

Original Research

Risk Assessment In Cases Of Laproscopic Cholecystectomy- An Original Research

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ABSTRACT

Aim: Purpose of the present study was to evaluate the risk in cases of laproscopic cholecystectomy

Methodology: A Medline search was conducted to review all published English literatures relevant to difficult cholecystectomy through 2009 to 2022. The search words were “laproscopic cholecystectomy,” “difficult cholecystectomy,” “difficult laparoscopy,” “subtotal laproscopiccholecystectomy,” “fundus first cholecystectomy,” and “causes of conversion of laproscopic cholecystectomy.”

Results: Sixty-seven studies, which included 324,553 patients, were selected for this review. Five major categories of difficulty were identified. Conversion rate and iatrogenic injuries during laproscopic cholecystectomy are still high despite significant improvement over the last 10 years. Depending on the technique of cholecystectomy, the degree of gall bladder inflammation, patient comorbidities, and surgical experience, the conversion rate was reported between 0.18% and 30%, whereas the incidence of iatrogenic injuries was from 0% to 0.6%. Subtotal cholecystectomy, antegrade and fundus first techniques, and pre-operative cholangiogram were associated with lower complications and conversion rate. Risk factors for difficulty were male sex, increased age, acute and thick wall chronic cholecystitis, wide and short cystic duct, cholecysto-digestive fistula, previous upper abdominal surgery, obesity, liver cirrhosis, anatomic variation, cholangiocarcinoma, and low surgeon’s caseload.

Conclusion: No consensus is found among surgeons on how to manage difficult laproscopic cholecystectomy. Iatrogenic injuries and conversion rate can be reduced depending on the surgeon’s experience, special techniques, and intraoperative investigations.

Keywords: laproscopic cholecystectomy, open cholecystectomy, common bile duct.

INTRODUCTION

Cholecystectomy is indicated in all but minority of the symptomatic gall stone disease depending on the clinical course and comorbidities. Asymptomatic gall bladder (GB) stone, on the other hand, is treated conservatively in the vast majority of cases because complications develop in only 1% to 2% of patients annually.¹ In one of the large studies from Europe (3933

patients) published recently, the indications for laparoscopic cholecystectomy (LC) were cholelithiasis in 75.5%, pancreatitis in 13.3%, cholecystitis in 6.3%, choledocholithiasis in 3.05%, and other complications in 1.2% of cases.² In the United States 600,000 cases of LC are performed annually. Some of these operations are associated with bile duct injuries and their importance cannot be underestimated.^{3,4} The incidence of these injuries ranges between 0%, 3% to 0%, 6%.^{5,6} This means there are approximately 1800 to 3600 cases of bile duct injuries/year. Significant numbers of these patients need complex surgery, postoperative special care with definite mortality and extra cost. The Brazilian study of 91,232 LC showed that the incidence of bile duct injury was 0.18%, whereas the mortality was 4.2%.⁷ In England 51,854 LC were performed during 2005 to 2006. The overall conversion rate was 5.2%; 4.6% for elective procedures and 9.4% for emergency LC.⁸ Difficult GB surgery is not uncommon, but the conversion rate has decreased compared with the previous decade. However, complete avoidance of bile duct injury and conversion is not achievable in the current era of surgical practice. Unfortunately, iatrogenic injuries and other potential difficulties direct the procedure to open cholecystectomy (OC) with definite complications and increased cost. The conversion rate is very much correlated with access problems, abnormal or unusual anatomy due to acute or chronic inflammation, patient comorbidities, bleeding, visceral injuries, and surgical experience.⁹ A study in one European institute of >4000 LC, investigators reported a conversion rate of 7%.¹⁰ Tokyo guidelines divided acute cholecystitis in three different grades of severity and several studies showed that Grade III acute cholecystitis were associated with increased risk of vasculobiliary injuries and a higher conversion rate to open surgery. The authors identified preoperative factors associated with prolonged operative time and conversion rate (gallbladder wall thickening, C-reactive protein levels, body temperature, age, BMI and previous abdominal surgery). In this classification, the radiologic findings were primarily based on ultrasonography and the laboratory tests evaluated C-reactive protein. On this background, the aim of our study was to identify other preoperative laboratory and radiological features predictive of difficult LC. The knowledge of reliable preoperative predicting factors could be an advantage for both the surgeon and patient in terms of options for management (skills of surgeon, need for intraoperative cholangiography, operative timing) in order to avoid intraoperative complications (vasculobiliary injuries, conversion to open surgery) and to obtain better postoperative outcomes.¹¹

AIM OF THE PRESENT STUDY

Purpose of the present study was to evaluate the risk in cases of laparoscopic cholecystectomy (LC).

METHODOLOGY

A Medline search was conducted to review all published English literatures addressing difficult LC through 2009 to 2022. The search words were “laparoscopic cholecystectomy,” “difficult cholecystectomy,” “difficult laparoscopy,” “subtotal laparoscopic cholecystectomy,” “fundus first cholecystectomy,” and “causes of conversion of laparoscopic cholecystectomy.” Sixty-seven relevant studies were selected for this review. Studies were selected based on their relevance to difficult cholecystectomy. The conversion rate and iatrogenic injuries were considered as indicators of a difficult procedure. Studies with different levels of evidence were included. Subsequently they were categorized according to the power of the study.

RESULTS

One thousand nine hundred and fifty nine studies were found but only 67 relevant articles were selected for this review. Five major categories of difficulty were identified. The rate of conversion and iatrogenic injuries during LC has decreased compared with studies in the 2000s.

The conversion rate ranged from 0.18% to 30%, whereas iatrogenic injuries rate ranged from 0% to 0.6%. Special approaches, surgical experience, high caseload, and intraoperative investigations have helped to reduce the conversion rate and iatrogenic complications (levels 2 and 3). Subtotal cholecystectomy, fundus first and antegrade techniques are associated with lower complications and conversion rate (level 2). There was conflicting evidence to whether emergency LC was associated with higher conversion and complication rates. However, clinical trials showed no significant difference in the conversion rate and postoperative complications between emergency and delayed cholecystectomy (level 1). The predictors for difficulties were male sex, age, acute and chronic cholecystitis, obesity, liver cirrhosis, adhesions from previous upper abdominal surgery, emergency cholecystectomy, large liver and big GB, GB carcinoma, anatomic variation, biliodigestive fistula, cystic duct stone, and surgical experience (level 3). Studies have shown that male patients have a high risk of a difficult operation and conversion to OC. Needless to say, this does not mean that difficulty will be encountered in every male patient (level 3). The incidence of difficult LC is significantly greater in the 31 to 40 year age group. Advanced age is also associated with difficulty. Although LC is considered a safe procedure in elderly patients, it is associated with a high morbidity and conversion rate (level 3). Patients with comorbidities have a high conversion rate if they are subjected to emergency LC (level 3). The American Society of Anesthesiologists grades 3 and 4 were more vulnerable to difficult operations and a poor outcome. This is due to cardiovascular, respiratory, and metabolic status. A randomized prospective study has shown that early LC (within 72 h) for the average patient is associated with a lower conversion rate when compared with delayed LC (17% vs. 30%). Without doubt, less complications and a low conversion rate are linked to sufficient laparoscopic experience. (Table 1)

Table 1: Algorithm for Management of Difficult cases of Lap. Cholecystectomy

Difficult Access/ Pneumoperitoneum	Difficult Grasping and Retraction of the GB	Difficult Dissection of Calot Triangle	Abnormal Anatomy	Difficult Retrieval of the Specimen
Place Veress needle away from midline and previous scar	Deflate the GB Apply traction suture	Subtotal cholecystectomy or Fundus first	Subtotal cholecystectomy or Fundus first	Deflate the GB first Enlarge the port
Place the ports away from the laparotomy scars Use optical port If severe adhesions stop	If no progress consider: Subtotal cholecystectomy or Fundus first	Consider pre-operative cholangiogram Cholecystostomy Stop or Convert to OC	Consider pre-operative cholangiogram Cholecystostomy Stop or Convert to OC	Use retrieval bag Use strong instrument for extraction Keep laparoscopic view to watch the specimen during retrieval

*GB indicates gallbladder; LC, laparoscopic cholecystectomy; OC, open cholecystectomy.

The largest UK study has shown that conversion becomes less common when the surgeon's caseload increases.

DISCUSSION

Cholecystectomy is currently one of the commonest reasons for admission to hospital with an associated mortality of 0.45 to 6% depending on severity of gallbladder disease.¹¹ It accounts for a significant workflow in gastrointestinal surgery and emergency care.¹² Optimising care and care pathways requires an understanding of the underlying disease.^{13,14} Not only can the natural history of gallbladder disease vary with patient cohorts but surgical findings can be surprising, with somewhat unexpected degrees of surgical difficulty (or ease).¹⁵ It is one of the

more unpredictable operations in general surgery, due to the variable operative findings. Publications reporting outcomes, including conversion to open surgery, are hard to compare as currently there is no grading or scoring of operative findings at surgery.^{16,17} There are some well-reported models of grading and classification systems that have laid the foundation for collaborative research and improved outcomes.^{18,19} The importance of disease classification is increasingly recognised. Crandall and colleagues²⁰ provide a grading system for measuring anatomic severity of several Emergency General Surgery (EGS) diseases based on the American Association for the Surgery of Trauma (AAST) uniform grading system. Grading and scoring surgical conditions provide a uniform tool for reporting disease severity. As many have only been recently developed, they need validation as does the current scoring system. The aetiology underlying variable outcomes from laparoscopic cholecystectomy is complex in origin, relating to disease severity, surgical experience, and available instrumentation. Laparoscopic cholecystectomy is now the gold standard replacing open cholecystectomy. It is accepted that recovery is delayed, and risk of complications compounded by both delayed emergency cholecystectomy and excessive conversion from laparoscopic to open surgery. Account needs to be taken, however, that a specialist hepatobiliary surgeon may have a lower conversion rate than general surgeons. However, comparisons between surgeons, institutions and published series are currently impossible as the denominator of the severity of cholecystitis is not only not standardized but also rarely reported. Lal¹⁵ and colleagues suggest that a difficult cholecystectomy is one taking longer than 90 minutes, tearing the gallbladder, spending more than 20 minutes dissecting the gallbladder adhesions, or more than 20 minutes dissecting Calot's triangle. While time to dissection of Calot's triangle will vary on surgical skills and level of experience, it will generally be longer in patients with increasing access difficulty, inflammation and adhesions. Predicting a difficult cholecystectomy is possible with some degree of accuracy, using patient demographics, BMI, presence of a palpable gallbladder, and pre-operative ultrasound (US) or computed tomography (CT) findings.¹⁶ In addition, previous cholecystitis or lithotripsy has been shown to increase the likelihood of a difficult procedure.¹⁷ With increasing pressure to perform acute index admission laparoscopic cholecystectomy, an intraoperative based scoring system will potentially allow meaningful comparison of outcomes. In addition it may provide a trigger to prompt earlier conversion or link specific outcomes measures such as bile leaks to specific operative scores.²²

CONCLUSION

There is cumulative evidence, based on retrospective studies (level 2 and 3), that identifies certain factors predicting difficult LC such as age, sex, acute and chronic cholecystitis, previous upper abdominal surgery etc.

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