Original Article

Clinico-radiological assessment for prediction of difficult laparoscopic cholecystectomy

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Abstract

Background: Although laparoscopic cholecystectomy (LC) is considered the gold standard technique for symptomatic cholelithiasis, sometimes it is technically challenging for the surgeons. There are some clinical and radiological factors which can be assessed preoperatively to reliably predict the feasibility of successful laparoscopic cholecystectomy. The aim of the present study was to assess clinical as well as radiological findings for prediction of difficult laparoscopic cholecystectomy. **Material and Methods:** This prospective observational study included 60 cases with symptomatic cholelithiasis chosen for laparoscopic cholecystectomy. All the patients were subjected to the clinical and radiological assessments which were regarded as preoperative factors for prediction of difficult laparoscopic cholecystectomy. **Results:** Clinical assessment showed that sex, fever at the time of attack, whereas, radiological assessment showed all bladder wall thickness, pericholecystic collection were significant for conversion. **Discussion:** Difficult laparoscopic cholecystectomy and conversion to open surgery can be predicted preoperatively based on clinico-radiological factors such as fever at the time of attack, gall bladder wall thickness, pericholecystic collection.

Key Words: Difficult cholecystectomy, clinical assessment, Pericholecystic collection.

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INTRODUCTION

Laparoscopic cholecystectomy (LC) is widely accepted as gold standard for treatment of symptomatic cholelithiasis[1]. Though considered the gold standard technique, it is also sometimes technically challenging for the surgeons in view of difficult intraoperative anatomy, difficulty in dissecting around the calot's triangle or dense adhesions between the gall bladder and the adjoining structures. It has been mentioned in previous studies, there are some clinical and radiological factors which can be assessed preoperatively to reliably predict the feasibility of successful laparoscopic cholecystectomy or the requirement for the conversion to open cholecystectomy[2,3]. Clinically, pain, fever at the time of attack and vomiting along with palpable GB has been found to be a predictor of difficult LC in a study[4]. Patients with long-standing disease and previous history of cholecystitis are at higher risk of experiencing a difficult procedure or conversion[5]. To confirm the preoperative diagnosis, abdominal ultrasonography (USG) is the most frequently used exam, being diagnostic method with relative low cost, free of ionizing radiation, non-invasive and practical realization. This exam has estimated sensitivity and specificity of 84% and 99%, being gold-standard for the diagnosis of extrahepatic biliary diseases, detecting gallstones of 1.5-2 mm in diameter[6-8]. Ultrasound findings, such as, gall bladder wall thickness, number and impacted stone can used as predictors of potential operative difficulties when selecting patients for laparoscopic cholecystectomy[9,10]. Predicting these factors may be used for the preoperative counselling of the patients regarding the successful outcome of the surgery, prepare the patient psychologically, arrange operating schedules accordingly, and minimize the procedure-related cost and help overcome financial constraints, which is a significant problem in developing countries so that needful arrangements can be made by the patients[11]. The aim of the present study was to assess clinical as well as radiological findings for prediction of difficult laparoscopic cholecystectomy.

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MATERIAL AND METHODS

This prospective observational study included 60 cases with symptomatic cholelithiasis chosen for laparoscopic cholecystectomy. Patients with acute cholecystitis, mucocele and pyocele and evidence of concomitant choledocholithiasis were included. Cases with laparoscopic cholecystectomy with common bile duct (CBD) exploration, laparoscopic cholecystectomy performed with other laparoscopic intervention in same setting and absolute contraindication to laparoscopic cholecystectomy like cardiovascular, pulmonary disease, coagulopathies and end stage liver disease were excluded from the study. All the patients included in the study were subjected to the clinical and radiological assessments which were regarded as preoperative factors for prediction of difficult laparoscopic cholecystectomy. The clinical signs of cholecystitis considered were tender right hypochondrium, positive Murphy's sign and palpable gall bladder. History of jaundice and symptoms of pain, fever, dyspepsia and vomiting were also considered. Ultrasonographical findings noted were gall bladder wall thickness, evidence of peri-cholecystic fluid collection, size and number of calculi. Gallbladder wall thickness was estimated by using the maximal obtainable measurement and evaluated as a dichotomous variable (thick ≥ 3mm versus normal <3mm). The calculus size was evaluated as a dichotomous variable for the purpose of analysis (small < 1cm versus large ≥ 1cm). The number of calculi was classified as a dichotomous variable (solitary versus multiple). Any impacted stone at neck of gallbladder, peri-cholecystic collection.

RESULTS

A total of 60 patients with symptomatic gallbladder disease who had undergone laparoscopic cholecystectomy were included in study. Maximum 37 subjects were from age group ≤40 years including 6 (10%) male and 31 (51.6%) female subjects (Table 1).

Table 1: Age and sex distribution of study subjects

Age group	Male	Percentage	Female	Percentage	Total
≤40	6	10	31	51.6	37
41-50	5	8.3	6	10	11
51-60	3	5	4	6.6	7
61-70	2	3.3	3	5	5
Total	**16**	**26.6**	**44**	**73.3**	**60**

Out of 60 LC, 58 successfully undergone laparoscopic cholecystectomy but 2 cases were converted to open which were very difficult to dissect and bleed severely. Of 60 patients, 24 were difficult LC. In present study, the patients who had duration of illness more than 30 days were consider as chronic cholecystitis (CC) and patients who had similar episode in past were consider as recurrent cholecystitis (RC). Most of the patients (44 patients) were diagnosed as acute calculus cholecystitis (ACC). Other 7 patients were diagnosed as chronic cholecystitis and 9 patients were diagnosed as recurrent cholecystitis. Out of 24 difficult cases,18 were acute calculus cholecystitis, 3 were chronic cholecystitis and 3 were recurrent cholecystitis. So, there were no statistical significance (p=0.9) found to be associated with these preoperative factors. On clinical examination, pain was present in almost all 100% cases, followed by vomiting 16.6%. Fever was present only in 10% patients. Out of 60 patients, 16 patients had history of previous surgery, 9 patients had history of similar episodes and 7 patients had co-morbidity. Out of 60 patients, 6 patients had fever among them 5 patients undergone LC were difficult. Thus, as a preoperative factors fever was found to be statistically significant factors for prediction of difficult LC (p=0.03). History of previous abdominal surgery (p=0.12), and co-morbidity (p=0.13) were not found to be statistically significant to be label as preoperative factors for prediction of difficult LC. On ultrasonography, 47(78.3%) patients had multiple small calculi and 13(21.6%) patients had single large calculi. Out of 24 difficult cases, 4 patient had single large calculi and 20 had multiple small calculi (p=0.33). A total of 44 patients (73.3%) had GB wall thickness≤3 mm and only 16 patients (26.6%) had GB wall thickness >3 mm. Out of 24 difficult LC, 13 patients had GB wall thickness>3 mm. So, GB wall thickness > 3mm were found to be statistically significant for prediction of difficult LC (p=0.0002). Only 4 (6.6%) patients had impacted stone; whereas, 7(11.6%) patients had peri-cholecystic collection. These 4 patients with impacted stone and 6 with pericholecystic collection were associated with difficult LC. As a preoperative factors, impacted stone and pericholecystic collection were found to be statistically significant for prediction of difficult LC (p=0.02 and 0.01 respectively).

Table 2: Comparison of clinical and radiological factors in difficult laparoscopic cholecystectomy

Pre-operative Factors		Difficult laparoscopic cholecystectomy		p Value
		Yes (n=24)	No (n=36)	
Clinical factors				
Vomiting	P	4	6	0.6
	A	20	30	
Fever	P	5	1	0.03
	A	19	35	
Duration of illness (days)	(Mean ±S.D.)	28.6 ± 4.9	28.38±5.3	0.4
Diagnosis	ACC	18	26	0.9
	CC	3	4	
	RC	3	6	
Previous abdominal surgery	Y	4	12	0.12
	N	20	24	
Radiological factors				
GB wall thickness (cm)	≤3	11	33	0.0002
	>3	13	3	
Impacted stone	Y	4	0	0.02
	N	20	36	
GB calculi	Single	4	9	0.33
	Multiple	20	26	
Peri-cholecystic collection	Y	6	1	0.01
	N	18	35	

Significant higher frequency of fever (p=0.03), raised LFT (p=0.03), raised TLC (p=0.007), GB Wall thickness >3 cm (p=0.0002), Impacted stone (p=0.02), and pericholecystic collection (p=0.01) was noted in subject with difficult laparoscopic cholecystectomy. No significant association was detected between history of vomiting, duration of illness, diagnosis and history of previous abdominal surgery (Table 2).

DISCUSSION

In the present study, a total of 60 patients were included and clinical and radiological variables were analyzed for difficult LC such aspain, fever and attacks of cholecystitis, ultrasonographic finding including thickness of GB, size and numberofstonesinGB encountered during surgery. In this study, age was found to be higher in subjects with difficult laparoscopic cholecystectomy compared to non-difficult laparoscopy group, but the difference failed to reach statistical significance (p=0.34). The present study and some other authors did not notice age to be associated with conversion rate [12,13]. Frequency of male gender was found to be higher on subjects with difficult laparoscopic cholecystectomy (p=0.03). Study of Kama *et al*[14], Hutchinson *et al*[12], Teixeira J *et al*[13] and Zisman *et al*[15] also showed that male gender is a risk factor for severe symptomatic cholelithiasis. In this study some clinical factors were found to be statistically significant like fever (p=0.03) but vomiting (p=0.6) and previous history of abdominal surgery (p=0.12) were not found to be statistically significant.Fever has been identified as a risk factor for conversion in our study and by many workers in their studies[11,16]. In few studies, previous abdominal surgery is a factor that predict difficult laparoscopic cholecystectomy and conversion to open cholecystectomy. In almost all of the studies, gall bladder wall thickness has been identified as a risk factor for conversion. In present study, gall bladder wall thickness of 3 mm was found to be critical.Hutchinson *et al*[12], Kama *et al*[14] and Nachani *et al*[17] considered GB wall thickness to be the most important sonographic risk factor of conversion to OC. Most of the studies did not find any statistical significance with number of stones and risk of conversion[12,18]. We also observed the same.Alponat *et al*[2] showed local signs of cholecystitis to be significant predictors for conversion to open cholecystectomy (OC). Pericholecystic collection was taken as an ultrasonography indicator of features of acute cholecystitis and was found to have statistically significant association (p=0.01) with difficult LC in our study and the same has been elucidated in the Schrenk P *et al*[19]. The conversion rate found in present study was 3.3%. The need for conversion was due to severe bleeding during dissection and difficulty to dissect. This is consistent with the previous studies where the conversion rates observed was 3 to 5%[19]. A high preoperative factors for prediction of difficult LC may allow the surgeon to take an early decision to convert to

OC when difficulty is encountered during dissection; this may shorten the duration of surgery and decrease the associated morbidity.

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