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Original Research Article

Pre-operative factors for predicting a difficult laparoscopic cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy is a very safe procedure yet there are instances where serious complications can be avoided and better managed if the surgeon is forewarned or prepared in advance for them. So, a need is felt to identify pre-operative parameters for anticipating a difficult cholecystectomy.
Methods: This study was carried over a period of two years (2007- 2009). Patients having symptomatic cholelithiasis willing to undergo laparoscopic cholecystectomy were enrolled in the study. The following pre-operative parameters were evaluated in the study: age, sex, body mass index, history of previous abdominal surgery, history of acute cholecystitis, history of biliary colic, palpable lump in right hypochondrium, experience of the surgeon and abdominal ultrasonogram (following parameters were noted increased gallbladder wall thickness, number of stones, size of largest stone and its location).
Results: Acute cholecystitis, palpable gall bladder, increased gallbladder wall thickness, biliary colic, gall stones >2 cm in size, gall stone impacted at gallbladder neck and BMI >30 kg/m^2 had a significant p-value in a difficult laparoscopic cholecystectomy.
Conclusions: Further research is needed to formulate a score based on the variables mentioned above to predict a difficult laparoscopic cholecystectomy and hence letting the surgeon be better prepared for any eventualities that he encounters whilst performing laparoscopic cholecystectomy.

Keywords: BMI, Cholecystectomy, Difficult, Laparoscopic

INTRODUCTION

In 1882 Carl Johann Langenbuch performed the first open cholecystectomy for cholelithiasis, since then it was the procedure of choice in the management of gall stone disease.[1] Cholelitiasis is a very common disease with a prevalence of 4% in India.[2] Since the advent of laparoscopy and the obvious advantages of better cosmesis, less post-operative pain, early recovery, etc., laparoscopic cholecystectomy has become the gold standard of treatment for gall stone disease.[3] Nearly 80% of all the cholecystectomies performed for gall stone disease are laparoscopic cholecystectomies.[4] Although a safe procedure, instances arise when it becomes a very difficult and cumbersome procedure due to reasons like difficulty in accessing the peritoneal cavity, identifying the relevant anatomy, creating pneumoperitoneum, anatomical variations, adhesiolysis, extracting the gall bladder from the peritoneal cavity and long duration of surgery itself.[5] In view of these, laparoscopic cholecystectomy has been classified by some authors as easy (time taken for surgery <60 minutes, no bile

spillage, no injury to duct/artery), difficult (time taken for surgey is 60-120 mins, bile/ stone spillage, injury to duct, no conversion to open cholecystectomy) and very difficult (time taken >120 mins, conversion to open cholecystectomy).[6]

The present study was undertaken to identify various factors associated with laparoscopic cholecystectomy, that may help us in predicting or anticipating a difficult laparoscopic cholecystectomy beforehand in the pre-operative period, hence allowing the surgeon to prepare in advance for the difficulties encountered during the procedure, thus reducing the morbidity and mortality with a difficult laparoscopic cholecystectomy.

METHODS

This study was carried over a period of two years (2007-2009) at Government Medical College, Srinagar, Jammu and Kashmir. The patients having symptomatic cholelithiasis willing to undergo laparoscopic cholecystectomy were enrolled in the study. Patients having surgical jaundice, choledocholelithiasis or any contraindication for general anaesthesia were excluded from the study.

The patients were evaluated prior to undergoing laparoscopic cholecystectomy with a detailed history and examination followed by all the relevant investigations (complete blood counts, liver function tests, kidney function tests, blood sugar levels, serum electrolytes, electrocardiogram, coagulation profile, chest skiagram and ultrasonography of the abdomen). An abdominal ultrasound was done preoperatively after overnight fasting and then within two week of surgery and the data relevant to the study was collected. On the basis of data collected, the following pre-operative parameters were considered in the study: age, sex, body mass index, history of previous abdominal surgery, history of acute cholecystitis, history of biliary colic, palpable lump in right hypochondrium, experience of the surgeon and on ultrasonography the following parameters were noted increased gallbladder wall thickness, number of stones, size of largest stone and its location .

Age and body habitus were evaluated as dichotomous variables, i.e., >65 years and <65 years and obese (BMI >30 kg/m^2) and non-obese (BMI <30kg/m^2) respectively.

Previous abdominal surgery was categorized as having no previous abdominal surgery and having undergone previous intra-abdominal surgery.

History of acute cholecystitis was taken as severe right upper quadrant pain radiating to the inferior angle of scapula or shoulder, vomiting, fever, requiring admission to the Emergency Department or any previous ultrasonographic documentation of an episode of acute cholecystitis within 8 weeks of undergoing the present laparoscopic cholecystectomy. Gall bladder wall thickness was evaluated as dichotomous variable (≥3mm versus ≤3mm). Gall bladder calculus size was defined as maximum diameter of the largest stone and was evaluated as <2 cm versus >2 cm as a dichotomous variable. Gall bladder calculus number was defined as solitary or multiple. Stone mobility was assessed by scanning the patient in supine and left lateral position. If the gall stone moved as the patient's position changed, the stones were considered mobile. Experience of the surgeon was taken as a dichotomous variable (>200 cases versus <200 cases).

Intra-operative assessment of the difficulty encountered, if any, was noted in each case. The cases which were converted to open surgery were noted. The criteria for technical difficulty were problems encountered due to equipment, amount of time taken for completion of procedure i.e., insertion of veress needle to removal of last trocar and cannula (more or less than 90 minutes), amount of bleeding (mild, moderate or severe), anatomy of calot's triangle (clear/unclear), adhesions (partial/dense), difficulty in extracting the gallbladder (present/absent) and spillage of bile or stones in the peritoneal cavity (present/absent). All the cases which were technically difficult or converted to open cholecystectomy were grouped into the category of cases with intra-operative difficulty during laparoscopic cholecystectomy and the cases where no significant technical difficulty was encountered were grouped separately as cases with no intra-operative difficulty. The ultrasonographic finding recorded preoperatively were also confirmed during operative surgery.

The objective of this study was to identify pre-operative parameters for anticipating a difficult cholecystectomy.

RESULTS

We operated upon a total of 100 patients, who were enrolled in our study as subjects. The number of male and female patients in our study group were 30 and 70 respectively.

Table 1: Preoperative variables.

Preoperative variables	N
Age (> 65 yr)	7
Males	30
BMI (>30 kg/m^2)	33
H/O previous abdominal surgery	20
H/O previous attack of acute cholecystitis	16
Single attack	52
Multiple attack	32
H/O biliary colic (> 10 attacks)	10
Lump in right hypochondrium	6
GB wall thickness (>3 mm)	23
Size of largest stone (> 2 cms)	20
Impacted stone at neck of gall bladder	20
Multiple calculi on USG	75

The age distribution from the youngest to the oldest subject was 15 and 74 years respectively. The commonest age group to be operated upon was 25-34 years. The preoperative factors assessed in our study are shown in Table 1.

No significant association was found between the age, gender of the patients or history of previous surgery and intra-operative difficulty during laparoscopic cholecystectomy in our study group. We found a significant relation between acute cholecystitis and intraoperative difficulty during laparoscopic cholecystectomy with p-value being 0.024. The relation was strongly significant between multiple episodes of acute cholecystitis and intraoperative difficulty during laparoscopic cholecystectomy (p-value 0.012) and insignificant for solitary episode of acute cholecystitis and intraoperative difficulty during laparoscopic cholecystectomy (p-value 0.485).

We also found a significant relation between intraoperative difficulty during laparoscopic cholecystectomy and pre-operative palpable gall bladder lump (p-value 0.003), increased gall bladder wall thickness (p-value 0.000), biliary colic (p-value 0.029), size of largest gallstone (p-value 0.00), location of gallstone at the neck (impacted) of the gall bladder (0.000) and BMI (p-value 0.005). The comparison of the ultrasonographic and intraoperative findings is shown in Table 2.

Table 2: Comparison between ultrasonographic findings and intra-operative findings.

Findings		Ultrasonographic	Operative	p value
Gall stone		100	100	1.000
Gall bladder wall thickness	≥3 mm	23	25	0.741
	<3 mm	77	75	
Size of largest calculi	>2 cm	20	19	0.858
	≤2 cm	80	81	
Location of GB stone	Impacted	20	21	0.861
	Unimpacted	80	79	
Multiple calculi	Present	75	80	0.397
	Absent	25	20	

Twenty two patients took more than 90 mins intra-operative time to undergo the laparoscopic cholecystectomy, difficult anatomy was encountered in 14 patients, bleeding (>100 ml) occurred in 11 patients, adhesions with subsequent adhesiolysis was performed in 20 patients, intra-peritoneal gall bladder contents spillage occurred in 36 patients (stones along with bile and bile alone were spilled in 10 and 26 patients respectively), difficulty in gall bladder extraction occurred in 20 patients and conversion to open cholecystectomy happened in 3 cases.

DISCUSSION

Laparoscopic cholecystectomy is considered as the gold standard for the treatment of cholelithiasis.[3] Various criteria have been identified for predicting a difficult laparoscopic cholecystectomy like male gender, obesity, geriartic patients, recurrent episodes of acute cholecystitis, thick walled gall bladder and contracted gall bladder.[7]

We found no association between age/ gender/ history of previous abdominal surgery with intra-operative difficulty during laparoscopic cholecystectomy in our study. These findings are consistent with other studies conducted by various authors.[8-10] A significant relation was found by us between previous attacks of acute cholesystitis and intra-operative difficulty during laparoscopic cholecystectomy. Similar findings have been corraborated by various authors in litreature.[10-12] Some authors have reported no significant relation between gall bladder wall thickness and a difficult laparoscopic cholecystectomy whilst others have reported it to be significant.[8,13] Present study found this relation to be statistically significant.

Gall stone impacted at the neck of the gall bladder and size of the largest stone showed a significant relation with difficult laparoscopic cholecystectomy. In the litreature certain authors have reported similar findings whilst others do not concur with it.[8,13] Patients having BMI more than 30 was significantly related to difficult cholecystectomy, the difficulty arose while gaining intra-peritoneal access, dissecting at calots triangle due to excess fat and while extracting the gall bladder and its contents from the peritoneal cavity. Various authors have reported similar findings.[6,8]

CONCLUSION

In the present study, acute cholecystitis, palpable gall bladder, increased gallbladder wall thickness, biliary colic, gall stones >2 cm in size, gall stone impacted at

gallbladder neck and BMI >30 kg/m^2 had a significant p-value in a difficult laparoscopic cholecystectomy. Further research is needed to formulate a score based on the variables mentioned above to predict a difficult laparoscopic cholecystectomy, hence letting the surgeon be better prepared for any eventualities that he encounters whilst performing laparoscopic cholecystectomy.

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