

Can We Predict A Difficult Laparoscopic Cholecystectomy A Prospective Study to Answer the Difficult Question

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Abstract

Introduction: Symptomatic gall stone disease is a common ailment and affects about 10 to 15% of general population. Though the vast majority of cholecystectomies are performed laparoscopically, still the rate of conversion to open is 5% to 10%. Although cholecystitis, choledocholithiasis, male sex, and obesity are major predictors for conversion, there is a need to evaluate various other factors responsible for difficult laparoscopic cholecystectomy.

Material and Methods: A total of 115 patients undergoing laparoscopic cholecystectomy for symptomatic gall stone disease in M S Ramaiah Hospital were studied from June 2013 to June 2015. The preoperative clinical and sonological data was compared with the intraoperative data and the outcome of surgery.

Results: Disease was more common among women of 40-50 years. 10.4% patients had acute cholecystitis and 5.2% had liver cirrhosis. Symptoms and signs of acute cholecystitis, previous surgery, contracted GB, GB wall thickness > 4mm, Liver cirrhosis were predictors of conversion to open cholecystectomy.

Conclusion: Certain parameters like symptoms and signs of acute cholecystitis, previous surgery, contracted GB, GB wall thickness > 4mm, liver cirrhosis, DM, and BMI>25 have

significance in predicting a difficult laparoscopic cholecystectomy and its conversion to open technique.

Keywords: Gall stone disease; Laparoscopic cholecystectomy; Open cholecystectomy.

Introduction

Gallstones are one of the commonest pathology of the biliary tract. In the USA it was estimated that gallstones were present in 10-15% of the adult population. Gall stones are asymptomatic in the majority of the population (> 80%). The prevalence of gallstones at the time of death was estimated to be 17% in UK, and may be increasing. Approximately 1-2% of asymptomatic patients with gall stones will develop symptoms requiring cholecystectomy per year, thus making cholecystectomy one of the most common operations performed by general surgeons.¹

There is widespread popularity and acceptance of laparoscopy and minimally invasive surgery thus making laparoscopic cholecystectomy, one of the commonly performed procedures today. Although the advantages of laparoscopic cholecystectomy are many, its limitations and unique complications should also be kept in mind. The incidence of bile duct injuries in laparoscopic cholecystectomy (0.2% to 0.8%) compared to open cholecystectomy (0.1% to 0.25%) is significantly higher. Previous abdominal operations will create technical difficulties with trocar placement, exposure, and visualization during laparoscopy. Conversion to an open cholecystectomy should not be considered a

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complication or a failure, but rather, a reflection of sound surgical judgment in difficult cases. The rate of conversion in the United States was 5% to 10%.²

Prediction of a difficult LC will allow the surgeon to discuss the likelihood of conversion with the patient and prepare him/her psychologically as well as planning their recovery and explaining their absence from work. Another benefit will be to allow more efficient scheduling of the operating lists and ensuring the availability of a more experienced laparoscopic surgeon for the procedure.³ In this context the current study aims to determine the predictive factors for difficult laparoscopic cholecystectomy in patients with symptomatic calculous cholecystitis.

Materials and Methods

A total of 115 patients who came with features of chronic calculous cholecystitis from June 2013 to June 2015 were studied prospectively. Patients with Common bile duct (CBD) calculous, dilated CBD, dilated intrahepatic biliary radicals, stricture of distal CBD were excluded from the study. The clinical preoperative factors like age, sex, BMI, DM, H/O acute cholecystitis, symptoms and signs of acute cholecystitis at presentation, previous abdominal surgery were assessed. The sonographic findings assessed were, gall bladder size, its wall thickness, peri-cholecystic fluid, gall stone size and number, and the liver condition. After evaluation the patients underwent laparoscopic cholecystectomy following written and informed consent. Parameters to assess difficult laparoscopic cholecystectomy were non-separable adhesions, inflammation around gall bladder, intraoperative bleeding or injuries, prolonged operating time.

Statistical analysis

Descriptive and inferential statistical analysis was done. Results on continuous measurements were presented on Mean \pm SD (Min-Max) and categorical measurements as Number (%). Significance was assessed at 5 % level of significance. The following assumptions on data were made.

1. Dependent variables should be normally distributed,
2. Samples drawn from the population should be random, Cases of the samples should be independent

Student t test was used to find the significance of study parameters on continuous scale between two

groups (inter group analysis) on metric parameters.

Significant figures

+ Suggestive significance (P value: 0.05<P<0.10)

* Moderately significant (P value: 0.01<P \leq 0.05)

** Strongly significant (P value: P \leq 0.01)

The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data.

Results

Out of 115 patients, 71(61.7%) were women with nearly one third were in 4th decade of age (Fig. 1) and nearly three quarter having normal BMI (Fig. 2). Though nearly 10% patients had history suggestive of acute cholecystitis, ultrasound demonstrated wall thickness in as many as 20% patients (Table 1 and 2). 17 procedures had to be converted into open technique either due to adhesions or due to injury (Table 3).

Table 1: Clinical findings of patients studied.

Clinical findings	Gender		Total (n=115)
	Female (n=71)	Male (n=44)	
History of acute cholecystitis			
• Yes	8(11.3%)	4(9.1%)	12(10.4%)
• No	63(88.7%)	40(90.9%)	103(89.6%)
Symptoms and signs of acute cholecystitis			
• Yes	7(9.9%)	3(6.8%)	10(8.7%)
• No	64(90.1%)	41(93.2%)	105(91.3%)
Previous surgery			
• Yes	1(1.4%)	1(2.3%)	2(1.7%)
• No	70(98.6%)	43(97.7%)	113(98.3%)

Table 2: Ultrasound findings.

Findings	Gender		Total (n=115)
	Female (n=71)	Male (n=44)	
Gall bladder size			
• Average	26(36.6%)	18(40.9%)	44(38.3%)
• Contracted	32(45.1%)	21(47.7%)	53(46.1%)
• Distended	13(18.3%)	5(11.4%)	18(15.7%)
Gall bladder wall thickness			
• Less than 4 mm	57(80.3%)	36(81.8%)	93(80.9%)
• More than 4 mm	14(19.7%)	8(18.2%)	22(19.1%)
Pericholecystic fluid			
• Yes	0(0%)	0(0%)	0(0%)
• No	71(100%)	44(100%)	115(100%)

Gall stone size			
• Less than 20 mm	37(52.1%)	22(50%)	59(51.3%)
• More than 20 mm	34(47.9%)	22(50%)	56(48.7%)
Gall stone number			
• Single	12(16.9%)	9(20.5%)	21(18.3%)
• Multiple	59(83.1%)	35(79.5%)	94(81.7%)
Condition of liver			
• Normal	70(98.6%)	39(88.6%)	109(94.8%)
• Cirrhosis	1(1.4%)	5(11.4%)	6(5.2%)

Table 3: Intra-op findings of patients studied.

Intra-op findings	Gender		Total (n=115)
	Female (n=71)	Male (n=44)	
Severe intraoperative adhesions			
• Yes	8(11.3%)	10(22.7%)	18(15.7%)
• No	63(88.7%)	34(77.3%)	97(84.3%)
Intraoperative injury			
• Yes	6(8.5%)	6(13.6%)	12(10.4%)
• No	65(91.5%)	38(86.4%)	103(89.6%)
Operative time in minutes			
• <50	23(32.4%)	11(25%)	34(29.6%)
• 50-90	48(67.6%)	30(68.2%)	78(67.8%)
• >90	0(0%)	3(6.8%)	3(2.6%)
Conversion to open cholecystectomy			
• Yes	10(14.1%)	7(15.9%)	17(14.8%)
• No	61(85.9%)	37(84.1%)	98(85.2%)

The following pre-operative parameters which showed a significant value in regression analysis to predict the operative timings and hence conversion are (Table 4):

- History of acute cholecystitis
- Symptoms and signs of acute cholecystitis

Table 4: Regression analysis to predict the operative timings (minutes) using risk variables.

Variable	B-coefficient	SE	Standardized β	t value	p value
Age in years	-0.003	0.068	-0.003	-0.049	0.961
Female	-3.902	1.865	-0.121	-2.092	0.039*
BMI(kg/m ²)	2.942	0.359	0.461	8.190	<0.001**
diabetes mellitus	-0.003	0.068	-0.003	-0.049	0.961
symptoms and signs of acute cholecystitis	-4.374	4.224	-0.078	-1.036	0.303
previous surgery	-0.041	7.089	0.000	-0.006	0.995
pericholecystic fluid	21.785	3.009	0.504	7.241	<0.001**
severe intraoperative adhesions	20.498	5.124	0.384	4.001	<0.001**
intraoperative inflammation	5.648	4.016	0.110	1.406	0.163
intraoperative injury	-0.774	2.147	-0.021	-0.360	0.719

- Contracted gall bladder
- Gall bladder thickness >4mm
- Cirrhotic liver

Also when combined pre and intraoperative parameters are studied with logistic regression analysis to predict the conversion to open cholecystectomy, BMI also has a significant value in addition to the above parameters (Table 5).

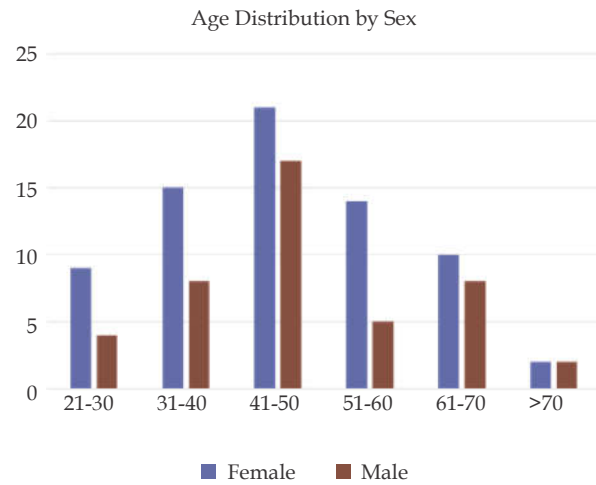


Fig. 1: age distribution

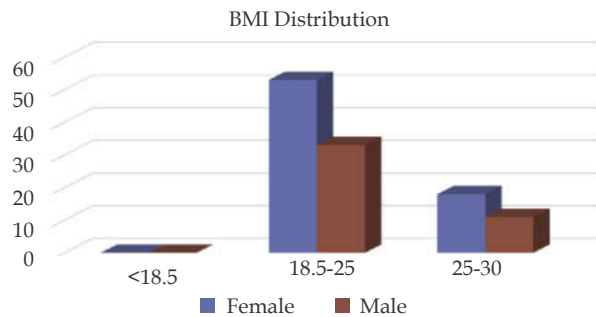


Fig. 2: BMI distribution.

Table 5: Logistic Regression analysis to predict the conversion to open cholecystectomy using risk variables

Variable	B-coefficient	SE	P value	OR	95%CI
Age in years	0.031	0.039	0.426	1.03	0.95–1.11
Female	0.291	0.841	0.730	1.34	0.25–6.96
BMI(kg/m ²)	0.479	0.182	0.008**	1.61	1.13–2.30
H/o acute cholecystitis	-2.923	1.480	0.048*	0.054	0.003–0.99
symptoms and signs of acute cholecystitis	-0.954	1.493	0.523	0.385	0.021–7.19
severe intraoperative adhesions	3.564	1.014	<0.001**	35.31	4.84–257.81
intraoperative inflammation	3.656	1.818	0.052+	38.70	0.99–1545
intraoperative injury	1.647	1.208	0.173	5.19	0.49–55.38

Discussion

In the current study symptomatic cholelithiasis was more common in females (61.7%) compared to males (38.3%) which was consistent with the studies by Nabil A. Abdel Baki et al³ and Magdy MA Elsebae et al.⁴ The most common age group was between 41 to 50 years which was also comparable with studies by Nabil A. Abdel Baki et al and Magdy MA Elsebae et al. The average BMI was 23.89±2.47 as compared to the study by Magdy MA Elsebae et al. History of acute cholecystitis was present in 10.4% patients as compared to 13.7% in the study by Magdy MA Elsebae et al. Symptom and signs of acute cholecystitis were present in 8.7% of the patients in current study as compared to Magdy MA Elsebae et al (13%). Thick GB wall was seen in 19.1% which was almost same as in the study conducted by Magdy MA Elsebae et al (19.4%). Gall stone size more than 20mm was found in 48.7% of patients where as it was 5.3 % in the study conducted by Magdy MA Elsebae et al. Gall stones were multiple in 81.7% of patients which was similar to the study done by Magdy MA Elsebae et al (81.9%). Liver cirrhosis was found in 5.2% of patients as compared to 6.2% in the study done by Magdy MA Elsebae et al. The mean operating time in current study was 59 minutes as compared to the study done by Nabil A. Abdel Baki et al (51 mins). Conversion to open procedure were done in 17(14.8%) patients which was higher when compared to Nabil A. Abdel Baki et al (7.5%).

In the current study difficulty during laparoscopic cholecystectomy was defined by the presence of severe adhesions, intraoperative injuries or bleeding, or operative time of more than 75minutes, or conversion to open cholecystectomy. Statistically significant variables in patients with intra-operative difficulty at LC were history of acute cholecystitis, symptoms and signs of acute cholecystitis, previous surgery, contracted GB, GB

wall thickness > 4mm, liver cirrhosis. Similar results were obtained in the studies done by Nabil A. Abdel Baki et al and Magdy MA Elsebae et al. Statistically significant variables in patients converted to OC were history of acute cholecystitis, symptoms and signs of acute cholecystitis, contracted gall bladder, GB wall thickness > 4mm, liver cirrhosis. This result was also similar to the study done by Magdy MA Elsebae et al and Haytham M.A. Kaafarani et al.⁵ On Logistic Regression analysis to predict the Conversion to open cholecystectomy using risk variables only history of acute cholecystitis and BMI were found to be statistically significant.

Conclusion

Though laparoscopic cholecystectomy is one of the most common surgical procedure performed worldwide, it is not devoid of complications. It is possible to predict difficulty during laparoscopic cholecystectomy and conversion to open cholecystectomy. In the current study its clearly understood that history of acute cholecystitis, symptoms and signs of acute cholecystitis, contracted GB, GB wall thickness > 4mm, liver cirrhosis, DM, and BMI>25 to be significant predictors of difficulty at laparoscopic cholecystectomy and should be always evaluated before an elective laparoscopic cholecystectomy.

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