



General Surgery

A CROSS SECTIONAL STUDY TO DETERMINE THE PREDICTIVE FACTORS OF DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Objective To determine the clinical and radiological predictive factors for difficult laparoscopic cholecystectomy.

Methods A prospective study was done among 50 patients admitted to Akash Institute of Medical Sciences and Research Centre during the period of May 2022 to May 2023. The patients who presented with upper abdominal pain, vomiting or dyspepsia are studied in detail clinically and investigations were done. All patients are subjected to ultrasonographic evaluation. The patients confirmed by USG examination were evaluated with following factors: age, sex, BMI ($>/<30$), h/o previous hospitalization, h/o previous abdominal surgeries, h/o acute cholecystitis / pancreatitis. Sonographic findings: GB wall thickness ($>/<3$ mm), pericholecystic collection, number (solitary versus multiple) and liver parenchyma (Normal, fatty infiltration, liver fibrosis) were noted. Following evaluation the patients were subjected to laparoscopic cholecystectomy and the following operative parameters like access to peritoneal cavity (easy/difficult), bleeding during surgery (normal/abnormal), gall bladder bed dissection (easy/difficult), injury to duct/artery, extraction of gall bladder (easy/difficult), or conversion to open surgery were noted. Analyses of pre operative risk factors, their relation to the dependent factors are performed using t-test, chi squared test and significance (p value <0.05) is demonstrated. Results were computed using relevant software (SPSS). **Results** The highest incidence of cholelithiasis was among age group of 4th decade, and more among females. Ultrasonography detected gall bladder stones in all the patients, wall thickening in 16 (32%), pericholecystic collection in 11(22%), and liver fibrosis in 10 (20%). Laparoscopic cholecystectomy was successfully done in 46 patents. The access to peritoneal cavity was difficult in 13(26%), gall bladder bed dissection was difficult in 10 (20%), abnormal bleeding occurred in 12 (24%) patients, difficulty in gall bladder contraction in 13(26%) patients. Conversion to open surgery had occurred in 4 (8%) patients. BMI >32.5 , history of cholecystitis previous abdominal surgery, gall bladder wall thickness >3 mm, pericholecystic collection, liver fibrosis were significant predictive factors of difficult laparoscopic cholecystectomy. There were no significant predictive factors for conversion to open surgery on analysis in this study. **Conclusion** The clinical and ultrasonographic findings help to predict a difficult laparoscopic cholecystectomy. This information is useful to the patient and operating surgeon. The conversion rate from laparoscopic cholecystectomy to open cholecystectomy was 8% and there were no significant predictive factors for it on analysis in this study.

KEYWORDS : Laparoscopic Cholecystectomy, Predictive Factors.

INTRODUCTION

Cholelithiasis is the most common biliary pathology, with a prevalence of 10 to 15%. The prevalence of gallstone varies widely in different parts of the world. In India it is estimated to be around 4%. An epidemiological study restricted to rail road workers showed that north Indians have 7 times higher occurrence of gallstones as compared to south Indians¹. Cholelithiasis is rare in the first two decades. Incidence gradually increases after 21 years and reaches its peak in 5th and 6th decade. Women are more affected than men in the ratio of 4:1.

The advantages of laparoscopic cholecystectomy over open cholecystectomy are less postoperative pain, shorter duration of hospital stay, earlier return to normal activity, and decreased overall cost²⁻³. 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 lower⁴. 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%. Hence it is necessary to study the predictive factors for difficult laparoscopic cholecystectomy. Hence this study was undertaken.

AIMS AND OBJECTIVES

To determine the clinical and radiological predictive factors for difficult laparoscopic cholecystectomy.

MATERIALS AND METHODS

Study Design: A Prospective study

Study Place: Department of General Surgery, Akash Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka.

Study Sample: 50 patients

Study Duration: 1 year (May 2022 to May 2023)

Inclusion Criteria

- The patients who have been clinically and radiologically (USG

abdomen) diagnosed as cholelithiasis and planned for laparoscopic cholecystectomy.

Exclusion Criteria

- Patients below 15 years of age
- Patients with Common bile duct (CBD) calculus, dilated CBD where CBD exploration is required.

METHODS

1. The patients who presented with upper abdominal pain, vomiting or dyspepsia were studied in detail and investigations were done. All patients were subjected to ultrasonographic evaluation. The patients confirmed by USG examination were evaluated with following factors: age, sex, BMI ($>/<30$), h/o previous hospitalization, h/o previous abdominal surgeries, h/o acute cholecystitis / pancreatitis.

2. Sonographic findings: GB wall thickness ($>/<3$ mm), pericholecystic collection, number (solitary versus multiple) and liver parenchyma (Normal, fatty infiltration, liver fibrosis) were noted.

3. After evaluation the patients were subjected to laparoscopic cholecystectomy and the following operative parameters like access to the peritoneal cavity (easy/difficult), bleeding during surgery (normal/abnormal), gall bladder bed dissection (easy/difficult), injury to duct/artery, extraction of gall bladder (easy/difficult), or conversion to open surgery were noted.

Data Analysis

Analysis of pre operative risk factors, their relation to the dependent factors were performed using t-test, chi square test and significance (p value <0.05) is demonstrated. Results were computed using relevant software (SPSS).

RESULTS

The highest incidence of cholelithiasis was among age group of 4th decade, and more among females. Among 50 patients 13(26%) had past history of acute cholecystitis. Ultrasonography detected multiple gall bladder stones in 28(56%) of the patients, wall thickening in 16 (32%), pericholecystic collection in 11(22%), and liver fibrosis in 10

(20%). The access to peritoneal cavity was difficult in 13(26%), gall bladder bed dissection was difficult in 10 (20%), abnormal bleeding occurred in 12 (24%) patients, difficulty in gall bladder contraction in 13(26%) patients.

Analysis Of Pre-operative Factors With Operative Parameters

BMI: In present study, 13(26%) patients had difficulty in access to peritoneal cavity with mean BMI 32.14, p value (0.005), 12(24%) patients with mean BMI 28.38 had abnormal bleeding with p value 0.04, 13(26%) patients with mean BMI of 32.026 had difficulty in extraction of GB with p value 0.018, and 4(8%) patients with mean BMI OF 32.475 were converted to open surgery with p value 0.023.

History of Acute Cholecystitis: Among 13(26%) patients with history of acute cholecystitis 10(20%) patients had difficulty in access to peritoneal cavity with p value 0.042, 8(16%) patients had bleeding with p value 0.02, 10(20%) patients had difficult extraction of GB with p value 0.008, and 3(6%) patients were converted to open surgery with p value 0.02.

History of previous abdominal surgery: Among 12 patients with h/o previous abdominal surgery 6 patients had difficult access to peritoneal cavity with p value 0.026, 4 patients had abnormal bleeding during surgery with p value 0.049, 3 patients were converted to open surgery with p value 0.017.

Gall bladder wall thickness: Among 16 patients with gall bladder wall thickness > 3mm, 8 patients had difficulty in access to peritoneal cavity with p value 0.005, 9 patients had abnormal bleeding with p value 0.021, 8 had difficulty in extraction of GB with p value of 0.021, 3 were converted to open surgery with p value 0.001.

Peri-cholecystic collection: Among 11 cases with pericholecystic collection, 6 had difficulty in access to peritoneal cavity and p value 0.003, 6 had abnormal bleeding with p value 0.001, 3 were converted to open surgery.

Liver parenchyma: Among 10 cases with liver fibrosis, 6 had abnormal bleeding with p value 0.000, 3 were converted to open surgery.

Coefficients And Standard Errors

Access To The Peritoneal Cavity

Variable	Coefficient	Std. Error	P
BMI	0.74422	0.21970	0.0007
H/o Acute cholecystitis	-4.14653	4.54671	0.3618
H/o previous abdominal surgeries	1.16715	1.16251	0.3154
GB wall thickness	0.96133	4.28883	0.8226
Pericholecystic collection	4.71386	2.13492	0.0272
No of stones	-2.70217	1.31878	0.0405
Constant	-22.5880		

Patients with mean BMI >32.14 had difficulty in access to peritoneal cavity with significant p value 0.0007 and there is two times the risk with 95% confidence interval 1.3684 to 3.2376 Patients with pericholecystic collection also had difficult access to peritoneal cavity with p value 0.0272.

Abnormal Bleeding

Variable	Coefficient	Std. Error	P
BMI	-0.021338	0.072076	0.7672
H/o Acute cholecystitis	0.17314	1.23425	0.8884
H/o previous abdominal surgery	0.010259	0.86733	0.9906
GB wall thickness	3.54691	1.25092	0.0046
Pericholecystic collection	-0.79316	1.02064	0.4371
Liver parenchyma Constant	1.54511-1.7364	0.89891	0.0856

Patients with gall bladder thickness > 3mm has abnormal bleeding with significant p-value 0.0046.

Extraction Of Gall Bladder

Variable	Coefficient	Std. Error	P
BMI	0.55915	0.19443	0.0040
H/o Acute cholecystitis	-0.21232	1.48542	0.8863
H/o previous abdominal surgeries	-0.74638	1.16580	0.5220
GB bed dissection	0.17931	1.43269	0.9004
Pericholecystic collection	1.34975	1.61048	0.4020

No of stones	-19.40193	2037.72111	0.9924
Liver parenchyma	0.46142	1.18533	0.6971
Constant	-17.9753		

Patients with mean BMI >32.14 had difficulty in extraction of gall bladder with significant p value of 0.004

Conversion To Open Surgery

Variable	Coefficient	Std. Error	P
BMI	0.61795	0.39833	0.1208
H/o Acute cholecystitis	-18.84746	3128.16667	0.9952
GB bed dissection	28.93112	4463.59784	0.9948
Pericholecystic collection	20.51760	3128.16681	0.9948
Liver parenchyma	1.80143	1.58980	0.2572
Constant	-51.8186		

In present study there are no factors associated with statistically significant conversion to open surgery

DISCUSSION

In present study, 13(26%) patients had difficulty in access to peritoneal cavity with mean BMI 32.14, p value (0.005), 12(24%) patients with mean BMI 28.38 had abnormal bleeding with p value 0.04, 13(26%) patients with mean BMI of 32.026 had difficulty in extraction of GB with p value 0.018, and 4(8%) patients with mean BMI of 32.475 were converted to open surgery with p value 0.023. Among 13(26%) patients with history of acute cholecystitis 10(20%) patients had difficulty in access to peritoneal cavity with p value 0.042, 8(16%) patients had bleeding with p value 0.02, 10(20%) patients had difficult extraction of GB with p value 0.008, and 3(6%) patients were converted to open surgery with p value 0.02.

Among 12 patients with h/o previous abdominal surgery 6 patients had difficult access to peritoneal cavity with p value 0.026, 4 patients had abnormal bleeding during surgery with p value 0.049, 3 patients were converted to open surgery with p value 0.017. Among 16 patients with gall bladder wall thickness > 3mm, 8 patients had difficulty in access to peritoneal cavity with p value 0.005, 9 patients had abnormal bleeding with p value 0.021, 8 had difficulty in extraction of GB with p value of 0.021, 3 were converted to open surgery with p value 0.001. Among 11 cases with pericholecystic collection, 6 had difficulty in access to peritoneal cavity and p value 0.003, 6 had abnormal bleeding with p value 0.001, 3 were converted to open surgery. Among 10 cases with liver fibrosis, 6 had abnormal bleeding with p value 0.0001, 3 were converted to open surgery.

Patients with mean BMI >32.14 had difficulty in access to peritoneal cavity with significant p value 0.0007 and there is two times the risk with 95% confidence interval 1.3684 to 3.2376 Patients with pericholecystic collection also had difficult access to peritoneal cavity with p value 0.0272. Patients with gall bladder thickness > 3mm has abnormal bleeding with significant p-value 0.0046. Patients with mean BMI >32.14 had difficulty in extraction of gall bladder with significant p value of 0.004. In present study there are no factors associated with statistically significant conversion to open surgery.

CONCLUSION

- In the present study, BMI >32.5, history of acute cholecystitis, previous abdominal surgery, GB wall thickness >3mm, pericholecystic collection, multiple stones and liver fibrosis were significant predictors of difficult laparoscopic cholecystectomy.
- The conversion rate from laparoscopic cholecystectomy to open cholecystectomy was 8% and in the present series on multivariate analysis there are no predictive factors associated with statistically significant conversion to open surgery.

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