Original Research Article

A study on clinical and radiological factors for predicting difficult laparoscopic cholecystectomy preoperatively

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ABSTRACT

Background: Laparoscopic cholecystectomy considered as the gold standard treatment for symptomatic gall stone disease has 1-13% conversion rate to an open procedure due to various reasons. Present study aims to predict difficult laparoscopic cholecystectomy preoperatively using clinical and sonological factors.
Methods: This is a prospective study done on 190 patients who were posted for laparoscopic cholecystectomy from March 2015 to February 2017. Parameters taken into consideration were: age, number of previous attacks of acute cholecystitis, impacted gallstone, thickness of GB wall, pericholecystic fluid collection, history of upper abdominal surgery and obesity. All surgeries were performed by surgeons with minimum ten years of experience on laparoscopic cholecystectomy and ultrasound of the abdomen was performed by senior radiologists with experience of minimum five years.
Results: Out of 190 patients, difficulty was experienced in 48 patients of which conversion to open cholecystectomy was needed for 11 patients. Elderly age, multiple attacks of pain abdomen (>2), palpable GB, impacted gallstone, thickness of GB wall >3 mm, peri-GB fluid collection, adhesions due to previous abdominal surgery and obesity were all found to be independent risk factors leading to difficult laparoscopic cholecystectomy.
Conclusions: Though there is no definite scoring system to predict difficult LC, there is scope for further refinement to make the same less cumbersome and easier to handle using the above clinical and radiological factors.

Keywords: GB, Laparoscopic cholecystectomy

INTRODUCTION

Laparoscopic cholecystectomy has revolutionized the treatment of patients with gallbladder stones since its introduction by Mouret in 1987, and it has rapidly replaced open cholecystectomy as the standard treatment.

The advantages of laparoscopic over open cholecystectomy include earlier return of bowel function, less postoperative pain, improved cosmesis, shorter length of hospital stay, earlier return to full activity and decreased overall cost. LC may be rendered 'difficult' by various problems encountered during surgery, such as difficulties in accessing the peritoneal cavity, dissecting the gall bladder (GB), or extracting the excised GB requiring conversion to open cholecystectomy. Prior prediction of possible difficulties may help a surgeon in deciding the approach (open /laparoscopic) most suitable for a particular patient, stratification of risk for technical difficulty, preoperative counseling of the patient; thereby reducing the morbidity, complication, rate of conversion and overall cost of therapy.

Various clinical and sonological parameters that may help to predict the difficult LC preoperatively were analyzed in the present study and may help the surgeon as well as the patient in being better prepared for the intra-operative challenges. Aim of the study is to predict difficult LC preoperatively using clinical and radiological factors.

METHODS

The study was conducted in the Department of Surgery, ESIC MC and PGIMSR, Bengalaru between March 2015 to February 2017. This was a prospective study and 190 patients with symptomatic gall stones were included in the study. Exclusion criteria included patients with suspected GB carcinoma, concomitant common bile duct (CBD) stones, refractory coagulopathy and inability to tolerate general anaesthesia.

All patients underwent USG of the abdomen and LFT the day prior to surgery. One dose of intravenous ceftriaxone (1g) at the time of induction of anesthesia was administered to all patients. All the cases were done under general anesthesia using four-port technique.

LC was categorized as 'difficult' if the operative time from insertion of the first port to removal of gall bladder was more than 1 hour, or where the laparoscopic approach had to be abandoned and converted to open technique because of non-progression. Age (<50 or >=50), sex (male or female), ASA class (I or II) were used as a dichomatous variable. BMI was used as a continuous variable. While abdominal surgery was categorized as none versus any previous abdominal surgery. Co-morbidities were categorized as present or absent.

RESULTS

Eleven patients out of 190 required conversion to open cholecystectomy in our study. Female sex predominance was observed and 124 were females against 66 males diagnosed with cholelithiasis with a female to male ratio of 1.9:1. Out of 124 females, 6 were converted to open holecystectomy and 5 males out of 66 required conversion to open cholecystectomy.
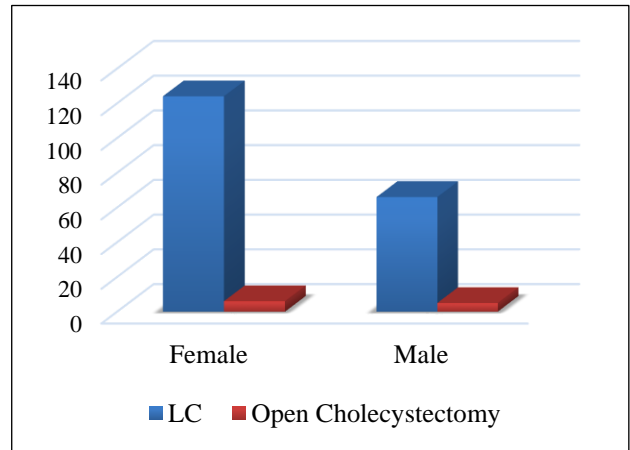

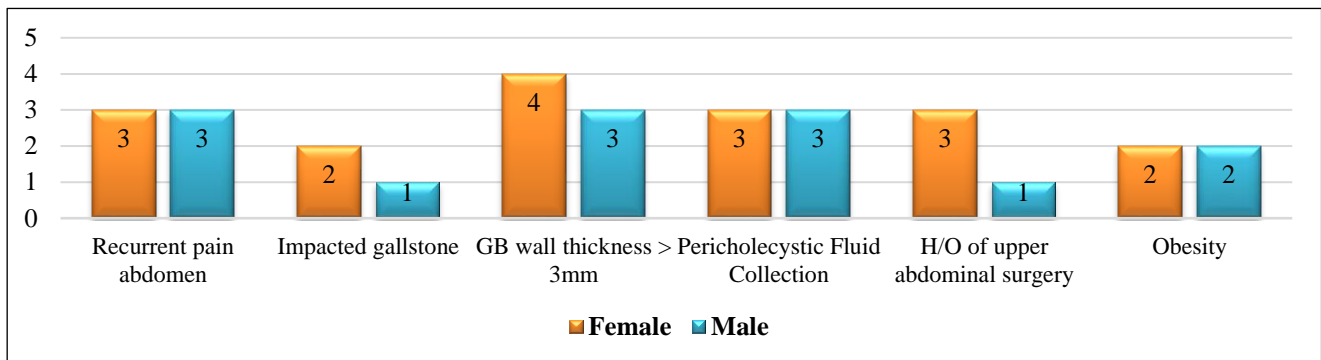**Figure 1: Number of LC converted to open cholecystectomy.**

Figure 2: Risk factors for difficult LC.

Table 1: Parameters used to predict difficult LC.

Age (years)	<50	>50
Number of attacks of pain abdomen	1	≥1
Impacted Gallstone	absent	present
Thickness of GB wall	<3 mm	>3 mm
Pericholecystic fluid collection	absent	present
History of upper abdominal surgery with adhesions	absent	present
BMI (kg/m^2)	≤25	>25

The youngest patient operated was 27 years of age and the eldest one was 76 years. Recurrent episodes of pain abdomen were noted among three out of six women and

three out of five men. Impacted gallstone was found in two women and one man in whom LC failed. GB wall thickness of more than 3 mm was seen in four females

and three males which necessitated conversion to open technique. Pericholecystic fluid collection of varying degrees was noted in three males and females respectively among conversion group. History of upper abdominal surgery was given by three females and one male. Obesity was documented in two males and females respectively among.

Table 2: Intraoperative assessment.

Easy LC	Difficult LC
Time taken <60 minutes	Time taken >60 minutes or conversion
No bile spillage	Bile or stone spillage
No injury to CBD	Injury to CBD

DISCUSSION

Though LC is technically more demanding than the classical OC, with technological advancement and increase in the expertise, the complication rate has significantly reduced to 2.0-6.0%.[1] Conversion to open cholecystectomy should be considered as a sound judgement rather than failure/complication of laparoscopic surgery. Predicting difficult LC beforehand may allow the patients to be mentally prepared for surgery and to plan their absence from work and to adjust their expectations accordingly. From the surgical aspect, the surgeon can be better prepared to take extra precautions to reduce intra-operative complications and to convert from LC to OC at an earlier stage. Also, the presence of senior surgeons can be requested.

Conversion rate in LC in the present study was 5.8%. This is comparable with other studies by Gupta N et al (4.3%), Nidoni R et al (5.6%) and Bhar P et al (5.35%).[1,2,6]

Elderly age as an independent risk for conversion is controversial. While studies by Fried et al, Brodsky et al and Liu et al favour this report, studies by Gupta N et al, Nidoni R et al and Randhawa JS et al show than increasing age is not an independent risk factor for conversion. Advancing age was found to be a risk factor for conversion in our study (p <0.05).[1-3,9-11]

Patients who had multiple attacks of acute cholecystitis (more than one) had higher chances of difficult laparoscopic cholecystectomy and conversion, probably due to dense adhesions at calot's triangle and gall bladder fossa. This was supported by Gupta N et al, Nidoni R et al, Randhawa JS et al, Ali Rizvi et al and others.[1-4]

As per the present study, impacted gall stone had no impact on LC which is supported in the study by Randhawa JS et al.[3] On the other hand, impacted gall stone was found to be a risk factor by Gupta N et al.[1]

Thick GB wall (more than 3 mm) as determined by USG is a potential risk factor for difficult LC as observed in present study and other studies like Gupta N et al, Nidoni R et al, Randhawa JS et al, Ali Rizvi et al, Nachnani J et al.[1-5]

Another parameter considered was pericholecystic fluid collection detected by USG. While it was found to be a significant risk factor in the present study, studies by Gupta N et al and Randhawa JS et al show that pericholecystic fluid collection no longer results in difficult LC.[1,3]

History of upper GI surgery and obesity are other two risk factors that can lead to difficult LC well supported by various studies including the present study.

CONCLUSION

From this study, we conclude that clinical and sonographic findings may help predict a difficult LC. As there are no universally accepted scoring systems for preoperative prediction of difficult LC, we suggest further studies on large scale to formulate an efficient scoring system.

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