

# Preoperative Prediction of Difficult Laparoscopic Cholecystectomy by Clinical Assessment and Ultrasonography

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## ABSTRACT:

### BACKGROUND:

Laparoscopic cholecystectomy(LC) has now replaced open cholecystectomy(OC) for the treatment of gallbladder diseases. However, LC may be rendered difficult by various problems encountered during surgery, such as difficulties in accessing the peritoneal cavity, dissecting the Calot's triangle and gall bladder, or extracting the excised gall bladder.

### OBJECTIVE:

Of this prospective study: is to determine whether preoperative clinical parameter and Ultrasonography can predict difficult LC.

### PATIENT AND METHODS:

100 patients underwent LC in Al-Jamhuri Teaching Hospital, all had gallstone disease. Prospective analyses of different preoperative clinical and ultrasonic parameters contributing to difficult LC were performed. These included: age, gender, BMI (Body Mass Index), previous upper abdominal surgery, previous attack of acute cholecystitis, gall bladders size, gall stones size and numbers. The outcomes included the following operative parameters: access to peritoneal cavity, adhesion and difficult dissection, bleeding during surgery, bile leak, and conversion to OC.

### RESULTS:

Of 100 patients with LC 41 patients (41%) developed difficulties during operation. Factors contributed to difficult LC were male sex, previous upper abdominal surgery, previous attack of acute cholecystitis, BMI more than 35 and gall stones that were more than (1 cm) in diameters. The most common type of difficulties was intraoperative bile leak (14%) and the least frequent difficulty was conversion to OC (1%).

### CONCLUSION:

Clinical and ultrasonographic findings can help to predict difficult LC. This information may be useful to both the patients and surgeons in being better prepared for the intra-operative risk including conversion to OC.

**KEY WORDS:** laparoscopic cholecystectomy, open cholecystectomy.

## INTRODUCTION:

OC was the standard treatment for gallstones till the late 1980s, when Philip Mouret from France performed the first human LC in 1987<sup>(1)</sup>. LC became the golden treatment of gallstone disease<sup>(2)</sup>. Decreased postoperative pain, earlier oral intake, shorter hospital stay, early resumption of normal activity and improved cosmeses have been well recognized after LC<sup>(3)</sup>. A significant reduction in the incidence of wound complications and postoperative ileus has been documented in patients undergoing LC. Most of previous contraindication to LC, such as morbid obesity, previous upper abdominal surgery and acute cholecystitis, are no longer absolute contraindication. LC may be rendered difficult by various problems encountered during surgery such

as difficulties in accessing the peritoneal cavity, creating a pneumoperitoneum, dissection of Calot's triangle and gall bladder or extracting the excised gall bladder<sup>(4)</sup>. In spite of increasing expertise and advances in technology conversion rate is still varied between 1.5-19% in different centers if the anatomy of Calot's triangle is not clear or bleeding occurs<sup>(5)</sup>. The levels of difficulties during LC and conversion to OC can be predicted by certain preoperative clinical and ultrasonic parameters<sup>(6)</sup>.

### PATIENTS AND METHODS:

In this prospective study, 100 patients (79 females, 21 male patients) of different age groups who underwent elective LC for gallstone between January 2010 and June 2011 were included. All the patients had gallstones, jaundiced patients were excluded. The patient variables were: Age, gender, BMI (weight in kilogram/height in meter square), Previous Right upper abdominal surgery and

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Previous Acute cholecystitis. Ultrasonography concentrate on the gall bladder size (normal, contracted or distended) , gall bladder wall thickness, size and number of stones. The outcomes variables were : Access to peritoneal cavity, Dissection of Calot’s triangle and gall bladder from its bed, Bleeding during surgery , injury to biliary ducts or perforation of gall bladder, Difficult extraction and extension of incision for extraction, Duration of surgery and Conversion to OC. LC adopted with the American method: Patients placed in supine position, surgeons stand on the left side of the patient. Pneumoperitoneum is created with carbon dioxide

gas. Duration of surgery included the time from the first trocar insertion till the removal of last trocar.

**RESULTS:**

100 patients admitted to 2<sup>nd</sup> surgical unit at AL-Jamhuri Teaching Hospital for LC for gallstone . The commonest age group was (30y-49y) comprising 54 patients (54%) followed by (10-29y) comprising 24 patients (24 %).The age group (30-49y) have( 59%) difficulties with (p-value 0.795).

Males were 21 (21%) while females were 79 patients (79%), 15 males out of 21 (70%) developed difficulties during operation, while 23 females out of 79 (30%) developed difficulties,

**Table :1.**

Gender	No.	Difficulties	%	X <sup>2</sup>	p-value	Significance
Male	21	15	70%	6.31	0.012	Significant
Female	79	23	30%	1.87	0.087	Not significant
Total	100	38				

Table 1: Frequency of occurrence of difficulties regarding gender 49 patients (49%) had BMI between 25.1-30 followed by 25 patients(25%) with BMI between 30.1-35 while only 1 patient(1%) had BMI less than 18 and no one

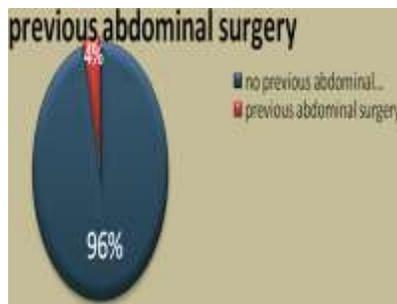
included in this study with BMI more than 40,we see that 13 patients (84.21%) who had BMI between 35.1-40 developed difficulties during operation Table2.

**Table 2: Frequency of difficulties regarding BMI.**

BMI	No	Difficulties	%	X <sup>2</sup>	p-value	Significance
< 18	1	Zero				
18.1-25	12	4	31.57%	0.141	0.707	Not significant
25.1-30	49	16	34.72%	0.104	0.747	Not significant
30.1-35	25	7	26.31%	0.904	0.342	Not significant
35.1-40	13	11	84.21%	4.696	0.03	Significant
Total	100	38				

Four patients (4 %) had previous upper abdominal

surgeries while 96 patients (96%) had no previous upper abdominal surgeries, figure-1.



**Figure 1: Previous upper abdominal surgery.**

From 4 patients in this study with previous upper abdominal surgery, 3 patients (75%) developed difficulties during operation ,while just 36.45% of

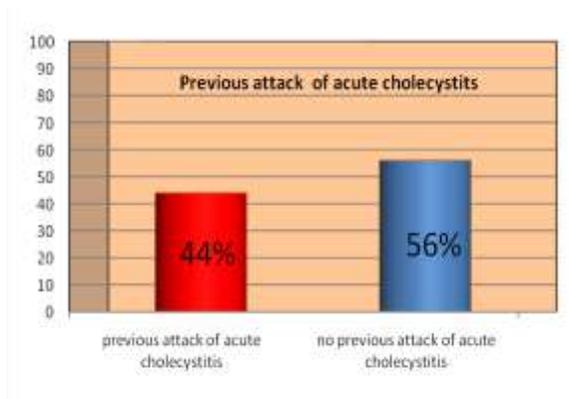
patients with no history of previous surgery developed difficulties during operation, Table -3

**Table 3: Frequency of difficulties regarding history of previous upper abdominal surgery.**

Previous abdominal surgery	No.	Difficulties	%	X <sup>2</sup>	P-value	Significance
Yes	4	3	75%	4.124	0.042	Significant
No	96	35	36.45%			
Total	100	38				

In this study 44 patients (44%) had previous attack

of acute cholecystitis, while 56 patients (56%) had no previous attack of acute cholecystitis, figure-2.



**Figure 2: Classification of patient according to previous attack of acute cholecystitis.**

23 patients out of 46 patients with history of previous attack of acute cholecystitis developed difficulties during operation, while 17 patient out

of 44 patients with no history of previous attack of cholecystitis (52.27%) developed difficulties , table -4.

**Table 4: Frequency of difficulties regarding history of previous attack of acute cholecystitis.**

Previous attack of cholecystitis	No.	Difficulties	%	X <sup>2</sup>	P-value	Significance
Yes	46	23	52.27%	0.128	0.028	significant
No	44	17	32.6%			
Total	100	40				

Although 63 patients had normal size gall bladder

by ultrasound, difficulties were encountered in 26 patients (p-value 0.087). Table-5.

**Table 5: Preoperative gall bladder size and operative difficulties.**

No. of cases -100	No adhesion	Minimal adhesion	Dense adhesion	Difficulties	p-value
Contracted gallbladder 22	0	20	2	4	0.165
Normal size gall bladder- 63	45	15	3	26	0.087
Distended gallbladder -15	4	9	2	8	0.0798

Preoperative ultrasonic gall bladder Wall but difficulties were encountered in 32 cases thickness of 66 patients was more than (3mm) (p-value 0.0657) ,Table-6 .

**Table 6: Preoperative gall bladder wall thickness and operative difficulties.**

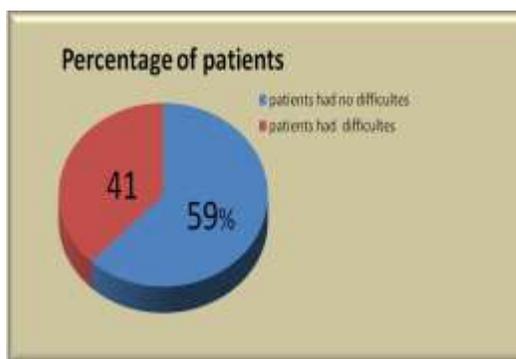
No. of cases -100	No adhesion	Minimal adhesion	Dense adhesion	Difficulties	p-value
Wall thickness (< =3 mm) 66 patients	50	15	1	32	0.0657
Wall thickness (>3mm) 34 patients	3	29	2	6	0.189

64 patients had multiple gall stones less than 1 cm in size, only( 37.5%) of them developed difficulties in grasping or in extractions of gall bladder , while15 patients with multiple stones more than 1 cm develop difficulties in 60% (p-value 0.032) .( 55.5%) of cases with single large stone (> 1cm) developed difficulties in extractions (p-value 0.04), table -7.

**Table 7: Operative difficulties regarding number and size of gall stones.**

No. of stone	size	No. of cases	Difficulties	%	p-value
Single stone	<1cm.	12	3	25%	0.168
	>1cm.	9	5	55.5%	0.046
Multiple stones	<1cm.	64	21	37.5%	0.096
	>1cm.	15	9	55.5%	0.032

In this study 41 patients (41%) had one or more difficulties during operations, while 59 patients (59%) had no difficulties and their operations passed smoothly ,figure 3.



**Figure 3: Percentage of patient according to development of difficulties.**

In this study, the most frequent type of difficulty encountered was bile leak (perforation to gall bladder) that occurred in 18 patients (32.74%), Table - 8.

Table 8: Frequency of occurrence of each type of difficulty.

Types of difficulties	No.	%
Difficult access	5	9.09%
Adhesion and difficult dissection	9	16.65%
Bleeding	8	14.33%
Perforation & Bile leak	18	32.74%
Conversion to open	1	1.8%
Total	41	

**DISCUSSION:**

In the present study, it was observed that the majority of the patients undergoing LC were in age group (30-49) years (54%), advancing age does not significantly increase the frequency of difficulties during LC, while Gurkan Yetkin et al. considered age as a significant parameter to increase the occurrence of difficulties probably due to longer history of gall stone and increasing number of cholecystitis attacks (7).

In the current study, we observed that male gender significantly increased the rate of occurrence of difficulties during LC, P-value 0.012. These findings are consistent with findings of many studies like Kamal I.A et al. who found that male patients have longer operation time and higher conversion rate than females(8). Yol S. et al. considered males more liable for difficulties because they had more pericholecystic fibrosis because macrophage was twice numerous than in female, mast cell 4 times more numerous, eosinophils 6 time more numerous in males than females, and tissue collagen levels both in the sub mucosa of gall bladder and in pericholecystic tissue were significantly higher in men than women (p-value 0.05) (9).

Initially, LC was contraindicated in obese patients mainly because of technical difficulties such as trocar placement and access to thick abdominal wall for creation of pneumoperitoneum, fat-laden omentum or falciform ligament and a heavy fatty liver difficult to retract(12). In this study, it was observed that the largest group of patients underwent LC had BMI between 25.1-30 (49%) and difficulties significantly increased as BMI increased especially when BMI is more than 35. This is in agreement with Hussein M. et al. who considered obesity a significant risk factor for difficulty due to the increased fat in Calot's triangle which make dissection more difficult [10]. Stephen Wise unger et al. considered L.C. is safe and effective treatment for obese patient and should be the procedure of choice for these

patients avoiding complication of prolonged bed rest and wound complications, so common in obese patients(11).

It was stated that previous upper abdominal surgery is not a contraindication to LC(12). Though, these patients may have failure of LC procedure if adhesions are present, as it poses a problem in creating pneumoperitoneum and the need for adhesiolysis. This study is in agreement with A.J.Karayiann et al. who found that previous upper abdominal surgery was associated with an increased need for adhesiolysis, a prolonged operation time, a higher conversion rate, increased incidence of post-operative wound infection and a longer post-operative stay, but he consider previous abdominal surgery not a contraindication for LC(13).

In this study, we noted that previous attack of acute cholecystitis had not significantly increased rate of occurrence of difficulties of LC P-value 0.720. This result was in agreement with Kamal I. et al. who demonstrated the safety and feasibility of L.C. in both acute and chronic cholecystitis despite the greater rate of conversion in acute cholecystitis than in chronic cholecystitis(8).

In our study we observed that gall bladder wall thickness (more than 3mm) estimated by preoperative ultrasound in 66 patients does not predict adhesion around gall bladder (P=0.189). This result was not in agreement with Alponat A et al who demonstrated that increased Gall bladder wall thickness represents the presence of inflammation or fibrosis due to previous attacks of cholecystitis and this make dissection of Calot's triangle difficult(14).

In this study, patients with solitary large stones (P=0.04) or multiple large stones (more than 1cm) (P=0.032) were associated with significantly longer operative time (mean 50.32 ± 10 minutes) (P=0.022) due to difficulty in grasping and extracting the gall bladder.

**CONCLUSION:**

In this prospective study , we conclude that preoperative clinical assessment and ultrasonography Can help to predict difficult LC for gallstones .It showed that, male gender, BMI 35.1-40 , previous upper abdominal surgery , previous attack of acute cholecystitis, large gall bladder size and multiple gall stones more than 1 cm in size are statistically significant predictive factors. Knowledge of these factors preoperatively may help in improving patients safety with involvement of experienced laparoscopic surgeon who could better anticipate difficulties during L.C. on these patient.

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