**BV01-01**

**ANTERIOR APPROACH-RIGHT LOBE HEPATECTOMY FOR LARGE HEPATOCELLULAR CARCINOMA**

Sung-Gyu Lee  
*Asan Medical Center, Ulsan University, Korea*

**Introduction**: Conventional approach-major right hepatectomy may not be feasible in selected patients with large HCC (>10 cm size), when HCC may infiltrate into posterior abdominal structures or diaphragm, the size of HCC may limit access to posterior aspect of right lobe of liver and anterior surface of IVC, where many short hepatic veins are present, or the associated tumor thrombus near to right hepatic vein and/or inferior right hepatic vein is found.

**Method**: Theoretical risk of injudicious mobilization of right lobe of liver during conventional approach may result in excessive bleeding from avulsion of right hepatic vein, prolonged ischemia of liver remnant from rotation of hepatoduodenal ligament, iatrogenic tumor rupture, and spillage of cancer cells into systemic circulation by tumor manipulation.

**Results**: To overcome the disadvantages of conventional approach, the anterior approach-right hepatectomy based on no-touch isolation technique of tumor during conventional approach may result in excessive bleeding from avulsion of right hepatic vein, prolonged ischemia of liver remnant from rotation of hepatoduodenal ligament, iatrogenic tumor rupture, and spillage of cancer cells into systemic circulation by tumor manipulation.

**Conclusions**: This video shows anterior-approach right lobectomy for large HCC associated with tumor thrombus in inferior right hepatic vein, using a hanging maneuver.

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**BV01-02**

**ANTERIOR APPROACH AND LIVER HANGING MANEUVER IN EXTENDED RIGHT TRISECTIONECTOMY**

Silvio Marcio Pegoraro Balzan, Vinicius Grandio Gava, Marcelo Arbo Magalhães, Marcelo Luis Dotto and Marcio Andrei Gil Monteiro  
*University of Santa Cruz do Sul - Ana Nery Hospital - Moinhos de Vento Hospital - Institute of Oncology Saint Gallen, Brazil*

**Objective**: To demonstrate the usefulness of anterior approach and liver hanging maneuver to perform a right trisectionectomy extended to the caudate lobe.

**Patient**: A 69-year-old female with a large colorectal liver metastasis sparing segments 2 and 3, with compression of the left hepatic vein and left liver pedicle (posteriorly), in contact (>180°) with the retro-hepatic vena cava (RHVC), and invading the diaphragm.

**Surgery**: Through a thoracoabdominal incision, the liver was prepared for total vascular exclusion. The right portal pedicle was sectioned. Following section of the Arantius ligament, a hanging maneuver was performed passing a nasogastric tube between the right and middle-left hepatic vein trunk, running anterior to the caudate lobe and between the right and left portal pedicles. Liver transection was performed at the right side of the falciform ligament. Section of the middle hepatic vein was possible after freeing the left hepatic vein from the tumor. For the dissection of the tumor from the RHVC, the portal flow to segments 2 and 3 was kept, and a clamp was positioned superiorly in the vena cava preserving the outflow of the left hepatic vein and another inferiorly above the renal veins.

**Results**: The easier access to the RHVC through anterior approach and clamping with preservation of portal flow allowed release of the vena cava from the tumor without vascular resection, despite the large area of tumor contact. The right adrenal gland and a portion of the diaphragm were resected en bloc with hepatic segment 1 and segments 4 through 8. Pathology reported metastatic adenocarcinoma with clear margins. The patient had a 30-day hospital stay due to persistent ascites, but is doing well three months after discharge.

**Conclusions**: Anterior approach and hanging maneuver facilitate RHVC access, and may preclude total vascular exclusion and venous resection in selected cases.

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**BV01-03**

**RESECTION OF RIGHT HILAR STRADDLING HEPATOCELLULAR CARCINOMA**

Jiang-Tao Li¹, Shu-You Peng¹, Yuan-Quan Yu¹, Yun Jin¹, Xing Jin¹ and Cong-Yun Huang²  
¹Second Affiliated Hospital, Zhejiang University School of Medicine, China; ²Yue Bei people’s Hospital, Shantou University, China

**Introduction**: Resection of hilar straddling hepatocellular carcinoma is not a routine procedure. Here we discuss the approach for resection of hilar straddling hepatocellular carcinoma.

**Method**: The location of hepatoma is in the junction of segment I, IV and VI, and surrounded by paracaval portion of caudate lobe, anterior and posterior branches of right portal vein. 3D reconstruction was planned by CT scan preoperatively, intraoperative ultrasound was performed as guided for the resection. After removed the gallbladder, liver parenchyma was split along right interlobar fissure and median fissure, upturned the liver parenchyma, intrahepatic anterior and posterior branches of right portal vein were exposed, the 3 cm tumor was stranded the posterior of this bifurcation and anterior of paracaval portion of
caudate lobe. The tumor was removed completely under clear view.

Results: The tumor was resected without injury of the anterior and posterior branches of right portal vein. The blood loss is 300 ml, operative time is 360 min. the patient was recovery uneventfully.

Conclusions: Though the resection of right hilar straddling hepatocellular carcinoma is rare and difficult, under guidance of preoperative 3D CT imaging reconstruction and intraoperative ultrasound, it is very important using suitable operative approach for removing the tumor safely.

BV01-04

HEPATECTOMY OF THE HEPATIC VENOUS DRAINAGE AREAS ALONG THE ANTERIOR FISSURE

Mamoru Sato, Akihiro Cho, Hiroshi Yamamoto, Osamu Kainuma, Hidehito Arimitsu, HHroo Ynagibashi, Humitaka Ishige and Matsuo Nagata
Chiba cancer center, Japan

Introduction: Liver resection including the right or middle hepatic vein may potentially induce right paramedian sector congestion of the remnant liver.

Method: To prevent venous congestion in the right paramedian sector, we performed various types of anatomical liver resection along the anterior fissure which divides the right paramedian sector into the right and middle venous drainage areas.

Results: In 11 of 15 patients (73%), temporary clamping of the common trunk of the middle and left hepatic veins and the proper hepatic artery provided the anterior fissure. Regeneration rate of the middle segment (10.8% vs. 11.2%) on postoperative CT after 3 months.

Conclusions: This procedure could represent a useful method for preventing postoperative venous congestion.

BV01-05

CONSERVATIVE HEPATECTOMY FOR TUMOURS INVOLVING THE MIDDLE HEPATIC VEIN AND SEGMENT ONE: THE LIVER TUNNEL

Matteo Cimino, Fabio Procopio, Guido Costa, Matteo Donadon, Daniele Del Fabbro, Andrea Gatti, Carlos A. Garcia Etienne and Guido Torzilli
University of Milan-School of Medicine, Humanitas Clinical and Research Center, Rozzano, Milan, Italy

Introduction: For liver lesions located in segment 4 superior (S4s) and/or segment 8 (S8) and invading the middle hepatic vein (MHV) at caval confluence the mini-mesohepatectomy was proposed. If the lesion is extended to the paracaval portion of segment 1 (S1) or inversely invades S1 from S4s or S8 being in contact or invading the MHV right/left hepatectomies are selected: for these conditions a new procedure is herein proposed.

Method: In case-1 a cholangiocarcinoma 4-cm in size involved the MHV and was in contact with right hepatic vein (RHV) and left hepatic vein (LHV) at the caval confluence. In case-2, two colorectal liver metastases both 2 cm in size occupied respectively S1 and S8 in contact with MHV.

Results: A J-shaped thoracoophrenolaparotomy was carried out in both of them. In case-1 a communicating vein (CV) between RHV and MHV was detected at color-flow IOUS while contact between the lesion and RHV and LHV were confirmed at IOUS as detachable. In case-2 contact between one of the lesions with MHV was confirmed at IOUS as detachable. Then, the so-called liver-tunnel with IVC and main portal vein bifurcation exposure was carried out in both cases. In case-1 it consisted in removal of S1, S4s and S8 together with the MHV preserving LHV and RHV, while in case-2 in removal of S1and S8 preserving both MHV and RHV. Both patients had ad uneventful postoperative course and were discharged on the 8th postoperative day. The patients are disease free and alive 15 and 12 months after surgery, respectively.

Conclusions: The proposed liver-tunnel resection is a feasible parenchyma sparing resection for tumors involving S1, S8 and/or S8s and the MHV at the caval confluence. This novel hepatectomy is a further step in favour of parenchyma-sparing policy in spite of centrally located lesions with complex tumor-vessel relationship.

BV01-06

RADICAL BUT CONSERVATIVE LIVER RESECTION FOR LARGE CENTRALLY LOCATED HEPATOCELLULAR CARCINOMA: THE MINI UPPER-TRANSVERSAL HEPATECTOMY

Fabio Procopio, Matteo Cimino, Matteo Donadon, Daniele Del Fabbro, Guido Costa, Andrea Gatti, Carlos Alberto Garcia-Etienne and Guido Torzilli
University of Milan, Humanitas Clinical and Research Center, Italy

Introduction: In patients with hepatocellular carcinoma (HCC) grown in a diseased liver, surgery should be offered in a parenchyma-sparing fashion. This approach seems unfeasible for large and deeply located lesions. Ultrasound study of the tumor-vessel relationship and hepatic in- and outflow seem opening new technical solutions: herein is described a further new operation based on this approach.

Method: A 69-yrs-old man with a large centrally located hepatocellular carcinoma (BCLC stage C) grown in hepatitis B diseased liver underwent surgery. The HCC located in segments 7, 8 and part of 5 extensively compressing and dislodging the anterior (P5-8) and posterior (P6-7) glissonean pedicles, involved the right hepatic vein (RHV) and was in contact with the middle hepatic vein (MHV) at the caval confluence. A thin inferior right hepatic vein (IRHV) was preoperatively evident. The estimated right and left hemiliver volume was 78% and 22%, respectively.

Results: After a J-shaped thoracoophrenolaparotomy, the liver exploration by intraoperative ultrasound (IOUS) confirmed the preoperative findings and additionally disclosed multiple communicating veins (CV)
between the MHV and the RHV warranting with together the IRHV the segments 5–6 outflows. Based on these findings, an ultrasound-guided resection of segments 7–8 with complete tumor detachment from P5–8 and P6–7 together with RHV resection was performed. At the end of resection no congested areas were evident. Postoperative course was normal. The patient is alive and disease-free 12 months after hepatectomy.

Conclusions: This video represents the first live demonstration of the previously reported radical but conservative policy, adding to the latter those technical solutions provided by detection of accessory veins as the IRHV and moreover CV.

BV02-01
SINGLE PORT LAPAROSCOPIC DISTAL PANCREATECTOMY WITH SPLenic PRESERVATION
Marcel Autran Machado, Fabio Ferrari Makdissi and Rodrigo Canadá Surjan
Sírio Libanes Hospital, Brazil

Introduction: Pancreatic surgery is an extremely challenging field, and the management of pancreatic diseases continues to evolve. In the past decade, minimal access surgery is moving towards minimizing the surgical trauma by reducing numbers and size of the port. In the last few years, a novel technique with a single-incision laparoscopic approach has been described for several laparoscopic procedures. This video shows a single-port laparoscopic spleen-preserving distal pancreatectomy.

Method: A 33-year-old woman MEN1 was found to have a solid tumor in the body of the pancreas during follow-up. CT scan disclosed a 1.8 cm tumor compatible with neuroendocrine tumor. Patient was referred for surgical treatment. With the patient under general anesthesia, a transumbilical 3-cm skin incision was performed. A single-incision advanced access platform with gelatin cap, self-retaining sleeve and wound protector was introduced (Gelpoint®). Single port was able to accommodate at the same time three instruments with no triangulation prejudice: a 10-mm laparoscope, a 12-mm flexible stapler or ultrasound laparoscopic probe and 5 mm instruments such as harmonic scalpel, grasper, scissors or dissector. Operation began with access to the lesser sac followed by intraoperative ultrasound. Pancreas inferior border was opened and a tunnel between pancreas and splenic vein was created about 1-cm away from the tumor location. Pancreas is divided with vascular stapler. Small venous and arterial branches from the pancreas were divided. Pancreatectomy was completed and specimen was removed through the single-port. Pancreas raw surface was checked for bleeding and closed suction drain was placed near pancreatic stump.

Results: Operative time was 174 minutes. Blood loss was minimal and recovery was uneventful, and the patient was discharged on postoperative day 4. Pathological findings indicated the presence of an IPMN without malignancy. There was biological or clinical pancreatic fistula. The patient was discharged on postoperative day 7.

Conclusions: Robotic spleen preserving distal pancreatectomy with splenic vessel preservation is safe.

BV02-02
ROBOTIC SPLEEN PRESERVING DISTAL PANCREATECTOMY WITH SPLENIC VESSEL PRESERVATION
Patrick Pessaux
Nouvel hôpital civil université hospital IRCAD-IHU Mix-Surg, France

Introduction: We report the case of a 58-year-old woman who has had 2 episodes of benign acute pancreatitis. Morphological findings showed dilatations of secondary ducts evocative of intraductal papillary mucinous neoplasm (IPMN) of the pancreas.

Method: The robot was placed at the patient’s head. Four ports were placed, one optical port at the umbilicus, two ports in the left hypochondrium and one port in the right hypochondrium. The procedure started with the opening of the lesser sac which is carried on to the left in order to lower the splenic flexure. Dissection was started at the inferior border of the pancreas in order to identify the superior mesenteric vein. Small collateral branches were clipped and divided. Dissection was carried on at the superior border of the pancreas in order to dissect the splenic artery, which was placed on a tape. A retropancreatic passage along the venous mesenterico-portal axis was performed. The splenic vein was dissected at the posterior aspect of the pancreas. Pancreatic isthmus on the left border of the mesenterico-portal axis was transected by a stapler. Dissection is carried on from right to left, hence making it possible to mobilize the posterior portion of the pancreas. The dissection allowed to free the pancreas from the splenic vessels. At the superior border of the pancreas, the splenic artery was dissected with division and ligature of the different branches by means of clip placement. The dissection was continued all the way to the splenic hilum, consequently allowing for a complete resection of the pancreatic tail, while preserving splenic vessels and the spleen.

Results: Pathological findings indicated the presence of an IPMN without malignancy. There was biological or clinical pancreatic fistula. The patient was discharged on postoperative day 7.

Conclusions: Robotic spleen preserving distal pancreatectomy with splenic vessel preservation is safe.

BV02-03
ROBOTIC CENTRAL PANCREATECTOMY WITH PANCREATICOGASTROSTOMY (TRANSGASTRIC APPROACH) IN BENIGN AND BORDERLINE MALIGNANT TUMOR OF THE PANCREAS
Chang Moo Kang, Sung Hwan Lee, Ho Koung Hwang and Woo Jung Lee
Yonsei University College of Medicine, Korea
Non-cancerous pancreatic lesions have been increasing and function preserving minimally invasive pancreatectomy is thought to be ideal approach for benign and borderline malignant tumors of the pancreas, because these pathologic conditions can be expected for long-term survival, and quality of life needs to be considered in choosing surgical option. Pancreatic tumor in the neck of the pancreas is challenging issue. Pancreaticoduodenectomy and subtotal distal pancreatectomy with/without splenectomy are usual mode of surgery for them. Central pancreatectomy is rare surgical procedure. With the development of laparoscopic experiences, a few cases of laparoscopic central pancreatectomy were reported, which is believed to be still demanding excellent laparoscopic skills and expertise. However, advance in computer technology encourages surgeons to overcome the limitation of conventional laparoscopic surgery. Wrist-like movement of effector instrument and stable 3-D visualization provided by robot surgical system are believed to enhance the precise and safe laparoscopic performance. This video presentation will present our current technique for robotic central pancreatectomy with (transgastric) pancreatectogastrostomy, and perioperative outcomes.

BV02-04

LAPAROSCOPIC PANCREATECTOMY FOR PANCREATIC CANCER

Akira Matsushita, Yoshiharu Nakamura, Hiroki Sumiyoshi, Tetsuya Shimizu, Yoichi Kawano, Yoshiaki Mizuguchi, Masato Yoshioka, Nobuhiro Taniai and Eiji Uchida

Nippon Medical School, Japan

Introduction: The recent advances of surgical techniques and technology allow minimally invasive surgery to be applied in patients with benign and malignant diseases of the pancreas. With regards to malignancy, we still have concerns regarding the oncologic adequacy of laparoscopic pancreatectomy, with fewer studies reporting oncologic outcomes. We would like to show our techniques of laparoscopic pancreatectomy for pancreatic adenocarcinoma (PDAC) in the videos to improve the curability of laparoscopic pancreatectomy in the treatment of PDAC and focus on the oncologic outcomes and long-term outcomes of laparoscopic surgery for PDAC patients.

Method: From January 2004, patients who had been diagnosed with the tumor in the pancreas without suspicion for vascular involvement were eligible for laparoscopic pancreatectomy at Nippon Medical School. In Lap-PD for PDAC patients, we apply laparoscopic left mesentery spreading approach, which enables both accurate laparoscopic lymph node retrieval and complete pancreatic nerve plexuses dissection to achieve R0 resection. In Lap-DP for PDAC patients, we perform retroperitoneal tissue dissection, which often includes adrenalectomy.

Results: We have experienced laparoscopic pancreatectomies in 172 patients including 32 PDAC patients. In the 32 patients with PDAC, the mean number of lymph nodes dissected was 24 ± 11 (6–57). Metastasis to the lymph nodes was observed in 10 of the 32 patients (31%). R0 resection was performed in 28 patients (88%). The median follow-up period for the PDAC patients undergoing laparoscopic pancreatectomy was 16 months (1–71 months). Six of the 32 patients died, at 2.5 months (stage IV), 15 months (stage I A), 29 months (stage IIB), 33 months (stage IIB), 24 months (stage IIA), and 18 months (stage IIB). Among surviving 26 patients, 2 patients had liver metastasis and the others had no recurrence.

Conclusions: Laparoscopic pancreatectomy for pancreatic cancer is feasible and seems to achieve similar oncologic and long-term outcomes to open approach.

BV02-05

TOTAL LAPAROSCOPIC PANCREATICODUODENECTOMY

Nguyen Thuan, Tran Cong Duy Long, Nguyenhoang Bac, Le Tien Dat and Dang Quoc Viet

Introduction: Laparoscopic pancreaticoduodenectomy represents one of the most advanced applications for laparoscopic surgery currently in use. Our aim was to describe the technique of total laparoscopic pancreaticoduodenectomy for cancer.

Method: Typically, a total of five trocars are used for the procedure. The procedure begins with mobilization of the hepatic flexure and a wide Kocher’s maneuver to rule out pathological lymphadenopathy. The right gastropiploic vessels are ligated and divided. The portal vein is identified at the superior border of the pancreatic neck. The retropancreatic tunnelization is completed. The lymphadenectomy of the hepatoduodenal ligament begins along the course of the proper hepatic artery. The lymphadenectomy continues by removing all the lymphatic tissue surrounding the common bile duct up to the hepatic hilum. The first portion of the duodenum is transected with a linear stapler. The gastroduodenal and right gastric arteries are ligated, and divided. The first jejunal loop is divided using a linear stapler.

Dissection of the pancreatic head and uncinate process off the portal vein, superior mesenteric vein, and superior mesenteric artery is typically performed using hem-o-lock clip and ultrasonic shears. The pancreatic neck parenchyma is divided ultrasonically. The Wirsung’s duct is identified. All peripancreatic lymphatic tissue is taken en bloc with the specimen. The common bile duct is divided. An end-to-side, pancreaticojejunostomy, duct to-mucosa anastomosis is performed over an 8-cm Silastic tube with an inner layer of 5-0 PDS sutures and an outer layer of running 4-0 PDS sutures. An hepaticojejunostomy is performed with running 4-0 PDS sutures.

An duodenojunostomy is performed with 2 layers of running 3-0 Vicryl. The specimen is removed via the infraumbilical trocar site extended.

Results: The patient has Vater ampulla carcinoma. Operation time: 360 min and blood loss: 100 ml. The hospital stay was 8 days. No Conversion, no pancreatic fistula.
Conclusions: Laparoscopic pancreaticoduodenectomy is feasible, safe, and effective. If patients are selected properly, it has low mortality and acceptable rates of complications.

BV02-06
LAPAROSCOPIC ROBOT-ASSISTED PANCREATICODUODENECTOMY WITH EN-BLOC RESECTION AND RECONSTRUCTION OF THE SPLENO-PORTO-MESENTERIC JUNCTION
Mario Antonio Belloumini, Andrea Gennai, Dario Tartaglia, Nélide De Lio, Stefano Signori, Fabio Vistoli and Ugo Boggi
University of Pisa, Pisa, Italy

Introduction: Tumor infiltration/adherence to portomesenteric vein is no longer considered a contraindication to pancreatectomy, at least in high volume centers. The enhanced dexterity offered by the daVinci Surgical System offers the unique opportunity to perform, in selected patients, en-bloc segmental resection and reconstruction of the porto-mesenteric vein during laparoscopic pancreatic resection.

Method: In this video we present the technique of robot-assisted pancreaticoduodenectomy (PD) with en bloc resection and reconstruction of spleno-portal-mesenteric junction. Although patients with overt tumor infiltration/adherence to portomesenteric vein are not selected for robot-assisted PD, we have successfully managed this occurrence in 6 patients out of 134 (4.4%) undergoing robot-assisted pancreatic resection at our institution.

Results: An ‘artery first approach’ is employed, as described for the open operation (Boggi U, et al. Surgery 2009; 146:869-881) and a jump graft (left internal jugular vein) is used for the reconstruction. Once the specimen is completely freed from all its attachments, but the porto-mesenteric vein, the superior mesenteric artery is crossclamped to reduce intestinal blood pooling and visceral congestion. Then, the superior mesenteric vein is crossclamped proximally and distally to the division site and reconstruction is begun using the jugular jump graft while portal flow continues through the splenic vein. Anastomoses are constructed using fine PTFE sutures, which are more resistant to robotic needle driver manipulations than polypropylene. After completing the proximal anastomosis, splenic and portal veins are crossclamped and divided. Vascular reconstruction is completed by distal end-to-end anastomosis to the portal vein and end-to-side implantation of the splenic vein onto the jump jugular graft. The rest of the operation is completed using standard techniques.

Conclusions: Our experience shows that, in selected patients, the enhanced dexterity offered by the daVinci Surgical System allows en-bloc resection and reconstruction of porto-mesenteric vein during laparoscopic PD using the same techniques used in open surgery.

BV02-07
LAPAROSCOPIC PANCREAS-SPARING DUODENECTOMY
Hiroo Yanagibashi, Akihiro Cho, Hiroshi Yamamoto, Osamu Kainuma, Yorihiro Muto and Hidehito Arimitsu
Chiba Cancer Center, Japan

Introduction: Although pancreas-sparing duodenectomy (PSD) is an attractive surgical procedure for patients with disease of the duodenum without pancreatic involvement, the surgical technique is challenging, especially laparoscopic resection, due to the close anatomical relationship between the pancreas and the duodenum.

Method: Three patients with duodenal tumor without pancreatic involvement underwent laparoscopic PSD in our institution.

Surgical Technique: In two patients, laparoscopic pancreas-sparing subtotal duodenectomy was performed. End-to-side anastomosis between the common duct of the bile and pancreatic ducts and the jejunal limb was performed intracorporeally following the pancreas-sparing duodenal resection. In the remaining patient, laparoscopic pancreas-sparing infra-ampullary duodenectomy was performed. Side-to-side anastomosis between the duodenal second portion and the jejunal limb was performed intracorporeally.

Results: In all patients, laparoscopic PSD could be successfully performed, as planned. In all three patients, the surgical margin was free of neoplastic change.

Conclusions: Laparoscopic PSD is minimally invasive, safe and feasible in selected patients with disease of the duodenum without pancreatic involvement. We have no conflicts of interest or financial ties to disclose.

BV02-08
DISTAL PANCREATECTOMY WITH CELIAC AXIS RESECTION IN PANCREATIC CANCER PATIENT WITH VASCULAR VARIATION
Huisong Lee, Dong Wook Choi, Jaehong Jeong, Dong Hun Kim, Jin Seok Heo and Seong Ho Choi
Samsung Medical Center, Sungkyunkwan University, Korea

Introduction: In pancreatic body cancer, celiac trunk tumor invasion is an indication for distal pancreatectomy with celiac axis resection (DP-CAR). However, the gastroduodenal artery should intact to maintain hepatic blood flow. In the patients with vascular variation, DP-CAR is a possible option although the gastroduodenal artery was invaded.

Method: The patient was 72 years old female. The diagnosis was pancreatic body cancer with the celiac trunk invasion including the gastroduodenal artery. The patient successfully underwent DP-CAR. There was the replacing right hepatic artery from superior mesenteric artery and the left hepatic artery from left gastric artery. The left gastric artery was saved. The hepatic blood flow was intact on postoperative doppler ultrasonography.
Conclusions: DP-CAR is a possible treatment option even though pancreatic cancer invaded the gastroduodenal artery. The vascular variation can give an operability in selected patients.

BV02-09

**PANCREATICODUODENECTOMY WITH SEGMENTAL RESECTION OF SMV-SV-PV CONFLUENCE FOLLOWING NEOADJUVANT CHEMORADIATION THERAPY**

Chang Moo Kang, Jin Ho Lee, Ho Koung Hwang and Woo Jung Lee

*Yonsei University College of Medicine, Korea*

**Introduction:** Pancreatic cancer is one of the lethal malignant diseases in gastrointestinal system. Only margin-negative resection is known to be essential step for promising long-term survival. However, resection rate is low because the patients are usually found in advanced stage of disease. Borderline resectable pancreatic cancer can be defined as a certain clinical presentation where resection is technically feasible, but harboring potential risk of R1 or R2 resection. In spite of controversy, pancreatectomy following neoadjuvant chemotherapy and portal vein embolization/ligation, two-stage hepatectomy, and ablations techniques are strategies to avoid these complications.

**Method:** We present the case of a 27 years old patient with an hepatic recurrence from a rectal cancer compromising the hepatocaval confluence. To avoid complications of the total vascular exclusion and the extracorporeal veno-venous bypass, we performed a porto-systemic shunt between the portal vein and the vena cava.

**Results:** The surgery accomplished an R0 resection, with low morbidity and no need to use veno-venous bypass. Total Hospital stay was eighteen days. The patient has no evidence of recurrence 7 month after surgery.

**Conclusions:** Ex vivo resection techniques are a valid approach to treat these tumors. To our knowledge this report is the first description of the portal-cava transitory shunt to avoid the drawbacks of total vascular exclusion and veno-venous bypass.

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To overcome this problem, different surgical procedures have been developed for the last 25 years. Ex vivo resection techniques provides excellent accessibility to tumors placed around the IVC that otherwise would be unresectable. The main problem regarding ex vivo procedures is the hepatic low tolerance to warm ischemia and the splanchnic congestion secondary to vascular exclusion. Hypothermic hepatic perfusion and veno-venous bypasses are 2 well-known strategies to avoid these complications.

In this video, we report a novel technique to minimize vascular complications for ante-situ resection using a goretex graft for IVC replacement and a temporary shunt between the vena porta and the IVC using a cadaveric venous graft.

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**BV03-02**

**EXCISION OF LEFT HEPATIC VEIN AND INFERIOR VENACAVA FOR RECURRENT HEPATOMBLASTOMA**

Vivekanandan Shanmugam1, Gomathy Narasimhan2, Rajasekhar Perumalla3, Srinivas Reddy3, Thomas Cherian4, Manoj Shrivastav5, Rajesh Rajalingam6, Kumar Palanliappan7, Anand Bharathan8 and Mohamed Rela9

1FRCS, India; 2Global Health City, Chennai, India; 3MS, DNB, FRCS, PhD, India; 4MS, DNB, FRCS, India; 5FRCS Gen, FRCS, India; 6DNB GI Surgery, Fellowship LT & HPB, India; 7DNB General Surgery, Postdoctoral fellowship in HPB Surgery, India; 8M Ch GI Surgery, Postdoctoral fellowship in Liver Transplantation, India; 9DNB GI Surgery, Postdoctoral fellowship in Liver Transplantation, India; 10MS, FRCS, India

**Introduction:** Recurrent hepatoblastoma is a difficult problem and requires aggressive surgical and chemotherapeutic management. We show the video of a 7 year old girl who had recurrent hepatoblastoma after previous right trisectionectomy with tumour infiltrating junction of left hepatic vein and inferior venacava.

**Method:** This is a video presentation of resection and replacement of left hepatic vein and contiguous wall of inferior venacava.

**Results:** After thorough laparotomy, inflow and outflow control of hepatic vasculature was performed.

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**Results:** The surgery accomplished an R0 resection, with low morbidity and no need to use veno-venous bypass. Total Hospital stay was eighteen days. The patient has no evidence of recurrence 7 month after surgery.

**Conclusions:** Ex vivo resection techniques are a valid approach to treat these tumors. To our knowledge this report is the first description of the portal-cava transitory shunt to avoid the drawbacks of total vascular exclusion and veno-venous bypass.
Total vascular occlusion was performed. Recurrent tumour in segment 2 that was infiltrating the right lateral wall of left hepatic vein and inferior vena cava was excised. Topical cooling of liver with ice was done during entire resection phase. Dacron graft was used to reconstruct the excised wall of left hepatic vein (which was the only outflow to the liver) and inferior vena cava.

Child recovered uneventfully and is now well, 10 months after the operation. **Conclusions:** Well selected children can be offered curative resection of recurrent hepatoblastomas, even in difficult anatomic areas (left hepatic vein and inferior vena cava). This video is an example of resection of liver tumors that are close to or infiltrate the hepatic veins or inferior vena cava.

**BV03-03**

**EXTENDED LEFT HEPATECTOMY WITH EX VIVO RECONSTRUCTION OF RIGHT POSTERIOR PORTAL VEIN, AUTOLOGOUS LIVER TRANSPLANT**

Ian MCGILVRAY, Pablo Serrano, Gordon Tait, Albert Fung, Paul Kelly and Paul Greig

*Toronto General Hospital, University Health Network, Canada*

**Introduction:** In this video we present the case of a young woman with a metastatic colon cancer deposit in the left lobe of her liver. The tumour had grown into and down the left portal vein, across the portal vein bifurcation, and into the anterior branch of the right portal vein, occluding all of these structures. Although the posterior branch of the right portal vein was occluded as well, the right posterior portal vein system was filled via multiple collaterals running in the biliary plate.

**Method:** We applied an ex vivo approach to perform an extended left hepatectomy. The patient’s vena cava was left intact and a temporary porto-caval shunt was performed to avoid veno-veno bypass. The right posterior portal vein collaterals were divided and controlled on the backbench. The main portal vein was reconstituted using a superficial femoral vein graft. Segment 6/7 was then re-implanted, anastomosing the vein graft to the divided right posterior vein.

**Results:** The patient was discharged home two weeks post-operatively and remains well and is disease free at 10 months’ follow-up.

**Conclusions:** This case demonstrates how techniques developed in the field of live-donation liver transplantation may be utilised to redefine concepts of resectability in HPB surgical oncology and facilitate advanced resections in appropriately selected cases.

**BV03-04**

**RIGHT HEPATECTOMY COMBINED WITH REMOVAL OF TUMOR THROMBUS EXTENDING TO THE CAVO-ATRIAL JUNCTION**

Mikel Gastaca1, Miguel Angel Rodriguez2, Andres Valdivieso3, Patricia Ruiz1, Alberto Ventoso1, Ibone Palomares2, Mikel Prieto1 and Jorge Ortizde Urbina1

1Crues University Hospital. University of the Basque Country, Spain; 2Crues University Hospital, Colombia

**Introduction:** Treatment of a large hepatocellular carcinoma combined with a tumor thrombus invading the hepatic veins or the inferior vena cava (IVC) is a surgical challenge. We present a simple and efficient manoeuvre to occlude the cavo-atrial junction during complete vascular isolation.

**Method:** A 64-year-old man previously operated for aortic valve replacement was diagnosed with a large hepatocellular carcinoma affecting the right lobe with a tumor thrombus invading the right hepatic vein and the IVC up to the right atrium. The operation was planned as a right hepatectomy with cavotomy to remove the tumor thrombus. We decided to occlude the IVC at the right atrium using an occlusion catheter (Stent graft balloon catheter, Reliant, Medtronic Vascular, California, USA). The catheter was advanced from the left femoral vein approaching the right atrium between the tumor thrombus and the wall of the vena cava. Placement of the balloon in the right atrium was monitored by transesophageal echocardiogram. This approach permitted the total vascular isolation while avoiding the need for veno-venous or cardiopulmonary bypass.

**Results:** An intraoperative ultrasound scan was performed to assess thrombus location and extension. After liver parenchyma transection, the cavo-atrial junction was occluded by pulling the inflated balloon caudally, gently but firmly, from the inguinal access. Total vascular exclusion was achieved by closing the infrahepatic IVC, the portal inflow and the hepatic outflow. Tumor thrombus was completely removed as were the right hepatic vein. Surgical time was 280 min including 25 min of total vascular exclusion. The patient was discharged after 8 days. The pathological study found a well-differentiated hepatocellular carcinoma over a normal liver.

**Conclusions:** Using a balloon catheter is an easy and effective method to occlude the cavo-atrial junction when IVC isolation is needed.

**BV03-05**

**IN-SITU LIVER SPLITTING AND PORTAL VEIN LIGATION OR ASSOCIATING LIVER PARTITION AND PORTAL VEIN LIGATION FOR STAGED HEPATECTOMY (ALPPS)**

M B Majella Doyle and William Chapman

*Washington University, school of Medicine, St Louis MO, U.S.A.*
**BV03-06**

**REVERSAL ALPPS: LEFT PORTAL VEIN LIGATION WITH IN SITU SPLITTING FOR TWO STAGED LEFT TRISECTIONECTOMY**

Marcel Autran Machado, Fabio Ferrari Makdissi and Rodrigo Canada Surjan
Sirio Libanes Hospital, Brazil

**Introduction:** The most common strategy for patients with multiple and bilobar metastases is to perform neoadjuvant therapy followed by two-stage hepatectomy with minor resections on the left lateral liver. A new technique, ALPPS (acronym for Associating Liver Partition and Portal vein ligation for Staged hepatectomy) combines associated liver partition with ligature of right portal vein and extended right hepatectomy in a 2-stage liver resection. This video shows a reversal ALPPS, right posterior section is preserved instead of left lateral liver.

**Method:** A 58-year-old man with disseminated liver metastasis was referred for treatment. Even after chemotherapy, disease seems unresectable. Patients is then referred for Alpps procedure. CT scan shows massive dissemination of metastasis and careful analysis of the images indicated impossibility to perform a standard Alpps. The reason is that segments 2 and 3 were filled with metastases and pedicle was compromised. However, part of segments 6 and 7, along with right hepatic vein, were free. Therefore, posterior section was elected to be the future liver remnant.

**Results:** Wedge resection of segment 7 was performed followed by multiple enucleations on the posterior right liver. Liver is partitioned and left portal vein is ligated. Abdominal cavity is closed and drained. Second stage consisted of left trisectionectomy. Patient recovered and was discharged on the 7th and 7th postoperative day, respectively. Postoperative CT scan showed enlarged remnant liver. Patient is alive with no evidence of disease 12 months after second stage.

**Conclusions:** ALPPS procedure is a new revolutionary technique that permits R0 resection even in patients with massive liver metastasis. However not all patients are suitable for a standard ALPPS due to bad location of metastasis. In these situations, reversal ALPPS seems to be an attractive surgical option. Reversal ALPPS is feasible and safe in experienced hands.

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**BV04-01**

**TOTALY LAPAROSCOPIC DONOR FULL LEFT HEPATECTOMY INCLUDING THE MIDDLE HEPATIC VEIN IN ADULT TO ADULT LIVING DONOR LIVER TRANSPLANTATION**

Daniel Cherqui¹, Benjamin Samstein², Fernando Rotellar² and Jean Emond²
¹Hepatobiliary Center, France; ²Columbia University Medical Center, U.S.A.

**Introduction:** In recent years different, efforts at minimal access strategies have been designed for donor hepatectomy in living donor liver transplantation (LDLT). In this video we present a totally laparoscopic retrieval of a full left liver including the middle hepatic vein for an adult to adult LDLT.

**Method:** The donor was the healthy 28 year-old daughter of the 52 year-old female recipient. The donor weighed 52 kg and the left liver volume was estimated at 461 mL on CT volumetry. The recipient weighed 59.5 kg and had cryptogenic cirrhosis with ascites and encephalopathy underserved by a MELD score of 11. Estimated graft weight to donor weight recipient ratio based on volumetric CT was 0.77. Donor anatomy included a single left hepatic artery arising from the left gastric artery and no other variation. The donor operation used 5 ports and included mobilization of the left liver lobe, dissection of the left hepatic artery and left portal vein, division of the left bile duct and liver transection using a combination of Harmonic, CUSA and Ligasure. The operation lasted 4 hours and blood loss was 125 ml. The graft was removed through a Pfannenstiel incision.

**Results:** The actual graft weight was 400g (actual GW/RW of 0.68) and it was successfully transplanted in the recipient. The donor had an uneventful outcome and left the hospital at postoperative day 3. The recipient left the hospital without complications 3 weeks after surgery.
Conclusions: Totally laparoscopic living donor left hepatectomy for adult to adult LT is a feasible alternative to the hybrid approach in selected donors with favourable anatomy. Reducing the donor incision and the graft size in adult to adult LDLT are designed to reduce invasiveness and donor morbidity. Specific expertise and training are required to assure donor safety.

BV04-02
TOTALLY LAPAROSCOPIC RIGHT HEPATECTOMY FOR ADULT LIVING DONOR LIVER TRANSPLANTATION
Fernando Rotellar1, Fernando Pardo1, Alberto Benito2, Pablo Martí-Crucaga1, Gabriel Zozaya1, Luis Lopez3, Francisco Hidalgo3, Bruno Sangro4 and Ignacio Herrero4
1Clinica Universidad de Navarra, Spain; 2Clinica Universidad de Navarra, Spain; 3Clinica Universidad de Navarra, Spain; 4Clinica Universidad de Navarra, Spain
Introduction: Laparoscopic approach has been adopted for numerous liver surgeries, including major hepatectomies and complex procedures. A totally laparoscopic right hepatectomy for adult living donor liver transplantation is presented. Technical aspects include hanging maneuver and radiologic control of bile duct division.
Method: A five-trocar technique was used. After hilar dissection and mobilization of the right liver, a hanging maneuver was prepared with an NG tube. The parenchymal transection was performed under hepatic pedicle occlusion. The division of the bile ducts was delayed until the transection reached the hilar plate. This division was performed under radiologic control. In order to minimize the warm ischemia time, a Pfannenstiel incision was performed prior to the division of the vascular elements.
Results: Total operative time was 480 min. Blood loss was less than 100 ml. The graft weight was 879 grams and warm ischemic time 3 minutes. The postoperative stay was uneventful. Hospital stay was 4 days.
Conclusions: Totally laparoscopic approach is feasible and safe in right lobe hepatectomy for adult recipients. Hanging of the liver resulted in an extremely useful maneuver and radiologic control of bile duct division.

BV04-03
THE EXACT MID-PLANE PARENCHYMAL DISSECTION WITH PRESERVING CAUDATE BRANCHES IN LIVING DONOR EXTENDED RIGHT HEPATECTOMY INCLUDING MIDDLE HEPATIC VEIN
Kyung-Suk Suh, Jeong-Moo Lee, Suk-Won Suh, Tae You, Youngrok Chooi, Nam-Jooy Yi and Kwang-Woong Lee
Seoul National University Hospital, Korea
Introduction: In the extended right hepatectomy(ERH) including the middle hepatic vein(MHV) on the graft side, some portion of segment 4 is resected if the dissection plane follows the MHV. And during dissection of the paracaval portion of the caudate lobe, many crossing branches are encountered and should be ligated one by one. We introduce the exact mid-plane parenchymal dissection including the parenchyma of paracaval portion of caudate lobe in ERH that we don’t need to divide the vessels.

Results: After finishing mobilization of the right liver, a tape was introduced between right hepatic vein and middle hepatic vein. After the hepatic artery and portal vein were temporarily interrupted with vascular clamps, the exact division line along the demarcation line was made. Then parenchymal transection was performed with ultrasonic device with electro-cautery. During this procedure, the exact mid-plane between right and left liver was dissected and so division and ligation of small glissonean pedicles was not necessary. The branches of segment 4 draining into MHV were divided along the just left side of MHV. And so MHV is excavated from segment 4. The branches of the caudate lobe was carefully evaluated and dissection plane followed the avascular plane and so all caudate branches was preserved. The right bile duct was divided after careful probing of the entire bile duct. After finishing parenchymal dissection and exposing the entire length of MHV, MHV is divided with use of temporary clamp of proximal side of MHV. After division of hepatic artery and right portal vein were done and the right liver was removed.

BV04-04
LIVE DONOR LIVER TRANSPLANT USING RIGHT POSTERIOR SECTION (SEGMENTS 6-7) AND PORTAL BLOOD FLOW MODULATION
Olivier Soubrâne, Fabiano Perdigao-Cotta and Olivier Scatton
Hopital St Antoine, France
Introduction: Live donor liver transplant may be risky for the recipient when the liver graft is too small, or bring excessive risk to the donor when too much of his own liver is taken. This video shows how to balance the risk between donor and recipient with the procurement of the right posterior section.
Case Presentation: The 50 yr old female donor was recipient’s sister. Her left hemiliver volume was 280 cc (graft to recipient weight ratio, GRWR, of 0.58), too small for the recipient. Her right liver volume was 856 cc, representing 75% of her whole liver. Such liver resection would bring a significant risk of postoperative liver failure. Thus, a 3rd option was chosen with the right lateral section of 440 cc, representing a GRWR of 0.91 and 38% of the donor liver.
Surgical Technique: Operation began with a complete mobilization of the right liver and dissection of two accessory veins of segment VII as well as the right hepatic vein. Right posterior hepatic artery and right posterior portal vein were dissected. Cholangiography was performed with the use of a marker thread. Liver transection was performed using a CUSA and bipolar coagulation. The right posterior bile duct was cut. Then the vessels were clamped and the liver graft taken out.
The recipient was the 45 yr sister with primary biliary cirrhosis. A portacaval shunt using an 8 mm iliac conduit from a tissue bank was created. The liver graft was orthotopically implanted. After reperfusion, hemodynamic measurements showed that portocaval pressure gradient was normal with the shunt open that allowed for a decrease in portal vein blood flow by 25%. Hepatico-jejunostomy used a silastic stent. Postoperative course was uneventful in both donor and recipient.

**Conclusions**: This case shows how to use the right lateral section from a live donor.

**BV04-05**

**TOTAL HEPATECTOMY AND LIVING-DONOR LIVER TRANSPLANTATION COMBINED WITH PANCREATICODUODENECTOMY FOR UNRESECTABLE HILAR CHOLANGIOCARCINOMA**

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

*Asan Medical Center, Ulsan University, Korea*

**Introduction**: In the treatment of hilar cholangiocarcinoma (HC), liver transplantation (LT) offers the advantages of resection of all structures that may be involved by tumor, including portal vein, hepatic artery, bilateral hepatic ducts and hilar liver parenchyma. Unfortunately, the early experience with LT for HC was disappointing with the results of 30% 5-year survival. As a result of these early results and the limited availability of cadaveric liver graft, HC was considered to be a relative contraindication to LT.

**Method**: Currently, the Mayo Clinic introduced their specific protocol with the intent of treating a highly selected group of patients by a strict regimen of preoperative staging and neoadjuvant chemoradiation treatment followed by LT. In the technical points of view, the Mayo Clinic has preferentially used a segment of cadaveric donor iliac artery as an interposition graft to the recipient infrarenal aorta following a hepatic artery thrombosis attributed to pre-LT radiation injury, and recommends to avoid hilus during dissection and divide portal vein as low as possible following portal vein stenosis attributed to radiation injury to the hepatic hilus. In living donor liver transplantation (LDLT), the vascular structures of the liver graft are short-length and the vascular replacement by cadaveric vessel is not always available in Asian countries.

**Results**: We treated HC by en-bloc right-lobe LDLT and pancreaticoduodenectomy with HA reconstruction from mobilized gastroduodenal and right gastroepiploic artery, and PV replacement by interpositioning autogenous saphenous vein-spiral tube. The middle hepatic venous tributary from segment 8 and two inferior right hepatic veins of right-lobe liver graft were reconstructed by 12mm ringed Gore-Tex interposition graft and creation of common-opening with autogenous saphenous vein.

**Conclusions**: In this video presentation, we demonstrate that LDLT combined with en-bloc HA, PV and BD resection can be performed even though cadaveric vessels for conduit are not applicable.

**BV04-06**

** AUXILIARY PARTIAL ORTHOTOPIC LIVER TRANSPLANTATION**

Vivekanandan SHANMUGAM1, Anand Bharathan2, Gomathy Narasimhan2, Rajasekhar Perumalla2, Srinivas Reddy2, Thomas Cherian2, Rajesh Rajalingam2, Kumar Palaniappan2, Manoj Shrivastav2 and Mohamed Rela2

1FRCS, India, 2Global Health City, India

**Introduction**: Auxiliary partial orthotopic liver transplantation (APOLT) is a valuable choice in some patients with acute liver failure and few metabolic diseases. Because of its technical complexity, it is not being widely performed. We present here a video recording of APOLT.

**Method**: Video recording of a case of APOLT at our center is being presented.

**Results**: A 18 year old girl presented with acute liver failure due to yellow phosphorous poisoning. She was on mechanical ventilatory support. Haemodynamics were stable and there was no feature of irreversible central nervous system injury. She underwent APOLT. Her sister donated her right lobe of liver. We performed extended right hepatectomy of native liver and APOLT. This video shows the steps of APOLT. She recovered over the next 2 week period and is well on 18 months follow up. There is good hypertrophy of the native liver and she is planned for gradual immunosuppression withdrawal.

**Conclusions**: APOLT is a technically challenging procedure, but is likely to provide good outcome with a scope of immunosuppression withdrawal in majority if performed in experienced centers in carefully selected patients.

**BV05-01**

**PURE LAPAROSCOPIC BILE DUCT INJURY REPAIR OF A BISMUTH-STRASBERG E2 BILIARY INJURY AT POSTOPERATIVE DAY TWENTY-ONE**

Marcel Sanhueza, Rose Marie Mege, Rodrigo Kusanovich, Julian Varas, Alfonso Diaz, Constanza Godoy, Cristian Diaz and Mario Caracci

*Sotero del Rio, Chile*

**Introduction**: The Objective of this video is to present how a complex case of a Bismuth-Strasberg E2 bile duct injury was resolved with a pure laparoscopic approach at postoperative day 21. The surgical team involved in this case has over 10 years of advanced HBP laparoscopic experience.

**Method**: Case: A 40-year-old female to whom a laparoscopic cholecystectomy for symptomatic gallstones was performed in another hospital. During postoperative course the patient develops a marked obstructive jaundice reaching, 12 mg/dl by day 18, with no inflamma-
tory parameters elevation. CT scan and US reveals dilatation of intra-hepatic ducts, unable to observe the distal bile duct and no intra-abdominal collections. ERCP demonstrates a complete choledocal obstruction. Referred to our hospital for the surgical resolution of the biliary injury, the patient was re-explored through a laparoscopic approach at postoperative day 21. Previous cholecystectomy port placement (French approach) were utilized plus a fifth right flank port; with the surgeon between the legs. Release of the postoperative inflammatory mass in relation to the gallbladder bed was performed. Dissection of the hepatic pedicle identifying: the portal vein, an extra-hepatic right hepatic artery, a clipped cystic artery and 2 complete iatrogenic transections of the common bile duct at a proximal (<2cm from the bile confluence) and distal level followed by titanium clips. Preparation of Roux-en-Y anastomosis with a 15cm transmesocolic biliary limb was created. The biliary confluence for an end-to-side hepaticojejunostomy was accessed by sectioning and removing the scar tissue on the proximal common bile duct injury. After the bile-diversion was performed all gap spaces were closed.

Results: Post operative course was uneventful and the patient discharged at the fourth day.

Conclusions: Under careful patient selection and an experienced surgical team, laparoscopic bile duct injury repair can be safely performed.

### BV05-03

**LAPAROSCOPIC PANCREATICODUODENECTOMY WITH LYMPH NODE DISSECTION FOR EXTRAHEPATIC CHOLANGIOCARCINOMA**

Yuichi Nagakawa, Yuichi Hosokawa, Hiroaki OSAKABE, Tetsushi Nakagima, Kazuhiko KASUYA and Akihiko Tsuchida
Tokyo Medical University, Japan

**Introduction:** Laparoscopic pancreaticoduodenectomy (LPD) has been performed recently for malignant tumor in some institutions. However, few reports describe technics of lymph node dissection. We show surgical procedure of LPD with lymph node dissection for patient with distal cholangiocarcinoma.

**Method:** Before operation, MDCT and peroral cholangioscopy were performed for diagnosing tumor spread. Then, the resection line of bile duct was designed. The procedure was performed in the supine position. 6 ports were used. Pneumoperitoneal pressure sat at 12 mm. First, the gastrocolic ligament was divided and the lesser sac widely exposed. After gastroduodenal artery and common hepatic artery were identified, gastroduodenal artery was ligated and divided. Then, lymph nodes around common hepatic artery were dissected. Next, common hepatic artery was taped, which allows exposing right and left hepatic artery. After portal vein was taped, the common hepatic duct was taped at the position of right hepatic artery. Kocher maneuver was performed widely. Next, Jejunum was transected using stapler. Mesentery was divided, and then left aspect of the superior mesenteric artery was identified. Bile duct was divided, and then skeletonization of hepatoduodenal ligament was completely performed with attaching lymph nodes to common bile duct. Pancreatic head was detached from portal vein, and then it was divided from superior mesenteric artery.

**Results:** Eighteen LPD with extended lymph node dissection were performed in our department; cholangiocarcinoma (n = 10), periampullary adenocarcinoma (n = 8). Median operative time was 539±61 minutes and median blood loss was 265±133 ml. Pancreatic fistula occurred in 1 patients. Median length of hospital stay was 17.9 ±4.9days. R0 reaction was achieved in 94.4%.

**Conclusions:** LPD with lymph node dissection was feasible procedure with less blood loss and high curability.
RIGHT HEPATECTOMY WITH CAUDATE LOBECTOMY FOR RECURRENT HILAR CHOLANGIOCARCINOMA

Xiangcheng Li, Ke Wang, Aihua Yao, Chenyu Jiao, Rui Peng, Sheng Han, Xiaofeng Wu and Xuehao Wang

The First affiliated Hospital of Nanjing Medical University, China

Introduction: Local recurrence, following a resection for cancer of the extrahepatic bile duct, is usually incurable with second curative surgery. To determine the feasibility and significance of second curative surgery recurrent hilar cholangiocarcinoma. This video shows right hepatectomy with caudate lobectomy for recurrent hilar cholangiocarcinoma.

Method: A 62-year-old male patient with hilar cholangiocarcinoma underwent extrahepatic bile duct resection with lymphadenectomy in 2009. Histological examinations revealed moderately differentiated adenocarcinoma with nerve involvement and without lymph node metastasis. No adjuvant chemotherapy was performed after surgery. Post-operative follow-up review annually and CT scan had been done every year after operation. Four and a half years later , CT scan showed that right posterior bile duct and Caudate bile duct dilated. CA 199 was elevated. Preoperative diagnosis could be recurrence hilar Cholangiocarcinoma. Surgical plan was to perform a right hepatectomy and caudate lobectomy with H-J.

Results: Excising the biliary-enteric anastomosis, inflammatory and protrudant lesions in the posterior wall were seen. Subsequently the lesion excised rapidly intra-operative biopsy . The final pathologic diagnosis was adenocarcinoma of bile duct of caudate lobe. Common and proper hepatic artery were encircled. Then right hepatic artery was ligated and divided. Main portal vein and right portal vein were dissected and encircled. Right portal vein was ligated and divided. Then right liver was mobilized and detached from retrohepatic vena cava. After parenchymal transection. Right hepatic vein was divided and closed. The procedure ended with left hepatic duct-jejunum anastomosis. The patient recovered uneventfully. Final pathology confirmed hilar cholangiocarcinoma and R0 resection. Patient was discharged on the 15th postoperative day.

Conclusions: The surgical technique for loco-regional recurrence if hilar cholangiocarcinoma is complicated, however, the second radical resection is possible and better survival outcomes can be expected for some selected cases.

RIGHT TRISECTIONECTOMY, CAUDATE LOBECTOMY WITH PANCREATODUODENECTOMY FOR AN EXTENSIVE BILE DUCT CANCER

Tsuyoshi SANO, Yasuhiro Shimizu, Yoshiki Senda, Taira Kinoshita and Yuji Nimura

Aichi Cancer Center Hospital, Japan

Aim: We present an anatomical right trisectionectomy caudate lobectomy with pancreatoduodenectomy (R3-HPD), which is one of the most invasive procedure in hepatobiliary surgery, on video.

Patient: A 66 year-old man presented with jaundice was diagnosed as having an extensive bile duct cancer in terms of transpapillary mapping biopsy. After the right trisectional portal vein embolization, R3-HPD was designed to achieve R0 resection.

Methods: First, pancreas head was divided, the right hepatic artery and portal vein were divided. Then portal vein branches arising from the dorsal aspect of umbilical portion of the left portal vein (UP) should be completely ligated and divided. This procedure provides complete mobilization of the UP which can be completely turned out. Also, the left hepatic artery and its branches run through the left side of the UP, and can be clearly identified between the bile ducts and the portal veins of the left lateral section. The liver transection line is corresponded not the right but rather on the left side of the falciform ligament. After division of the right hepatic vein and complete mobilization of the right liver and caudate lobe, liver parenchymal transection along the demarcation line starts using intermittent inflow occlusion. The fissural vein should be identified on the raw surface of the liver. The middle hepatic vein is divided at its root with suture closure. Finally, the bile ducts are transected in the ventral to dorsal direction, and the left lateral inferior (B3) and left lateral superior (B2) segmental ducts are identified in order.

Results: The operation time was 591 minutes and the intraoperative blood loss was 730 grams. The surgical margins were negative for cancer.

Conclusion: Although R3-HPD is invasive procedure, can be treatment of choice for selected patients with extensive bile duct cancer.

CURATIVE RESECTION OF CONVENTIONALLY INOPERABLE TYPE 4 HILAR CHOLANGIOCARCINOMA THROUGH SEPARATE RECONSTRUCTION OF TWO SUBSEGMENTAL 6 AND 7 HEPATIC ARTERIES

Deok Bog MOON, Sung-Gyu Lee, Jung-Man Namkoong, Cheon-Soo Park, Chul-Soo Ahn, Shin Hwang, Ki-Hun Kim, Tae-Young Ha, Dong-Hwan Jung and Gi-Won Song

Asan Medical Center, Ulsan University, Korea

Introduction: Type 4 hilar cholangiocarcinoma needs left or right trisectionectomy to achieve R0 resection. When combined with vascular invasion at contralateral side, especially in the presence of hepatic artery invasion, operation is more difficult or even inoperable. However, accumulated knowledges from living donor liver transplantation at our institution enable us to perform R0 resection for conventionally inoperable type 4 hilar cholangiocarcinoma.

Method: The 56 years male with type 4 hilar cholangiocarcinoma was referred to us for operative evalu-
of the anterior Glissonean pedicle, the right hepatic vein was exposed from the root side toward the peripheral side by lifting the excised liver and the resection was completed.

**Results:** The operation time was 269 min. Blood loss was 130 g. He was discharged to home on day 8 without any complications.

**Conclusions:** This procedure can avoid splitting the bifurcation of the hepatic vein by moving CUSA from the root side toward the peripheral side as well as utilizing the unique view from the caudal side in the laparoscopic approach.

**BV06-02**

**TOTALLY LAPAROSCOPIC RIGHT ANTERIOR SECTIONECTOMY WITH GREAT VASCULAR EXPOSURE (VIDEO CLIP)**

Ki-Hun Kim

*Asan Medical Center, Ulsan University, Korea*

Right anterior sectionectomy (RAS) of the liver, which was first described in 1956, is one of the most difficult hepatic resection because of the danger of bleeding from the two major hepatic veins, the middle and right hepatic veins (MHV and RHV) during hepatectomy. In performing RAS, it is important that the surgeon should be aware of the anatomy of liver and the location of tumor. Laparoscopic surgery for liver resection is increasingly common, but it is not yet widely accepted and remains controversial among liver surgeons. The indications for laparoscopic liver resection are still limited, primarily due to the difficult involved in mobilizing the liver and ensuring adequate resection margins, the risk of injury to major branches of the hepatic vein during dissection of the hepatic parenchyma, a difficult learning curve, the risks of tumor seeding and wound metastases, and potential differences in long-term outcome are major concerns in laparoscopic surgery. Here, we report a video clip about totally laparoscopic right anterior sectionectomy with great vascular exposure for HCC.

**BV06-03**

**LAPAROSCOPIC CENTRAL HEPATECTOMY WITH EXTRA GLISSONEAN APPROACH**

Long Tran Cong Duy, Bac Nguyen Hoang, Thuan Nguyen Duc, Dat Le Tien and Viet Dang Quoc

*Introduction:* Liver resection is a popular curative therapy for HCC. Open liver resection results in very painful, long incision and slow post-operative recovery. Laparoscopic hepatectomy, with minimally invasive techniques, potentially brings HCC patients more benefits. Anatomic liver resection, removing tumor together with surrounding liver parenchyma and portal pedicles supplying blood for that part of liver, is critical point of oncologic principle.
Many previous researches show that laparoscopic liver resection minimize the invasion to patients but the feasibility and safety of this procedure for anatomic liver resection are still not well experienced. So, we would like to introduce our techniques of laparoscopic anatomic liver resection for hepatocellular carcinoma with Extra Glissonean approach (or Intrahepatic Glissonean approach).

**Method:** In this case, the tumor was located in anterior sector. Because the remnant liver volume was not sufficient if right heptectomy had been performed, we decided to apply total laparoscopic anatomic anterior sectorectomy.

We routinely use five ports for this procedure. After cholecystectomy, we open Glissonean sheat at hepatic hilar plate, dissect and isolate two pedicles of anterior and posterior sectors. Next, tapes are applied to encircle pedicles. The borderline between two sectors can be clearly defined after clamping concerned pedicles. Then, anatomic liver resection is easily performed by transecting relative Glissonean pedicle and dividing liver parenchyma along those borderlines.

**Results:** We do routinely this technique for laparoscopic anatomic liver resection for HCC in our center.

**Conclusions:** We find that totally laparoscopic anatomic liver resection with Extra Glissonean approach (or Intrahepatic Glissonean approach) is feasibility, safety and have some advantages: minimizing operation time, reducing blood loss, reserving optimal liver parenchyma and better oncologic results.

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**BV06-05**

**ROBOTIC ASSISTED FULLY LAPAROSCOPIC RIGHT LIVER LOBECTOMY: THE ROUTINE TECHNIQUE. VIDEO PRESENTATION OF THE CASE: PATIENT WITH NET**

Evgeny Solomonov1, Sigal Aizner1, Eviatar Nesher1, Ezra Shaharabani1, Anton Kvasha1, Eytan Mor1, Salomon Shtemer1, Ofer Binyaminov1, Ran Tur Kaspa2 and Marius Brown2

1Tel Aviv University School of Medicine, Israel; 2Tel Aviv University School of Medicine, Israel; 3Tel Aviv University School of Medicine, Israel; 4Tel Aviv University School of Medicine, Israel

**Introduction:** Laparoscopic Liver resections are relatively new method of heptectomy for wide range of pathologies required surgical treatment. Minimally invasive approach allows quicker patient postoperative recovery with minimum complications, yet this technique restricted for small number of centers with experience in Hepato-Biliary surgery and advanced laparoscopic surgery. While general tendency in laparoscopic liver resections is growing, number of laparoscopic major liver resections is limited all around the world due to difficulties to reach high level of safety; very long learning curve per surgeon and natural technological limitations of conventional laparoscopic instruments. Robotics allows overcoming these limitations, to improve safety major liver resections and precede vast majority of liver resections laparoscopically.

We present video of robotic right liver lobectomy as routine technique in our Unit. Our experience based on 50 cases of robotic liver resections since January, 2012 while 50 percent of it is major liver resections.

**Method:** 50-y-old male, athletic and healthy, diagnosed as suffering from right liver lobe neuroendocrine tumor of 5 cm in diameter on the base of CT scan, high level of Cromogranin and positive Dotatoc PET Scan. No primary tumor was found on preoperative check out. He underwent fully laparoscopic robotic right liver lobectomy in April 2013. Ma Vinci Si surgical system was used.

**Results:** Duration of the surgery was 290 min. No blood transfusion needed. No opioids used for pain management. The patient has been discharged from the hospital on day four after the surgery. He returned to his work after two weeks.

**Conclusions:** We present video of technique of robotic right liver lobectomy which demonstrates safety of the procedure and ability to reach oncological aim of the surgery by minimally invasive approach. This surgery may become routine way to perform major liver resections in selected centers in expertise in hepatobiliary surgery and robotics as well.
TOWARDS CYBERNETIC SURGERY: ROBOTIC AND AUGMENTED REALITY-ASSISTED LIVER SEGMENTECTOMY

Patrick Pessaux
Novel Hospital civil university hospital-IRCAD-IHU MixSurg, France

Introduction: Augmented Reality (AR) in surgery consists in the fusion of synthetic computer-generated images (3D virtual model) obtained from medical imaging preoperative work-up and real-time patient images with the aim to visualize unapparent anatomical details. The 3D model could be used for a preoperative planning of the procedure.

Method: A 36-year-old female, under estroprogestinic contraception, presented a symptomatic benign lesion of the fifth hepatic segment with a marked enlargement over one year (an increase in size from 30 to 60 mm in diameter). The 3D virtual anatomical model was obtained from thoraco-abdominal CT-scan using customary software (VR RENDER®, IRCAD). A computer scientist manually registered virtual and real images using a video mixer (MX 70; Panasonic, Secaucus, NJ) in real time.

Results: An external beamer was positioned above the patient and the virtual model was projected on the patient’s skin to provide a “see-through” view of the abdomen to guide strategic port positioning. After pneumoperitoneum simulation, a virtual view by a virtual camera was used to choose optimal robotic camera port placement first, and for the working ports to create a surgical triangulation with the instruments aiming at the tumour. The model was then processed using a VR RENDER® plug-in application the Virtual Surgical Planning (VSP®, IRCAD) to delineate the surgical resection planes including the elective ligature of the portal branches of the fifth segment. AR allowed for precise and safe recognition of all the important vascular structures during the procedure. Operative time was 120 minutes. AR display and fine registration was performed within 6 minutes. The postoperative course was uneventful. The pathology was positive for Focal Nodular Hyperplasia with clear surgical margins.

Conclusions: AR is a valuable navigation tool that can enhance the ability to achieve safe surgical resection during robotic hepatectomy.

LAPAROSCOPIC ROBOT-ASSISTED SELECTIVE DISTAL SPLENORENAL SHUNT – WARREN SHUNT

Mario Antonio Belluomini, NelideDe Lio, Vittorio Perrone, Fabio Caniglia, Stefano Signori, Fabio Vistoli and Ugo Boggi
University of Pisa, Pisa, Italy

Introduction: In the past two decades percutaneous transjugular portosystemic shunts (TIPSS) have nearly replaced surgical shunts in the treatment of severe portal hypertension (SPH). In selected patients, however, surgical shunts may still have a role. The enhanced dexterity offered by the daVinci Surgical system could allow surgeons to revive surgical shunts in highly selected patients, hopefully coupling the high efficiency and selectivity of surgical shunts with the low-morbidity of laparoscopy.

Method: In this video we present what we believe to be the first world case of laparoscopic robot-assisted selective distal spleno-renal shunt (RWS) for the SPH treatment. Overall two patients, both diagnosed with idiopathic liver fibrosis, were successfully operated.

Results: The patient shown in the video is a 25-year-old woman diagnosed with non-cirrhotic portal fibrosis causing SPH with recurrent gastrointestinal bleeding not manageable by endoscopic methods. Two years before, she had received a renal transplant because end-stage renal failure. In this patient a selective distal splenorenal shunt was deemed convenient over a TIPSS because of preservation of hepatopetal portal flow delaying, and possibly avoiding, the need for liver transplantation. The patient was placed supine, with partted legs, in a 20º reverse Trendelenburg position. A total of five ports were used. The left renal vein (LRV) was identified, dissected free, and tied proximally. The splenic vein (SV) was also dissected free in the segment lying just above the LRV. Vessels were hence cross-clamped and a side-to-end spleno-renal shunt was created. Working thus in a low-pressure venous system the SV was further isolated proximally, dividing the enlarged pancreatic tributaries, to make the shunt selective. All collaterals (gastroepiploic veins, right and left gastric veins) were sealed to make the shunt selective. Finally the SV was ligated distally to the anastomosis completing the operation.

Conclusions: Our experience with two, highly selected, patients shows that RWS is feasible.

LAPAROSCOPIC ALPPS

Marcel Autran Machado, Fabio Ferrari Makdissi and Rodrigo Canada Surjan
Sírio Libanes Hospital, Brazil

Introduction: The most common strategy for patients with multiple and bilobar metastases is to perform neo-adjuvant therapy followed by two-stage hepatectomy with minor resections on the left lateral liver. A new technique, ALPPS (acronym for Associating Liver Partition and Portal vein ligation for Staged hepatectomy) combines associated liver partition with ligation of right portal vein and extended right hepatectomy in a 2-stage liver resection. This video shows a totally laparoscopic ALPPS. Both times were performed entirely by laparoscopy.

Method: A 56-year-old woman with disseminated liver metastasis was referred for treatment. After chemotherapy, MRI showed marked response. Patient is then referred for ALPPS procedure. First stage consisted of resection of segment 2, enucleations of segment 3, right portal vein ligature and partitioning of the liver. Future liver remnant volumetry was 177 ml. After two weeks, CT scan showed great hypertrophy of the future liver remnant (increase of 158%). Second stage was then performed and consisted of right trisectionectomy.
Results: Patient recovered uneventfully without complications and without the need for blood transfusion. Patient was discharged on the 5th and 7th postoperative day, respectively. There was complete regeneration of the liver. Patient is alive with no evidence of disease 12 months after second stage.

Conclusions: ALPPS is a revolutionary procedure that enables R0 resection even in patients with multiple liver metastases occupying the entire liver. It is indicated in patients with very small future remnant liver. Total or partial use of laparoscopy may be an easy solution for adhesions and difficulties that may be encountered during the second stage. Laparoscopic ALPPS is feasible and may be worthwhile in experienced hands.

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ROBOTIC LAPAROSCOPIC ASSOCIATING LIVER PARTITION WITH PORTAL VEIN LIGATION FOR STAGED HEPATECTOMY (ALPPS)

Evgeny Solomonov, Sigal Aizner, Eviatar Nesher, Ezra Shaharabani, Anton Kvasha and Eytan Mor
Tel Aviv University School of Medicine, Israel

Introduction: Associating Liver Partition with Portal Vein Ligation for Staged Hepatectomy (ALPPS) is a new procedure and a variant of two stages Hepatectomy, allowing quick remnant hypertrophy and potential cure surgery with low incidence of postoperative liver failure. Trauma of the major liver surgery is a major concern and may be decreased by minimally invasive approach. Based on our experience in robotic liver surgery accounting more than 50 cases with approximately 50% Major Liver Resections we proposed Robotic ALPPS.

Method: 68-year-old male suffering 6 centimeters hepatocellular carcinoma in the right lobe as per biopsy and macrovesicular steatosis up to 30% and mild liver fibrosis as per biopsy from the future remnant. We proposed two-staged liver resection by ALPPS technique and minimally invasive laparoscopic robotic approach using Da Vinci surgical System.

Results: Both steps have been done fully robotically with 14 days interval. Duration of the first stage was 390 minutes and the second 190. There was no blood transfusion during the both steps of the surgery. The patient was discharged 7 days after the first step and on the day 3 after the second in good general condition without complications.

Conclusions: Combination of two stages surgical strategy with minimally invasive approach by using robotic laparoscopic technique allowed uneventful recovery of this patient with impaired liver parenchyma. Minimally invasive robotic liver resection may have added value in quick recovery process and should be used in specialized centers with expertise in both liver surgery and robotics.