

Original Research Article

Predicting difficult Laparoscopic Cholecystectomy based on clinico radiological parameters

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Abstract: Laparoscopic cholecystectomy is now considered to be gold standard operation for cholelithiasis. Pre-operative prediction of difficult laparoscopic cholecystectomy can help in better preparation to tackle intraoperative difficulties and assessing chances of conversion to open procedure. The aim is to predict difficult laparoscopic cholecystectomies by clinical and radiological assessment. Patients reporting to the Surgery dept. within study duration Jan. 2016 to Dec.2016. Pre-operative clinical and ultrasonographic criteria were considered and compared with intraoperative difficulty encountered. Out of 50 patients, 3 required conversion to open cholecystectomy. Factors that were significant in predicting difficult laparoscopic cholecystectomy were attack of cholecystitis in last 15 days from surgery, duration of attacks of cholecystitis for more than 6 months, history of fever during attacks of cholecystitis, positive Murphy's sign at the time of presentation, gall bladder wall thickness >3mm. Difficult laparoscopic cholecystectomy can be predicted based on clinical and ultrasonographic findings.

Keywords: Cholelithiasis, Cholecystectomy, Laparoscopic cholecystectomy

INTRODUCTION:

As a consequence of advancements in the techniques and instruments of laparoscopy, laparoscopic cholecystectomy has become gold standard procedure for treatment of cholelithiasis. It offers advantages of small incision, early recovery and less pain compared to open cholecystectomy. Laparoscopic cholecystectomy is now considered a safe procedure in the hands of experienced laparoscopic surgeons but certain factors can lead to difficulty during laparoscopic cholecystectomy. At present, laparoscopic cholecystectomy is considered the treatment of choice for symptomatic cholelithiasis. It has many advantages over open cholecystectomy in terms of minimal postoperative pain, shorter hospital stay, better cosmetics and early recovery. As the experience with laparoscopic cholecystectomy is increasing throughout the world, selection criteria have become more liberal. Most of the factors like morbid obesity and previous upper abdominal surgery which were considered as absolute contraindication for attempting laparoscopic cholecystectomy have no longer remained as absolute

contraindications. The number of contraindications has come down significantly over time.

The aim of our study was to predict difficult laparoscopic cholecystectomies by clinical and radiological assessment and help in pre-operative preparedness to early intra operative decision of conversion.

MATERIALS AND METHODS:

It is a prospective hospital based study conducted in Dept. of Surgery, S.P. Medical College and P.B.M Hospital, Bikaner. A total of 50 patients of all age group and both sex with symptomatic gallstone disease who presented between Jan. 2016 to Dec. 2016 were included in study. A detailed proforma was used to record patient particulars, clinical findings, laboratory parameters, details on ultrasonography and intraoperative findings. Intraoperative findings used to label difficult laparoscopic cholecystectomy were difficult Intra peritoneal access, difficult Calot's triangle dissection, excessive bleeding during surgery and difficult gallbladder bed dissection.

Inclusion Criteria: patients who require cholecystectomy for reasons like acute calculus cholecystitis and chronic calculus cholecystitis were included.

Exclusion Criteria: Patients with common bile duct stone, jaundice or abnormal liver function test, acalculus cholecystitis, known carcinoma gall bladder, peritonitis, cholangitis, biliary enteric fistula, portal hypertension and contraindication to laparoscopic surgery.

STATISTICAL METHOD: Variables were analyzed by chi-square test and p-value was calculated to assess significant association of a variable.

RESULTS:

There were 50 cases out of which 46 were females and 4 were males. Out of 50 patients who underwent laparoscopic cholecystectomy, 13 were considered as difficult by operating surgeon. Among

difficult cases 13 had difficulty in Calot's triangle dissection, 6 had excessive bleeding during surgery, 6 had difficult gall bladder bed dissection and 3 were converted to OC.

The clinical parameters having significant association with difficult laparoscopic cholecystectomy were attack of cholecystitis in last 15 days from surgery, duration of attacks of cholecystitis for more than 6 months, history of fever during attacks of cholecystitis, Positive Murphy's sign at the time of presentation.

Pre-operative ultrasonographic findings like size of gallbladder, gallbladder wall thickness, pericholecystic fluid collection, calculus size, number of calculi were evaluated. The only variable significantly associated with difficult laparoscopic cholecystectomy was gall bladder wall thickness >3mm.

VARIABLE	NO. OF PATIENTS (50)	PATIENTS WITH INCREASED DIFFICULTY IN SURGERY (13)	X ²	P value
Age	>45= 30 <45= 20	02 (6.66%) 11 (55%)	0.859	0.354
Sex	MALE- 04 FEMALE- 46	01 (25%) 12 (26.08%)	0.291	0.59
Residence	RURAL- 22 URBAN- 28	08 (36.36%) 05 (17.85%)	0.666	0.414
No. Of Attacks In Last 15 Days Of Surgery	NONE- 37 ≥1 – 13	02 (5.40%) 11 (84.61%)	12.64	0.001
Duration Of Attacks >6 Months	YES- 07 NO- 43	06 (85.71%) 07 (16.27%)	4.698	0.030
H/O Fever During Attack	YES- 25 NO- 25	12 (48%) 01 (4%)	5.974	0.015
H/O Jaundice During Attack	YES- 04 NO- 46	03 (75%) 10 (21.73%)	1.093	0.296
H/O Previous Upper Abdominal Surgery	YES- 00 NO- 50	00 13 (26%)	-	-
Murphy's Sign At The Time Of Presentation	YES- 07 NO- 43	06 (85.71%) 07 (16.27%)	4.698	0.030
Total Leucocyte Count	<11000- 44 >11000- 06	09 (20.45%) 04 (66.66%)	1.498	0.221
Size Of Gall Bladder	DISTENDED- 39 CONTRACTED- 11	07 (17.94%) 06 (54.54%)	1.952	0.162
Gall Bladder Wall Thickness	≤3MM= 38 >3MM= 12	04 (10.52%) 09 (75%)	7.572	0.006
Pericholecystic Collection	YES- 02 NO- 48	02 (100%) 11(22.91%)	0.742	0.389
Calculus Size	≤10MM=27 >10MM=23	07 (25.92%) 06 (26.08%)	0.091	0.762
Number Of Calculi	SINGLE- 13 MULTIPLE- 37	00 13 (35.13%)	-	-

Variables used to define difficult laparoscopic cholecystectomy:

Difficult intraperitoneal access	YES- 00 NO- 50
Difficult calot's triangle dissection	YES- 13 NO- 37
Excessive bleeding during surgery	YES- 06 NO- 44
Difficult gall bladder bed dissection	YES- 06 NO- 44
Conversion to oc	YES- 03 NO- 47

DISCUSSION:

Laparoscopic cholecystectomy is the gold standard procedure for symptomatic cholelithiasis. We did our study on 50 patients undergoing laparoscopic cholecystectomy in Dept. of General Surgery at Sardar Patel Medical College and PBM hospital, Bikaner, Rajasthan. The purpose was to identify group of patients in which laparoscopic approach can be technically difficult, which, if identified preoperatively or early during surgery can optimize surgical planning, reduce the chances of avoidable complications, unnecessary prolongation of surgery and early decision of conversion to open procedure can be taken.

In most of the studies age was considered to be a risk factor for difficult laparoscopic cholecystectomy. Randhawa *et al.*; [7] found that age >50 years is associated with difficulties in Calot's triangle dissection and adhesiolysis. Sanabria *et al.*; also considered age to be a risk factor. [9]. Fried *et al.*; considered age >65 to be a risk factor [1]. Contrary to above studies, in our study age < 45 years was associated with slightly more incidence of increased difficulty (36%) during laparoscopic cholecystectomy as against 16% in cases of age group ≥ 45 years. Likely due to more attacks of cholecystitis in patients in ≤ 45 years age group. However, p-value was non-significant (0.354)

Male sex as an independent risk for conversion is controversial. It has been observed that male patients more intense inflammation and fibrosis resulting in difficult Calot's triangle and gall bladder bed dissection by Nachnani et al [6]. Liu *et al.*; did not notice sex to be associated with conversion [4]. In our study, male sex was not found to be a risk factor for conversion (p value 0.59) possibly because of less number of male cases operated upon. Considering demographic risk factor, difficulty in laparoscopic cholecystectomy was observed more in patients from rural background compared to urban possibly because of delayed presentation and less health awareness among people

from rural areas. However, p value was non-significant (0.414). An attack of acute cholecystitis 15 days prior to surgery was found to be a risk factor for difficult laparoscopic cholecystectomy as concluded by Jitendra Singh Yadav *et al.*; [2]. Fried et al. also considered acute cholecystitis to be a risk factor for conversion [1]. In our study, similar findings were observed with 84.61% incidence of difficult laparoscopic cholecystectomy in patients with ≥1 attacks of acute cholecystitis 15 days prior to surgery possibly due to inflammation at pericholecystic area leading to difficult visualisation and dissection of Calot's triangle.

Patients presenting with history of attacks of cholecystitis with duration of more than 6 months have more chances of difficult laparoscopic cholecystectomy and conversion, most probably due dense adhesions at Calot's triangle and gall bladder fossa [5]. In our study also, it was found to be a significant factor to predict difficult laparoscopic cholecystectomy with and 85.71% of patients with history of attacks for more than 6 months having difficulty in laparoscopic cholecystectomy. In cases with positive history of fever during attack of cholecystitis difficulty during laparoscopic cholecystectomy was encountered in 48% cases as compared to 4% in cases with negative history, suggesting it to be a significant risk factor in predicting difficult laparoscopic cholecystectomy with significant p-value 0.015. It is possibly due to fever signifying more severe form of inflammation as a result of cholecystitis.

Positive history of jaundice during attack of cholecystitis was found to be a risk factor for difficult laparoscopic cholecystectomy as concluded by Jitendra Singh Yadav *et al.*; [2] In our study 3 out of 4 cases with history of jaundice had difficult laparoscopic cholecystectomy but this factor was found to be insignificant with p-value 0.296 possibly due to small sample size. History of previous upper abdominal surgery predisposes to adhesions between viscera or

omentum and abdominal wall. This can lead to increased chances of injury to these structures during port insertion. Risk of conversion to OC was reported to be higher in these patients by and Nachnani *et al.*; [6]. No cases with history of upper abdominal surgery were encountered in our study. Murphy's sign signifies acute cholecystitis. In our study, 6 (85.71%) out of 7 patients who presented to us with positive Murphy's sign had difficult laparoscopic cholecystectomy possibly due to increased chances of inflammation as a result of cholecystitis. However, Jitendra Singh Yadav *et al.*; did not find right hypochondrium tenderness to be a significant risk factor [2].

Raised total leucocyte count (>11000/cu.mm) has been identified as a predictor of difficult laparoscopic cholecystectomy and conversion by Ravindra Nidoni *et al.*; [8]. This can be attributed to persistence of acute inflammation with edematous gall bladder making the procedure difficult. In our study, 66.66% patients with raised TLC had difficult laparoscopic cholecystectomy compared to 20.45% cases with TLC within normal limits.

Difficulty in gall bladder grasping is associated with both distended and contracted gall bladder as concluded by Vivek MK *et al.*; [10]. A distended gall bladder is not grasped easily as it tends to slip away. An over distended gall bladder may require bile evacuation which can lead to spillage of bile in peritoneal cavity. As a result of repeated attacks of acute cholecystitis or acute pancreatitis gall bladder may become scarred and fibrosed and it can also result in dense fibrosis and adhesions at Calot's triangle or in gall bladder fossa rendering laparoscopic cholecystectomy difficult. In our study, 54.54 % of cases with contracted gall bladder had difficulty in laparoscopic procedure as against 17.94% cases with distended gall bladder.

Thickened gall bladder wall is an ultrasound finding in acute cholecystitis and it was considered a significant risk factor in previous studies [6]. Majeski James in 1990, showed that a preoperative gallbladder ultrasound evaluation for symptomatic cholecystitis, which documents a thick gallbladder wall (=3 mm) with calculi, is a clinical warning for the laparoscopic surgeon of the potential for a difficult laparoscopic cholecystectomy procedure which may require conversion to an OC procedure [5]. Similarly Fried *et al.* considered thickened gall bladder wall to be an independent risk factor for conversion [1]. In our study, 75% cases with increased gall bladder wall thickness (>3mm) had difficulty in laparoscopic cholecystectomy as against 10.52% cases with normal gall bladder wall

thickness (≤ 3 mm). Pericholecystic collection is also an ultrasound finding in acute cholecystitis. Randhawa *et al.*; concluded it to a non-significant finding in their studies [7]. In our study, both cases with pericholecystic collection had difficult laparoscopic cholecystectomy as against 22.91% cases with no pericholecystic collection.

Large calculus at neck region is associated with distention of gall bladder as stated by Lal *et al.*; [3] leading to difficulty in grasping of gall bladder. In our study, calculus size is a non-significant factor with p-value of 0.762 in accordance with findings of Jitendra *et al.*; [2]. Multiple stones are associated with difficulty in gall bladder extraction through small incision of laparoscopic cholecystectomy and hence may lead to perforation of gall bladder with spillage of bile and gall stones as noted by Lal P *et al.*; [3]. The need to increase the length of epigastric port incision may also arise. In our study all the cases which had difficult laparoscopic cholecystectomy were associated with multiple stones and none of the cases with single stone had any difficulty during laparoscopic approach. The overall conversion rate in our study was 6%. Ravindra Nidoni *et al.*; conducted study on 180 patients undergoing laparoscopic cholecystectomy [8]. Conversion rate in their study was 6%. Out of 50 cases, 3 were converted to OC.

Patient 1, 45 year male from urban background had 2 attacks of cholecystitis in last 15 days prior to surgery, duration of attacks was > 6 months with positive history of fever during attacks, TLC > 11000/cu mm. USG findings showed distended gall bladder with 6mm thick gall bladder wall, multiple calculi largest 13mm and no pericholecystic collection. Difficult Calot's triangle dissection, excessive bleeding during surgery and difficult gall bladder bed dissection led to conversion to OC.

Patient 2, 18 year old female from rural background had single attack of acute cholecystitis in last 15 days, duration of acute attacks >6 months with positive history of jaundice, TLC > 11000/cu mm and positive Murphy's sign at the time of presentation. USG findings showed distended gall bladder with 5mm thick gall bladder wall, multiple calculi of 6-10mm and no pericholecystic collection. Difficult Calot's triangle dissection, excessive bleeding during surgery and difficult gall bladder bed dissection led to conversion to OC.

Patient 3, 40 year old female from rural background had single attack of acute cholecystitis in last 15 days, duration of acute attacks >6 months with

positive history of fever and positive Murphy's sign at the time of presentation. USG findings showed contracted gall bladder with normal gall bladder wall, multiple calculi of 6-10mm and no pericholecystic collection. Difficult Calot's triangle dissection, excessive bleeding during surgery and difficult gall bladder bed dissection led to conversion to OC.

SUMMARY AND CONCLUSIONS

- The incidence of cholelithiasis is more in females than males.
- This study has shown higher incidence of difficult laparoscopic cholecystectomy in patients under 45 years of age.
- Recent and repeated attacks of cholecystitis have definite association with difficult laparoscopic cholecystectomy.
- People from rural background are more likely to delay seeking medical advice for acute cholecystitis attacks and hence are more prone to have difficulty during laparoscopic cholecystectomy.
- Patients with history of fever during attack of cholecystitis have significant association with difficult laparoscopic cholecystectomy.
- History of jaundice during cholecystitis also increases risk for difficult laparoscopic cholecystectomy.
- positive Murphy's sign at presentation which signifies acute cholecystitis has definite and significant association with difficult laparoscopic cholecystectomy
- Raised total leucocyte count has not found to have significant association with difficulty during laparoscopic cholecystectomy.
- The study has shown increased incidence of difficult laparoscopic cholecystectomy in contracted gall bladder and gall bladder with pericholecystic collection. However, statistical significance could not be demonstrated for these factors.
- Thickened gall bladder wall with thickness >3mm has definite and significant association with difficulty during laparoscopic cholecystectomy.
- The study has shown no association of difficult laparoscopic cholecystectomy with size of stones.
- Single stone in gall bladder does not alter the per-operative difficulty in laparoscopic cholecystectomy.

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