The Egyptian Journal of Hospital Medicine (April 2022) Vol. 87, Page 1586-1590

Assessment of Retro Infundibular Laparoscopic Cholecystectomy in Difficult Cases

Mahmoud Abdou Yassin, Wesam Mohamid Ali,
Mohamed Ebrahim Abd Elhamid*, Ahmed Mohamed Yehia
Department of General Surgery, Faculty of Medicine, Zagazig University, Sharkia, Egypt
***Corresponding author:** Mohamed Ebrahim Abd Elhamid, **Mobile:** (+2): 01279524645, **Email:** m7mdibrhm2@gmail.com

ABSTRACT

Background: Laparoscopic cholecystectomy becomes the gold standard surgical procedure for treating gallstones. Standard laparoscopic cholecystectomy (SLC) requires proper dissection of Calot's triangle to achieve the critical view of safety.

Objective: To evaluate the role of application of Retroinfundibular laparoscopic cholecystectomy technique during laparoscopic cholecystectomy regarding its impact on biliary and vascular injuries.

Patients and methods: A clinical trial study included 30 patients with gallstone diseases which were carried out at Zagazig University Hospitals. All patients who had asymptomatic gallstone who admitted for laparoscopic cholecystectomy and were fit for laparoscopic surgery. We selected the patients that had the preoperative predictors for difficult cholecystectomy. Patients were operated on within 6 months duration.

Results: There is a statistically significant difference in the distribution of patients regarding the history of previous hospitalization**.** Four patients (13.3%) had palpable gall bladder on preoperative abdominal examination with a statistically significant difference in the distribution of patients. Five patients (16.7%) had thick gall bladder walls on preoperative ultrasonographic examination with a statistically significant difference in the distribution of patients. Only one patient needs conversion to open a statistically significant difference in the distribution of patients. One patient had bile injury, one with bleeding, and one had infection with a statistically significant difference between those who developed complications and those who passed uncomplicated.

Conclusion: Dissection to retroinfundibular area with mass ligation of cystic duct and artery is a safe and feasible alternative method to conversion to open in difficult cholecystectomy.

Keywords: Laparoscopic Cholecystectomy, Difficult Cases, Gallstones.

INTRODUCTION

Laparoscopic cholecystectomy becomes the standard surgical procedure for treating symptomatic gallstones. Standard laparoscopic cholecystectomy (SLC) requires safe dissection of the contents of Calot's triangle, to achieve the critical view of safety (CVS) **(1).** This step becomes difficult in cases of acute inflammation, Mirizzi syndrome, longstanding chronic inflammation, and difficult access to the gallbladder due to dense omental adhesions for any reason. These results in a higher risk of bile duct injury (BDI), this risk may reach up to 3.5 times as for easy cholecystectomy **(2).** The traditional response in these cases was the conversion to open, which may reach up to 25% in some literature, with an average of 5-10%. But conversion does not guarantee the avoidance of biliary or vascular injury. At the same time, conversion to open is associated with sequelae of open surgery **(3).**

Difficult cholecystectomy is not clearly defined because it is subjective. So many studies tried to use objective parameters to define a difficult cholecystectomy. These include male gender, age > 60, recurrent attacks, elevated amylase, history of previous upper abdominal surgery post-ERCP, adhesion masking the gallbladder, acute inflammation, and Mirizzi syndrome **(4).**

Intraoperative cholangiography, antegrade or subtotal cholecystectomy are alternatives to conversion to open in difficult cases, but these techniques are time-consuming and need skills and experiences **(5).**

This study aimed to evaluate the role of application of the Retroinfundibular laparoscopic cholecystectomy technique during laparoscopic cholecystectomy regarding its impact on biliary and vascular injuries.

PATIENTS AND METHODS

This is a clinical trial study that included 30 patients with gallstone diseases which was carried out in Zagazig University Hospitals. Patients were operated on within 6 months duration.

Inclusion criteria: All patients presented with chronic calcular cholecystitis and have the preoperative predictors for difficult cholecystectomy such as age >40 years, BMI >25, history of hospitalization for acute cholecystitis, previous upper abdominal surgery. Sonographic picture of thick wall GB, pericholecystic collection, or impacted stone **(Figure 1)**. Long-standing cases of chronic calcular cholecystitis and cases of Mirrizi syndrome proved by pre-operative investigations.

Exclusion criteria: Patients unfit for laparoscopic surgery as cardiac diseases and patient refusal.

Methods:

All the patients had been submitted to thorough history taking with special stress on symptoms of jaundice, cholangitis (fever, rigors, and jaundice.

Received: 29/10/2021
Accepted: 27/12/2021

Complete physical examination, laboratory investigations, and abdominal ultrasonography were performed for all patients. Examination by an experienced ultrasonographer to ensure extraction of reliable information about intrahepatic biliary radicles dilatation, length of bile duct stump, intra-abdominal free fluid, and other abdominal abnormalities.

Figure (1): Ultrasound image showed multiple gallbladder stones.

Operative strategy:

The patient was placed in the supine position on the operating table with both lower extremities apposed. Standard laparoscopic cholecystectomy equipment involved 2 laparoscopic monitors, one telescope (5/10 mm, 0/30 degrees) including a camera cord and light source. A preoperative single dose of heparin (Clexane 40 unit) subcutaneously to provide thromboprophylaxis 12 hours and single-dose antibiotics (cefalexin 1gm) are given within 30 minutes of incision per protocol.

General anesthesia was used for all included patients. After dissection of the adhesion that masking the GB, if present, to reach the Hartmann pouch, at this point Calot's triangle. Dissection and separation of the lower third of gallbladder body from its bed, using suction-irrigation probe or hook dissector. The cut end of the GB was grasped by forceps trying to prevent the spillage of its content. The GB is removed from the abdomen in a specimen pouch. Wound closure by interrupted dermo-epidermal stitching.

Outcome Measures:

Primary outcome measure as the incidence of conversion to open and biliary injury. Secondary outcome measures include hospital stay and mortality incidence.

Ethical Consideration:

The study was approved by the Local Ethical Committee of Zagazig University. Written consent was obtained from every patient before the procedures. This study has been carried out following the code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Data were analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) software for analysis. Type of data qualitative represents as number and percentage, quantitative continues group represented by mean ± SD. Differences between quantitative independent multiple by ANOVA or Kruskal Wallis. P-value < 0.05 was considered significant.

RESULTS

This study showed that 53.3% of cases were males. Their mean age was 35.3 years with 43.3% aged less than 35 years old with a statistically no-significant difference in the distribution of patients according to age or gender **(Table 1).**

About six patients (20%) had a history of previous hospitalization due to acute cholecystitis. Five patients (16.7%) had an abdominal scar of previous abdominal surgery. There is a statistically significant difference in the distribution of patients regarding the history of previous hospitalization **(Table 2).** Four patients (13.3%) had palpable gall bladder on preoperative abdominal examination with a statistically significant difference in the distribution of patients **(Figure 2)**. Five patients (16.7%) had thick gall bladder walls on preoperative ultrasonographic examination with a statistically significant difference in the distribution of patients **(Table 3)**.

Only one patient (16.7%) needs conversion to open a statistically significant difference in the distribution of patients **(Figure 3)**. The time interval for analgesia needed ranged from 6 to 24 hours with a mean of 12.17 hours. Length of hospital stay ranged from 1 to 11 days with a median of 1 day. Time to start oral fluids ranged from immediately postoperative to 5 hours with a median of 1 hour. Patients return to work within 3 to 18 days with a mean of 6.83 days **(Table 4)**.

Only one patient had bile injury, one with bleeding and one had infection with statistically significant difference between those who developed complications and those who passed uncomplicated **(Figure 4)**. There was a statistically non-significant relation between postoperative complications and either age, gender, past history, abdominal, ultrasound examination, operative time, time till analgesia, time till oral fluids, length of hospital stay, or time to return to work **(Table 5)**.

Table (1): Distribution of the studied patients according to demographic data:

	N=30	%	p-value
Gender:			
Male	**16**	**53.3%**	**0.855**
Female	**14**	**46.7%**	
Age (year):			
Mean ± SD	**35.13 ± 10.83**		
<35 years old	**15**	**50%**	**>0.999**
≥35 years old	**15**	**50%**	
BMI (kg/m2):			
Mean ± SD	**25.68 ± 3.55**		
Average	**13**	**43.3%**	**0.584**
Overweight and obese	**17**	**56.7%**	

Table (2): Distribution of the studied patients according to past history

	N=30	%	P-value
History of previous acute cholecystitis:			
No	24	80.0%	0.002*
Yes	6	20.0%	
Abdominal scar:			
No	25	83.3%	0.001**
Yes	5	16.7%	

*p<0.05 is statistically significant **p≤0.001 is statistically highly significant

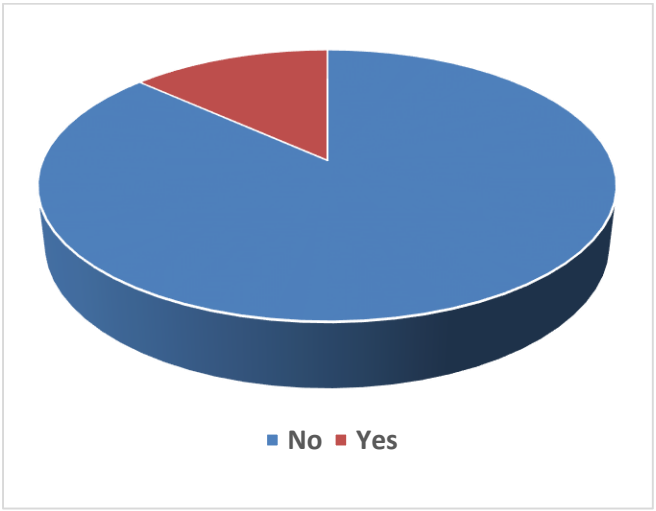

Figure (2): Distribution of the studied patients regarding palpable gall bladder on abdominal examination.

Table (3): Distribution of the studied patients according to the presence of thick wall on abdominal ultrasonography

	N=30	%	P-value
Thick wall			
No	**25**	**83.3%**	**0.001****
Yes	**5**	**16.7%**	

**p≤0.001 is statistically highly significant

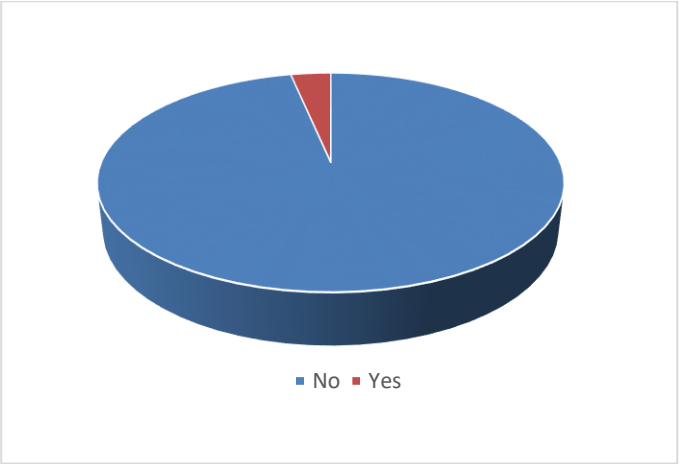

Figure (3): Distribution of the studied patients regarding conversion to open

Table (4): Distribution of the studied patients according to postoperative stay and return to work:

	N=30
Time interval for analgesia needed (hours)	
Mean ± SD	**12.17 ± 5.23**
Range	**6 – 24**
LOS:	
Median	**1**
Range	**1 – 11**
Time to return to work (day):	
Mean ± SD	**6.83 ± 3.69**
Range	**3 – 18**
Time to start oral fluids:	
Median	**1**
Range	**0 – 5**

.

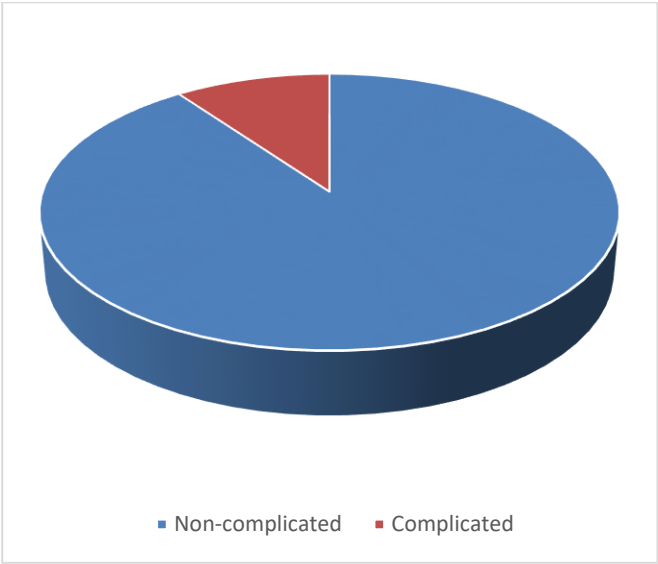

Figure (4): Distribution of the studied patients regarding the presence of postoperative complications

Table (5): Relation between postoperative complications and the studied parameters:

Parameter	Complications		P-value
	Absent N=27 (%)	Present N=3 (%)	
Gender:			
Male	14 (51.9)	2 (66.7)	>0.999
Female	13 (48.1)	1 (33.3)	
Age:			
<35 years	13 (48.1)	2 (66.7)	>0.999
≥35 years	14 (51.9)	1 (33.3)	
BMI:			
Average	22 (81.5)	2 (66.7)	0.501
Overweight and obese	5 (18.5)	1 (33.3)	
Abdominal scar:	24 (88.9)	1 (33.3)	0.064
No	3 (11.1)	2 (66.7)	
Yes			
Palpable gall bladder:	24 (88.9)	1 (33.3)	0.064
No	3 (11.1)	2 (66.7)	
Yes			
Sonographic thick wall:	23 (85.2)	2 (66.7)	0.433
No	4 (14.8)	1 (33.3)	
Yes			
Conversion to laparoscopic:	26 (96.3)	3 (100)	
No	1 (3.7)	0 (0)	>0.999
Yes			
Operative time:			
Median (range)	86 (40 – 110)	55 (35 – 120)	0.58
Time for analgesia:	12	6	0.056
Median (range)	(6 – 24)	(6 – 10)	
LOS:			
Median (range)	1 (1 – 11)	2 (1 – 5)	0.306
Time to return to work:	6 (3 – 16)	9 (5 – 18)	0.185
Median (range)			
Time for oral fluids:	1 (0 – 5)	1 (0 – 2)	0.57
Median (range)			

Z Mann Whitney test χ^2 Chi-square test

DISCUSSION

The traditional response in this circumstance was to convert to open but, conversion does not guarantee the avoidance of biliary or vascular injury but may increase it, as dissection that is difficult by laparoscopy is difficult at open and conversion does not improve exposure or facilitate identification of cystic duct but may be the reverse, as the magnification power of laparoscopy is lost [(3)].

At the same time, conversion to open is associated with increased postoperative pain, increased hospital stay, delayed mobility, peritoneal adhesion with its sequel, and incisional hernia formation [(1)].

Our study included 30 patients and aimed to evaluate the role of the application of the Retroinfundibular laparoscopic cholecystectomy technique, especially in difficult cases. About 53.3% were males and the mean age was 35.3 years with 43.3% aged less than 35 years old with a statistically non-significant difference in the distribution of patients according to age or gender that is similar to **Vettoretto *et al.*** [(6)] study and this is comparable with a study by **Sewefy *et al.*** [(7)] which included 125 patients (78.5%) of them were males, mean age was 58.9 ± 5.7 years.

Our study had (20%) of patients who gave a history of previous hospitalization due to acute cholecystitis. And (16.7%) who had an abdominal scar of previous abdominal surgery. There is a statistically significant difference in the distribution of patients regarding the history of previous hospitalization while the study by **Sewefy *et al.*** [(7)] reported that the patients who had previous upper abdominal surgery were (4%) and the patients who gave a history of previous hospitalization due to acute cholecystitis were (10%).

In the present study, the conversion rate in the RI group was (16.7%) needs conversion to open as compared to 1.5% in **Sewefy *et al.*** [(7)] and compared to 10% in the SLC group, with a significant reduction in conversion rate with RI approach compared to the standard approach and for the known average rate of conversion in difficult cholecystectomy in literature, which ranged between 5 to 10% [(8)].

A study by **Georgiades *et al.*** [(9)] found that the risk of BDI for difficult laparoscopic cholecystectomy (acute inflammation) was 3.5 times as for normal GB. While **Targarona *et al.*** [(10)] and **Kaplan *et al.*** [(11)] reported an incidence of BDI in difficult cholecystectomy of 1.3% and 3.3% respectively. The main cause of BDI during SLC even with CVS, especially in difficult cases, was the misperception (in 97% of cases due to identifying CBD as cystic duct with cutting it)], but in the RI approach, in which we shifted up in dissection to the retroinfundibular area, away from the biliary tree, this misperception was absent.

Our results are in agreement with **Sewefy *et al.*** [(7)] had a study showing mean length of hospital stay was (2.1±0.3 days) compared with the standard approach (3.7±5.3 days), due to the reduction in the number of cases converted to open and cases with complications.

According to our short-term study, we recommend using the RI approach as a standard technique in difficult cases of LC to help in decreasing the rate of BDI and operative time. Also, we recommend a long term study and a multicenter study to prove the role of the RI approach in decreasing BDI.

CONCLUSION

Dissection to retroinfundibular area with mass ligation of cystic duct and artery is a safe and feasible alternative to conversion to open in difficult cholecystectomy.

Financial support and sponsorship: Nil.
Conflict of interest: Nil.

REFERENCES

1. **Lengyel B, Azagury D, Varban O *et al.* (2012):** Laparoscopic cholecystectomy after a quarter-century: why do we still convert? Surg Endosc., 26(2): 508–513.
2. **Kuwabara J, Watanabe Y, Kameoka K *et al.* (2014):** Usefulness of laparoscopic subtotal cholecystectomy with operative cholangiography for severe cholecystitis. Surg Today, 44(3): 462–465.
3. **Henneman D, da Costa D, Vrouenraets B *et al.* (2013):** Laparoscopic partial cholecystectomy for the difficult gallbladder: a systematic review. Surg Endosc., 27:351–358.
4. **Sugrue M, Sahebally S, Ansaloni L *et al.* (2015):** Grading operative findings at laparoscopic cholecystectomy- a new scoring system. World J Emerg Surg., 10: 14-18.
5. **Vivek M, Augustine A, Rao R (2014):** Comprehensive predictive scoring method for difficult laparoscopic cholecystectomy. J Minim Access Surg., 10(2): 62–67.
6. **Vettoretto N, Saronni C, Harbi A *et al.* (2011):** Critical view of safety during laparoscopic cholecystectomy. JSLS., 15:322–325.
7. **Sewefy A, Hassanen A, Atyia A *et al.* (2017):** Retroinfundibular laparoscopic cholecystectomy versus standard laparoscopic cholecystectomy in difficult cases. International Journal of Surgery, 43: 75-80.
8. **Livingston E, Rege R (2004):** A nationwide study of conversion from laparoscopic to open cholecystectomy. Am J Surg., 188: 205-211.
9. **Georgiades C, Mavromatis T, Kourlaba G *et al.* (2008):** Is inflammation a significant predictor of bile duct injury during laparoscopic cholecystectomy? Surg Endosc., 22: 1959-1964.
10. **Targarona E, Marco C, Balague C *et al.* (1998):** How, when, and why bile duct injury occurs. Surgical Endoscopy, 12(4): 322-326.

Kaplan D, Inaba K, Chouliaras K *et al.* (2014). Subtotal cholecystectomy and open total cholecystectomy: alternatives in complicated cholecystitis. The American Surgeon, 80(10): 953-955.