

## THE ROLE OF LAPAROSCOPIC CHOLECYSTECTOMY IN ACUTE CHOLECYSTITIS

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*Submitted 15/5/2017; accepted 31 30/6 2017*

### ABSTRACT

**Background:** Laparoscopic cholecystectomy has become the treatment of choice for symptomatic gallstone diseases; many surgeons still prefer interval laparoscopic cholecystectomy over early laparoscopic cholecystectomy in acute cholecystitis. The aim of this study is to evaluate the safety of laparoscopy in acute cholecystitis and to determine the best time for early cholecystectomy in acute cholecystitis.

**Subject and Methods:** A prospective study done at Azadi teaching hospital –department of surgery from June 2013 to December 2014, include 60 cases of acute cholecystitis which had been diagnosed by clinical, laboratory and imaging examinations and underwent early laparoscopic cholecystectomy.

**Results:** There were 60 patients of acute cholecystitis underwent early laparoscopic cholecystectomy, they were 37 females and 23 males and the median age was 46 years (range 22-80 years), the median operative time was 60 min., the conversion rate was (6.7%) and postoperative complications rate was (5%).

**Conclusions:** Laparoscopic cholecystectomy for acute cholecystitis is safe procedure with low morbidity, mortality and conversion rate, and the best time may be within 72 hours of beginning signs and symptoms of acute cholecystitis.

**Duhok Med J 2017; 11 (1): 69-81.**

**Keywords:** Acute cholecystitis, Laparoscopic cholecystectomy, early cholecystectomy

Acute cholecystitis is a relatively common presentation in general surgery<sup>1</sup>, some patient can be treated conservatively while other need surgical intervention.<sup>(2-5)</sup>

The main etiology is obstruction of cystic duct by gallstone with bacterial infection in 50% of cases.<sup>(6-8)</sup> the risk of developing recurrent attacks of acute cholecystitis is higher than that of suffering an initial episode.<sup>(9, 10)</sup>

Laparoscopic cholecystectomy is now considering the operation of choice for

elective as well as urgent cholecystectomy.

<sup>11</sup> In the United Kingdom most of the cholecystectomies are done laparoscopically and about one third are carried out for acute cholecystitis.<sup>(12-16)</sup>

Nevertheless there is considerable controversy about the time of laparoscopic cholecystectomy<sup>17</sup>, with evidence of increase risk of complications in delaying surgery.<sup>18</sup> Open rather than laparoscopic cholecystectomy conducted in acute cholecystitis was recommended as it has lower complication rates.<sup>(19-22)</sup>

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Nevertheless recent studies have shown the early laparoscopic cholecystectomy during acute cholecystitis is a safe procedure and might even reduce the length of hospital stay<sup>(23,24)</sup>, with no significant difference in morbidity and mortality in comparison with delayed laparoscopic cholecystectomy.<sup>(25-30)</sup>

Recent guidelines for the management of acute cholecystitis have been developed and include the recommendation of early cholecystectomy depending on the severity of the acute episode.<sup>(31,32)</sup>

### PATIENTS AND METHODS

This is a prospective study of 60 patients underwent laparoscopic cholecystectomy over a period of 19 months (1<sup>st</sup> of June 2013 -31th Dec. 2014) at-Azadi Teaching Hospital/Department of Surgery to evaluate the safety of laparoscopy in acute cholecystitis and to determine the best time for early cholecystectomy in acute cholecystitis.

The patients were diagnosed as acute cholecystitis<sup>(31)</sup> based on the clinical presentation (right hypochondrial pain, epigastric pain with or without nausea and repeated vomiting). The patients were then examined for the presence of right hypochondrial tenderness and fever. The leukocyte count was measured to differentiate biliary colic from acute cholecystitis.

The diagnosis was confirmed by ultrasound which shows features of acute cholecystitis as the presence of gallstone(s), increase wall thickness more than 3mm, sonographic Murphy's sign and pericholecystic fluid.

Patients who were included in the study ; adult patients (>18 years), clinical (pain,

fever > 37.5°C, tenderness, White Blood Cell (WBC) > 10.000/microL), ultrasonic evidence of cholecystitis (presence of gallstone(s), increase wall thickness more than 3mm, sonographic Murphy's sign and pericholecystic fluid) and informed consent (including risk of conversion to open surgery).

Patients who were excluded from the study; informed consent refusal, choledocholithiasis, generalized peritonitis, simultaneous acute pancreatitis, previous upper abdominal surgical procedures and patients with intra-operative findings of different pathology. The excised gallbladders were sent to histopathological study.

Laparoscopic cholecystectomy which were the subject of this study were performed by surgeons who are expert in the field (performed at least 50 laparoscopic cholecystectomy per year)<sup>(33)</sup>.

The time of laparoscopic intervention was calculated as days from the time of starting the symptoms of acute cholecystitis till laparoscopic procedure.

SPSS version 18 for Microsoft Pack was used to manage and analyzed the data depended in the study. X-squared and Fisher Exact's tests were used to calculate the p-values of association between the timing of surgery and selected intra-operative and post-operative variable. All tests are two sided with 0.05 level of significance.

### RESULTS

Over a period of 19 months (1<sup>st</sup> of June 2013 – 31th Dec. 2014), 60 patients underwent an early laparoscopic cholecystectomy for acute cholecystitis. They were 23 males and 37 females with a

mean age of 45 years a Standard Deviation (SD) of 13 years and a median of 46 years (Range, 22–80 years).

**Clinical Manifestations:** The pain was in the right hypochondrial area in 36 patients (60%) and in the epigastric area in 24 patients (40%), other symptoms are shown in (Table 1).

**Table 1: Demographic variables and preoperative findings**

Variable		Frequency	Percent
Sex	Male	23	38.3
	Female	37	61.7
Chief Complaint	Epigastric pain	24	40
	Right hypochondrial pain	36	60
Duration	< 3 days	7	11.7
	3 days- 1 week	27	45
	> 1 week	26	43.3
Associated symptoms	Dyspepsia	9	15
	Fever	26	43.3
	Nausea	30	50
	Vomiting	8	13.3
Physical exam	RHT only	38	63.3
	RHT and fever	17	28.3
	RHT and jaundice	1	1.7
	RHT, jaundice, and fever	1	1.7
	RHT and RH mass	2	3.3
	RHT, RHT mass, and jaundice	1	1.7
WBC count (cell/cmm)	Normal	17	28.3
	Elevated	40	66.7
	Not recorded	3	5
Ultrasound (US) findings	Gallstone(s)	6	10
	Gallstone(s) + wall thickness	40	66.7
	Gallstone(s) + wall thickness+ distension	1	1.7

ERCP	No	59	98.3
	Yes	1	1.7

On physical examination, right hypochondrial tenderness (RHT) was found in 38 cases (63.3 %) and RHT with fever in 17 cases (28.3%), as shown in table (1).

**Timing of Surgery** Sixty patients underwent laparoscopic cholecystectomy during their initial hospitalization, as shown in table (1).

**Laboratory and Imaging Findings** No jaundiced patients were included in this study, although one case underwent Endoscopic Retrograde Cholecystopantcreatogram (ERCP) to exclude obstructive jaundice before operation, as shown in table (1).

White blood cells count was elevated in 40 cases (66.7%), normal in 17 cases (28.3%) and not recorded in 3 cases (5%), as shown in table (1).

All patients had ultrasound examinations during the attack of acute cholecystitis. In these patients a distended gallbladder was seen in 11 cases. A thickened gallbladder wall was observed in 54 cases. Pericholecystic fluid was noted in one case, whereas a stone(s) were observed in 58 cases and no stone in 2 cases, as shown in table (1).

**Operative Findings and Procedures**

There was no evidence of intra-operative injury to CBD. Laparoscopic cholecystectomy was completed successfully in 56 patients and four patients (6.7%) had their operation converted to an open cholecystectomy because of severe adhesions that rendered dissection of Calot's triangle unsafe, as shown in (Table 2).

**Table 2: Intra-operative findings**

Variable		Frequency	Percent
Adhesions	None	12	20
	Fine adhesions	28	46.7
	Thick adhesions	20	33.3
Fluid in subhepatic area		33	55
Trocar technique	3	1	1.7
Gallbladder aspiration	4	58	96.7
	5	1	1.7
Bleeding from the cystic artery		2	3.3
Gallbladder perforation		18	30
Bleeding from gallbladder bed		16	26.7
Drain		36	60
Common bile duct injury		0	0
Conversion to open cholecystectomy		4	6.7
Operation time (min)	Less than 60	26	43.3
	60 and more	34	56.7

The mean length of the laparoscopic procedure, measured from skin incision to skin closure, was 59 minutes (range 25 - 120), the median was 60 min, and the SD

was 20 min. Operative details are shown in Table 2.

**Outcome** Three patients developed complications postoperatively. One case developed wound infection which had been treated by antibiotics and daily dressing, one case developed bile leak (leakage from cystic duct stump) which had been treated by ERCP. The third patient developed jaundice after a month which was treated by ERCP which showed a missed stone in CBD that was successfully removed.

There was no mortality and no re-exploration in this study.

The postoperative hospital stay was 1 day in 43 cases (71.7%) and 2 days in 16 cases (28.3%); including the conversion to open cholecystectomy and one case remained for 8 days due to bile leak. The main histopathological findings included a thick edematous gallbladder wall, mucosal congestion with frequent ulceration and leukocytic infiltration.

Histopathology showed acute cholecystitis in 31 cases (51.7%), and chronic cholecystitis in 29 cases (48.3%). Postoperative findings are shown in (Table3).

**Table 3: post-operative findings**

Variable		Frequency	Percent
Length of post-operative Hospital Stay	1 day	43	71.7
	2 days	16	26.6
	8 days	1	1.7
Complications		3	5
Histopathology	Acute cholecystitis	25	41.7
	Acute on chronic cholecystitis	6	10
	Chronic cholecystitis	29	48.3

The sixty patients were then divided into two groups: group (A) those patients who had been operated upon within one week of symptoms to the time of operation (34 cases) and group (B) patients operated upon more than a week from the onset of symptoms to the operation (26 cases), both group were compared regarding intraoperative findings, complications, procedure modifications, operative time and hospital stays, as shown in (Table4). Fine or no adhesions were more frequent in group (A) 19 cases than group(B) only 9 cases , while severe adhesions were more frequently encountered among patients in group (B) 17cases than among patients in group (A) 15cases . Decompression of gallbladder performed more in group (A) 16 cases while in group (B) only 6 cases (Table 4). Gallbladder perforation occurred more frequently in group (A) 11 cases than in

the group (B) 7 cases , bleeding from gallbladder bed and or cystic artery were more common in group (A) 10 cases than in the group (B) 6 cases , while all conversion to open cholecystectomy occurred in group (B) 4 cases (15.4%). As shown in table (4).

The use of closed drain in subhepatic area were more common in group (A) 19 cases than in the group (B) 17 cases, the operative time was less than 60 min. in 17 cases of group (A) and in 9 cases of group (B), while the length of postoperative hospital stay was one day in 26 cases of group (A) and in 17 cases of group (B) and others all discharged from hospital within 2 days.

All postoperative complications occurred in group (B) 3cases while there were no postoperative complications in group (A)

**Table 4: Selected intraoperative findings and complications as related to timing of surgery from symptom onset**

Variable		Timing of surgery		p-value
		Within a week of symptom onset (group A) 34 patients	More than a week of symptom onset (group B) 26 patients	
Adhesions	None/fine	19 (55.9)	9 (34.6)	
	Thick	15 (44.1)	17 (65.4)	
Bleeding from gallbladder and/or cystic artery	Cases (%)	10 (29.4)	6 (23.1)	0.58*
Gallbladder perforation	Cases (%)	11 (32.4)	7 (26.9)	0.65*
Gallbladder aspiration	Cases (%)	16 (47.1)	6 (23.1)	0.05*
Conversion to open cholecystectomy	Cases (%)	0 (0)	4 (15.4)	0.03†
Drain	Cases (%)	19 (55.9)	17 (65.4)	0.45*
Post-operative complications	Cases	0	3	0.054*
Operation time	Less than 60 min (%)	17 (50)	9 (34.6)	0.23*
Length of post operative hospital stay	1 day (%)	26 (76.5)	17 (68)	0.34*
	2 days (%)	8 (23.5)	8 (32)	

\*chi-squared test

†Fisher's exact test

**DISCUSSION**

Our study include a 60 patients with acute cholecystitis,( 61.7 %) were females, and the mean age was 45 years (range, 22 to 80) , these results were comparable to which was done by Abdulmohsen A. Almulhim in Saudi Arabia (2008)<sup>34</sup> and Muhmad Abdulla in Baghdad (2012)<sup>35</sup> .

In this study, upper abdominal pain and fever were observed in 100% and 43.3% of patients, respectively. Leucocytosis was the most common laboratory finding in (66.7%), these results were comparable to Gourgiotis et al in United Kingdom (UK) 2007<sup>36</sup> and Muhmad Abdulla in Baghdad (2012)<sup>35</sup>.

Abdominal US is the initial imaging modality of choice, the presence of gallstones(96.7%) and gallbladder wall thickening(90%), are the most common ultrasonographic findings, which were similar to Gourgiotis et al in UK (2007)<sup>36</sup> , Muhmad Abdulla in Baghdad (2012)<sup>35</sup> and Abdulmohsen A. Almulhim in Saudi Arabia (2008)<sup>34</sup> .

In the early experience with laparoscopy, many surgeons considered acute cholecystitis a relative contraindication to laparoscopy, because of the inflammation, edema and obscured anatomy associated with acute cholecystitis led to an increased number of complications <sup>(37-39)</sup>, that what we found in our study edema and dense adhesions (33.3%) were the main problems but they were more in cases after one week presentation.

As a result many patients with acute cholecystitis underwent open cholecystectomy. As laparoscopic surgery has evolved, demonstrated that laparoscopy for acute cholecystitis can be done safely and most patients can get the

benefits of the minimum access surgery, <sup>(20, 40 - 43)</sup> for that reason we applied this study over our patients.

The incidence of sever dense adhesions in this study was (33.3%), this was comparable to which had been done by Lo et al <sup>30</sup> (33%) and Liu et al <sup>44</sup> (28%), and it was the main reason of conversion in this study.

In this study most of bleeding from gallbladder bed (26.7%) and cystic artery (3.3%) were controllable by cautery and additional clipping.

The modifications of laparoscopic technique are more required in patients with acute cholecystitis than that of interval cholecystectomy by laparoscopy such as use of 5th cannula, gallbladder decompression, endoscopic bag for retrieval of specimen and use of subhepatic drain.

In our study most of laparoscopies done by 4-trocar technique (96.7%) and one more case required use of 5th cannula (1.7%). Gallbladder decompression required in (36.7%) of cases and this was similar to which was done by Muhmad Abdulla (38%) <sup>35</sup> and less than which done by Lo et al (85%) <sup>30</sup> and Liu et al ( 75%) <sup>44</sup>.

The use of endoscopic bag for retrieval of perforated gallbladder and stones required in (30%) of cases, our result was better than those done by Lo et al (75%) <sup>30</sup> and Liu et al (77%) <sup>44</sup>.

The use of drain in sub hepatic area required in about (60%) of cases which was more comparable to that done by Muhmad Abdulla (88.8%) <sup>35</sup> and Lo et al (90%) <sup>30</sup>.

These reductions in the use of modifications technique in laparoscopy for acute cholecystitis in our study is due to



improvement in skills of surgeon and better laparoscopic equipments over the last decade.

Although conversion rates of 0% to 39% have been reported by some with specific laparoscopic surgeons<sup>(27, 45 - 48)</sup>, the true rate of conversion in acute cholecystitis, is largely unreported.<sup>(30, 42, 49-52)</sup>

Traditionally, patients with acute cholecystitis were admitted to the hospital for conservative treatment, and then they were discharged and returned 6 to 8 weeks later for an interval cholecystectomy.

This "conservative" management has largely been abandoned, because many studies have reported the safety and cost effectiveness of early laparoscopic cholecystectomy for acute cholecystitis.<sup>(45-48)</sup>

In our study the overall conversion rate was 6.7%. Significant difference existed in conversion rates between groups A (0%) and group B (15.4%) (P<0.03).

The rising conversion rate associated with a delay in urgent cholecystectomy is related to the stage of the acute inflammatory process.

Lo et al<sup>30</sup> observed that the presence of dense, fibrous adhesions in the delayed group made laparoscopic dissection difficult and unsafe and this was the main reason of conversion in our study.

The median duration of surgery (60 minutes) compared favorably with that reported in several randomized trials for acute cholecystitis.<sup>(53, 54)</sup>

This increase in the duration of laparoscopic surgery for acute cholecystitis mostly due to use of modification technique for laparoscopy such as decompression of gallbladder ,use of

endobag for retrieval of specimen and use of subhepatic drain.

The overall complication rate in this series (5%) mostly in group (B) is lower than that observed in other large laparoscopic series for acute cholecystitis range (6.6\_13%).<sup>(30, 40, 55, 56)</sup>

No mortalities or CBD injuries occurred in our study and this was similar to other series.<sup>(26, 27)</sup> The reported risk of bile duct injury is between 0.3–1.3% in acute cholecystitis.<sup>(57, 58)</sup>

The postoperative hospital stay was short in this study. This is in accordance with other series reports<sup>(29, 40, 55)</sup>, and this show the benefit of early laparoscopic cholecystectomy in comparison to open and delay laparoscopic surgery.

It has been suggested that the optimum timing for urgent cholecystectomy is within 72 hours of admission or within 7 days of the onset of symptoms.<sup>47</sup> Furthermore, failure to perform cholecystectomy within 72 hours of admission to the hospital might be an indication for interval cholecystectomy.<sup>43</sup> This was based on the finding that the conversion rate was seen to rise sharply after 72 hours from admission, negating the potential benefits of urgent surgery.

Others have found the optimum timing for surgery to be within 96 hours of admission, with longer delays leading to a rising conversion rate.<sup>(59, 60)</sup>

In this study the best time to perform early laparoscopic cholecystectomy is less than one week.

The Histopathology shown acute cholecystitis , acute on chronic cholecystitis in 31 cases( 51.7%), and chronic cholecystitis in 29 cases ( 48.3%) and this was comparable to that done by

Lo et al ( 55%) and (45%) respectively <sup>30</sup>, and to that which was done by Yacoub et al (53%) and (47%) respectively <sup>61</sup>.

Although (48.3%) of cases were diagnosed by histopathology as chronic cholecystitis, but all were presented clinically as acute cholecystitis. that is why the diagnosis of acute cholecystitis depends on clinical , laboratory and radiological findings rather than histopathological findings according to the Tokyo guidelines. <sup>31</sup>

In conclusion laparoscopic cholecystectomy for acute cholecystitis is safe procedure and it is associated with low conversion and complication rates. The best time to perform laparoscopy in acute cholecystitis may be less than 72 hours of admission or within one week of beginning of symptoms because the incidence of complications and conversion rate rise after this period.

In addition it add the advantages of solving patient problem in one hospital admission, reducing readmission in patient who is waiting the operative list and early recuperation.

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## ثوخته

### رولۍ راکرنا زقرظی بدویرببنا د کولبوونا زقرظی یا دملدهستدا

**نیشته‌کی:** راکرنا زقرظی بنشته‌قرطرییا دویرببنا یا بوویه ریکا سقره‌کی بو ضارسته‌سقرکرنا نخوشییا بقرکین زقرظی یا ب نیشان وطله‌تک نشته‌قرکار هتتا نوکه راکرنا درتط یا زقرظی بدویرببنا ب باشتهر دبببن ذ زوی راکرنی لدمی کولبوونا دملدهست یا زقرظی. نارمانج ذ طی‌طه‌کولینی هتلسه‌تاندنا نیمانهاییا نشته‌قرطرییا دویرببنا د کولبوونا دملدهست یا زقرظی دا وهقره‌سا دهستنیشانکرنا باشتهرین دم بو زوی راکرنا زقرظی د کولبوونا دملدهستدا.

**ریکین طه‌کولینی:** طه‌کولینه‌کا تیشطه‌ضوونی هاته نجانمدان لبه‌شی نشته‌قرطری ل نخوشخانا نازادی یا فیرکرنی هتر ذ خزیرانا 2013ئی هتتا کانونا نیکی 2014ئی کو تیدا 60 نخوش به‌شداربوون. ظان نخوشان کولبوونا زقرظی یاده‌ملدهست هتوو کو بریمین کلینیکی وناقیطه‌هی وتیشکی هاتبوونه دهستنیشانکرنا و بو هتیمان زوی راکرنا زقرظی هاته کرن بریکا نشته‌قرطرییا دویرببنا.

**نه‌نجام:** ذوان 60 نخوشین به‌شدار دطه‌کولینی دا 37 می بوون و 23 نیر و تیکرای ذی وان 46 سال بوو ب مهورادی 22 – 80 سال. تیکرای ماوی نشته‌قرطری 60 خوله‌ک بوون و ریذا طوهارتنی 6.7% بوو و ریذا نالوزیین نشتی نشته‌قرطری 5% بوو.

**دقرنه‌نجام:** راکرنا زقرظی بنشته‌قرطرییا دویرببنا بو کولبوونا دملدهست ریکه‌کا نیمه و بکیمترین ناریشه و مرن و ریذا طوهارتنی یه. باشتهرین دم بو نشته‌قرطری د 72 دهمزیرین نیکی ذ دهستنیکرانا نیشانین کولبوونا دملدهست یا زقرظی.

## الخلاصة

### دراسة إستباقية عن دور المنظار في استئصال التهاب المرارة الحاد

#### الخلفية والأهداف:

أصبح استئصال المرارة بالمنظار العلاج الأمثل لأمراض حصى المرارة ، وكثير من الجراحين لا يزالون يفضلون استئصال المرارة المتأخر بالمنظار على استئصال المرارة المبكر بالمنظار في التهاب المرارة الحاد. والهدف من هذه الدراسة هو تقييم سلامة وفعالية تنظير البطن في التهاب المرارة الحاد وتحديد أفضل وقت لاستئصال المرارة في وقت مبكر من التهاب المرارة الحاد.

**طرق البحث:** دراسة استباقية تمت في مستشفى آزادي التعليمي قسم الجراحة ما بين حزيران 2013 وحتى كانون الثاني عام 2015، وشملت الدراسة 60 حالة من التهاب المرارة الحاد الذي تم تشخيصها بواسطة الأعراض السريرية، الفحوصات المختبرية والإشعاعية وأجريت لهم عملية استئصال المرارة المبكر بالمنظار.

**النتائج:** كان هناك 60 مريضا لديهم التهاب المرارة الحاد خضعوا لعملية استئصال المرارة المبكر بالمنظار، كان هناك 37 من الإناث و 23 من الذكور وكان متوسط العمر 46 عاما (المدى 22-80 سنة)، كان متوسط الوقت للعملية 60 دقيقة. ، كان معدل التحويل (6.7%) وكان معدل مضاعفات ما بعد الجراحة (5%).

**الاستنتاجات:** استئصال المرارة المبكر بالمنظار لالتهاب المرارة الحاد هو إجراء آمن وفعال مع الاعتلال منخفض ومعدل الوفيات منخفضة ومعدل التحويل قليل، وقد تبين ان أفضل وقت لإجراء العملية هو خلال 72 ساعة من تشخيص المرض.