A 5-year analysis of readmissions following elective laparoscopic cholecystectomy – cohort study

P. Sanjay, R. Weerakoon, I.A. Shaikh, T. Bird, A. Paiily, S. Yalamarthi

Aims: This study aimed to determine readmission rates, causes for readmission and outcomes for patients undergoing elective Laparoscopic Cholecystectomy (LC) without intraoperative cholangiogram (IOC).

Methods: Timing related to readmissions was grouped as <6 weeks, 6 weeks–1 year, 1–2 years and >2 years. Outcomes and variables related to readmission were evaluated.

Results: 101 readmissions (6.6%) were noted amongst 1523 consecutive LC. The median follow up was 4 years (range 1.6–6.4 years). There was no difference in the median age (48 vs. 53 years, P = 0.2) and sex of the patients between the readmitted and no readmission groups. The incidence of readmissions (n = 101) within the first 6 weeks, 6 weeks–1 year, 1–2 years and >2 years were 2.8%, 1.5%, 1.4% and 0.7% respectively. The most common reasons for readmissions were non-specific abdominal pain (NSAP) (36%), obstructive jaundice (14%), peptic ulcer disease (10%), intra-abdominal collection (4%) and bile leak (3%), pancreatitis (3%), and other reasons (30%). Overall, 24 (22%) of readmissions were related to biliary problems, the majority of these occurred (15/24, 63%) within 6 weeks of LC. The incidence of retained stones within the first 6 weeks, 6 weeks–1 year, 1–2 years and >2 years were 0.4%, 0.3%, 0.1% and 0% respectively. Overall 14 (14%) patients were readmitted with retained stones and all were managed by ERCP & ductal clearance.

Conclusions: Readmission rate following elective LC is low with the majority occurring within the first 6 weeks and only a quarter of these related are directly to biliary pathology. In the absence of routine IOC, around 1% of patients present with retained stones within 2 years of LC. A small fraction of patients continue to suffer from NSAP and should be warned prior to the surgery.
risk factors for presence of CBD stones, i.e. dilated CBD and derangement of liver function tests. In the absence of risk factors, they were placed on the waiting list for elective laparoscopic cholecystectomy.

2.1.2. Emergency presentation
Patients presenting with acute cholecystitis but with symptoms for more than 48 h were managed conservatively with antibiotic treatment and considered for laparoscopic cholecystectomy at a later date. All patients admitted to the emergency surgery department with biliary colic, chronic cholecystitis or acute cholecystitis of less than 48 h duration were considered for emergency laparoscopic cholecystectomy. The cut-off period of 48 h was chosen based on a previously published data from the authors (PS) institution which suggested that the conversion rate was higher when surgery was performed after 48 h of onset of symptoms.1 These patients were excluded from the study. In addition patients known to have CBD stones preoperatively and required ERCP and those undergoing IOC based on clinical suspicion of CBD stones preoperatively were excluded from the study.

2.1.3. Definitions
Biliary colic was defined as >4 h of colicky right upper quadrant pain with ultrasonographic evidence of gallstones and absence of acute inflammation on histology. Acute cholecystitis was defined as right upper quadrant pain associated with pyrexia, leucocytosis > 11 x 10^9/ml, ultrasound evidence of acute inflammation and histological confirmation of acute cholecystitis. Chronic cholecystitis was defined by previous recurrent episodes of biliary colic and/or previous episode of acute cholecystitis prior to current admission, and histological confirmation of chronic cholecystitis.

Gallstones were diagnosed preoperatively by ultrasound scan and liver function tests. Patients suspected of having Common Bile Duct (CBD) stones preoperatively based on a dilated common bile duct and derangement of liver function underwent Magnetic Resonance Cholangiography (MRC) and a subsequent Endoscopic Retrograde Cholangio-Pancreatography (ERCP) with sphincterotomy and clearance of common bile duct if stones were identified.

Laparoscopic cholecystectomy was carried out by consultant grade surgeons or trainees supervised by consultants. Intraoperative cholangiogram (IOC) was not carried out routinely. Patients were considered for IOC in the presence of strong suspicion of CBD stones preoperatively based on a dilated CBD and derangement of liver function tests and were unsuitable to undergo an MRCP. The hospital did not employ a policy of day surgery for patients undergoing laparoscopic cholecystectomy and all patients presented surgically on the first postoperative day if medically fit. Patients readmitted with derangement of liver function tests, in the presence of suspicion of CBD stones, underwent an MRCP initially. If presence of CBD stones were confirmed, then an ERCP and clearance of duct were performed. All patients readmitted following elective laparoscopic cholecystectomy were identified from a prospectively maintained database. Hospital admission records were explored to identify readmissions. In addition GP databases were cross-checked to identify patients readmitted to other hospitals outside the catchment area of Queen Margaret Hospital. Data collected included demographics of patients readmitted, indication for surgery, any postoperative complications, readmission timing in relation to surgery, and reasons for readmission as well as outcomes in those patients admitted with biliary problems.

The readmission timing in relation to surgery was grouped as <6 weeks, 6 weeks to 1 year, 1–2 years and >2 years. The reasons for readmission were grouped as biliary and non-biliary causes. Patients undergoing emergency laparoscopic cholecystectomy were excluded from the study.

2.2. Statistical analysis
This was performed using SPSS software (SPSS, Chicago, Illinois). Continuous variables were compared using Mann–Whitney U test. Categorical variables were compared using Chi-square test as appropriate. \( P < 0.050 \) was considered statistically significant.

3. Results

1523 consecutive elective LC was performed over a 5-year period. The median follow up was 4 years (range 1.6–6.4 years). 101 (6.6%) patients were readmitted. 94 patients were admitted to the surgical unit and 7 to the medical unit. 74% (n = 74) of readmission was female and the median age was 48 (18–81). There was no difference in the median age (48 vs. 53 years, \( P = 0.2 \)) and sex of the patients between the readmitted and no readmission groups. The median BMI of the readmitted group was 27 (range 19–43). None of the procedures were performed as day cases, however majority of the patients (70%) were discharged on the first postoperative day after surgery. The median postoperative stay was 1 day (range 1–7 days).

The indications for surgery in patients readmitted were chronic cholecystitis (n = 1) and biliary colic (n = 100). Seven patients amongst the readmitted group were found to have common bile duct stones on preoperative MRCP and underwent preoperative ERCP and ductal clearance. The reason for readmission in these patients was non-specific abdominal pain. There were no instances of retained stones in these patients on further investigations.

Amongst the total readmissions (n = 101), the incidence within the first 6 weeks, 6 weeks–1 year, 1–2 years and >2 years was 2.8%, 1.5%, 1.4% and 0.7% respectively. The most common reasons for readmissions were non-specific abdominal pain (NSAP) (36%), obstructive jaundice (14%), peptic ulcer disease (10%), intra-abdominal collection (4%) and bile leak (3%), pancreatitis (3%), wound haematoma (1%) and other reasons (30%) (Table 1). In all patients readmitted with NSAP, biliary, upper GI and colonic causes for pain were excluded with subsequent imaging, endoscopic investigations and routine blood tests. In patients with other intra-abdominal pathology (n = 23) (Table 1), the causes for readmission were diverticular disease (n = 14), ischaemic colitis (n = 2), urinary tract infection (n = 2), appendicitis (n = 4) and Meckels diverticulitis (n = 1).

Overall 24 (22%) readmissions were related to biliary problems, which included bile leak (n = 2), intra-abdominal collections (n = 4), acute pancreatitis (n = 3) and obstructive jaundice (n = 14). The majority of these admissions occurred (15/24, 63%) within 6 weeks of LC. Three patients admitted with bile leak were managed with ERCP and stenting and the leak resolved. All the intra-abdominal collections were non-specific postoperative fluid collections and were dealt with conservatively with no need for radiological or surgical intervention with complete resolution of symptoms. The aetiology in patients readmitted with pancreatitis was alcohol excess. All the cases were predicted mild in severity and were managed conservatively and discharged.

The incidence of retained stones within the first 6 weeks, 6 weeks–1 year, 1–2 years and >2 years was 0.4%, 0.3%, 0.1% and 0% respectively. Overall 14/1523 (1%) patients were readmitted with retained stones in the common bile duct during follow up. All patients presented with obstructive jaundice. An MRCP was performed to further investigate the CBD. Following confirmation of CBD stones, these patients were managed by ERCP and ductal clearance. They were followed up in the outpatient department to ensure normalisation of liver function tests and were subsequently discharged from routine follow up.

4. Discussion

The present study with a long-term follow up of patients undergoing elective laparoscopic cholecystectomy has shown that the incidence of readmission is low with majority of them occurring within 6 weeks of surgery. The incidence of retained stones after elective laparoscopic cholecystectomy without intraoperative
Cholangiogram is low (1%) and present within 2 years of laparoscopic cholecystectomy.

Laparoscopic cholecystectomy is one of the most commonly performed procedures in the UK. Nevertheless, there is paucity of data in the literature regarding readmission rates and subsequent management. This may be related to the fact that the majority of the surgeons do not routinely follow up patients following an uncomplicated elective laparoscopic cholecystectomy. NSAP formed the most frequent cause of admission within 6 weeks up to a year. In all these patients, both biliary and non-biliary biliary causes of post cholecystectomy pain were excluded with imaging of the abdomen and liver function tests. The diagnosis of NSAP was reached after exclusion of gastrointestinal or colonic cause of symptoms. In series from non-specialised centres, 70—80% of patients were found to have non-biliary causes accounting for their post cholecystectomy pain. However these results were noted in the era of open cholecystectomy. Interestingly a similar number of readmissions (76%) in the current series, performed in the laparoscopic era were found to be non-biliary in origin. Although the fraction of patients readmitting with NSAP declined during the follow up, a small fraction of patients continued to present up to 2 years after surgery (0.2%). Patients should be warned of the possibility of continued symptoms although this is unlikely in the majority of them.

One of the perceived disadvantages of laparoscopic cholecystectomy is the lost ability to palpate intra-abdominal organs which the formal laparotomy of the open cholecystectomy would allow. However, it is imperative that a clear indication for LC is established by careful clinical history, appropriate investigations and excluding other intra-abdominal pathology. Ultrasound examination of the abdomen particularly may not identify other hollow viscus pathologies such as colonic cancer, gastric cancer, pancreatic cancer and gynaecologic cancers. The debate continues whether or not to perform full diagnostic laparoscopy before performing LC diagnostic laparoscopy for chronic abdominal pain can yield a definitive diagnosis in up to three quarters of patients. There have been limited reports of missed major intra-abdominal pathology at the time of laparoscopic cholecystectomy, with over all incidence of missed intra-abdominal pathology ranging from 0.5% to 1.1. Although a routine diagnostic laparoscopy was not performed during laparoscopic cholecystectomy, there were no instances of missed intra-abdominal malignancy in the present series during the follow up.

Biliary related problems formed the second most frequent cause for readmission within the first 6 weeks in the present series. Cohen et al. noted a 30-day readmission rate after laparoscopic cholecystectomy of up to 3.7% which, they thought was due to increased bile duct injuries or early discharge of patients after index surgery. Although there were no instances of bile duct injuries in the present series, 3 patients developed bile leak from the cystic duct stump requiring ERCP and stenting. Retained stones formed the majority of biliary causes for readmission (50%) within the first 6 weeks. Routine intraoperative cholangiogram was not employed in the present series and one such policy would have identified these patients facilitating clearance of the duct on the same admission. Fogli et al. followed up 1321 patients who underwent laparoscopic cholecystectomy without intraoperative cholangiogram and noted no readmission secondary to retained stones. In asymptomatic patients, the natural history of bile duct stones discovered at IOC during LC is not completely clear and available studies suggest that biliary complications are rare and bile duct stones discovered at LC may not need removal. Nevertheless, the data from the literature suggests that 1–2% of all patients who undergo cholecystectomy have retained stones left in the CBD that require further intervention. Recently there has been an enhanced interest in the use of critical view of safety to prevent bile duct injuries during laparoscopic cholecystectomy. In a recent publication have shown that critical view of safety can be employed as an alternative to routine IOC, with the use of IOC restricted to patients with high suspicion of CBD stones preoperatively. The use of such policy has resulted in no readmissions with retained CBD stones. In the present series readmission related to retained stones was low (14/1523, 1%) and in line with data from the literature. Interestingly after 2 years there were no instances of readmissions related to retained stones.

In conclusion the present series have shown that the readmission rate following elective LC is low. The majority of the readmissions occur within the first 6 weeks with only a quarter of these related directly to LC i.e. biliary pathology. A small fraction of patients present with retained stones with the majority of them, becoming symptomatic within 2 years of LC. A small fraction of patients continue to suffer from NSAP and should be warned prior to surgery.