Assessing Patient Preoperatively and Role in Decreasing Risks on Patients and Preventing Post-Operative Complications for Cholecystectomy

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Abstract

Background: Laparoscopic cholecystectomy has many difficulties which include port Insertion, Dissection of the Calot's Triangle , Grasping of the Gallbladder , Wall thickness, Adhesion and extraction of the Gallbladder. **Aim of the Study:** To predict how difficult cholecystectomy will be from assessing the patient preoperatively which, in turn, help in decreasing the risks on the patients and preventing post-operative complications. **Patients and Methods:** A prospective study conducted in the department of General Surgery at Al-Ramadi Teaching Hospital for the period of nine months from 15th of May 2018 till the 15th of February 2019. It included 60 patients, all of them were undergone laparoscopic cholecystectomy for Gallstone. Patients with common bile duct calculus, dilated common bile duct, current attack of acute cholecystitis, those with absolute contraindications to laparoscopic cholecystectomy, The data were collected prospectively to predict the significance of association with patients' characteristics. The time of operation was calculated from the first port site incision until the last port closure. All the intra operative events were recorded. Conversions to open cholecystectomy were done by median or subcostal laparotomy according to the surgeon's decision and each patient's condition. **Results:** In this study, the highest proportion of operations was categorized as easy (58.3%), 28.3% of operations were considered difficult and 13.3% of them were very difficult. A significant association ($P < 0.05$) between operation difficulty and all of the following characteristics: Aging, obesity, history of previous biliary hospitalization, thickened bladder wall, pericholecystic collection, and large stones. **Conclusions:** The difficult laparoscopic cholecystectomy can be predicted preoperatively based on number of factors, like: obesity, previous biliary admission, gall bladder wall thickness, ultrasound findings (stone size and pericholecystic fluid) and aging process, evaluating of such factors minimize the complications of laparoscopic cholecystectomy and conversion to the open procedure.

Keywords: *Laparoscopic cholecystectomy, difficulty, conversion, Iraq*

Introduction

Laparoscopic cholecystectomy though safe and effective, yet can be difficult at times. Various problems faced are difficulty in creating pneumoperitoneum, accessing peritoneal cavity (difficult port insertion), garsping of the Gallblader, releasing adhesions, identifying anatomy of Calot's triangle, anatomical variation and extracting the gall bladder. Many advantages had been reported in past that includes cosmesis, shorter hospital stay, less pain and postoperative morbidity. Despites these advantages there are several cases where its lethal complications had been reported in cases where anatomy of Calot's triangle is difficult to identify or distorted even in experience hands [(1)].Geography and ethnicity has an enormous role in the prevalence of GSD and also the type of stone that forms: cholesterol gallstones prevalent in the developed countries of the

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Western world; brown pigment stones in the bile ducts are more common in Asia [2]. female gender has an obvious association with GSD, especially during the fertile years. They are almost twice as likely as men to form stones; parity, oral contraceptive use and estrogen replacement therapy are an established risk factors for cholesterol gallstone formation [3].particularly abdominal or centripetal obesity, is a well-established risk factor for GSD [4]. At least 25% of morbidly obese individuals have evidence of GSD. Obesity in the late teenage years carries the greatest risk, whereas thinness protects against GSD [5].Patients with biliary colic typically have normal laboratory test results. blood tests should include a complete blood count with differential, liver function, amylase and lipase [6].Ultrasonography has a specificity and sensitivity of 90-95%. The sonographic features of acute cholecystitis include gallbladder wall thickening (>5 mm), pericholecystic fluid, gallbladder distention (>5 cm), and a sonographic Murphy sign. Also has the efficacy in identifying the anatomy of the pancreas and common bile duct diameter . Gallstones appear as echogenic foci in gallbladder which move freely with positional changes with an acoustic shadow [7].

Aim of study: To predict how difficult cholecystectomy will be from assessing the patient preoperatively which, in turn, help in decreasing the risks on the patients and preventing post-operative complications.

Patients and methods: A prospective study conducted in the department of General Surgery at Al-Ramadi Teaching Hospital. The data collection was completed during the period of nine months from 15th of May 2018 till the 15th of February 2019. This study included 60 patients, all of them were undergone laparoscopic cholecystectomy for Gallstone. Diagnosis of cholelithiasis was confirmed by an abdominal ultrasonography (U/S) in patients presenting with upper abdominal pain, or vomiting or dyspepsia or jaundice.

Preoperative characteristics, intraoperative details, and postoperative outcomes were further analyzed. The data were collected prospectively to predict the significance of association with patients' characteristics.

Statistical Analysis

The data analyzed using Statistical Package for Social Sciences (SPSS) version 25. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Chi square test was used to show the association between LAP difficulty and categorical variables. A level of P – value less than 0.05 was considered significant.

Results

The total number of study patients was 60. All of them undergone laparoscopic cholecystectomy for Gallstone.

The distribution of study patients by general characteristics is shown in table (3.1). Study patients age was ranging from 17 to 65 years with a mean of 39.05 years and a standard deviation of ± 12.11 years. The highest proportion of study patients was aged between 30 – 49 years (53.3%). More than three quarters of study patients were females (76.7%) with a male to female ratio of 1: 3.28.

About BMI level, 51.7% of study patients were overweighed.

Table 1: Distribution of study patients by general characteristics

Variable	No. (n= 60)	Percentage (%)
Age (Years)		
< 30	12	20.0
30 – 49	32	53.3
≥ 50	16	26.7

Cont... **Table 1: Distribution of study patients by general characteristics**

Gender		
Male	14	23.3
Female	46	76.7
BMI level		
Normal	13	21.6
Overweight	31	51.7
Obese	16	26.7

Table (2) shows the distribution of study patients by clinical information. We noticed that 16.7% of patients had a history of biliary hospitalization and 33.3% of them undergone caesarean section before. Gall bladder was not palpable in all patients (100%).Regarding comorbidity, 18.3% of patients were hypertensive and 10% were diabetics. Liver function test and Pancreatic enzymes (ALP , TSB , SGOT , SGPT , s.amylase) was normal in all patients.

Table (2) : Distribution of study patients by clinical information

Variable	No. (n= 60)	Percentage (%)
History of biliary hospitalization		
Yes	10	16.7
No	50	83.3
Previous Surgery		
No	34	56.7
Caesarean Section	20	33.3
Appendectomy	4	6.7
Abdominal hysterectomy	2	3.3
Comorbidity		
Hypertension	11	18.3
Diabetes Mellitus	6	10.0
Hypertension + Diabetes	4	6.7
No	39	65.0
Liver Function Test and Pancreatic enzymes		
Normal	60	100.0
Elevated	0	0

The distribution of study patients by ultrasound finding is shown in table (3). In this study, the wall of gall bladder was thin in 81.7% of patients, pericholecystic collection was presented in 10%, impacted stone was detected in the neck of Gall bladder in 5% and the content of gall bladder was stone in 81.7% of cases. Most of gall stone were ≤ 1 cm in size (65%).

Table (3): Distribution of study patients by ultrasound finding

Variable	No. (n= 60)	Percentage (%)
Wall Thickness		
Thin (≤ 3 mm)	49	81.7
Thick (> 3 mm)	11	18.3
Pericholecystic collection		
Yes	6	10.0
No	54	90.0
Impacted Stone (In the neck)		
Yes	3	5.0
No	57	95.0
Size of stone (cm)		
≤ 1	39	65.0
> 1	21	35.0
Gall Bladder Content		
Stone	49	81.7
Polyp	8	13.3
Sludge	3	5.0

Table (4) shows the distribution of study patients by intraoperative information. It was obvious that 58.3% of operations were lasted for < 60 minutes. Bile leak was occurred in 18.3% of cases, bleeding occurred in 6.7%, and stone spillage in 20%.

Conversion to open cholecystectomy was occurred in 13.3% of cases.

Table (4): Distribution of study patients by intraoperative information

Variable	No. (n= 60)	Percentage (%)
Time of operation (Minutes)		
< 60	35	58.3
60 – 120	17	28.3
> 120	8	13.3
Bile Leak		
Yes	11	18.3
No	49	81.7

Cont... **Table (4): Distribution of study patients by intraoperative information**

Bleeding		
Yes	4	6.7
No	56	93.3
Stone Spillage		
Yes	12	20.0
No	48	80.0
Conversion to open		
Yes	8	13.3
No	52	86.7

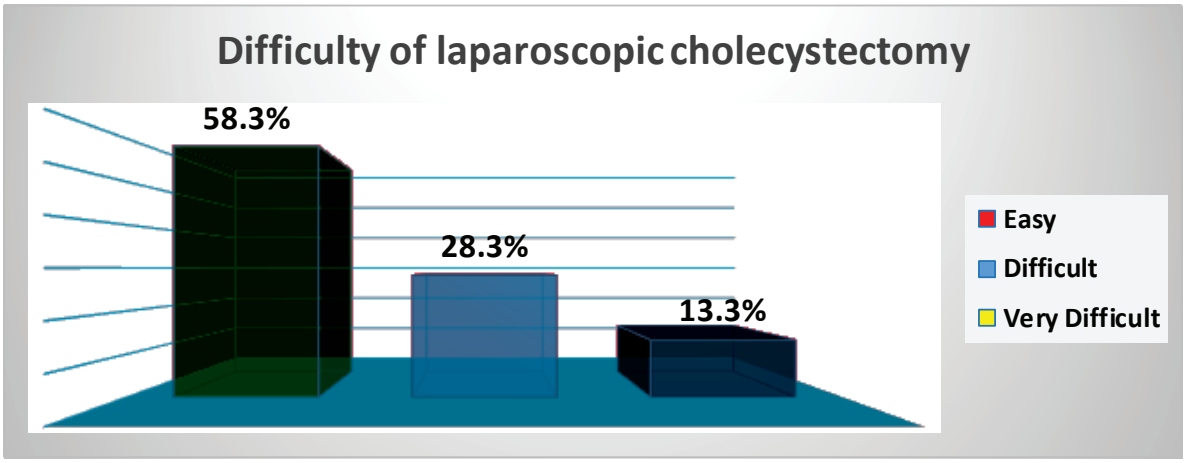

Figure (1): Distribution of study patients by difficulty of laparoscopic cholecystectomy

Figure (1) shows the distribution of study patients by difficulty of laparoscopic cholecystectomy. In this study, the highest proportion of operations was categorized as easy (58.3%), 28.3% of operations were considered difficult and 13.3% of them were very difficult

The association between operation difficulty and demographic and clinical information is shown in table (5). In this study, the highest prevalence of difficult and very difficult operation was seen in patients aged ≥ 50 (68.8%) with a significant association (P= 0.036) between operation difficulty and age. Regarding history of biliary hospitalization, 80% of patients who had a previous biliary hospitalization were suffering from difficult and very difficult operation with a significant association (P= 0.007) between operation difficulty and history of biliary hospitalization.About BMI level, we noticed that 62.5% of obese patients were suffering from difficult and very difficult operation with a significant association (P= 0.037) between operation difficulty and BMI level.No statistical significant association (P ≥ 0.05) between operation difficulty with gender, previous surgery and comorbidities.

Table (5): Association between operation difficulty with demographic and clinical information

Variable	LAP Difficulty		Total (%) n= 60	P - Value
	Difficult and Very Difficult (%) n= 25	Easy (%) n= 35		
Age (Years)				
< 30	4 (33.3)	8 (66.7)	12 (20.0)	0.036
30 – 49	10 (31.3)	22 (68.7)	32 (53.3)	
≥ 50	11 (68.8)	5 (31.2)	16 (26.7)	
Gender				
Male	7 (50.0)	7 (50.0)	14 (23.3)	0.47
Female	18 (39.1)	28 (60.9)	46 (76.7)	
BMI level				
Normal	2 (15.4)	11 (84.6)	13 (21.6)	0.037
Overweight	13 (41.9)	18 (58.1)	31 (51.7)	
Obese	10 (62.5)	6 (37.5)	16 (26.7)	
History of biliary hospitalization				
Yes	8 (80.0)	2 (20.0)	10 (16.7)	0.007
No	17 (34.0)	33 (66.0)	50 (83.3)	
Previous surgery				
Yes	11 (42.3)	15 (57.7)	26 (43.3)	0.376
No	14 (31.8)	30 (68.2)	34 (56.7)	
Comorbidity				
Yes	10 (47.6)	11 (52.4)	21 (35.0)	0.492
No	15 (38.5)	24 (61.5)	39 (65.0)	

Table (6) shows the association between operation difficulty and ultrasound finding. The highest prevalence of difficult and very difficult operation was found in patients with thick wall gall bladder (81.8%) with a significant association (P= 0.002) between operation difficulty and wall thickness. Regarding pericholecystic collection, 83.3% of patients who had pericholecystic collection were suffering from difficult and very difficult operation with a significant association (P= 0.029) between operation difficulty and pericholecystic collection.Concerning size of stone, we noticed that 66.7% of patients with stone > 1 cm were suffering from difficult and very difficult operation with a significant association (P= 0.003) between operation difficulty and size of stone.No statistical significant association (P ≥ 0.05) between operation difficulty with impacted stone in the neck , and gall bladder content.

Table (6) : Association between operation difficulty and ultrasound finding

U/S Finding	LAP Difficulty		Total (%) n= 60	P - Value
	Difficult and Very Difficult (%) n= 25	Easy (%) n= 35		
Wall Thickness				
Thin (≤ 3 mm)	16 (32.7)	33 (67.3)	49 (81.7)	0.002
Thick (> 3 mm)	9 (81.8)	2 (18.2)	11 (18.3)	
Pericholecystic collection				
Yes	5 (83.3)	1 (16.7)	6 (10.0)	0.029
No	20 (37.0)	34 (63.0)	54 (90.0)	
Impacted Stone in the neck				
Yes	2 (66.7)	1 (33.3)	3 (5.0)	0.367
No	23 (40.4)	34 (59.6)	57 (95.0)	
Size of stone (cm)				
≤ 1	11 (28.2)	28 (71.8)	39 (65.0)	0.003
> 1	14 (66.7)	7 (33.3)	21 (35.0)	
Gall Bladder Content				
Stone	20 (40.8)	29 (59.2)	49 (81.7)	0.656
Polyp	3 (37.5)	5 (62.5)	8 (13.3)	
Sludge	2 (66.7)	1 (33.3)	3 (5.0)	

Discussion

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. At present, laparoscopic cholecystectomy (LC) 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 [8]. In this study, easy operation represented the highest proportion of operations as constituted (58.3%), while, 28.3% of operations were considered difficult and 13.3% of them were very difficult. A comparable result observed in Agrawal et al study in 2015, in which 30 patients involved in their study, they found that seventeen patients were scored easy (56.7%) and 13 (43.3%) were difficult and nil in very difficult group [9].

In the current study, difficult and very difficult operation was seen in more than two third of patients aged ≥ 50 (68.8%) with a significant association (P= 0.036) between operation difficulty and age.In contrast to the current results, Agrawal and colleagues in their study in 2015, the majority of patients were in the age group of ≤50 years (83.3%) and only (16.7%) were >50 years, in which no significant correlation between age and the difficult level of surgery (P>0.05) [9]. Increasing age

is associated with an increased probability of multiple attacks of cholecystitis and also increased frequency of upper abdominal surgeries [10].In the present study, a previous biliary hospitalization was significantly observed in 80% of patients suffering from difficult and very difficult operation (P= 0.007).

Similarly, Agrawal et al study that conducted in 2015, found in their univariate and multivariate analysis that previous hospitalization was statistically significant in predicting difficult LC [71].Another agreement observed in Randhawa et al study in 2009, in which found that previous hospitalization was significantly associated with difficult LC (P<0.05) [10].

In concern to BMI level in this study, nearly two third of obese patients were suffering from difficult and very difficult operation with a significant association (62.5%, P= 0.037) between operation difficulty and BMI level.

An agreement observed in Dhanke *et al*., study in 2014, in which discover that difficult LC was significantly higher observed in patients with BMI >27.5 kg/m^2, as found in 80% of those had a difficult LC (P<0.001) [11].

In the current study, no statistically significant association (P ≥ 0.05) between operation difficulty with gender, previous surgery and comorbidities.

Comparable results observed in a study conducted by Dhanke and colleagues in 2014, in which noticed that no significant association observed between difficult LC and gender of the participants and the previous surgery performed (P=0.596 for both) [11].Male with symptomatic gall bladder are more prone to inflammation and fibrosis with the same disease intensity thus leading to difficulty in dissection.

In the current study, the difficult and very difficult operation was found in patients with thick wall gall bladder (81.8%), 83.3% of patients who had pericholecystic collection and 66.7% of patients with stone > 1 cm with a significant association between operation difficulty and wall thickness, pericholecystic collection and size of stone (P< 0.05), while no statistical significant association (P ≥ 0.05) between operation difficulty with impacted stone, common bile duct diameter, and gall bladder content.

In contrary, a higher conversion rate was observed in Bat O study in 2015, in which the rate of conversion to open cholecystectomy observed was 67.1%, in which found that operation time was significantly prolonged in conversion group (P<0.0001) [77].

Furthermore, a lower result observed in Bourgouin et al study in 2016, as found that 4.3% of cases operated laparoscopically required conversion to open cholecystectomy, in which the major causes for conversion include; tight adhesions, severe inflammation and uncontrollable bleeding [12].

Another lower result observed in Ahmed et al study in 2018, in which noticed that conversion rate to open surgery was 6.7% [13]. In this study, the wall of gall bladder was thin in 81.7% of patients, pericholecystic collection found in 10%, impacted stone was detected in 5% and the content of gall bladder was stone in 81.7% of cases. Most of gall stone were ≤ 1 cm in size (65%).

Another different result observed in Atta et al study in 2017, in which U/S findings showed that thickened gallbladder wall in difficult group represented 5.8% of the study patients [14].

In the current study, a mean and a standard deviation of age was 39.05 ± 12.11 years (ranging from 17 to 65 year). The highest proportion of study patients was aged between 30 – 49 years (53.3%). Females predominance exist as it constituted 76.7% of patients with a male to female ratio of 1: 3.28. About BMI level, 51.7% of study patients were overweighed.

Comparable results observed in Agrawal et al study in 2015, in which the mean and SD of the participant's age was 39.47 ± 12.008 years with the minimum age being 18 years and the maximum being 64 years. The majority of patients were in the age group of ≤50 years. Female were the predominant in the study, as formed the majority of the study patients (80%), with female to male ratio was 4:1 [9].

Conclusion

The difficult laparoscopic cholecystectomy can be predicted preoperatively based on number of factors, like: obesity, previous biliary admission, gall bladder wall thickness, ultrasound findings (stone size and pericholecystic fluid) and ageing process, evaluating

of such factors minimize the complications of LC and conversion to the open procedure.

Conflict of Interest: Non

Source of Findings: Self-findings.

Ethical Clearance: Taken from hospital and patients

References

1. Kanakala V, Borowski DW, Pellen MG, Dronamraju SS, Woodcock SA, Seymour K, et al. Risk factors in laparoscopic cholecystectomy: A multivariate analysis. Int JSurg 2011;9(4):318–23
2. Shaffer EA. Gallstone disease: epidemiology of gallbladder stone disease. Best Pract Res Clin Gastroenterol. 2006; 20:981–996.
3. Cirillo DJ, Wallace RB, Rodabough RJ, Greenland P, LaCroix AZ, Limacher MC, *et al.*, Effect of estrogen therapy on gallbladder disease. Jama. 2005 Jan 19;293(3):330-9.
4. Tsai CJ, Leitzmann MF, Willett WC, Giovannucci EL. Prospective study of abdominal adiposity and gallstone disease in US men. Am J Clin Nutr. 2004;80:38–44.
5. Li VK, Pulido N, Fajnwaks P, Szomstein S, Rosenthal R, Martinez-Duartez P. Predictors of gallstone formation after bariatric surgery: a multivariate analysis of risk factors comparing gastric bypass, gastric banding, and sleeve gastrectomy. Surg Endosc. 2009;23:1640–1644.
6. Dauer M, Lammert F. Mandatory and optional function tests for biliary disorders. Best Pract Res Clin Gastroenterol. 2009. 23(3):441-51.
7. Stogryn S, Metcalfe J, Vergis A, Hardy K. Does ultrasonography predict intraoperative findings at cholecystectomy? An institutional review. Can J Surg. 2016 Feb. 59 (1):12-8. https://emedicine.medscape.com/article/1582292-overview#a3
8. Nidoni R, Udachan TV, Sasnur P, Baloorkar R, Sindgikar V, Narasangi B. Predicting difficult laparoscopic cholecystectomy based on clinicoradiological assessment. Journal of clinical and diagnostic research: JCDR. 2015 Dec;9(12): PC09.
9. Agrawal N, Singh S, Khichy S. Preoperative prediction of difficult laparoscopic cholecystectomy: a scoring method. Nigerian Journal of Surgery. 2015;21(2):130-3.
10. Randhawa JS, Pujahari AK. Preoperative prediction of difficult lap chole: A scoring method. Indian J Surg. 2009; 71:198–201.
11. Dhanke PS, Ugane SP. Factors predicting difficult laparoscopic cholecystectomy: A single-institution experience. International Journal of Students' Research. 2014 Jan 1;4(1):3.
12. Bourgouin S, Mancini J, Monchal T, Calvary R, Bordes J, Balandraud P. How to predict difficult laparoscopic cholecystectomy? Proposal for a simple preoperative scoring system. The American Journal of Surgery. 2016 Nov 1;212(5):873-81.
13. Ahmed N, ul Hassan M, Tahira M, Samad A, Rana HN. Intra-Operative Predictors of difficult cholecystectomy and Conversion to Open Cholecystectomy–A New Scoring System. Pakistan journal of medical sciences. 2018 Jan;34(1):62.
14. Atta HM, Mohamed AA, Sewefy AM, Abdel-Fatah AF, Mohammed MM, Atiya AM. Difficult Laparoscopic Cholecystectomy and Trainees: Predictors and Results in an Academic Teaching Hospital. Gastroenterology research and practice. 2017;2017.