Original Article

Laparoscopic subtotal cholecystectomy in patients with acute cholecystitis

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Summary:

Background: Using Laparoscopic approach, Cholecystectomy is made hazardous by distortion of the anatomy of Calot's triangle by acute or chronic inflammation and dense omental adhesions. Laparoscopic subtotal cholecystectomy (LSTC) without cystic duct ligation is an alternative to conversion to open surgery in difficult cases.

Methods: This prospective study included 50 patients with different forms of clinical presentations subjected to LSTC at the 2nd floor in Baghdad Teaching Hospital and conducted during a period from Jan. 1st, 2010 to Dec. 31st, 2012.

Results: Fifty cases of LSTC were performed, 32 of them were males and the remaining 18 patients were females. The age of study group was ranged (18 – 75) years with a median of (46) year. The median operating time was about 90 min. and the mean duration of hospital stay was 7.3±2.2 days. There were 8 patients (16%) with postoperative bile leak, most of them recover spontaneously and only 2 patients (4%) underwent postoperative ERCP and stent insertion for persistent bile leak. 4 patients (8%) with postoperative wound infection and 2 (4%) with postoperativechest infection due to bile leak and longer operating time.1 patient (2%) with subphrenic collection which mandates open drainage for cure. No mortality was recorded in our study.

Conclusion: LSTC is an alternative to open conversion in cases with Calot's triangle difficult anatomy and dissection is hazardous. And is associated with avoidance of any injury to biliary passages in spite of longer operating time.

Key words: Laparoscopic subtotal cholecystectomy (LSTC), No cystic duct ligation.

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Introduction:

Cholecystectomy was established as the surgical treatment for cholelithiasis in 1882 ,Carl Johan August Langenbuch was the first who performed this procedure; Open cholecystectomy became the gold standard for the treatment of cholelithiasis till the introduction of laparoscopic cholecystectomy in 1980s ,when Philip Mouret from France performed the first human laparoscopic cholecystectomy in 1987; There is no doubt that laparoscopic cholecystectomy has replaced open cholecystectomy as a standard for the treatment of symptomatic cholelithiasis (1). A consensus development conference panel, convened by national institutes of health in September 1992, endorsed laparoscopic cholecystectomy as a safe and effective surgical treatment for gall bladder removal in patient with gall bladder disease (2). Decreased postoperative pain, earlier oral intake, shorter hospital stay, early return to normal activity, and improved cosmoses have been well recognized after laparoscopic cholecystectomy. A significant reduction in the incidence of wound complications and postoperative ileus has been documented in patients undergoing laparoscopic cholecystectomy. The spread of the procedure in most hospitals and advancement in surgeons' experience and confidence has led to decrease the work with the open technique to be performed only in failures of the laparoscopically attempted ones. Some patients require conversion to open surgery and several preoperative variables have been identified as risk factors that are helpful in predicting the probability of conversion (3, 4). The traditional response to a difficult laparoscopic cholecystectomy is conversion to an open procedure, but this may result in increased postoperative pain, delayed mobility, prolonged hospital stay, adhesions formation and incisional hernia. In addition, a dissection that is difficult laparoscopically is often equally difficult at open operation, and conversion does not guarantee the avoidance of inadvertent biliary or vascular injury (5). Growing experience allowed the use of Lap. Chole. in more complex procedures, such as in acute cholecystitis patients. The risk of bleeding and bile duct injuries during a standard cholecystectomy is greatly increased while dissecting in Calot's triangle particularly in the presence of severe inflammation or fibrosis of the gall bladder. Open subtotal cholecystectomy has been proven to be a safe simple and definitive procedure in this situation (6). Increasing laparoscopic experience and techniques have made laparoscopic subtotal cholecystectomy (LSTC) a feasible option in recent years; few studies with few cases of LSTC have shown good results in patients with various forms of cholecystitis (7).

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Patients and Method:

A prospective study was conducted during a period from Jan.1st, 2010 to Dec. 31st, 2012 in Baghdad Teaching Hospital at the 2nd floor.

The study included 50 Patients who were admitted to the hospital one day prior to surgery. Abdominal ultrasonography was performed and all patients were investigated by LFT, RBS, RFT, CBP, Blood group, CXR and ECG before surgery. At the time of admission the following data were obtained: age, gender, past medical history, past surgical history, Abdominal U/S findings, and at the time of surgery the surgical difficulties & intraoperative findings were recorded. A standard technique for laparoscopic cholecystectomy was practiced; NG tube was not used routinely but occasionally. After general anesthesia and positioning of the patient, CO2 insufflations achieved by either a veress needle or Hasson method. Carbon dioxide is used as the insufflations gas. 30 degrees camera used through 10mm port. Standard procedures done through 4 ports technique. The instruments available were; Graspers, dissectors, spatula, L-shaped cauterization tool, suction-irrigation machine, Babcock, and veress needle. Intra operative cholangiogram was not available. An early assessment was made of the safety and feasibility of laparoscopic cholecystectomy. If dissection of Calot's triangle was deemed unsafe, a LSTC was performed. The anterior wall of the gallbladder was excised, leaving the posterior wall of the gallbladder in situ; sometimes the posterior wall of the gall bladder can be excised. All gallstones were retrieved and extracted along with the excised gallbladder wall. The gallbladder fossa was lavaged. No attempt was made to dissect out, divide or seal the cystic duct or artery. Drains were placed in the gallbladder fossa or subhepatic space. These were left in place for 48 hours, or until any postoperative bile leakage ceased. A single prophylactic peroperative dose of intravenous antibiotic was given. Postoperative endoscopic retrograde cholangiopancreatography (ERCP) was used selectively if there was prolonged biliary leakage, or if CBD stones were suspected.

Data management and Statistical analysis:

Data of all cases were checked for any error or inconsistency then which were transferred into a computerized database program; Microsoft excel software was used. All variables were coded with a specific code for each variable and prepared for statistical analysis. SPSS (statistical package for social sciences) software for windows version 20 was used in statistical analysis. Descriptive statistics were presented as frequency (number of cases) with proportions (percentages), and as mean ± standard deviation. Chi square test was used to compare frequencies and proportions. In all statistical tests and procedures, level of significance (P. value) was set at $P \leq 0.05$ considered as significant difference or association. Finally, results were presented in tables and figures.

Results:

This study included 50 patients who subjected to LSTC due to unsafe dissection at Calot's triangle. The median operating time was 90 (range 60–180) min. and the mean duration of hospital stay was (7.3±2.2) Days. There were 32 (64%) men and 18 (36%) women, figure 1. The age of studied group was ranged (18 - 75) years with a mean of (42.1±12.9) years.

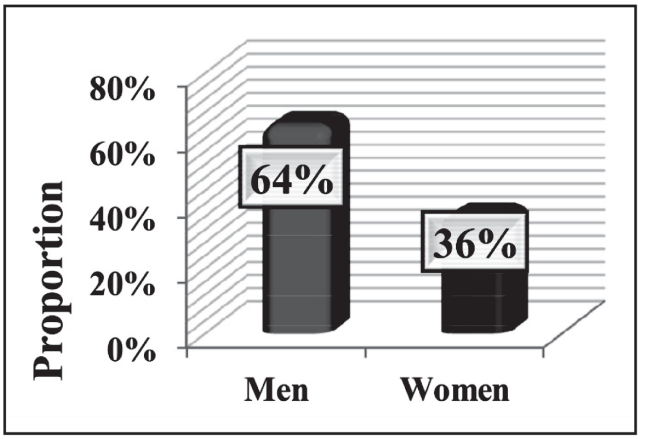

Figure 1. Gender distribution of cases (N=50)

Table 1 and figure 2, show the distribution of clinical presentations among cases; chronic cholecystitis was present in 18 cases (36%), biliary colic in 16 (32%), and post ERCP CBD stones in 8 (16%), acute cholecystitis in 5 (10%), and empyema gall bladder in 3 cases (6 %).

Table 1. Distribution of clinical presentation among cases.

Clinical presentation	No. of cases	% of cases
Chronic cholecystitis	18	36.0
Biliary colic	16	32.0
Post ERCP	8	16.0
Acute cholecystitis	5	10.0
Empyema gall bladder	3	6.0
Total	50	100.0

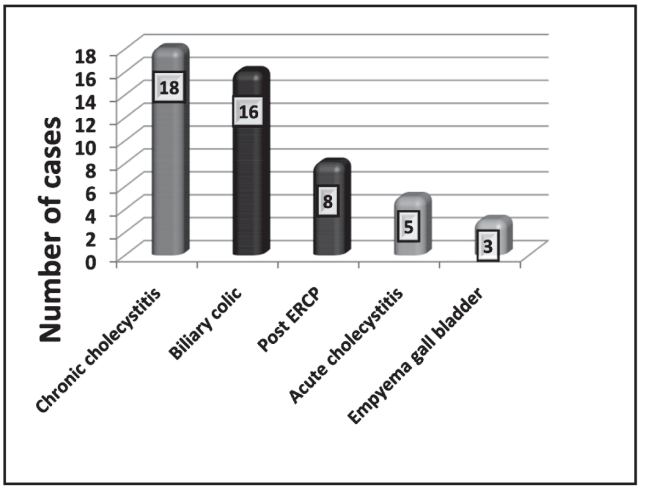

Figure 2. Distribution of clinical presentation among cases.

The distribution of clinical presentation by sex had been significantly shown (P<0.05) that acute cholecystitis is more common among females rather than males while the opposite regarding chronic cholycystitis as it is more in males;1 male (2%) & 4 females (8%) with acute cholecystitis; 13 males (26%) & 5 females (10%) with chronic cholecystitis.

No significant difference within gender regarding other presentations; 9 males (18%) & 7 females (14%) with biliary colic; 3 males (6%) & 0 female with empyema gall bladder, and 6 males (12%) & 2 females (4%) with post ERCP CBD stones, as shown in table.2 & figure.3.

Table 2. Distribution of clinical presentation by sex.

Clinical presentation	Male		Female		P.value
	N	%	N	%	
Acute cholecystitis	1	2.0	4	8.0	0.04 Sig*
Chronic cholecystitis	13	26.0	5	10.0	0.02 Sig*
Biliary colic	9	18.0	7	14.0	0.72 Not sig. **
Post ERCP	6	12.0	2	4.0	0.13 Not sig. **
Empyema gall bladder	3	6.0	0	0.0	0.11 Not sig. **
Total	32	64.0	18	32.0	

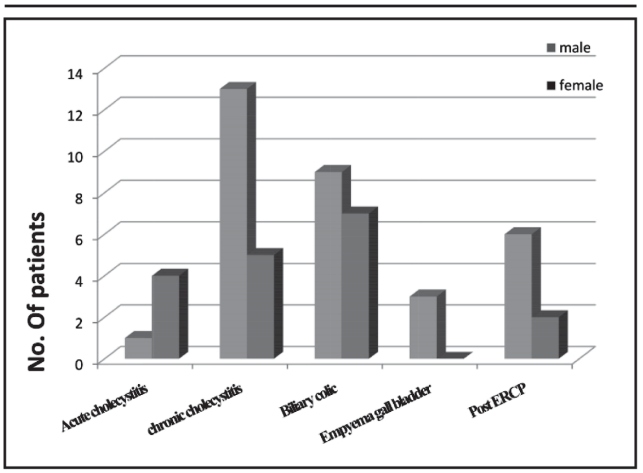

Figure 3. Distribution of clinical presentation by sex among study group.

With regard to age of presentation into both sexes; Patients fall in different age groups. There were 3 patients (6%) all were males with age group (<25) year; 12 patients (24%) as 6 males & 6 females with age group (26-35) year; 18 patients (36%) as 11 males & 7 females with age group (36-45) year; 11 patients (22%) as 9 males & 2 females with age group (46-55) year; 3 patients (6%) as 1 male &2 females with age group (56-65) year; 3 patients (6%) as 2 males &1 female with age group (66-75) year; And no patients above 75 years of age. For all age groups in both sexes, it has been found that P.value (0.67) was not significant. As shown in table 3 & figure 4.

Table 3. Distribution of age at presentation by sex, among cases.

Age group	Male		female		Total	
	N	%	N	%	N	%
< 25 years	3	6.0	0	0.0	3	6.0
26 – 35 years	6	12.0	6	12.0	12	24.0
36 – 45 years	11	22.0	7	14.0	18	36.0
46 – 55 years	9	18.0	2	4.0	11	22.0
56 – 65 years	1	2.0	2	4.0	3	6.0
66 – 75 years	2	4.0	1	2.0	3	6.0
Total	32	64.0	18	36.0	50	100.0
Mean age	42.06+-13.3		42.17+-12.4		42.1+-12.9	
P.value (0.67) Not Significant.						

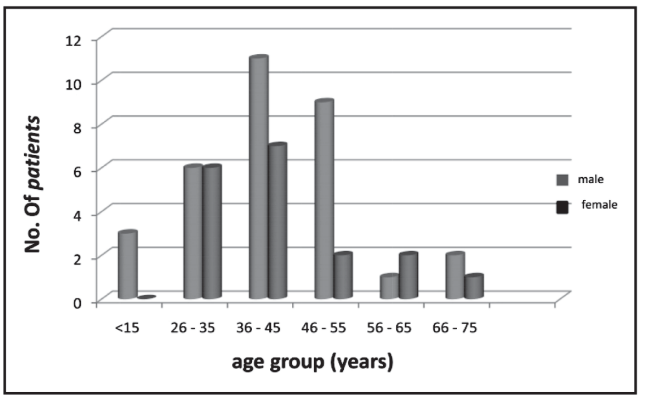

Figure 4. Distribution of age at presentation by sex, among cases.

About intraoperative events; 8 patients (16%) had bleeding from dissected edge of the gall bladder which was controlled by clipping and cauterization. 20 patients (40%) had spillage of stones into the peritoneal cavity and can be removed individually by grasper and suction. 2 patients (4%) had injury to liver capsule with small bleeding which was controlled by cauterization. Injury to the bile ducts, bowel and diaphragm or ports' insertion injury was not reported in our study; and the remaining 20 patients (40%) underwent no specific intraoperative event. As shown in table 4 & Figure 5.

Table 4. Distribution of Intraoperative events among cases.

Intraoperative Event	No. of patients	% of patients
Bleeding	8	16.0
Spillage of Stones	20	40.0
Liver Injury	2	4.0
Ports> Insertion Injury	0	0.0
No specific Event	20	40.0
Total	50	100.0

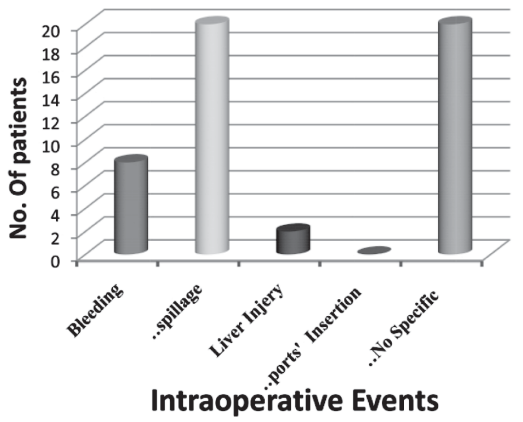

Figure.5 Distribution of Intraoperative events among cases.

About postoperative complications; 8 patients (16%) had postoperative bile leak. Those patients were with different presentations preoperatively as 4 of them (8%) were presented with acute cholecystitis; 3 of them (6%) were presented with biliary colic; 1 of them (2%) was presented with empyema gall bladder; While none of them were presented with chronic cholecystitis nor with post ERCP CBD stones, as shown in table 5.

Table 5. Postoperative bile leak distributed according to preoperative clinical presentation.

Clinical presentation	Postoperative Bile leak	
	No. of cases	% of cases
Acute cholecystitis	4	8.0
Chronic cholecystitis	0	0.0
Biliary colic	3	6.0
Empyema gall bladder	1	2.0
Post ERCP	0	0.0
Total	8	16.0

In 6 of them (12%), the leak managed conservatively and resolved spontaneously. The remaining 2 patients (4%) underwent postoperative ERCP and stent insertion at day 18 and 25 respectively due to sustained bile leak. In all 8 patients, bile leak was seen immediately on opening the gall bladder at time of initial cholecystectomy and continued into the postoperative period. No postoperative bile leak developed in the remaining 42 patients (84%) in whom no bile leak was seen during the operation.

Other postoperative complications; 4 patients (8%) had postoperative wound infection in the sub or supraumbilical incisions 4 days after the operation, this was controlled by daily dressing and antibiotics. 4 patients (8%) developed right side shoulder pain due to CO2 pneumoperitoneium which resolved after 2 days. 2 patients (4%) had postoperative chest infection managed conservatively & resolved spontaneously. Few weeks later, 1 patient (2%) developed subphrenic collection which was managed by ultrasound guided drain insertion; but 3 weeks later open drainage for complete healing was required. No other complications were reported in our study as well as no death was reported. As in figure 6.

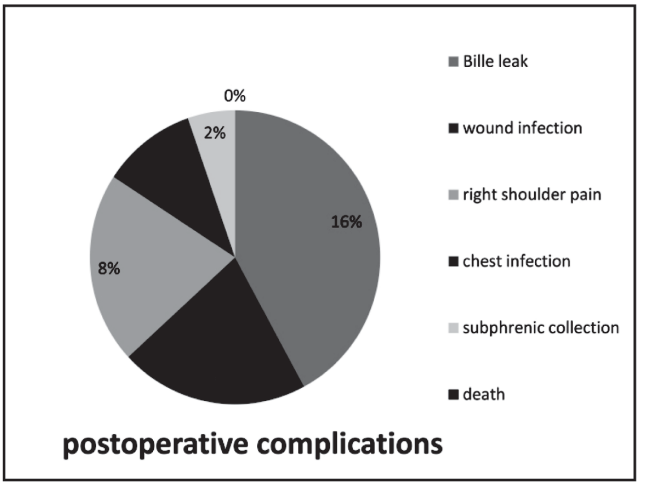

Figure 6. % of postoperative complications.

Hospital Stay

35 patients (70%) were discharged from hospital 24 – 48 hours postoperatively and drain removed 48 – 72 hours postoperatively. The remaining 15 patients (30%) needed more postoperative care & hospital stay longer than 48 hours due to developedment of postoperative complications these complications include: 6 patients (12%) with temporary bile leak, 2 patients (4%) needed ERCP due to sustained bile leak, 2 patients (4%) with chest infection, 4 patients (8%) with wound infection and 1patient (2%) with subphrenic collection as shown in table 6.

Table 6. Postoperative Complications & Duration of Hospital Stay.

Postoperative complication	No. of cases	% of cases	Hospital Stay (days)	Mean Hospital stay(Days)
Temporary Bile leak	6	12.0	5 – 7	5.4±0.78
Need of ERCP	2	4.0	21 – 28	24.5±4.9
Chest Infection	2	4.0	4 – 5	4.5±0.71
Wound infection	4	8.0	3	3±0
Subphrenic collection	1	2.0	21	21±0
Total	15	30.0	3 – 28	7.3±2.2

Discussion:

Between Jan. 2010 and Dec. 2012; 50 cases were exposed to LSTC without cystic duct ligation, due to unsafe dissection of the structures in Calot's triangle. This is rendered difficult in the presence of acute or chronic inflammation, dense omental adhesions with associated higher rates of injury to biliary

passages. Safe dissection of the structures in Calot's triangle can pose a considerable challenge during both laparoscopic and open surgery. During open surgery a partial cholecystectomy with drainage of the gallbladder stump is used occasionally when the tissues in Calot's triangle are hostile (7). As in many other areas of surgical practice, the lessons of open surgery can be relearned and adapted to laparoscopy. This study has shown that LSTC without cystic duct ligation represents an alternative to open conversion when dissection of Calot's triangle is deemed unsafe. In our study, the median operating time was 90 min. (range 60 – 180 min.) while Nathanson et al, and others showed that the operating time is less in classical laparoscopic cholecystectomy 45 min. (range 35 – 55 min.) due to several factors:

1. Straight forward dissection of Calot's triangle in classical Laparosopic Cholecystectomy. Compared to the more time consuming dissection in our study.
2. The more time required for retrieving the spillage of the gall stones in LSTC while this spillage may rarely happen in classical Laparoscopic. Cholecystectomy as with improving hand skills and experience. (8).

Muqim et al reported 3.9% bile leak after Laparoscopic Cholecystectomy. With cystic duct ligation as 2% of them due to major bile duct injury (11). While in our study the bile leak was 16% without any record of bile duct injury. 12% of patients respond to conservative management and the remaining 4% needed further intervention and recovered well without any sequel. All patients with postoperative bile leak were expected from intraoperative findings, thus making bile leaks predictable and potentially simplifying postoperative management decisions. Most bile leaks were managed expectantly and took about one week to settle spontaneously.(9) Following this, a policy of postoperative ERCP and stent insertion was adopted in patients with sustained bile leaks, with the aim of resolution of bile leakage and hastening discharge from hospital. An alternative approach in the event of an obvious bile leak peroperatively would be to attempt closure of the cystic duct orifice within the opened gallbladder, for example by suturing or by using an endoloop. Although this may be feasible, it runs the risk of inadvertent impingement on the main biliary tree, and would have to be undertaken with caution. In contrast, it was evident that no postoperative bile leak developed if the gallbladder stump was dry at the end of LSTC. In the light of this, the current policy of leaving two abdominal drains in place for 48 hours could be deemed unduly cautious. (9) In our study there was no bile leak in patients presented with chronic cholecystitis due to fibrosed and obstructed cystic duct while most of bile leak is seen in patients who presented with acute cholecystitis and biliary colic. L.Shariyeh et al reported 8% bleeding from liver bed in Laparoscopic Cholecystectomy and needed conversion to open cholecystectomy; 16.3% of patients the bleeding was from the Calot's triangle due to dissection and 5% of them needed conversion to open cholecystectomy (10). While in our study most of the patients who had intra operative bleeding is from the dissecting edge of the gall bladder which was controlled easily by clipping and cauterization. 2 patients had bleeding from minor liver injury which was also controlled successfully. Rooh et al had reported 10% spillage of stones in laparoscopic Cholecystectomy. (11); while in our study the rate of spillage was 40% due to dissecting the wall of the gall bladder. This spillage had gone out without any sequel but led to an increase in operating time. Windberge et al reported chest infection and ports' site infection of 0.8% and 4.8% respectively in Laparoscopic Cholecystectomy (12); while in our study there was 4% of patients with postoperative chest infection and 8% with ports' site infection mostly due to longer operating time and increasing incidence of spillage of stones and bile leak. Cohen et al and others had reported a mortality rate of 0.5% in Laparoscopic Cholecystectomy (13)(14)(15); while in our study there was no mortality reported. The rarity of bile duct injuries overall means that much larger patient numbers would be required to assess any potential impact of LSTC without cystic duct ligation on bile duct injury rates. It is clear, however, that rates of conversion to open surgery can be reduced significantly by adopting a policy of LSTC for selected patients.(16)(17).

Conclusion:

LSTC is used for cases in which dissection in Calot's triangle is difficult during Laparoscopic Cholecystectomy And found to be an effective mean in avoiding any possible injury to biliary passages. Also it has been found to be a substitute to open conversion in certain circumstances, thus reducing the rate of conversion to open cholecystectomy.

Author contribution:

Study conception: dr. Tariq Ibrahim Al-aubaidi
Study design: dr. Tariq Ibrahim Al-aubaidi
Acquisition of data analysis: dr. Tariq Ibrahim Al-aubaidi, dr. Anwar Aied
Interpretation of data: dr. Anwar Aied, dr. Khalid Rahi
Drafting of manuscript: dr. Tariq Ibrahim Al-aubaidi, dr. Anwar Aied , dr. Khalid Rahi
Critical revision: dr. Tariq Ibrahim Al-aubaidi, dr. Anwar Aied

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