

Correlation of pre operative factors with intra operative factors associated with difficult laparoscopic cholecystectomy

1. **DR. PANKAJ GOYAL**, EX JUNIOR RESIDENT, DEPARTMENT OF GENERAL SURGERY, NKPSIMS, NAGPUR
2. **DR. KULDIP PRATAP PATEL**, ASSISTANT PROFESSOR, DEPARTMENT OF GENERAL SURGERY, GMC SHAHDOL, MADHYAPRADESH
3. **DR. RAVI PRATAP SINGH**, SENIOR RESIDENT, DEPARTMENT OF GENERAL SURGERY, DR. BABA SAHEB AMBEDKER MEDICAL COLLEGE AND HOSPITAL DELHI [CORRESPONDING AUTHER]
4. **DR. ATUL KUMAR KHARE**, EX SENIOR RESIDENT, DEPARTMENT OF GENERAL SURGERY, GMC SHAHDOL, MADHYAPRADESH ORCID ID= 0000-0002-8869-5614
mgmatulkhare92@gmail.com

ABSTRACT

Background: Laparoscopic cholecystectomy is the gold standard treatment for symptomatic cholelithiasis. However, of all Laparoscopic cholecystectomies, 1-13% requires conversion to an open surgery. Thus, for surgeons it would be helpful to establish criteria that would predict difficult laparoscopic cholecystectomy and conversion preoperatively. The objective of the study was to compare preoperative parameters with intraoperative parameters associated with difficult laparoscopic cholecystectomy.

Methods: Analytical cross sectional study includes 68 patients having symptomatic cholelithiasis. All patients underwent elective LC in Department of General Surgery in tertiary care center at hingna, Nagpur. The collected data of preoperative factors include sex, age, previous attack, obesity (BMI), lower abdominal scar, palpable gallbladder, wall thickness of gall bladder, pericholecystic collection and impacted stone in Hartman's pouch and intraoperative factors include gall bladder adhesions to bowel and adjacent structure, duct and artery clipping, omental adhesions and extraction of gall bladder.

Results: In this study, previous history of attacks of cholecystitis, body mass index, prior abdominal surgical history, gall bladder wall thickness and impacted stones in Hartmann's pouch were found to be statistically significant in predicting difficult LC. Factors such as age, sex, palpable gall bladder and pericholecystic collection were not statistically significant in predicting difficult LC.

Conclusions: The difficult laparoscopic cholecystectomy and conversion to open surgery can be predicted preoperatively based on number of previous attacks of cholecystitis, body mass index, prior abdominal surgical history, gall bladder wall thickness and impacted stones in Hartmann's pouch.

Keywords: factors with intra operative laparoscopic cholecystectomy

Introduction

Cholelithiasis is the most common biliary disease.¹ Gallstones are present in 10–15% of the general populations and are asymptomatic in most of them (>80%); moreover, the prevalence of gallstones varies widely in different parts of the world.² Approximately 1–2% of asymptomatic patients will develop symptoms requiring cholecystectomy per year, making cholecystectomy the most common operations performed by general surgeons.³ Laparoscopic cholecystectomy (LC) has become the procedure of choice for management of symptomatic gall stone disease.⁴ In LC, the surgeons encountered difficulty when there were acutely inflamed or gangrenous gallbladder (GB), dense adhesions at Calot's triangle, fibrotic and contracted GB, cholecystoenteric fistula, etc.⁵ There are many risk factors that make laparoscopic surgery difficult like male sex, old age, obesity, attacks of acute cholecystitis, previous abdominal surgery, and certain ultrasonographic findings, that is, thickened GB wall, distended GB, pericholecystic fluid collection, and impacted stone.⁶ Another similar study by Lee et al.⁷ found that the risk factors for conversion included age greater than 65 years, male sex, patients with previous upper abdominal surgery, and those with documented history of acute cholecystitis. Ultrasonography is the most common noninvasive, safe, and highly accurate screening test for cholecystitis and cholelithiasis, and it can also help surgeons to get an idea of potential difficulty to be faced during surgery in that particular patient.⁸ The objective of this study was to evaluate the preoperative predictive factors that determine difficult LC (preoperative scoring system) in comparison with intraoperative parameters (intraoperative scoring factors) and outcome.

MATERIALS AND METHODS

The present analytical cross sectional study was conducted on 68 patients of both sex having symptomatic cholelithiasis and aged between 18 and 80 years (with exclusion of patients with below 18 years of age, patients who presents with Obstructive Jaundice with CBD Calculus and patients not willing for surgery). All patients were admitted to the department of general surgery in Lata Mangeshkar Hospital, Nagpur, in the period from November 2019 to October 2021. All patients underwent elective LC. Ethical approval was taken from the concerned institutional committee for the commencement of the study. Informed written consent was taken from all patients. Data were collected by us and our residents. Diagnosis of symptomatic cholelithiasis was made based on history, clinical examination, laboratory, and radiological investigations. The preoperative predictive factors of difficult LC included history (age, sex, and history of hospitalization for acute cholecystitis), clinical data (BMI= weight (kg)/height (m)²), abdominal scar, and palpable GB) and sonographic data (wall thickness of GB, pericholecystic collection, and impacted stone). Moreover, various intraoperative parameters like gall bladder adhesions to bowel and adjacent structure, duct and artery clipping, omental adhesions and extraction of gall bladder which were used for categorization and grading of difficult level of LC.

STATISTICAL ANALYSIS

The data will be coded and analysed using STATA, version 10.1, 2011 statistical software. Descriptive and inferential statistics will be used in the data analysis. The mean and standard deviation of quantitative data (AGE, BMI) will be summarized using descriptive statistics. To summarize category (i.e. qualitative) variables, frequency and percentages will be employed (GENDER) Tests of significance for comparing parameters in two groups will be included in inferential statistics. To assess the difference between the mean of qualitative parameters in two comparison groups, two independent sample T tests will be utilised. significance of mean difference in two groups. The chi square test will be used to compare the proportions of qualitative attributes in two groups. For all comparisons, a P-value of 0.05 will be deemed statistically significant.

RESULTS

-A total of 68 patients were included in this study from November 2019 to October 2021 majority of them were female(N=50).

-In our study, the mean age was 46.31 years (range: 18–80 years). Most patients were in the age group of 40–49 years.

-Of 68 patients, 50 were female and 18 were male patients, with female to male ratio of 2.77: 1. Regarding ultrasonography findings 5 patients had impacted stone, 14 patients had wall thickness greater than or equal to 4 mm, and pericholecystic collection was present in 4 patients.

-History of hospitalization for acute cholecystitis was recorded in 21 subjects, 32 subjects have BMI above 25, 5 patients had history of prior abdominal surgery, 3 patients had palpable gall bladder, 14 patients had gall bladder wall thickness above or equal to 4mm, 4 patients had pericholecystic collection and 5 patients had impacted stone in Hartman pouch and these were considered difficult subjects for laparoscopic cholecystectomy preoperatively.

-Out of 68 patients, 27 underwent difficult laparoscopic cholecystectomy. For history of hospitalization for acute cholecystitis 19 subjects had difficult laparoscopic cholecystectomy, 5 patients out of 7 had BMI above 27.5 who underwent difficult laparoscopic cholecystectomy, 2 of the 5 subjects had history of prior abdominal surgery underwent difficult laparoscopic cholecystectomy, 9 out of 14 subjects with gall bladder wall thickness above or equal to 4mm had difficult laparoscopic cholecystectomy, 2 out of 4 patients had pericholecystic collection who underwent difficult laparoscopic cholecystectomy and 5 patients who had impacted stone in Hartman pouch underwent difficult laparoscopic cholecystectomy.

-Out of 27 difficult laparoscopic cholecystectomy, 5(18.52%) were converted to open cholecystectomy due to two with dense adhesions with multiple calculi, empyema of gall bladder, frozen calots and Type 1 mirzzi syndrome.

DISCUSSION

Cholecystectomy is currently one of the most common reasons for emergency admission with an associated mortality

rate of 0.45 to 6%, depending on the severity of gallbladder disease. This study was conducted to determine predictive factors of a difficult cholecystectomy.

Many factors were found to be predictors of a difficult surgery. Generally, the surgery process becomes difficult in subjects older than 50 years and conversion is higher with increasing age due to recurrent attacks.⁸ In our study, 3 of 5 converted cases were male, indicating the higher rate of difficult dissection in males. A study with a larger study population could help clarify the results.

The other factor that significantly predicted the risk of conversion was BMI>27.5 Kg/m². Obesity is known to harden the access to the peritoneal cavity, thus increasing the need for conversion to open laparotomy.⁴ In our study, BMI of >27.5 Kg/m² was found to be a significant predictor of difficult cholecystectomy preoperatively. Even history of an acute attack requiring hospitalization made the surgery difficult in our study (P<0.001). It was also found to be a significant predicting factor of difficult laparoscopic cholecystectomy. Such cases required more time for dissection of Calot's triangle and dissection of gallbladder from the liver bed (>90 min).

Clinically palpable gallbladder has not been reported to be a predictor of difficult cholecystectomy.⁹ In distended gallbladder, it is difficult to grab the fundus of gallbladder, often requiring aspiration of the contents of the gallbladder. This process is complicated and time consuming, and increases the possibility of spillage of contents into the peritoneal cavity. Clinically palpable gallbladder is a significant predictor of difficult cholecystectomy. Upper abdominal surgery is reported to have a high rate of conversion (37.5%) due to dense adhesion. Increasing experience on adhesiolysis and advanced laparoscopic surgery (using high-definition cameras and newer energy sources) have led to reduced need for conversion.

Sonography is the method of choice for detection of gallbladder wall thickening and gallstones. Thickening of the gallbladder wall is an important predictor for conversion. It is mainly related to inflammation or fibrosis following previous attacks of cholecystitis, and thus may reflect difficulty in delineation of the anatomy during surgery. Our study shows that stone impaction in the gallbladder neck is a good predictor of difficulty in laparoscopic cholecystectomy. This is contrary to the findings of previous studies indicating that stone impaction has a moderate correlation with difficulty in laparoscopic cholecystectomy.¹⁰ In our study, sonological impacted stone was found as a significant predictor of difficult cholecystectomy.

The presence of pericholecystic fluid significantly increases difficulty of visualization and risk of local sepsis. Pericholecystic fluid collections and edema have not been reported to be significant predictor of difficult laparoscopic cholecystectomy.

Other risk factors including the intraoperative status of distended, contracted or shriveled gallbladder corollary to the thickened gallbladder wall may be considered important poor prognostic criteria for laparoscopic cholecystectomy. The size of the impacted stone (especially > 1 cm) at the neck of the gallbladder was also found as a determinant of the surgery outcome.

CONCLUSION

Our findings indicate that the preoperative factors are more useful for predicting the outcome of laparoscopic cholecystectomy. With the help of an accurate prediction method, high-risk patients may be informed beforehand regarding the possibility of conversion, enabling the patients to make arrangements accordingly. This also increases awareness of surgeons regarding the spectrum of potential complications in high-risk patients. Therefore, the preoperative factors can be used as a simple method of predicting difficult laparoscopic cholecystectomy. A new scoring system based on both the preoperative and intraoperative variables could be more effective. Finally, the need for conversion to laparotomy is neither a failure nor a complication, but merely an attempt to avoid complications.

References

1. Shaffer EA. Gallstone disease: epidemiology of gallbladder stone disease. *Best Pract Res Clin Gastroenterol* 2006; 20:981–996.
2. Rao KS, Meghavathu GN, Rao GS, Prasad HRT. Clinical study of gallstone disease and treatment options. *J Evol Med Dent Sci* 2015; 4:13841–13848.
3. Thamil RS, Sinha P, Subramaniam PM, Konapur PG, Prabha CV. A clinicopathological study of cholecystitis with special reference to analysis of cholelithiasis. *Int J Basic Med Sci* 2011; 2:68–72.
4. Le VH, Smith DE, Johnson BL. Conversion of laparoscopic to open cholecystectomy in the current era of laparoscopic surgery. *Am Surg* 2012; 78:1392–1395.
5. Singh K, Ohri A. Difficult laparoscopic cholecystectomy: a large series from north India. *Indian J Surg* 2006; 68:205–208.
6. Abdel Baki NA, Motawei MA, Soliman KE, Farouk AM. Pre-operative prediction Of difficult laparoscopic cholecystectomy using clinical and ultrasonographic parameters. *JMRI* 2006; 27:102–107.
7. Lee NW, Collins J, Britt R, Britt LD. Evaluation of preoperative risk factors for converting laparoscopic to open cholecystectomy. *Am Surg* 2012; 78:831–833.
8. Nachnani J, Supe A. Pre-operative prediction of difficult laparoscopic cholecystectomy using clinical and ultrasonographic parameters. *Indian journal of gastroenterology*. 2005; 24:16–8.
10. Daradkeh SS, Suwan Z, Abu-Khalaf M. Preoperative ultrasonography and prediction of difficulties in laparoscopic cholecystectomy. *World Journal of Surgery*. 1998; 22(1):75-7.
11. Kadell BM, Zimmerman P, Lu DSK. Radiology of the abdomen. In: Zinner MJ, editors. *Maingot's abdominal*

operations, Vol. 1(10); 1997. pp. 3-115.

12. Dinkel HP, Kraus S, Heimbucher J, Moll R, Knupffer J, Gassel HJ, Freys SM, Fuchs KH, Schindler G. Sonography for selecting candidates for laparoscopic cholecystectomy: a prospective study. *AJR Am J Roentgenol* 2000 May;174(5):1433-1439.

13. Schietroma M, Carlei F, Ciuca B, Risetti A, Lannucci D, Leardi S, Muzi F, De Santis C, Di Placido R, Recchia CL, et al. Video laparoscopic cholecystectomy in acute cholecystitis: when, how and why? *Minerva Chir* 1997 May;52(5):515-522.

14. Palanivelu C. History of laparoscopic surgery, laparoscopic cholecystectomy. In: Gem digestive diseases foundation. 1st ed. Textbook of surgical laparoscopy, Vol. 3(6); 2002. pp. 121-138.

15. Sinai M. History of minimal invasive surgery. The Mount Sinai Medical Centre; 2007.

16. Braghetto I, Csendes A, Debandi A, Korn O, Bastias J. Correlation among ultrasonographic and videoscopic findings of the gallbladder: surgical difficulties and reasons for conversion during laparoscopic surgery. *Surg LaparoscEndosc* 1997 Aug;7(4):310-315.

17. Lal P, Agarwal PN, Malik VK, Chakravati AL. A difficult laparoscopic cholecystectomy that requires conversion to open procedure can be predicted by preoperative ultrasonography. *JLS* 2002 Jan-Mar;6(1):59-63.

18. Alponat A, Kum CK, Koh BC, Rajnakova A, Goh PM. Predictive factors for conversion of laparoscopic cholecystectomy. *World J Surg* 1997 Jul-Aug;21(6):629-633.