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Research Article

Evaluation of preoperative predictive factors that determine difficult laparoscopic cholecystectomy

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ABSTRACT

Background: Cholelithiasis is the most common biliary pathology. Gallstones are present in 10 to 15% of the general population and asymptomatic in the majority (>80%). The prevalence of gallstone varies widely in different parts of the world. In India it is estimated to be around 4%. Since laparoscopic cholecystectomy is the most common procedure done now days we undertook a study to evaluate factors determining difficult laparoscopic cholecystectomy. The objective of the study was to evaluate preoperative data that can serve as predictors of difficult laparoscopic cholecystectomy and help in planning of surgery.
Methods: Patients presenting with upper abdominal discomfort and sonographically confirmed cholelithisis were studied in terms of several clinical factors and scoring system was devised. Based on scoring system patients were categorised and evaluated post operatively.
Results: In present study prior history of hospitalisation ($p<0.001$), previous abdominal surgeries ($p<0.01$), palpable gall bladder ($p<0.01$), BMI >27.5 ($p<0.01$), thickened GB wall ($p<0.001$) were found to be significant predictors of difficult laparoscopic cholecystectomy. Remaining parameters like age, sex, impacted stone and pericholecystic collection were not found significant predictors of difficult laparoscopic cholecystectomy.
Conclusions: Difficult laparoscopic cholecystectomy can be predicted preoperatively based on parameters used in the study. Knowledge of these factors for difficult laparoscopic cholecystectomy could help surgeons during pre-operative assessment and improve the informed consent.

Keywords: Laparoscopic cholecystectomy, Preoperative factors

INTRODUCTION

Cholelithiasis is the most common biliary pathology.[1] Gallstones are present in 10 to 15% of the general population and asymptomatic in the majority (>80%). The prevalence of gallstone varies widely in different parts of the world. In India it is estimated to be around 4%.[2] An epidemiological study showed that north Indians has 7 times higher occurrence of gallstones as compared to south Indians.[3]

Changing incidence in India is mainly attributed to westernization and availability of investigation that is ultrasound in both rural and urban areas and due to change in socioeconomic structure. Approximately 1-2% of asymptomatic patients will develop symptoms requiring cholecystectomy per year, making cholecystectomy one of the most common operations performed by general surgeons.

The advantages of laparoscopic cholecystectomy over open cholecystectomy are earlier return to bowel functions, less postoperative pain, better cosmetic outcome, shorter length of hospital stay, earlier return to full activity, and decreased overall cost. Laparoscopic cholecystectomy is associated with better preservation of

immune function and a reduction of the inflammatory response compared with open surgery. The rate of postoperative infections seems to be lower.

Laparoscopic cholecystectomy has become the gold standard in the treatment of cholelithiasis and is replacing open cholecystectomy. The rate of conversion from laparoscopic cholecystectomy to open cholecystectomy is 5 to 10%.[4] Hence it is necessary to study the predictive factors for difficult laparoscopic cholecystectomy. This study was undertaken to evaluate preoperative data that can serve as predictors of difficult laparoscopic cholecystectomy and help in planning of surgery.

METHODS

We conducted prospective observational study of 50 patients presenting to surgery department with complains of upper abdominal discomfort and sonography diagnosis of cholelithiasis. Period of study was from June 2014 to June 2015 for period of 1 year. The method for the study included screening of patients who presented with upper abdominal pain, or vomiting or dyspepsia or jaundice. Ultrasonography (USG) abdomen was done in all patients. Routine haematological and biochemical investigations including liver function test (LFT) were done.

The patients confirmed by USG examination were evaluated with following factors: age, sex, h/o previous hospitalization, body mass index (BMI), site of abdominal scars, palpable gall bladder, sonographic findings- wall thickness, pericholecystic collection, impacted stone. All the patients were received symptomatic treatment and Inj vitamin K for 3 days preoperatively. Following evaluation the patient were subjected to laparoscopic cholecystectomy after due consent and time taken, biliary / stone spillage, injury to duct/ artery or conversion were noted.

All the patients were operated by single laproscopic surgeon. All cases were followed up for any recurrent symptoms. Inclusion criteria included patients aged between 16 and 60 years presenting with symptoms and signs of cholelithiasis/ cholecystitis and diagnosed by USG examination. Exclusion criteria included patients below 15 years of age, patients with common bile duct (CBD) calculus, raised alkaline phosphatase (ALP), and dilated CBD, where CBD exploration was needed, patients with features of obstructive jaundice, patients refusing surgery, patients not willing for laparoscopic cholecystectomy.

The following scoring system is used to calculate the preoperative score for difficulty and the easy/difficult categorisation Table is used for per operative outcome. The data was taken and scoring was done according to score distributed in the following Table 1 devised by J S Randhawa and AK Pujahari.[5] Per operative categorisation of difficulty level of laparoscopic cholecystectomy has been done by using following Table 2.[5]

Table 1: Scoring system.

History			Max score
Age	<50 y (0)	>50 y (1)	1
Sex	Female (0)	Male (1)	1
H/o hospitalisation	N (0)	Y (4)	4
Clinical			
BMI weight (kg/ht (m^2))	< 25(0)	25-27.5 (1) > 27.5 (2)	2
Abdominal scar	N (0)	Infraumbilical (1) Supraumbilical (2)	2
Palpable GB	N (0)	Y (1)	1
Sonography			
Wall thickness	Thin (0)	Thick >4mm (2)	2
Pericholecystic collection	N (0)	Y (1)	1
Impacted stone	N (0)	Y (1)	1

Table 2: Categorization of difficulty level.

Easy	**Time taken <60 min** **No bile spillage** **No injury to duct, artery**
Difficult	Time taken 60-120 min Bile/stone spillage Injury to duct No conversion
Very difficult	Time taken >120 min Conversion

Statistical method

All the data collected in proforma were entered in Microsoft excel sheet and SPSS software was used for statistical calculations. Chi-square test with Yaet's correction and p value was used to find the significant association of findings of preoperative score with peroperative outcome.

RESULTS

In our study the youngest patient was 16 years of age and the oldest was 60 years of age. Majority of the patients in the present series were in the age group of 21-30 years of age as shown in Figure 1. Out of 50 patients 39 were females and 11 were male patients. The ratio of male: female is 1: 3.5 as shown in Figure 2. All the 50 patients had stones in gallbladder, 9 patients had single calculus, 36 patients had multiple calculi, and solitary impacted stone was present in 4 patients. Gallbladder wall thickening was present in 19 patients, and 6 patients had pericholecystic collection.

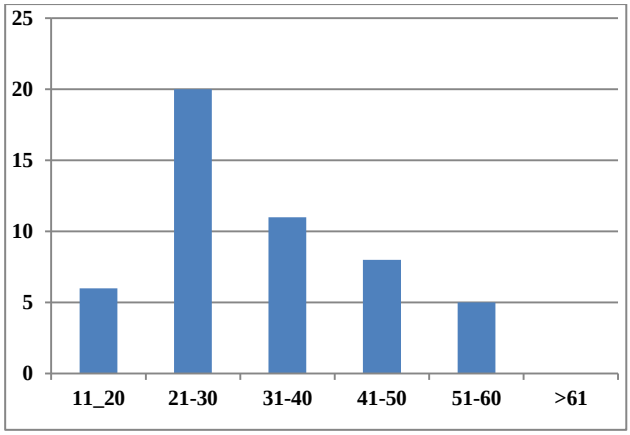

Figure 1: Age wise distribution of cholelithiasis.

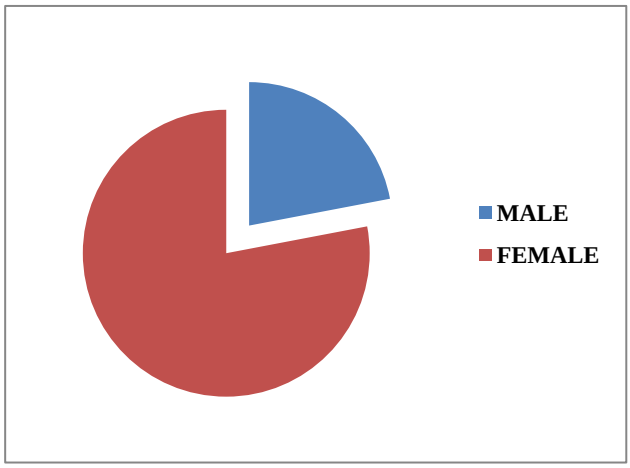

Figure 2: Sex wise distribution of cholelithiasis.

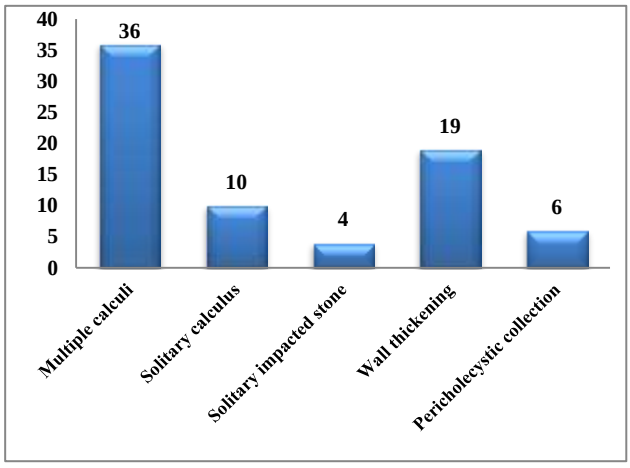

Figure 3: Ultrasonography findings.

When correlation of pre-op score and the outcome were compared out of the 50 patients, 7 converted from laparoscopy to open procedure. Out of 7 cases which were converted to open, one patient was suspected to have choledocholithiasis as there was dilated CBD found intraoperatively, though ultrasound missed the diagnosis, for which choledocholithotomy and T tube placement was done. Other two patients had abberent anatomy, while dissecting the Calot's triangle and during liver bed dissection there was injury to duct and bile spillage, for this converted to open and cholecystectomy was done. Remaining four patients had dense adhesions which lead to difficulty in dissection and injuries. Out of these 4, one was suspected intraoperatively to be having Mirrizi syndrome and other patient was suspected to be having empyema gallbladder. In both cases there was injury to CBD. Both treated with choledochoduodenostomy. In other 2 patients thick adhesions lead to difficulty in dissection for which they were converted to open procedure. Results are shown in Table 3. Analysis of per-operative outcome with the risk factors been shown in Table 4.

Table 3: Correlation of pre-operative score and the outcome.

Preoperative score	Easy	Difficult	Very-difficult	Total
0-5	28	4	4	36
6-10	0	10	3	13
11-15	0	1	0	1
Total	28	15	7	50

The factors that we assessed included age, sex ,prior history of hospitalisation for acute cholecystitis or biliary pancreatitis, BMI, abdominal scar due to previous surgery, clinically palpable GB, wall thickness, GB wall thickness, impacted stone, peri cholecystic collection. In present study prior history of hospitalisation, previous abdominal surgeries, palpable GB, BMI>27.5, thickened GB wall were found to be significant predictors of difficult laparoscopic cholecystectomy. Remaining parameters like age, sex, impacted stone and pericholecystic collection were not found significant predictors of difficult laparoscopic cholecystectomy.

DISCUSSION

The observations and results of present series are analysed and compared with the available literature and studies. Majority of the patients in this study were in the age group of 21-30 years of age. Our patient age group is comparable to other studies done by Anand A, Randhawa JS, Memon AA.[5,7] Ultrasound was done as a routine investigation in all the patients. All the 50 patients had stone in gall bladder. Out of 50 patients, 36 (72%) had multiple calculi, 9 had solitary calculus, 4 had solitary impacted stone , thickened gall badder wall was present in 19 patients and peri cholecystic collection was present in 6 patients.

Table 4: Analysis of per-operative outcome with the risk factors.

Risk factors	Level	Per-op outcome		P# value	
		Difficult-No	Easy-No	PS	R*
Age	<=50 Y	12	27	>0.2	0.937
	>50 Y	3	1		
Sex	Female	11	24	>0.5	0.736
	Male	4	4		
BMI wt (kg)/ht (m^2)	<=25	2	14	<0.01	0.01
	25.1-27.5	7	10		
	>27.5	6	4		
Previous surg.	Nil	4	22	<0.01	0.882
	Yes	11	6		
Hospitalisation	Nil	6	27	<0.01	<0.001
	Yes	9	1		
Gb palpable	NP	10	28	<0.01	0.022
	Yes	5	0		
USG-Wall thick	No	7	25	<0.001	0.038
	Yes	10	1		
Impacted stone	Nil	13	27	>0.3	0.19
	Yes	2	1		
P/C collection	Nil	12	27	>0.2	0.999
	Yes	3	1		

PS- Present study; No-number; R*- Randhawa study; #-p value significant if<0.05

Present study also not found age and sex as significant variables, but found past abdominal surgery as significant predictor of difficult laparoscopic cholecystectomy similar to study done by Partha B et al, Elsebae MMA et al.[8-9] In our study BMI was significantly associated with difficult cholecystectomy as published by Randhawa JS et al, Gabriel R et al. Results of our study match with other studies done by Van der steeg HJJ et al, Kaplan M et al, Nanchani J and Supe A, Younis KK et al, Sharma SK et al. Present series results are not matching with study results of Simopoulos C et al, Nabil A et al and Yetkin G et al.[5,10-18]

The results of present study shows significant predictors of difficult laparoscopoic cholecystectomy as follows - previous history of hospitalisation, palpable gallbladder, previous abdominal surgeries, BMI >27.5 and thickened gallbladder wall. It is in agreement with some of the studies listed above. Some studies found age and sex as significant predictors of difficult laparoscopic cholecystectomy but in present study these factors are statistically insignificant in prediction of difficult laparoscopic cholecystectomy. Other two factors impacted stone and peri cholecystic collection on ultrasonography found insignificant predictors in present study.

Out of 50 patients who underwent laparoscopic choplecystectomy, 7 cases were converted to open procedure because of intraoperative complications. So these cases are excluded from the study as these fall in very difficult category according to the classification applied in this study. The conversion rate in the present study was 14%.

Table 5: Conversion rates in different series.

Series	Conversion rate
Genc V et al[19]	3.16%
Anand A et al[6]	11.93%
Bhar P et al[8]	5.35%
Iqbal P et al[20]	9.4%
Memon AA et al[7]	2.73%
Gabriel R et al[10]	26.1%
Dhakkal RR et al[22]	4.03%
Simopoulas C et al[16]	5.2%
Mehmet K et al[12]	7.7%
Nabil et al[17]	7.5%
Vander steeg HJJ et al[11]	12%
Lipman JM[22]	8.1%
Lal P et al[23]	23.3%
Nanchani J et al[24]	11.4%
Sharma SK et al[15]	4%
Alpomet A et al[25]	7.4%
Kama NA et al[26]	4.8%
Present series	14%

Out of 7 patents that underwent open cholecystectomy, the pre-operative score of 4 patients was between 0-5 and 3 patients had score between 6-10. Thus by present study we found the most common cause for conversion was

adhesion followed by aberrant anatomy, duct injury. The findings of present study matches with the findings of the other studies like Genc V et al, Anand A et al, Iqbal P et al, Memon AA et al, Dhakkal RR et al and Van der Steeg HJJ et al.[5,7,11,19-21]

CONCLUSION

Thus the factors which we found statistically significant in predicting difficult laparopscopic cholecystectomy may be useful in prediction of difficulty that may occur in laparoscopic cholecystectomy. Knowledge of these factors for difficult laparoscopic cholecystectomy could help surgeons during pre-operative assessment and take necessary precautions during laparoscpic cholecustectomy.

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