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Case Report: Modified Laparoscopic Subtotal Cholecystectomy: An Alternative Approach to the “Difficult Gallbladder”

Authors' Contribution:
Study Design A
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Patient: Male, 56
Final Diagnosis: Acute cholecystitis
Symptoms: Abdominal pain
Medication: —
Clinical Procedure: Laparoscopic subtotal cholecystectomy
Specialty: Surgery

Objective: Unusual clinical course
Background: Laparoscopic cholecystectomy is a commonly performed surgical procedure. In certain situations visualization of the Callot triangle can become difficult due to inflammation, adhesions, and sclerosing of the anatomy. Without being able to obtain the “critical view of safety” (CVS), there is increased risk of damage to vital structures. An alternative approach to the conventional conversion to an open cholecystectomy (OC) would be a laparoscopic subtotal cholecystectomy (LSC).
Case Report: We present a case of a 56-year-old male patient with acute cholecystitis with a “difficult gallbladder” managed with LSC. Due to poor visualization of the Callot triangle due to adhesions, safe dissection was not feasible. In an effort to avoid injury to the common bile duct (CBD), dissection began at the dome of the gallbladder allowing an alternative view while ensuring safety of critical structures.
Conclusions: We discuss the potential benefits and risks of LSC versus conversion to OC. Our discussion incorporates the pathophysiology that allows LSC in this particular circumstance to be successful, and the considerations a surgeon faces in making a decision in management.

MeSH Keywords: Cholecystectomy • Cholecystectomy, Laparoscopic • Gallstones • Laparoscopes

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Background

Laparoscopic cholecystectomy (LC) is one of the most commonly performed surgical procedures throughout the world. Ever since Langenbuch developed the technique for open cholecystectomy (OC) over a century ago, it has become the gold standard for treatment of symptomatic cholelithiasis [1]. In 1985, Mühe performed the first LC [2]. This was a major step in integrating advances in surgical techniques, as the benefits of laparoscopy were introduced to symptomatic cholelithiasis treatment. LC achieves shorter recovery time, decreased expense, less postoperative pain, and improved cosmetics [3]. There are certain situations where visualization of the Callot triangle becomes difficult due to inflammation, adhesions, and sclerosing of the anatomy. The inability to obtain the “critical view of safety” (CVS) and identify the cystic duct, cystic artery, and common bile duct (CBD) alters how the surgeon must proceed [4]. The standard of care has been to convert the procedure to an OC [5]. Depending upon the patient’s comorbidities and the surgeons comfort level, an alternative approach to conversion to an OC can be a laparoscopic subtotal cholecystectomy (LSC).

Case Report

A 56-year-old male presented to our emergency department (ED) with epigastric pain radiating to the right upper quadrant of one-week duration. The patient reported having prior abdominal symptoms that he believed were not severe enough to warrant a trip to the ED. Initial laboratory results indicated leukocytosis of 15.6. His physical examination findings were consistent with acute cholecystitis. He had a past medical history of brain cancer with four courses of chemo-radiotherapy.

Imaging studies were performed to support the diagnosis of cholecystitis. An abdominal ultrasound displayed multiple echogenic shadowing gallstones within the gallbladder, a diffusely thickened wall measuring 0.57 cm, and the CBD measured 0.60 cm (Figure 1). No dilatation of the CBD was present; consistent with the patient’s liver function tests being within the normal limits.

The patient was scheduled for a LC with possible conversion to OC. Intraoperatively, adhesions were noted between the gallbladder, omentum and duodenum (Figure 2). At that point, 20 cc of bile were drained from the patient’s distended gallbladder.

The gallbladder wall was noted to be friable. The infundibulum along with the ducts, including cystic duct and artery, were embedded in fibrotic adhesions making it difficult to obtain the CVS during dissection (Figure 3). Visualization of the Callot triangle was unobtainable, thus safe dissection was not

Figure 1. Ultrasound revealing thickened gallbladder wall.

Figure 2. Image of adhesions on gallbladder.

Figure 3. Image of gallbladder with adhesions noted between the gallbladder, omentum and duodenum.

feasible. With hemostasis maintained, the decision to remain laparoscopic and perform a LSC was made.

We turned our attention to the lateral wall of the gallbladder, where an incision was made along the dome of the gallbladder dissecting it from lateral to medial. The anterior, medial, and lateral wall of the gallbladder were removed with electrocautery down from the fundal dome until the infundibulum of the gallbladder was reached leaving the posterior wall intact with exposed mucosa. The intraluminal cystic duct was identified (Figure 4). The stones and excised gallbladder wall were removed (Figure 5). Irrigation and suction removed residual bile from the infundibulum basin. Electrocautery was

Figure 4. Drawing depicting biliary anatomy.

Figure 5. Image following LSC, the remaining posterior wall of the gallbladder.

used to score the posterior wall mucosa. The visualized intraluminal cystic duct was not itself cauterized to prevent damage to unidentified structures lying in close proximity, particularly the CBD. A Jackson-Pratt (JP) drain was placed within the basin of the infundibulum connected to a suction bulb in order to monitor any bilious drainage through a patent cystic duct. The patient was discharged from the hospital one day postoperatively with the JP drain remaining in place.

At one week postoperative, there was bilious drainage noted from the JP. At the second postoperative week, there was less than 5 mL serous fluid drained, and the JP drain was removed. The patient has reported no postoperative complications since the procedure and no abdominal pain.

Discussion

Laparoscopic cholecystectomy (LC) is the “gold standard” procedure for cholecystitis. In the event that a surgeon encounters a “difficult gallbladder,” laparoscopic subtotal cholecystectomy (LSC) is a viable option. When presented with the scenario where delineation of the Callot triangle would be difficult and pose a hazard to proper identification of the anatomy, LSC versus conversion to OC should be considered.

The introduction of open subtotal cholecystectomy by Madding in 1955 presented a safe alternative to a total cholecystectomy by preventing misidentification of the cystic duct [6]. Since then, LC has been converted to OC in cases of difficult dissection and a prolonged surgery without progress. Early identification of the “difficult gallbladder” and the subsequent decision to change the management course to a LSC prevents the need to perform two procedures, the attempted LC and subsequent open procedure, thus reducing operative time.

In this particular case, the cystic duct was left patent and the mucosa was scored by electrocautery along the back wall and near the infundibulum. The proposed pathophysiology was that heat from the cautery causes subsequent sclerosis of the cystic duct. However, this must be done cautiously since the bile duct and nearby soft tissue can be sclerosed by excessive heat [7]. It can be difficult to control the extent of sclerosis, due to electrocautery causing damage or strictures to nearby structures. Unique to this case was the use of electrocautery as opposed to the alternative options of intracorporeal suture or an endoclip to secure the cystic duct. The results of the procedure were monitored externally by measuring the decreasing JP drain output. If bilious drainage continued, then endoscopic retrograde cholangiopancreatography (ERCP) with stenting would be the subsequent next step, identifying anatomy, promoting drainage from the main pancreatic duct, and allowing for sclerosis of the cystic stump. In this particular case, bilious drainage decreased without further intervention, as monitored externally via the JP drain.

The risks of performing a LSC must be weighed against any potential benefits on a case-by-case basis. There is still a risk of bleeding since tissues are inflamed and friable. Additionally, bile leakage and difficulty removing spilled stones are more common when performing a LSC [8]. In addition; the patient may develop continued biliary drainage necessitating ERCP with stenting [9].

LSC has the short-term perioperative benefits of remaining laparoscopic. Long-term, there have been no cases revealing cholecystitis, abscess formation, or cancer in the remnant gallbladder tissue according to Tamura et al. [10]. OC remains the ideal procedure for insuring hemostasis. The determination of technique to use ultimately is determined by surgeon preference, as the goal of either technique is to avoid damage to the CBD. The definitive operation with removal of the entire gallbladder is always the preferred option, reducing the chance of retained stones and subsequent attacks, however, not at the expense of additional risk. Circumstances of each case contribute to the decision of how to proceed with a difficult gallbladder.

Conclusions

Upon visual inspection of the gallbladder intraoperatively, the decision of how to proceed must be made. When presented with friable, dense adhesions that make obtaining the CVS difficult, a modified approach must be considered to avoid inadvertent damage to critical structures. The authors of this paper agreed that with select patients, LSC is a viable and preferred option. This procedure, in particular the use of electrocautery causing local sclerosis in proximity to the cystic duct, is an alternative option for management in LSC, that

while successful in this case, may warrant further investigation. As LSC provides the benefits of reduced duration of hospital stay postoperatively and reduced pain for the patient, it should be considered. The surgeon should maintain a low threshold for the conversion to OC when there is compromise of hemodynamic instability. With the goal of reducing operative time and ensuring patient comfort postoperatively, LSC, with further study, improved technique, and surgeon comfort, is a viable alternative to traditional conversion to laparotomy for removal of the gallbladder.

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