANCREATIC CANCER AFTER SURGERY
Taegyun Yun¹, Woon Kwon², Byung-Chul Lee³, Junghyun Namkung¹, Sung Gon Yi¹, Kyeongin Seo¹, Sun Whe Kim², Sangjo Han¹ and Jin-Young Jang²
¹Healthcare Group, SK telecom, Korea, ²Seoul National University College of Medicine, Korea

Introduction: Sensitive and specific monitoring marker is useful for clinical management of cancer patients after surgery by monitoring treatment effects and recurrence of cancer. Recently one group introduced new monitoring method for patients with large size of solid cancers or in metastasis, such as breast cancer and colorectal cancer, which are using patient-specific genetic markers found by analyzing whole genome sequence (WGS). However, this approach has not been tested for patients with relatively small size of solid cancers. Here, we performed the pilot study using two Korean patients with pancreatic cancer.

Method: We generated WGS datasets of tumor tissues and whole blood samples from two patients, and then analyzed them on our own WGS analysis platform to identify patient-specific somatic structural variations (i.e. translocation) as the monitoring markers, which are basically not present in germline DNA, but only observed in tumor tissue. To confirm whether such candidate somatic markers are specific to each patient’s tumors, each genomic region specific to each patient were compared with nine normal Korean WGS datasets. Experimentally to confirm whether each marker is detected only in the corresponding tumor, we designed PCR primers spanning break-point within each candidate structural variation, and performed end-point as well as quantitative PCR.

Results: More than tens of candidate structural variation regions useful as patient-specific monitoring markers were identified, which are confirmed to be not present in patient’s germline DNA, and even in known 9 normal Korean persons. As well, PCR experiment showed that most of candidate regions are specific in patient’s tumor.

Conclusions: Current pilot study showed that patient-specific somatic structural variations for the monitoring markers have been successfully discovered, and then PCR amplifying the discovered region would work well for monitoring patients. Now we are evaluating it in the corresponding patient’s time series serum samples after surgery with digital PCR.
FO33-03

CLINICOPATHOLOGICAL FINDINGS OF PANCREATIC DUCTAL ADENOCARCINOMA CONCOMITANT WITH INTRADUCTAL PAPILLARY MUCINOUS NEOPLASMS

Takahiro Ito, Daisuke Noguchi, Takao Omori, Yasuo Okura, Takashi Hamada, Hiroshi Kaneko, Hiroki Taoka, Toshifumi Takeuchi, Shimpei Matusaki and Tetsuya Murata

Suzuka general hospital, Japan

Introduction: Although branch duct intraductal papillary mucinous neoplasms (IPMN) are slow-growing tumors with a favorable prognosis, the synchronous occurrence of pancreatic ductal adenocarcinomas (PDAC) in patients with IPMN have been reported. However, it is considered that PDAC concomitant with IPMN (PDAC-IPMN) have a better prognosis than PDAC without IPMN. The aim of this study is to investigate clinicopathological findings of PDAC with IPMN compared to PDAC without IPMN.

Method: From January 2003 to August 2013, forty-one patients were undergone the resection for PDAC in our hospital. We had investigated clinicopathological differences that were background of the patient, opportunity of the diagnosis, site and size of the tumor, histological character, recurrence rate, prognosis, between 5 patients with IPMN and 36 patients without IPMN (PDAC).

Results: Patients in PDAC-IPMN group showed a lower rate of clinical symptoms (0% vs. 83%, p < 0.001) than those from PDAC group. PDAC-IPMN had showed lower tumor stage (T1: 80% vs. 14% T2; 20% vs. 8% T3; 0% vs. 78%, p = 0.004), lower recurrence rate (0% vs. 63%, p = 0.026) comparing with PDAC. The median survival times were 30.1 months in PDAC-IPMN group, on the other hand 20.9 months in PDAC group. According to the TS1 (tumor size <2.0 cm) cases, the rate of extrapancreatic spread of tumor (JPS-rules; S+ and/or RP+) in PDAC-IPMN group was tended to be lower than those in PDACs (0% vs. 55%, p = 0.057). According to the stage IB and II cases, the recurrence rate in PDAC-IPMN was fewer than those in PDAC (0% vs 69%, p = 0.034).

Conclusions: PDAC with IPMN had small size of tumor, less invasive, and lower rate of recurrence comparing with PDAC without IPMN. It is considered as the one reason that they were early diagnosed. However, the rate of extrapancreatic spread and recurrence rate were different in similar stage. These findings suggest that PDAC with IPMN may have more favorably biological behaviors than PDAC without IPMN.

FO33-04

IRREVERSIBLE ELECTROPORATION WITH “NANOKNIFE” SYSTEM IN TREATMENT OF LOCALLY ADVANCED PANCREATIC CANCER. THE FIRST EARLY RESULTS

Dmitry Panchenkov1, Yuri Ivanov2, Nikolay Soloviev2, Fedor Zabozlaev2, Alexey Nechunaev1 and Dmitry Astakhov1

1A.I. Evdokimov Moscow State University of Medicine and Dentistry, Russia; 2Federal Research Clinical Center of Specialized Medical Care and Medical Technologies FMBA, Russia

Introduction: The methods of local destruction now a day are not widely spread in treatment of pancreatic cancer because of characteristics of blood supply, anatomic and histologic structure of pancreas and high rate of complications and recurrence. The method if irreversible electroporation (IRE) is a new unique technology of non-thermal ablation directed to destruction of cancerous cells by subjecting them to a series of short electrical pulses using high-voltage direct current. This creates multiple holes in the cell membrane, irreversibly damaging the cell’s homeostasis mechanisms and leading to cell death.

Aim of the study: To estimate the possibilities of IRE in treatment of locally advanced pancreatic cancer (LAPC).

Method: Seven patients underwent IRE for unresectable LAPC with “Nanoknife” surgical system. Our short experience shows the following advantages of IRE: comparable technical simplicity, safety for vascular and duct structures, minimal impact on the pancreas.

Results: The efficacy of IRE proved with ultrasound, CT and histologic (biopsy) investigation in postoperative period. The maximal period of supervision was 7 months. In one case acute pancreatitis noticed on the 8th day after the procedure with following successful conservative treatment.

Conclusions: Though the definite indications to IRE in patients with LAPC are not established but the world results and our own first experience permit to acknowledge the efficacy of this technique in palliative surgical treatment of LAPC and its safety.
FO33-05
ENDOSCOPIC STENTING MAY BE PREFERABLE TO SURGICAL BYPASS FOR PALLIATION, EVEN IN THE ABSENCE OF METASTATIC DISEASE, IN PATIENTS WITH UNRESECTABLE OBSTRUCTIVE PANCREATIC HEAD CANCER

Alexandros Kofokotsios, David Taraboulous, Fotini Maloudi, Christiana Papaefthimiou, Konstantinos Papazis, Loukas Kontovinis, Ioannis Andronikidis, Dimitrios Kardassis, Achilleas Ntinas and Dionisios Vrochides

“Euromedica Geniki Kliniki” General Hospital, Greece

Introduction: Endoscopic stenting techniques and materials for gastro-intestinal malignancies are constantly improving. This study evaluates the efficacy of stenting compared to the standard operative procedures, in patients with unresectable obstructive pancreatic head cancer.

Method: This is a retrospective case control study of 52 patients who were diagnosed with obstructive (biliary, duodenal or both) adenocarcinoma of the pancreatic head. Twenty-nine patients (endoscopy group) underwent palliative endoscopic stenting (biliary: 29 stents, duodenal: 4 stents). Eleven patients (bypass group) underwent palliative double by-pass. Twelve patients (Whipple’s group) underwent Whipple’s operation with curative intent, however histopathology revealed R1 resection (palliative Whipple’s). Primary end-point was survival. Tumor characteristics, laboratory values and post-intervention complications were also analyzed.

Results: Metastatic disease was present only in the endoscopy group (n = 12, 41.3%). T4 disease was identified in 44.8% (n = 13), 63.6% (n = 7) and 25% (n = 3) in the endoscopy, bypass and Whipple’s group, respectively. 27.2% (n = 3) and 25% (n = 3) of patients in the bypass and Whipple’s group, respectively, received neoadjuvant chemoradiation, after endoscopic biliary stenting. 48.3% (n = 14), 54.5% (n = 6) and 100% (n = 12) of patients in the endoscopy, bypass and Whipple’s group, respectively, received adjuvant chemotherapy. In the endoscopy group, primary and secondary anatomic patency rates were 86% and 100%, respectively. There was no intervention-related mortality. Median survival was 280 (95%CI: 103, 456), 157 (95% CI: 0, 411) and 647 (95% CI: 300, 993) for the endoscopy, bypass and Whipple’s group, respectively (p = 0.116).

Conclusions: In patients with obstructive pancreatic head cancer, endoscopic stenting offers equally good palliation when compared to surgical double by-pass, even in the absence of metastatic disease. The numerically better (although not statistically significant) survival after palliative Whipple’s might be explained by the smaller tumor burden in this sub-group of patients and not by the superior efficacy of this operation.

FO33-06
FIRST JEJUNAL VEIN-ORIENTED MESENTERIC EXCISION FOR PANCREATODUODENECTOMY REDUCES INTRAOPERATIVE BLEEDING

Toshiya Abe, Hiroshi Nakashima, Atsushi Urakami, Toshihiro Hirai and Masafumi Nakamura
Kawasaki Medical College, Kurashiki, Japan

Introduction: Dissection of the pancreatic head from the superior mesenteric vein (SMV) and artery (SMA) are major points of bleeding in pancreaticoduodenectomy (PD) because of congestion of the pancreatic head. Ligatinon of IPDA is effective for preventing congestion. However, detection of IPDA is not easy and sometimes duplicated. We applied a new surgical approach, first jejunal vein-oriented mesenteric excision (FME) for PD, by which we totally resected mesoduodenum before cutting branches of SMV. This study aimed to clarify the effect of FME on reduction of bleeding during PD.

Method: We retrospectively analyzed the perioperative outcome of 54 patients who underwent resection of the pancreatic head, PD and total pancreatectomy (TP) from January 2010 through June 2013 in Kawasaki Medical College. 33 patients underwent pancreatic head resection by FME, and 21 patients underwent the conventional method. Analysis of anatomical findings of the FJV: Computed tomography (CT) images of 56 patients who underwent surgery for the treatment of hepato-biliary-pancreatic disease were analyzed to determine the anatomy of the FJV and spatial relationship between FJV and IPDA.

Results: FME-based PD significantly reduced intraoperative blood loss compared with conventional PD (571 mL vs. 1,234 mL, p = 0.0061). The median distance of the FJV was 0 mm from the middle colic artery and 0 mm from the 3rd portion of the duodenum. The FJV was posterior to the SMA in the majority of the patients but was anterior to the SMA in 16.7% of patients.

Conclusions: FME is useful for reducing intraoperative bleeding.

FO33-07
USE OF HARMONIC FOCUS® IN CUTTING PANCREAS FOR SOFT TEXTURE REDUCES THE RATE OF PANCREATIC FISTULA AFTER PANCREATICODUODENECTOMY

Kei Sato, Koichi Taniguchi, Ryusei Matsuyama, Ryutaro Mori, Kazuhiisa Takeda, Takaumi Kumamoto, Kazunori Nojiri, Michio Ueda, Kuniya Tanaka and Itaru Endo
Yokohama City University, Japan

Introduction: Harmonic FOCUS® (Ethicon Endo-Surgery, Inc, Cincinnati, OH) is an ultrasonic surgical scalpel that cuts and coagulates tissues using lower temperatures than those used by electrosurgical equipment. It has been reported to occlude and seal small to
medium-sized arteries, veins and lymphatic vessels by the coagulation effect. The aim of this report is to assess the outcome of cutting pancreas with Harmonic FOCUS® in pancreaticoduodenectomy for soft pancreatic texture.

**Method:** Amylase concentration of postoperative drainage fluid, incidence of pancreatic fistula was compared between patients who underwent pancreaticoduodenectomy with Harmonic FOCUS® (FOCUS group, n = 44) and with surgical knife (Knife group, n = 112) as a prospective observational study. Also, risk factors for ISGPF grade B or C pancreatic fistula were analyzed by univariate and multivariate analysis.

**Results:** Mean drain amylase level was relatively lower in FOCUS group on postoperative day 1 with marginal significance (p = 0.08). In Knife group, exponential increase of amylase level was observed on postoperative day 6. Serum CRP level in FOCUS group was significantly lower on postoperative day 6. The rate of grade B or C pancreatic fistula was significantly lower in FOCUS group compared to Knife group (27% vs. 44%, p = 0.002) and operative time (≥660 min) (OR 6.457, 95% CI 2.0–20.848, p = 0.002) and operative time (≥660 min) (OR 11.08, 95% CI 3.45–35.586, p < 0.001) were the independent predictive factors for developing clinically relevant pancreatic fistula of grade B or C.

**Conclusions:** Use of Harmonic FOCUS® in cutting pancreas for soft texture may seal branch pancreatic ducts and suppress leakage of pancreatic juice from pancreatic cut end and thus reduces the rate of pancreatic fistula after pancreaticoduodenectomy.

**FO33-08 END-TO-SIDE INSERTING PANCREATICO-JEJUNOSTOMY: A PROSPECTIVE STUDY OF 41 CONSECUTIVE PANCREATICODUODENECTOMIES**

Daisuke Hashimoto1, Masahiko Hirota2, Akira Chikamato1 and Hideo Baba1
1Kumamoto University Graduate School of Medical Sciences, Japan; 2Kumamoto Regional Medical Center, Japan

**Introduction:** Leakage from pancreatic anastomosis remains the most important cause of morbidity, and it also contributes significantly to prolonged hospitalization and mortality after pancreatico-duodenectomy. Therefore, generating a method for anastomosing the pancreas with the jejunum which might reduce the rate of complication is important. We have developed end-to-side inserting pancreatico-jejunostomy (Hashimoto et al. Surg Today 2013; 43:821–4.). The aim of this prospective study was to assess the safety of this new anastomosis.

**Method:** In this novel anastomosis technique, the pancreatic stump was isolated from the surrounding tissue. An incision which has the same diameter with the pancreatic stump was made on the opposite side of the mesenterium of the jejunum. A purse string suture was applied around the incision of the jejunum. Five to 6 stay sutures were also applied on the pancreas. The pancreatic stump was inserted into the jejunal incision by end-to-side, applying the stay sutures on the incision to secure the depth of inserting. A stent tube was inserted to a main pancreatic duct. Finally, the purse string suture was tied to seal the anastomosis. We performed this new anastomosis to 41 patients prospectively in Kumamoto University Hospital from April 2012 to July 2013.

**Results:** There was no hospital death. Postoperative pancreatic fistula was observed as grade A in 2 cases (4.9%), grade B in one case (2.5%) and grade C in 2 cases (4.9%). Importantly, 2 patients (4.9%) developed hemorrhage from pancreatic cut end into the jejunum.

**Conclusions:** Whereas careful hemostasis of the pancreatic cut end should be complete before inserting into the jejunum avoiding hemorrhage, this new method would be expected to minimize leakage from pancreatico-jejunostomy. Further studies should be planned in a randomized controlled trial compared with another traditional pancreatico-jejunostomy.
COMPARATIVE STUDY OF LAPAROSCOPIC AND OPEN PANCREATODUODENECTOMIES OVER 15 YEARS IN A TERTIARY CENTRE
Senthilnathan Palanisamy, Palanivelu C, Paramesh KN, Sandeep S, Nalankilli VP, Parathasarathi R, Sathiaymurthy R and Praveen Raj P
GEM Hospital and Research Centre, Coimbatore, India

Introduction: Pancreatoduodenectomy is a formidable procedure involving complex resection and reconstruction. In this fast growing minimal access surgery era, such complex and challenging surgeries are being performed by laparoscopic method in increasing numbers. Though technical feasibility had been established beyond doubt, very few studies compared its outcome with open approach. This article aims to review our comparative experience of Laparoscopic pancreatoduodenectomy (LPD) with its open counterpart, open pancreatoduodenectomy (OPD) in reference to perioperative and long term outcome.

Method: A retrospective review of prospectively maintained data from 1998 to 2013 was done. Out of 533 patients who underwent pancreatoduodenectomy for pancreatic and periampullary tumours, 393 underwent OPD and 140LPD. Patients with borderline resectability and associated vascular resections were excluded from the study. These two groups were compared on the basis of overall survival as the primary end point and perioperative variables as the secondary end points.

Results: Patients in both arms were similar in terms of age, sex, BMI, ASA grade and comorbidities. The mean tumor size is 3.1 cm in LPD and 3.6 cm in OPD and location is comparable. Operative time is more in LPD group whereas blood loss is significantly less compared to OPD. Perioperative morbidity profiles including pancreatic fistula (8.57% LPD vs. 9.66% OPD) rates are comparable between the groups. Mean hospital stay is less in LPD group but this difference fades out in complicated patients. No significant difference was noticed in terms of margin status, no of lymph nodes harvested, node positivity and pTMN stage. The overall five year survival was 29.4% in LPD and 27.1% in OPD.

Conclusions: This comparative study reinforces the already proven facts about feasibility, safety of LPD. With added benefits in terms of reduced hospital stay, blood loss combining with comparable oncological safety and overall outcome, LPD is a treatment option in expert hands for pancreatic and periampullary tumours.

LAPAROSCOPIC CENTRAL PANCREATECTOMY FOR BENIGN OR LOW-GRADE MALIGNANT LESIONS IN PANCREATIC NECK AND PROXIMAL BODY
Ki Byung Song, Song Cheol Kim, Young-Joo Lee, Kwang-Min Park, Jae Hoon Lee, Jeong Su Nam, Jong Hee Yoon, Dong Joo Lee and Jung Woo Lee
Asan Medical Center, Ulsan University, Korea

Introduction: Laparoscopic central pancreatectomy (LCP) is a parenchyma-sparing minimal invasive surgery that enables the removal of benign or low-grade malignant lesions from the neck and proximal body of the pancreas. The aim of this study was to compare the short and long-term clinical outcomes between LCP and other pancreatectomies.

Method: In the study period (From January 2007 to December 2010, median follow up time: 40.6 months), we performed 279 cases of pancreatectomy for benign or low-grade malignant tumors of pancreatic neck and proximal body. For comparative study of clinical outcomes between LCP and other pancreatectomies, we selected 26 cases of LCP, 14 cases of open central pancreatectomy (OCP), and 96 cases of laparoscopic distal pancreatectomy (LDP).

Results: The tumor size of LCP (2.2 cm) and OCP (2.9 cm) groups were smaller than LDP (4.0 cm) groups. The mean operation time for LCP group (350.2 minutes) was longer than for OCP (270.3 minutes) and LDP group (210.6 minutes). There were more surgical complications in LCP (38.5%) and OCP groups (50%) compared to that of the LDP group (14.6%). The mean duration of postoperative hospital stay was 13.8 days for the LCP group, which was significantly shorter than the OCP group (22.4 days). New onset diabetes was less frequent following LCP than LDP (11.5 vs. 30.8%).

Conclusions: In selected patients, with small and benign tumors in pancreatic neck and proximal body, LCP are associated with early postoperative recovery (compared with OCP) and an increased postoperative morbidity but an excellent postoperative pancreatic function (compared with LDP). Therefore, they should be considered as a valid therapeutic option in selected patients.

MINIMALLY INVASIVE VERSUS OPEN DISTAL PANCREATECTOMY FOR TREATMENT OF PANCREATIC LESIONS: A SINGLE CENTER EXPERIENCE
Gazi B. Zibari1, Mohammad Kazem Fallahzadeh1, Navid Mokhtari1, Alireza Hamidian2, Quyen Chu2, Sophia T. Abdehou1 and Hosein Shokouh-Amiri1
1WK John C. McDonald Regional Transplant Center, USA; 2LSUHSC-Shreveport, USA

Introduction: Minimally invasive surgery of pancreas is increasingly gaining more popularity among the surgi-
The aim of this study was to compare the surgical and oncological outcomes of minimally invasive distal pancreatectomy (MIDP) vs. open distal pancreatectomy (ODP) in patients with pancreatic lesions who were treated at our center.

**Method:** In this IRB approved study, the charts of 341 patients who underwent pancreatic resection at our center were retrospectively reviewed. Among them, 40 consecutive patients who had MIDP and 34 consecutive patients who had ODP were enrolled in the study. The surgical and oncological outcomes including OR time, estimated blood loss, the length of hospital stay, the amount of blood transfusion requirement, and postoperative complication rate were compared between 2 groups. Moreover, free resection margin and survival rates were compared between patients with pancreatic adenocarcinoma in 2 groups.

**Results:** Demographic data were similar between two groups. In MIDP group, 30 had laparoscopic and 10 had robotic DP. Twelve patients in the MIDP group and 14 patients in ODP group had pancreatic adenocarcinoma. There were no statistically significant differences between two groups in terms of OR time, the amount of blood transfusion requirement or postoperative complications. There were also no statistically significant differences between patients with adenocarcinoma in MIDP and ODP in terms of free resection margin and survival rates. However, the length of hospital stay was significantly shorter in the MIS group as compared with ODP group (8.6 vs. 12.4 days, p = 0.05).

**Conclusions:** Our results show that while surgical and oncological outcomes of MIDP and ODP are comparable, MIDP has shorter length of hospital stay. The long-term outcomes of MIDP and ODP should be evaluated in future randomized controlled trials.