

Residual gallstone disease – Laparoscopic management

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Abstract

Background A few patients who continue to suffer antecedent symptoms following laparoscopic cholecystectomy (LC) may harbor residual gallstones. The incidence of residual gallstones following cholecystectomy is <2.5%. Many of these patients require a completion cholecystectomy to ameliorate their symptoms.

Materials and methods We reviewed our experience of laparoscopic re-intervention for residual gallstones over a period of 10 years from January 1998 to December 2007. Twenty six patients underwent Laparoscopic completion cholecystectomy (LCC) for residual gallstone disease. Twelve patients had a previous LC (2 patients - subtotal cholecystectomy) and 9 patients had a previous open cholecystectomy (7 patients - subtotal cholecystectomy). Five patients had previously undergone a cholecystostomy. Diagnostic investigations included abdominal ultrasound, endoscopic ultrasound (EUS), magnetic resonance cholangio-pancreatography (MRCP) and endoscopic retrograde cholangio-pancreatography (ERCP).

Results Findings included a remnant gallbladder in 3 patients, long cystic duct stump with impacted stone in 18 patients and a contracted gallbladder in 5 patients. All procedures were successfully completed laparoscopically.

The mean operative time was 62 minutes and mean blood loss 50cc. Ten patient required abdominal drains post-operatively. Two patients had bilious drainage lasting 9 days and 11 days respectively. One patient died a week following surgery of acute myocardial infarction. Another patient died 6 months later of unrelated causes. The remaining patients have remained symptom free at a mean follow up of 3.2 years (range 7 months to 9 years).

Conclusion The possibility of residual gallstones increases with subtotal cholecystectomy and inadequate dissection of the Calot's triangle in the presence of acute inflammation. Laparoscopic re-intervention for treating residual gallstone disease is feasible and can be safely performed in centers of expertise.

Keywords Residual gallstones · Completion cholecystectomy · Remnant gallbladder

Introduction

Laparoscopic cholecystectomy (LC) is the accepted “gold standard” treatment for gallstone disease. The procedure is associated with minimal morbidity and rapid recovery resulting in a high acceptability of this treatment option. A few patients (10–40%) following cholecystectomy present with persistence of antecedent symptoms [1]. The condition is commonly referred as post cholecystectomy syndrome (PCS) [2]. Etiology of PCS is often non-biliary, however a few of these patients may actually harbor gallstones in a residual gallbladder or cystic duct stump [3, 4]. The reported incidence of residual gallstones following cholecystectomy is <2.5% [5]. The condition may arise as a result of inadequate dissection of cystic duct or a partial or

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subtotal cholecystectomy. Patients with severe anatomical distortion, tissue friability or poor general condition are often managed by performing a salvage partial cholecystectomy or a cholecystostomy [6–10].

We performed a retrospective review of our data on LC from January 1997 to December 2008 to analyze and evaluate the outcome of patients undergoing a laparoscopic completion cholecystectomy (LCC) for residual gallstone disease from a previous cholecystectomy/cholecystostomy.

Materials and methods

In a period between January 1998 to December 2007, 13,794 laparoscopic cholecystectomies were performed at our center. Out of these, 26 patients underwent a LCC following a previous cholecystectomy/cholecystostomy. Patients presenting with retained stones in the common duct following cholecystectomy were not included in the study. We have developed a data storage system whereby the patients' demographics, clinical details and follow up are prospectively archived using specially designed indigenous software for easy retrieval and analysis.

In this study group of 26 patients, 24 patients had undergone the initial cholecystectomy/cholecystostomy at another center. The different procedures performed are mentioned in Table 1.

The commonest presenting symptoms were pain right hypochondrium, recurrent biliary colics, and jaundice (Table 2).

Pre-operative work up of patients included a detailed history; physical examination and assessment of previous surgical scar, routine hematological and biochemical blood

tests were performed. Liver function test and abdominal ultrasound were the preliminary tests performed to diagnose common bile duct (CBD) stones.

The residual gallstones were diagnosed on abdominal ultrasound in 17 patients (includes 5 patients with primary cholecystostomy). The ultrasound reported 8 patients with a remnant gallbladder containing calculi. All other ultrasound reports mentioned an echogenic focus in the gallbladder fossa. The remaining 9 patients (7 patients post LC and 2 patients post open cholecystectomy) were diagnosed on EUS (2 patients), magnetic resonance cholangio-pancreatography (MRCP) (4 patients) and endoscopic retrograde cholangio-pancreatography ERCP (3 patients) respectively. In all 9 patients a stone was reported in the residual cystic duct stump (Table 3).

Table 3 Diagnostic modality

| Investigation | Patients (n = 26) |
|--------------------|-------------------|
| Ultrasound abdomen | 17 |
| Endo-ultrasound | 2 |
| MRCP | 4 |
| ERCP | 3 |

Seventeen patients (65.38%) were subjected to a pre-operative ERCP. Indications for an ERCP included history of altered liver functions (17 patients), jaundice (9 patients) or dilated CBD (4 patients) on ultrasound.

No patient had any retained stones in the CBD. The stones present in the cystic duct and gallbladder remnant were not amenable to endoscopic extraction.

Surgical procedure

The procedure followed was as for standard LC. Access to the peritoneal cavity was by veress needle supraumbilically or at the Palmer's point in the left hypochondrium. Standard 4 port technique was used (Fig. 2). An additional port was made midway between the umbilical and epigastric port on the left of midline to retract the duodenum to improve visualization of operative site if required (Fig. 1). Identification of the liver as an anatomical landmark was an important step in initiating dissection. Adhesiolysis was performed and the gallbladder fossa exposed. Adhesiolysis began medially and proceeded laterally as this was found to give a good plain of dissection (Fig. 3). The duodenum was another independent anatomical landmark for identifying the CBD and marking the inferior limit of dissection. The lateral fissure of the liver helped in identifying the porta. Dissection was conducted using a combination of blunt and sharp dissection with the help of suction cannula/dissector and endoscissors respectively. Monopolar electrocautery used judiciously in short spurts

Table 1 Primary procedures

| Procedure | Patients |
|-------------------------------|----------|
| LC | 12 |
| Lap subtotal cholecystectomy | 2 |
| Open cholecystectomy | 9 |
| Open subtotal cholecystectomy | 7 |
| Tube cholecystostomy | 5 |
| Laparoscopic cholecystostomy | 2 |
| Open cholecystostomy | 3 |

Table 2 Presenting symptoms

| Symptom | No. of patients |
|--------------------------------------|-----------------|
| Persistent pain RHC | 17 |
| Recurrent biliary colics | 9 |
| Jaundice | 9 |
| Postprandial nausea after fatty meal | 3 |
| Intermittent low grade fever | 1 |
| Abdominal distension and diarrhea | 1 |

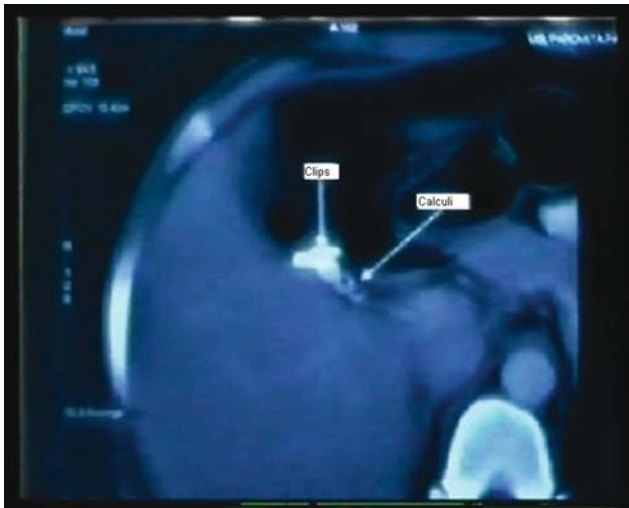


Fig. 1 MRI scan showing clips and calculi in gallbladder remnant

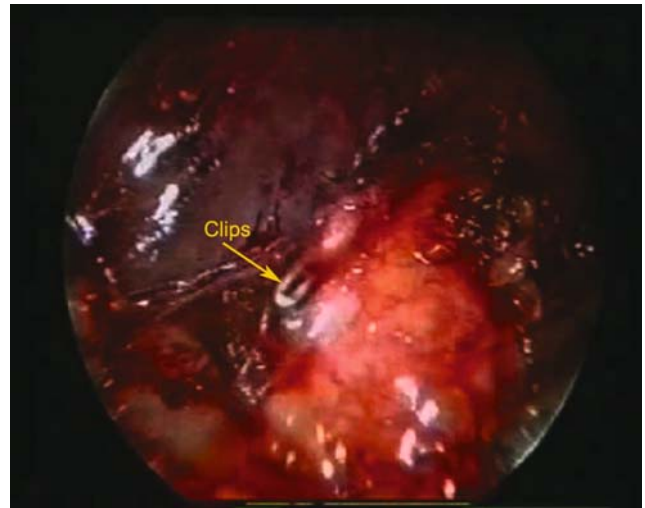


Fig. 3 Clip from previous surgery seen at beginning of dissection

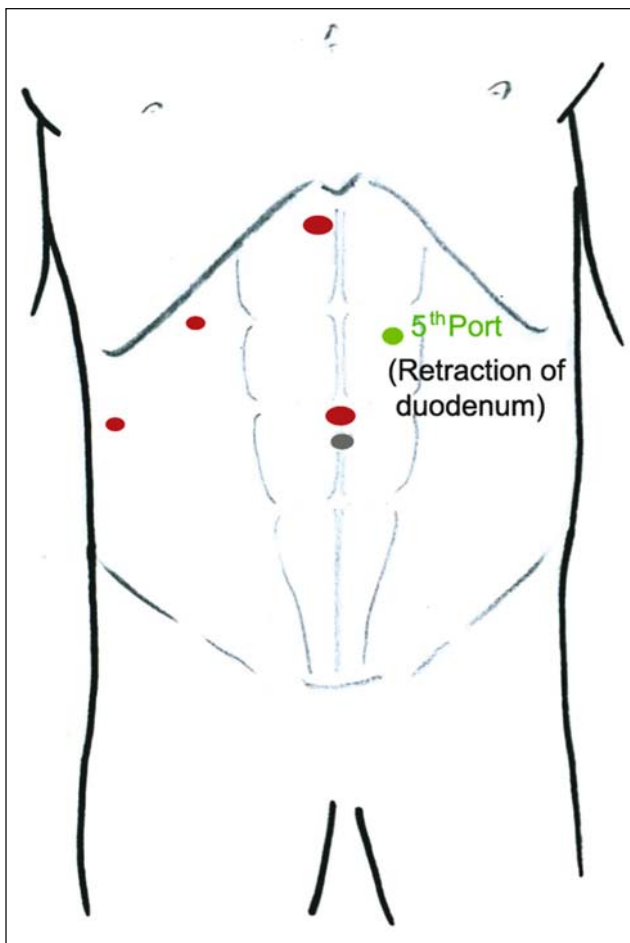


Fig. 2 Port placement for LCC

was adequate for achieving hemostasis. In patients with previous subtotal cholecystectomy and cholecystostomy, a formal cholecystectomy was performed. The difficulty in delineation of the anatomy at the previous surgical site

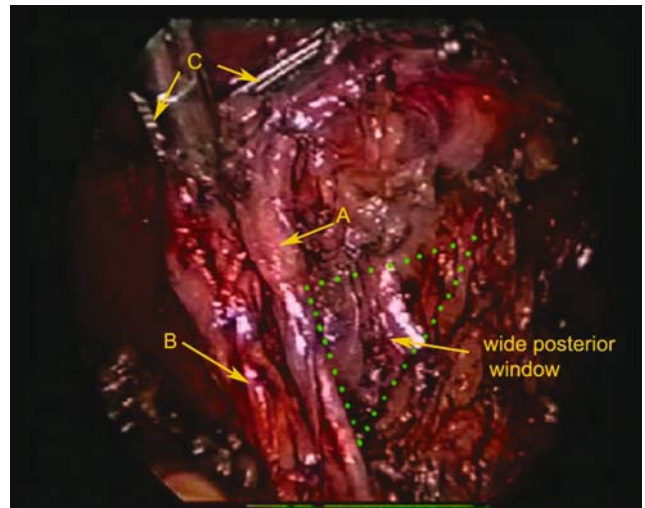


Fig. 4 Wide posterior window

was not much probably due to the interval of time between the previous and present surgical procedure. The adhesions were primarily omental and only occasionally fibrous. A suction cannula in such a situation was found to be an excellent dissection instrument to maintain a clear field of vision. A wide window was created to delineate biliary anatomy prior to application of clips on cystic duct in patients with remnant/ contracted gallbladders (Fig. 4). In patients with residual cystic duct stones, the stone itself served as an excellent landmark for dissection close to the wall. The cystic duct and artery were defined, clipped and divided and gallbladder dissected off the liver bed. In the absence of a gallbladder the hepatic fissure at the porta hepatis and the duodenum were kept as the guiding anatomical landmarks for dissection. In all such patients a long cystic duct stump was found and traced to its junction with the CBD. The junction of the cystic duct with the CBD was identified, dissected and defined before clipping

and dividing the cystic duct remnant. An abdominal drain was placed in patients with severe adhesions and difficult dissection (10 patients). It was possible to complete all 26 procedures laparoscopically.

Results

From January 1998 to December 2007, 13794 patients underwent LC at our center. Twenty six (0.188%) patients underwent a revision or LCC for residual gallstone disease. Mean age of the patients was 51 years (range 32–67 years). There were 10 males and 16 females. The patients presented at a mean of 4.1 years (range: 6/12 – 12 years) following the primary procedure.

The previous medical records of 22 patients were available (including two patients from our center). The reasons for performing a subtotal cholecystectomy were acute cholecystitis (seven patients) with inflammation and dense fibrosis with anatomical distortion (two patients) at the Calot's triangle precluding a safe dissection.

Seventeen patients had altered liver function tests in the past, however only seven patients had deranged liver functions at the time of admission. All seven patients showed elevated levels of alkaline phosphatase and gamma glutamine transaminase. Three of these 7 patients had raised serum transaminase and 2 patients had raised serum bilirubin levels.

All procedures were successfully completed laparoscopically. Laparoscopic excision of gallbladder remnant was done in three patients and excision of cystic duct stump with stone was performed in 18 patients. A formal LC was done in five patients who had previously undergone cholecystostomy and cholecystolithotomy. The mean operative time was 62 minutes (range 21–126 minutes) and mean estimated blood loss was 50cc (range 15–200cc). There was no mortality and no major morbidity. Minor complications included bilious drainage in two patients and epigastric port discharge in two patients (which responded to drainage and dressings). Ten patients required drainage, which lasted from 2–12 days. Two patients had bilious drainage, which lasted up to day 9 and day 11. Mean hospital stay was 2.6 days (range 1.5–7 days). An elderly male, who underwent LCC following primary cholecystostomy, died of acute myocardial infarction on postoperative days 8. Another 68 year-old-female died 6 months after surgery from following cerebro-vascular accident. All patients showed complete resolution of their biliary symptoms on a mean follow up of 3.2 years (range 7 months to 9 years).

Discussion

Persistence of symptoms following cholecystectomy often raises doubts on gallstones being the cause of original pain [1, 2]. A majority of these cases are diagnosed as PCS.

The causes of PCS are often non-biliary like peptic ulcer, gastroesophageal reflux, pancreatic disorders, liver diseases, irritable bowel and coronary artery disease [2]. However in some of these patients the cause may be biliary such as choledocholithiasis, traumatic biliary stricture, Sphincter of Oddi dysfunction or cystic duct/gallbladder remnant [3, 4]. Patients with symptoms suggestive of gallstone disease such as biliary colic and obstructive jaundice justify a detailed evaluation to rule out any retained stone. The percentage of such patients is quite small and a high index of suspicion needs to be kept to reach a diagnosis. In 2003 we reported our initial experience of residual gallstone disease, which comprised 0.12% of the total volume of laparoscopic cholecystectomies (LCs) being performed at our center [6]. In the current expanded series, patients with residual gallstone disease comprised 0.18% of total volume of LCs performed.

Five patients in the group had previously undergone a tube cholecystostomy. Two of these patients from our own institute underwent a laparoscopic tube cholecystostomy. In both patients, the poor general condition and the severe local inflammatory findings prevented a formal surgical procedure from being performed. Three patients had open cholecystostomies as an emergency procedure; however their medical records were unavailable for perusal. All five patients underwent a formal removal of the gall-bladder laparoscopically at our institute. Kuster et al. recommend a temporary LC followed by delayed LC as an alternative to conversion to open cholecystectomy in acute cholecystitis [10]. Similar recommendations have been duplicated by other authors wherein a tube cholecystostomy has been suggested to be a good salvage procedure in select patients with acute cholecystitis or a poor general condition [11–13]. Our own experience also corroborates these recommendations wherein an emergency cholecystostomy helped in salvaging two patients unfit for cholecystectomy.

Twelve patients had undergone a previous subtotal/partial cholecystectomy. Subtotal cholecystectomy has been recommended as a safe and viable option in patients where anatomical distortion at Calot's triangle precludes a safe dissection [7, 8, 13–15]. Conversion rate to open surgery is higher for patients with acute cholecystitis than in those without acute cholecystitis. Laparoscopic subtotal cholecystectomy has been suggested as an alternative to decrease this conversion rate [15].

We have also reported a similar experience, especially in patients with portal hypertension, Mirizzi Syndrome, and inflammation at Calot's triangle with severe anatomical distortion wherein a laparoscopic subtotal cholecystectomy was the only viable surgical option [16]. Seven patients from our series were conversions from an attempted LC. A study by Jenkins et al. [17] on open cholecystectomy also found that patients who were conversions from attempted LC had a higher incidence of subtotal cholecystectomy as compared to patients primarily undergoing open cholecystectomy.

Several reports on residual gallstone disease also mention a remnant gallbladder with stones suggesting the primary surgery to have been a subtotal cholecystectomy [5, 18].

Residual gallstones are more often reported in cystic duct remnants. The possible etiology of such an occurrence is often a failure to define the cystic duct, CBD junction. This is more likely to occur in the presence of acute local inflammation or fibrosis as discussed above. It may be prudent to dissect the cystic duct up to the common duct defining their junction in patients with history of biliary colics, pancreatitis, obstructive jaundice and those having undergone therapeutic ERCP prior to clipping and dividing the cystic duct. In such patients, there is a higher likelihood of stones in the cystic duct. Stones in the cystic duct may be evident on visualization or may also be palpated with the dissector. Adhesions around the cystic duct may be another indicator of an impacted stone within it. In these circumstances, dissection should continue proximal to the stone towards junction of the cystic duct and CBD. With increasing experience, it is almost always possible to apply clips on the cystic duct proximal to the stone. No attempt should be made to “milk” the stone distally, as such a maneuver may fragment the stone which may pass into the common duct and lead to biliary colic in the postoperative period.

The tools for evaluating these patients include an abdominal ultrasound, EUS, MRCP and ERCP. An abdominal ultrasound is the commonest utilized diagnostic tool for its high sensitivity, cost economy and easy availability. An EUS is indicated in the presence of a high index of clinical suspicion with a negative abdominal ultrasound. EUS has proven its feasibility in diagnosing liver and biliary pathologies with a high sensitivity (96.2%) and specificity (88.9%) and has also been shown to be cost effective in avoiding number of ERCPs [19–21]. ERCP enjoys significant popularity as a diagnostic and therapeutic tool in managing extrahepatic biliary pathology. However it is an invasive investigation and associated with specific procedure related complications [22]. The main advantage of MRCP is its non-invasiveness, absence of sedation and avoidance of radiation exposure. Its sensitivity and specificity is similar to EUS [21].

The present study conforms to this pattern of evaluation wherein an abdominal ultrasound was found to have been performed in nearly all the patients and the remaining patients were diagnosed using other investigative modalities, however in no specific pattern.

Conclusion

Residual gallstones form a small percentage of treatable causes of PCS. A high index of suspicion should be maintained in patients with persistent biliary symptoms. In patients who had subtotal cholecystectomy a persistence

of symptoms is more likely due to residual gallstones. Defining the cystic/common duct junction before clipping and dividing the cystic duct in selected patients can prevent residual stones in the cystic duct stump.

Laparoscopic re-intervention performed for residual gallstone disease is safe, feasible and may be offered as the treatment of choice in centers performing advanced laparoscopic procedures.

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