

# Laparoscopic cholecystectomy: experience with 303 patients over the initial four years

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## SUMMARY

**A total of 303 patients underwent attempted laparoscopic cholecystectomy (LC) over a four-year period by two consultant surgeons or a senior trainee under their supervision. The procedure was completed in 291 with a conversion rate to open cholecystectomy of 3.9% and a median post-operative length of stay of two days, range zero to nine days. In eighteen patients the indication for LC was failure of symptoms to settle, two of whom required conversion (11.1%). Diathermy dissection was avoided in Calot's triangle and dissection started at the junction of Hartmann's pouch and cystic duct with full mobilisation of this area prior to clip application. Pre-operative endoscopic retrograde cholangiopancreatography ERCP was performed in patients suspected of having common bile duct stones without routine intra-operative cholangiography. There was one death in this series (0.3%) and an overall complication rate of 6.3%. There was no incidence of either bile duct injury or leak. LC can be performed with a low complication rate with attention to careful dissection technique in the region of Calot's triangle.**

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## INTRODUCTION

Laparoscopic cholecystectomy has rapidly gained popularity within the last ten years as the surgical procedure of choice for symptomatic gallbladder stones. Proposed benefits include less post operative pain, better cosmetic result and shorter hospital stay when compared with open cholecystectomy.<sup>1</sup>

However concern has been raised over the possibility of an increased incidence of common bile duct injuries with this new procedure and whether this problem may be reduced by routine laparoscopic cholangiography or other operative techniques.<sup>2,3</sup>

Potential hazards include dissection and clipping of either the common bile duct or common hepatic duct instead of the cystic duct or an indirect diathermy burn leading to duct damage.<sup>4,5</sup> Due to the potential for injury a strict policy of avoidance of either hook or scissors diathermy for dissection in Calot's triangle has been employed in our unit. In addition no duct structure is clipped until Hartmann's pouch has been mobilised allowing clear identification of the cystic duct.

The aim of this study was to analyse the first four year's experience with LC in a single surgical

unit with particular regard to post-operative morbidity and mortality.

## METHODS

A consecutive series of 303 patients with symptomatic gallstones underwent attempted laparoscopic cholecystectomy between July 1991 and September 1995. The mean age was 48 years with a range of 15 to 85 years.

The indication for the procedure was symptomatic gallstones demonstrated by ultrasonography or oral cholecystogram. A selective policy of pre-operative endoscopic retrograde cholangiopancreatography (ERCP) was used. A history of jaundice, pancreatitis, deranged liver function tests or dilated bile ducts on ultrasonography was investigated by ERCP and sphincterotomy was

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performed if duct stones were found. Routine laparoscopic cholangiography was not performed. All procedures were carried out by one of two consultants or by a senior trainee under direct supervision. The technique of establishing pneumoperitoneum was similar to that described previously.<sup>6,7</sup> A Verres needle was used via a subumbilical incision and carbon dioxide insufflated to maintain a pressure of 15 mmHg. Through the same incision a 10mm cannula was inserted and a laparoscope passed into the peritoneal cavity. Under videoscopic guidance another 10mm cannula was placed to the right of the midline just inferior to the xiphoid process and two 5mm cannulae placed to allow retraction and dissection, the position depending on operator preference.

The surgical technique employed was similar to that reported previously. In particular, the initial dissection centred on the junction of Hartmann's pouch and cystic due, with combined use of blunt instrument and pledges dissection to demonstrate clearly that the cystic had been identified. Diathermy at this stage was avoided and only used to dissect the gallbladder from the liver bed once the cystic duct had been divided between three titanium clips. If the cystic artery was identified clips were again applied in triplicate; however with the dissection now concentrated on a more distal level than previously used at open cholecystectomy it was possible on occasions to divide the smaller terminal branches using diathermy at the time of gallbladder dissection. Early in this series a retrieval bag was not used to remove the gallbladder through the umbilical port site. However, one patient developed a persistent wound infection which was subsequently shown to be due to a gallstone retained in the wound, and from then on a retrieval bag was used routinely.

Following surgery patients were allowed to eat and drink when tolerated, and were discharged when fully mobile and needing only oral analgesia.

## RESULTS

Of the 303 patients LC was successfully completed in 291 making an overall conversion rate to open cholecystectomy of 3.9%. Eighteen patients had LC attempted during the same admission after acute symptoms failed to respond to conservative treatment, two of whom underwent conversion (11.1%). A total of 295 patients had elective LC

within three months of acute symptoms and of this group nine required conversion (3.0%).

The reason for conversion was inability to safely identify or dissect Calot's triangle in eight patients, bleeding from the gallbladder bed in two, and large bowel perforation which occurred during dissection of dense adhesions between the greater omentum and the gallbladder in one patient. There was no significant change in conversion rate throughout the study period.

There were no bile duct injuries in this series, defined as either bile leak, duct injury or resection. Other post-operative complications occurred in nineteen patients (6.3%) (Table). Four patients developed signs of haemorrhage and required emergency laparotomy. In two this bleeding was found to be from the epigastric port site and the other two had bleeding from an aberrant cystic artery. In all bleeding was easily controlled and followed by an uneventful post operative recovery.

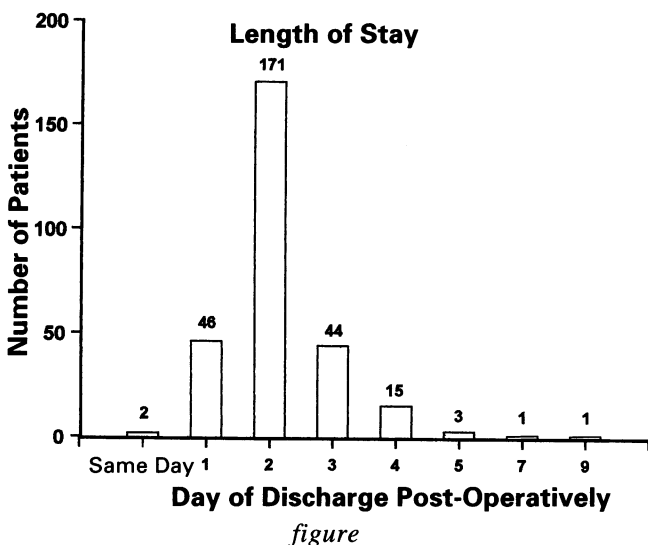
There was one death in this series (0.3%) due to a small-bowel perforation which presented on the third day following the laparoscopic procedure. This patient, a 73 year old female, developed abdominal pain and distension and at laparotomy was found to have a small-bowel perforation in the right iliac fossa. It is postulated that this injury occurred as a result of bowel being adherent to the anterior abdominal wall due to adhesions following previous lower abdominal

TABLE  
Post-operative complications following  
Laparoscopic Cholecystectomy

Wound Infection	1
Urinary Infection	1
Chest Infection	2
Intraperitoneal Haemorrhage	4
Urinary Tract Infection	1
Myocardial Infarction	1
Small Bowel Perforation	1
Retained Common Bile Duct Stone	1
Re-admission with non-specific abdominal pain	2
Richter's Hernia	1
Fluid Collection in Gallbladder Bed	1
Port Site Infection due to gallstones	1
Pneumothorax	1
Pulmonary Embolus	1
TOTAL	19 (6.3%)

surgery. At insufflation of the peritoneal cavity it is possible that a shearing force caused the linear tear subsequently identified at laparotomy. Following small bowel resection the post-operative course was complicated by a subphrenic abscess which necessitated a second laparotomy and drainage. However she deteriorated and died of respiratory complications.

The median post-operative stay (fig) was two days, with two patients discharged on the same day and the maximum stay being nine days.



## DISCUSSION

The benefits of LC were quickly identified by both patient and surgeon and led to a dramatic shift from open surgery to the laparoscopic technique. However it is now clear that there are several complications specifically associated with this procedure which have caused some to question the place of laparoscopic surgery in general.<sup>8</sup> Of major concern are the reports of an increase in the incidence of injury to the common bile duct during dissection of Calot's triangle and whether with appropriate training or modification of surgical technique the rate of occurrence of this complication would be comparable to that following open cholecystectomy.

Although McMahon et al reported that the introduction of LC was associated with an increased incidence of bile duct injury a systematic review of the effectiveness and safety of LC carried out by Downs et al under the auspices of The Royal College of Surgeons of England concluded that there was only weak evidence of an increased risk.<sup>1,3</sup> This was almost certainly

due to the dearth of randomised controlled clinical trials with sufficient power and length of follow-up. More recently a study of 114,005 cases of LC was reported by MacFadyen et al which encompassed forty series performed in the United States from 1989 to 1995.<sup>9</sup> A total of 561 major bile duct injuries (0.5%) and 401 bile leaks (0.38%) had occurred and they concluded that this was indeed an increase over what would be expected after open cholecystectomy. A major problem with the literature addressing the issue of bile duct injury at open cholecystectomy is that some studies do not record bile leaks. In the largest single series of open cholecystectomies where both bile duct injury and bile leak were recorded, carried out by Morgenstern et al, an incidence of 0.5% was reported.<sup>10</sup>

The role of intraoperative cholangiography to reduce bile duct injury is also controversial. With the availability of skilled endoscopy a policy of selective ERCP, either pre- or post-operatively, in patients with suspicion of common bile duct stones is possible.<sup>11</sup> Khalili et al reported a series of 1207 patients from Los Angeles who underwent LC and intraoperative cholangiography (IOC) and demonstrated a 0.4% incidence of common bile duct injury, which is comparable to the figure of 0.5% reported by Morgenstern et al for open cholecystectomy.<sup>12</sup> The Los Angeles group went on to report a series of 46 laparoscopic bile duct injuries and found that IOC had been performed in 16.<sup>4</sup> There was no difference in severity or type of injury when IOC had been achieved and in 11 of the 16 the image had been misinterpreted. This raises the question of the quality of image at IOC and whether this investigation can significantly reduce bile duct injury rate. We have shown in this study that a policy of selective pre-operative ERCP with attention to surgical technique is a feasible approach with a low incidence of bile duct injury. Although numbers in this study are relatively small it does include patients with acute inflammation which have been shown to be at increased risk of bile duct injury.<sup>13</sup>

An overall mortality and morbidity rate of 0.3% and 6.3% respectively are in keeping with figures for other reported series of LC.<sup>1</sup> The patient who developed a small bowel tear highlights the careful selection required and we would now include lower abdominal incisions as a relative contradiction to LC. The use of an open technique to achieve pneumoperitoneum is a reasonable alternative.

The importance of retrieving the gallstone spilled at LC has been highlighted in case reports where such stones subsequently led either to intra-abdominal or to abdominal wall abscesses.<sup>13, 14, 15</sup>

We recommend the routine use of a retrieval bag to remove the gallbladder through the wound and removal of all gallstones spilled during the procedure if possible.

In summary, a policy of avoidance of diathermy in Calot's triangle combined with dissection centred on the junction of Hartmann's pouch and the cystic duct has been employed in 291 successfully completed laparoscopic cholecystectomies with no bile duct injuries or leaks. The selective use of per-operative ERCP has been used to manage patients suspected of having common bile duct stones, without the routine use of intra-operative cholangiography.

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