



TO PREDICT THE FACTORS RESPONSIBLE FOR DIFFICULT LAPROSCOPIC CHOLECYSTECTOMY: A SINGLE INSTITUTION STUDY

General Surgery

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ABSTRACT

Aims & Objective: To estimate the factors that will predict difficult laparoscopic cholecystectomy.

Material And Methods: Prospective study of 100 patients conducted at J.L.N Medical Ajmer from September 2018 to March 2020. Following parameters were assessed to predict the difficult laparoscopic cholecystectomy; age, sex, BMI, history of hospitalisation for acute cholecystitis, palpable gall bladder, GB wall thickness, pericholecystic collection, impacted stone. The statistical analysis was done using Z test.

Study design: Prospective observational descriptive study

Results: Pericholecystic collection ($P < 0.0001$), palpable gall bladder ($P = 0.04$), thick gallbladder wall ($P < 0.0001$), and impacted stone ($P = 0.0003$), were considered as the significant factors that predict difficult laparoscopic cholecystectomy.

Conclusion: The pre-operative factors evaluated in this study is reliable and beneficial in predicting the difficulty of laparoscopic cholecystectomy.

KEYWORDS

cholecystectomy, gall bladder, cholecystitis.

INTRODUCTION

Gallstone disease is one of the most common problems affecting the digestive tract. The prevalence of gallstones is related to factors like age, gender, and ethnic background. The prevalence of gallstone varies widely from place to place. It is estimated that approximately 20 million people in the United States have gallstones and that approximately 1 million new cases of cholelithiasis develop each year. In India the prevalence is estimated to be around 4%¹ changing incidence in India is mainly attributed to westernization of diet, change in socioeconomic structure and availability of ultrasound as investigation in both rural and urban areas. The National Institute of Health (NIH) consensus development conference in the year 1992 concluded that laparoscopic cholecystectomy provides a safe and effective treatment for most patients with symptomatic gallstones². 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. The number of contraindications has come down significantly over time. Attempts can be made in all cases of gall stone diseases with laparoscopic procedure except for patients with bleeding diathesis, carcinoma gallbladder and patients not fit for general anaesthesia³. However, of all Laparoscopic cholecystectomies, 1-13% requires conversion to an open for various reasons⁴. Thus, for surgeons it would be helpful to establish criteria that would assess the risk of conversion preoperatively. This would be useful for informing patients and a more experienced surgical team could be assembled when risk for conversion appears significant. This study was conducted to predict the difficult laparoscopic cholecystectomy and conversion using various clinical and radiological parameters.

MATERIAL AND METHOD:

This study is designed as prospective observational descriptive study. All the cases of elective laparoscopic cholecystectomy coming to the J.L.N Hospital from September 2018 to March 2020 were included.

Inclusion Criteria:

- Patients of either sex with acute calculous cholecystitis and chronic cholecystitis.
- Patient aged 20-60 years with symptomatic gall stone disease

Exclusion Criteria:

- Patients with features of obstructive jaundice.
- Suspected malignant gall bladder disease.

- Patient medically unfit for laparoscopic surgery.

All intraoperative events such as duration of surgery, biliary leakage, stone spillage and injury to duct, artery are recorded and surgery is labelled as easy/difficult/very difficult based on these findings. Intraoperative assessment is compared with preoperative predictive score to determine the usefulness of preoperative predictive score.

Intra-Operative Assessment

Parameters	Grading
Operative time < 60 min; No bile spillage No injury to duct	Easy
Operative time 60-120 min; and/or Bile or stone spillage; and/or Injury to duct	Difficult
Operative time > 120 min or conversion	Very difficult

After the OPD workup, history, clinical examination, blood investigations and sonological findings are recorded one-day prior to surgery.

Definition Of Variables:

A GB wall thickness > 4 mm on ultrasound was defined as “increased wall thickness”.

Obesity is defined as body mass index ($BMI = \text{weight in kg} / (\text{height in m})^2$) > 30 kg/m²

Pericholecystic collection :

It is USG finding suggestive of fluid around the gallbladder

Impacted Stone:

Stone which stuck in the gallbladder neck

Abdominal Scar :

It may be supraumbilical or infraumbilical, depends on previous surgery

History Of Hospitalization:

Patient admitted in hospital previously due to attack of acute cholecystitis.

Palpable Gallbladder:

Gallbladder may be palpated from right hypochondrium to right iliac fossa

OBSERVATION AND RESULTS

In the present series the youngest patient was 20 yrs of age and the

oldest was 60 yrs of age. Majority of the patients in the present series were in the age group of 31-50 yrs of age (table 1). Out of 100 patients 86 were females and 14 were male patients. The male: female ratio is 1:6.1 (table 2). Comparison of BMI (table 3), baseline clinical characteristic (table 4) and USG findings (table 4) of patients undergoing laparoscopic cholecystectomy. Preoperative risk factor and surgical outcome (table 5). Out of the 11 patients in whom laparoscopic was converted to open cholecystectomy, 7 patients had extensive adhesions with difficulty in dissection and 2 had uncontrolled bleeding from cystic artery which was anatomical variant. Another 2 had mass formation.

DISCUSSION

In our study laparoscopic cholecystectomy was performed in 100 patients and different predictive risk factors for difficult laparoscopic cholecystectomy were analyzed. Old age, male sex, history of hospitalization, obesity, previous abdominal surgery, palpable gall bladder and ultrasonographic findings like gall bladder wall thickness, pericholecystic fluid collection, impacted stone were included as risk factors in this study.

Old age (age > 50 years) has been found to be a significant risk factor for difficult laparoscopic cholecystectomy as observed by **Lee NW et al.**⁶ and **Hussain et al.**¹¹. **Randhawa et al.**⁷ (p=0.937) and our study (p=0.997) old age was not a significant risk factor.

Male sex makes surgery difficult as being reported by **Hussain et al.**¹¹, **Nachnani J et al.**¹², **Lee HH et al.**¹³. Conversion rate and significantly higher mortality has been reported in male sex in **Bouarfa et al.**¹⁴, **Randhawa et al.**⁷ (p=0.736) and our study (p=1.000) found that male sex was not been a significant factor.

Obesity has been considered as another risk factor for difficult laparoscopic cholecystectomy as observed by **Rosen et al.**¹⁷, **Randhawa et al.**⁷ and **Simopoulos C et al.**¹⁸ observed that obesity was not significant factor. In our study BMI >25 did not significantly affect the outcome (p=0.288).

Patient, who require hospitalization for repeated attacks of acute cholecystitis, carry more chances of difficult laparoscopic cholecystectomy and conversion, probably due to dense adhesions at calot's triangle and gall bladder fossa observed by **Bouarfa et al.**¹⁴ and **Majeski J et al.**¹⁶, **Randhawa et al.** and in our study also, it was found to be a significant factor for prediction of difficult laparoscopic cholecystectomy (p=0.003).

After previous upper or lower abdominal surgery there may be adhesions present between viscera or omentum and abdominal wall. There may be chances of injury to these structures during insertion of first port and risk of conversion was reported to be higher reported by **Hussain et al.**¹¹, **Nachnani J et al.**¹², **Randhawa et al.**⁷ and in our study it was not found to be a significant confounding factor (p=0.288).

Palpable gall bladder it is difficult to catch hold of the fundus of GB and hence aspiration of the contents of GB is often required. It is cumbersome, time consuming and also there is chance of spillage of contents into the peritoneal cavity. There is only one study by **Randhawa et al.**⁷ which has correlated palpable gallbladder with intraoperative difficulty with a significant association (p=0.022). The outcome of our study was not dependent on this variable (p=0.078).

Thickened gall bladder wall is an ultrasonographic finding of acute cholecystitis and it was a significant factor in **Nachnani J et al.**¹², **Daradkeh SS et al.**¹⁵ studies. **Majeski James et al.**¹⁶ in 1990, and is a clinical warning for the laparoscopic surgeon of the potential for a difficult laparoscopic cholecystectomy. But **Carmody E et al.**¹⁹ concluded that there were no ultrasound features that can differentiate between the unsuccessful, difficult, or uneventful laparoscopic cholecystectomy.

Randhawa et al.⁷ reported that thickened gallbladder wall was found to be dependent on this variable by chi-square test (p<0.038). In our study thickened gallbladder wall was present in 33 patients and outcome was found to be dependent on this variable by chi-square test (p<0.001).

Pericholecystic fluid in study by **Randhawa et al.**⁷ was not significant factor (p=0.999) but in our study was a significant factor for difficult laparoscopic cholecystectomy (p=0.001).

Impacted stone was not significant factor by **Randhawa et al.**⁷ (p=0.0190) but in our study it was significant factor (p=0.003).

Conversion rate from laparoscopic to open cholecystectomy reported in literature was between 7-35%.⁶⁶ In **Randhawa et al.**⁷ study it was 3% and in our study it was 7%. Undoubtedly experience of surgeon is an important factor that should be considered in for conversion, as it is low in cases done by experienced surgeons. Conversion because of cystic artery bleeding has been reported as a cause of conversion by **Cuschieri et al.**²¹ In our study injury to artery occurred in only three cases but they were not converted and bleeding was stopped with clip application. Spillage of stones as a cause of conversion had been observed by **Frazer R.C. et al.**²² But in our study none of the cases were converted due to this reason.

In our study 7 cases out of 100 were converted, and the reason for conversion was dense adhesions between gall bladder and surrounding tissue like omentum, duodenum or colon leading to dense calot's triangle.

CONCLUSION

In the present study, history of prior hospitalization (P < 0.0037), impacted stone (P < 0.0003) and pericholecystic fluid collection (P < 0.0001) & thickened gallbladder wall >4mm (p=0.0001) were significant predictors of difficult laparoscopic cholecystectomy.

Conversion rate from laparoscopic to open cholecystectomy was 11%. Experience of surgeon is an important factor that should be considered in for conversion, as it is low in cases done by experienced surgeons.

Tables

Table 1: Showing The Age Wise Distribution Of Cholelithiasis

Age (In Years)	No. of patients	%
0-10	0	0
11-20	1	1%
21-30	18	18%
31-40	19	19%
41-50	41	41%
51-60	21	21%
>60	0	0

Table 2: Showing Sex Wise Distribution Of Cholelithiasis

Sex	No. of patients	%
Male	14	14%
Female	86	86%

Table 3: Showing The BMI Wise Distribution Of Cholelithiasis

BMI (kg/m ³)	No. of patients	%
<25	23	23
25-30	61	61
>30	16	16

Table 4: Baseline Clinical Characteristics Of The Enrolled Patients That Underwent Laparoscopic Cholecystectomy

Factors	Results (%), n=100
Age (years)	
≤ 50	21 (21)
>50	79 (79)
Gender n (%)	100 (100)
Male	14 (14)
Female	86 (86)
BMI, n (%)	
< 25	23(23)
25-30	61(61)
>30	16(16)
Previous surgical history, n (%)	
Tubectomy	22(22)
LSCS	4(4)
Appendectomy	3(3)
Hysterectomy	2(2)
Ultrasonography findings, n (%)	
Multiple calculi	64(64)
Solitary calculi	19(19)
Impacted calculi	17(17)
Wall thickening >4mm	36(36)
Pericholecystic collection	14(14)

Palpable gallbladder, n (%)	6(6)
History of hospitalization, n (%)	10(10)

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Table 5: Comparison Of Preoperative Risk Factors And Surgical Outcome In The Present Study With That Conducted By Randhawa And Pujahari

Risk factors	Preoperative score		P value	
	Difficult	Easy	Present study	Randhawa and Pujahari [1]
Age (years):				
< 50	14	63	0.9973	0.937
>50	3	17		
Sex:				
Female	15	68	1.000	0.736
Male	2	12		
BMI:				
< 25	2	21	0.2883	0.227
25.1-30	11	49		
>30	4	10		
Previous surgery:				
None	9	59	0.1585	0.882
Yes	8	21		
History of hospitalisation				
No	12	77	0.0037	< 0.001
Yes	5	3		
Gallbladder palpable:				
Not palpable	15	79	0.0784	0.022
Yes	2	1		
Ultrasound wall thickness				
Not thickened	3	61	< 0.0001	0.038
Thickened	14	19		
Impacted stone				
None	9	73	0.0003	0.190
Yes	8	7		
Pericholecystic collection				
None	9	77	< 0.0001	0.999
Yes	8	3		

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