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Original Research Article

Assessing Pre & Peri Operative Predictors of Difficult Laparoscopic Cholecystectomy: A Prospective Study

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Abstract

Background: Laparoscopic cholecystectomy is a common abdominal surgery considered to be relatively safe. Risk may arise intraoperatively which may cause the conversion of Laparoscopic cholecystectomy to open cholecystectomy. Thus, preoperative prediction of difficult laparoscopic cholecystectomy should be carried out beforehand to decrease surgical complications, morbidity & increase post-operative comfort.

Aim: To assess pre & peri operative predictors of difficult Laparoscopic cholecystectomy.

Material and Methods: This prospective observational study recruited 60 patients (>18 - 65 yrs) with acute or chronic cholecystitis with cholelithiasis who underwent laparoscopic cholecystectomy. A thorough clinical history recording of weight, height, body mass index (BMI), duration of illness, history of endoscopic retrograde cholangiopancreatography (ERCP), and previous history of acute cholecystitis, upper abdominal pain, vomiting, dyspepsia, jaundice noted. Abdominal examination included liver span, presence & absence of ascitis, palpable gall bladder, abdominal scar (infraumbilical or supraumbilical). Complete blood profile, liver & kidney function tests, coagulation profile, biochemical investigations and abdominal ultrasonography (USG) were performed. During Laparoscopic cholecystectomy, parameters noted were duration of surgery, biliary / stone spillage, bleeding, injury to duct / artery, need for conversion to open cholecystectomy.

Results: The mean age was 48.65 ± 6.42 years with 65% female patients.8.3% had history of hospitalization, 24% had > 27.5 kg/m² body mass index, 8.8% had thickened gall bladder (>4mm), 4% had supraumbilical scar, dense adhesions in 22% with 5% conversion to open cholecystectomy. Significant correlation (p value <0.05) was found between age, gender, history of hospitalization due to previous attacks of cholecystitis, high body mass index, palpable & thickened gall bladder, Pericholecystic collection with difficult laparoscopic cholecystectomy, operating time, dense adhesions requiring conversion to open cholecystectomy.

Conclusion: Prediction of difficulty in laparoscopic cholecystectomy preoperatively can prepare an experienced surgeon to handle complications appropriately. Preoperative indicators are number of previous attacks of cholecystitis, gall bladder wall thickness, and presence or absence of Pericholecystic collection and palpable gall bladder and/or impacted stones along with age, gender, high body mass index. Perioperative predictors affecting the outcome of laparoscopic cholecystectomy are operating time, intraoperative bleeding, and dense adhesions requiring conversion to open cholecystectomy.

Keywords:Preoperative and Perioperative Predictors, Laparoscopic Cholecystectomy, Cholelithiasis, Gall Bladder.

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Introduction

Laparoscopic cholecystectomy (Lap C) is the treatment of choice in cholelithiasis.

Cholelithiasis is the most common biliary disease with clinical presentation of pain in right upper quadrant of the abdomen, which is upon palpation. The prevalence of cholelithiasis, varies between 2-29% in India. [1] It can be asymptomatic in 50-70% patients, in symptomatic cases there is a need to perform elective Lap C. [2] In 1882, Carl Johann August Langenbuch performed the first Open cholecystectomy (Open C) in a patient suffering from cholelithiasis.[3]

In 1985, Dr Erich Mühe of Germany performed the first Lap C has become the gold standard for gall bladder removal with various advantages of minimal invasive surgery, less post-operative pain, day care procedure, earlier return of bowel function, shorter duration of hospital stay & fast postoperative recovery.[4] Inoue et al 2017 stated the superiority of early LC over delayed LC in the treatment of acute cholecystitis (AC). Some disadvantages of Lap C over open C are lack of depth perception, more difficult to control hemorrhage, decreased tactile discrimination, potential CO₂ insufflation complications, more bile duct injuries, limited use in adhesions & inflammations.[5]

In spite of being safe & effective, Lap C can be problematic with difficulty in creating pneumoperitoneum, accessing peritoneal cavity, and releasing adhesions.[4] In cases of acute inflammation difficulty in precisely identifying the anatomy of Calot's increased triangle can result in complications like bile leakage, common bile duct injury, and bowel injury. [5] There are 1-15% chances of conversion of lap C to open C during the operation. This perioperative increases the time. complication rates, perioperative costs, the length of hospital stay, and hospital

charges. This has been shown to associate with bile leakage, duct injury, bleeding requiring reoperation or transfusion & death.[3] Thus predictions of difficulties to be encountered in Lap C should be prepared beforehand to better handle perioperative challenges. Few scoring systems have been developed to assess the risk with no definitive predictions. [6]

Various Pre & peri operative factors affecting the outcome of Lap C are acute cholecystitis, empyema gall bladder, gangrenous cholecystitis, fibrosed gallbladder, severe adhesions in Calot's triangle and intrahepatic gall bladder.[7]

Thus the present prospective study was aimed to analyse the various pre & peri operative indicators in patients undergoing Lap C.

Material & Methods

This prospective observational study recruited 60 patients (>18 - 65 yrs) with acute or chronic cholecystitis with cholelithiasis who underwent Lap C in Gen. surgery department of Atal Bihari Vajpayee govt. medical college & associated hospital Vidisha mp from January 2022 to December 2022. Patients undergoing laparoscopic cholecystectomy with other laparoscopic interventions in the same setting, or with Common Bile Duct (CBD) exploration, bile duct calculus, dilated CBD, features of obstructive jaundice, positive viral marker (HBs Ag, HCV, HIV), pregnant females, who refused to give written informed consent, unfit in preanesthetic checkup, various comorbid contraindications like illnesses. cardiopulmonary illness, coagulopathies and end-stage liver disease were excluded.

The study was approved by the hospital ethics committee & written informed consent taken from patients. A through clinical examination by an experienced surgeon was performed. A thorough history recording of weight, height, body mass index (BMI), duration of illness, history of endoscopic retrograde cholangiopancreatography, and previous history of acute cholecystitis the clinical signs & symptoms of upper abdominal pain, vomiting, dyspepsia, jaundice were recorded. Abdominal examination included liver span, presence & absence of ascitis, presence of palpable gall bladder, presence of previous abdominal scar (infraumbilical supraumbilical). Investigations or undertaken were complete blood profile, liver & kidney function tests, coagulation profile, biochemical investigations and abdominal ultrasonography (USG). USG evaluated for gall bladder wall thickness, Pericholecystic collection, impacted stone.

After this, the patients underwent Lap C and the following parameters were noted i.e. operating time taken from incision to port closure, biliary / stone spillage, bleeding during surgery, injury to duct/artery, need for conversion regarding upon the difficulty of the case.

Statistical analysis

The collected data was tabulated in excel spreadsheet & put to statistical analysis. The data was expressed as mean and standard deviation & percentage. Association between the various parameters was analysed using Chi-square test. P value <0.05 was considered statistically significant.

Results

The present study recruited 60 patients to analyse the pre & perioperative predictors in patients undergoing Lap C. Most of them were above 50 years of age(n=36) and majority were females (n=39). Easy Lap C was encountered in 67% of the patients, 26% had difficult & 7% had very difficult Lap C. Preoperative indicators like age, male predilection, history of hospitalization, BMI >27.5 kg/m², palpable & thickened gall bladder, Pericholecystic collection, showed a significant association with the difficulty of Lap C. (Table 1) Perioperative parameters like operating time, intraoperative bleeding, dense adhesions showed a significant association (p value <0.05) with the difficulty of Lap C& 5% showed conversion to open C (Table 2).

Demographic & Pre-operative parameters	Mean±SD	P Value
Age (years)	48.65±6.42	<0.05 Sig
Gender (Male/ Female)	17/33	<0.05 Sig
Percentage of female (%)	65%	
History of hospitalization (%)	8.3%	<0.05 Sig
BMI (kg/m^2)		
<25	40.6%	
25-27.5	35.4%	
>27.5	24%	<0.05 Sig
Abdominal Scar (%)		
No	31%	
Infraumblical	25%	>0.05 non-Sig
Supraumblical	4%	
Palpable gall bladder	0	
Thickness of gall bladder		
< 4mm	91.2%	
>4mm	8.8%	<0.05 Sig
Pericholecystic collection	13.4%	<0.05 Sig

 Table 1: Relation between demographics characteristics & preoperative parameters &

 the difficulty of laparoscopic cholecystectomy.

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Impacted stone	None	
No. of stone		
Single	28%	>0.05 non-Sig
Multiple	72%	
Size of stone	9.7±5.4	>0.05 Non Sig

Table 2: Relationship between perioperative parameters and difficulty of LC

Perioperative parameters	Mean±SD/ Frequency	P value
Operative time	46.8±17.7	<0.05
Intraoperative bleeding	2%	>0.05
Dense adhesions	22%	<0.05
Conversion to open	5%	< 0.05

Discussion

Laparoscopic cholecystectomy is the most common abdominal surgery worldwide, with improved technology is becoming safer, cost effective & cosmetically preferred.

Age is considered to be an important risk factor in Lap C since it is associated with various comorbid conditions diabetes mellitus, cardiovascular illness.[8] In the present study, 60% of patients were in > 50category with age statistically vrs significant association observed with difficult Lap C. In Baki et al study mean age was 42.5 ± 11.7 years.[9] In Jeremy M Lipman et al study mean age was 44.2 \pm 16.8 years & that 26.8 % patients with >65yrs age had difficult Lap C.[10]

In the present study, there were 35% males & 65% females. Out of total males, 50% encountered difficulty in Lap C. There was no statistically significant difference in the duration of surgery in both genders. Eldar S et al observed males to be more prone for conversion from lap to open cholecystectomy which was statistically significant.[11] In accordance with the study by O'Leary DP et al 2013 also showed difficult Lap C in males. [12]

In the present study, palpable gall bladder was not found in any patient. Clinically palpable gall bladder could be a predictor of difficult Lap C. [13] In contrast, study done by Agrawal N 2015, found 90% of the patients having clinically palpable gall bladder to have difficult procedure postsurgery.[14] Few studies have been found in literature supporting clinically palpable gall bladder as a predictor of difficult Lap C. Abd-El-Aal and Abdallah 2018 found GB wall thickness to be predictor of difficult Lap C. In univariate analysis of preoperative and intraoperative outcomes Palpable GB is found to be statistically significant risk factor.[15]

In the present study, no correlation was noted between number & size of gall bladder stone & liver USG findings with the outcome of Lap C.

In the present study, a previous history of hospitalization was shown to be significantly associated with difficult Lap C (p<0.05). Study done by Agrawal N, found strongly significant linear correlation between previous history of hospitalization and difficult Lap C. Recurring attacks of cholecystitis increases the thickness of gall bladder with scarring, fibrosis & adhesions at the Calot's triangle and between Gall bladder and fossa.[14]

Perioperatively, impacted stone at the neck of gall bladder leads to surgical problems, due to gall bladder distension & thickened wall. Difficulty may arise to adequately retract the neck of gall bladder & perform dissection at the Calot's triangle.[16] Agrawal N 2015 study found 33.3% patients with impacted stone & reported statistically significant association between its & difficult procedure.[14] Sahu et al

Singh et al.

noted more risk for difficult Lap C in patients with impacted stone in the neck of gall bladder. [17]

In the present study, 24 % of the patients had high BMI >27.5 kg/m². This was statistically significantly associated with difficult Lap C (p<0.05) . Various factors play a role in obese patients as longer time of placement of port due to the thick abdominal wall. Excess intraperitoneal fat may obscure the anatomy & dissection at the Calot's triangle mav become difficult.[18] Dhanke PS et al 2014[19], Nachnani J et al 2005[20] observed high BMI(>30 kg/m2) to be a significant predictor of difficult of Lap C. In contrast, Agrawal N study 2015 didn't found any correlation between BMI and difficult level of surgery.[14]

In the present study, Pericholecystic collection was found in 13.4% of the patients & found to be statistically significantly associated to be a predictor of difficult Lap C. Accordingly, Agrawal N study 2015 found difficulty in procedure in 90.9% of such patients with strong correlation with Pericholecystic collection.[14] Elgammal AS et al. 2019 patients study showed that with pericholecystic collection was significantly association with difficult laparoscopic cholecystectomy & had 3.7 times more risk for difficult cholecystectomy as compared with no Pericholecystic to patients collection.[21] Similar results were noted by Abd-El-Aal and Abdallah 2018,[15] Sandhu et al 2016 [22] & Ghanem et al 2017 [7]. In contrast, Naik and Kailas 2017 found no statistically significant association between pericholecystic collection & difficult procedure.[23]

In the present study, supraumbilical scars & infraumblical scars were noted in 4% & 25% of patients. There was no statistically significant association between abdominal scars & difficult scars. Accordingly, Elgammal AS et al. 2019 reported statistically insignificant association of abdominal scars as a predictor of risk preoperatively & perioperatively. Scars due to previous abdominal occurs operations & may lead to adhesions between omentum and abdominal wall.[21] Hussain A. reported higher chances of injury to omentum and abdominal wall during insertion umblical port with increased risk of conversion of Lap C to open C .[24] Sandhu et al 2016 observed that the abdominal scar doesn't have a significant association with the outcome of Lap C. [22] Ko-iam et al 2017 also noted it to be a non-significant predictor for a lengthy hospital stay Lap C patients.[25] However, study by Agrawal N 2015 reported supraumbilical scars to be a significant predictive factor. [14]

In the present study, GB wall thickness was >4mm in 8.8% of patients which showed statistically significant association as predictor of difficult procedure. Increased thickness may pose challenges to grasping, manipulation & dissection GB from its bed.[26] Agrawal N 2015 found no significant correlation between the GB wall thickness and the difficulty level of surgery. [14]

In the present study, conversion rate to open C was 5% which may be due to higher age group, previous history of hospitalization, dense adhesions in 22 %. Previous literature reports conversion rate between 7 and 35%.[27] Difficult surgeries noticed conversion rate of 25% .[28] In Elgammal AS study, the conversion rate was 4%, because of dense adhesions at Calot's triangle, Mirrizi's syndrome.

Uncontrolled bleeding in 2% cases & all were males.[21]

In the present study, dense adhesions were noted in 22 % of patients. Adhesions are statistically significantly perioperative predictor of difficult Lap C which cannot be assessed on USG. Individual anatomic variations can make identification of structures difficult & may require surgical expertise.[29]

Conclusion

Various pre & perioperative indicators can predict difficulty encountered in Lap C which are necessary to surgical planning of cases. Preoperative indicators i.e. previous history of hospitalization, gall bladder wall thickness, and presence or absence of pericholecystic collection and palpable gall bladder and/or impacted stones along with age, gender, high body mass index are found to be significantly associated with difficult procedure. Perioperative predictors affecting the outcome of laparoscopic cholecystectomy are operating time, intraoperative bleeding, and dense adhesions requiring conversion to open cholecystectomy.

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