Sarcouncil Journal of Medicine and Surgery

ISSN(Online): 2945-3534

Volume- 02| Issue- 05| 2022

Research Article **Received:** 14-03-2022 | **Accepted:** 21-04-2022 | **Published:** 22-05-2022

Laparoscopic Subtotal Cholecystectomy without cystic Duct Ligation

***Dr. Khalid Rahi Al-Yassiri*[1], *Dr. Hamed Zubala Hamza*[2] *Dr. Zainalabdin Ali Abdulhassan*[3]**

[1]*M.B.CH.B, C.A.B.S, Al- Manathera General Hospital, Iraq*

[2]*M.B.CH.B, F.I.C.M.S, Al- Najaf Teaching Hospital, Iraq*

[3]*M.B.CH.B, F.I.C.M.S, Al- Najaf Teaching Hospital, Iraq*

Abstract: Background: Using laparoscopic approach, cholecystectomy is made hazardous by distortion of the anatomy of Calot's triangle due to 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 surgical unit of 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 ranged from (18 to 75) years with a median age 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 postoperative chest infection due to bile leak and longer operating time. One patient (2%) with subphrenic collection which mandates open drainage for cure. No mortality was recorded in our study. Conclusion: LSTC is a possible alternative to open conversion in cases with Calot's triangle difficult anatomy and when dissection is hazardous. LSTC is associated with less injury to biliary passages in spite of longer operating time.

Keywords: Acute Cholecystitis, Laparoscopic cholecystectomy with difficulties, Laparoscopic subtotal cholecystectomy (LSTC).

INTRODUCTION

There is no doubt that laparoscopic cholecystectomy has replaced open cholecystectomy as a standard for the treatment of symptomatic cholelithiasis (Cuschieri, A. *et al*., 1991).

A consensus development conference panel, convened by the 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 (Beldi, G. *et al*., 2003).

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 (Michalowski, K. *et al*., 1998).

The popularity of the procedure in most hospitals and the advancement in the surgeons' experience and confidence has led to less need for the open technique. It's performed only in failures of the laparoscopic approach. 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 (Michalowski, K. *et al*., 1998; Southern Surgeons Club, 1991).

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, adhesion 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 (Kane, R.L. *et al*., 1995).

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. As in many other areas of surgical practice, the lessons of open surgery can be relearned and adapted to laparoscopy (Cottier, D.K. *et al*., 1991).

Growing experience has allowed the use of laparoscopic Cholecystectomy (L.C) 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 suggested to be a safe simple and definitive procedure in this situation (Ransom, K. J, 1998).

Increasing laparoscopic experience and techniques

***Corresponding Author:** Dr. Khalid Rahi Al-Yassiri

DOI- https://doi.org/10.5281/zenodo.7958255

have made laparoscopic subtotal cholecystectomy (LSTC) a feasible option in recent years; it has shown good results in patients with various forms of cholecystitis (Ransom, K. J, 1998).

PATIENTS AND METHODS

A prospective study was conducted during the 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, ECG and pulmonary function test before surgery.

At the time of admission the following data were obtained: age, gender, past medical history, past surgical history, abdominal U/S findings, all was recorded in questionnaire paper. Also, at the time of surgery the intraoperative findings and surgical difficulties were recorded.

A standard technique for laparoscopic cholecystectomy was practiced; Nasogastric tube was not used routinely but occasionally. After general anesthesia and positioning of the patient, CO2 insufflations was achieved by either a Veress needle or Hassun method. Carbon dioxide is used as the insufflations gas. A 30 degrees camera was used through 10mm port. Standard procedures were done through 4 ports technique. The instruments available were: Graspers, dissectors, spatula, L-shaped cauterization tool, suction-irrigation machine 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 due to:

1. Dense adhesions at the triangle of Calot (frozen triangle of Calot) prohibiting proceeding laparoscopically without risk.
2. Contracted and fibrotic gallbladder.
3. Gangrenous gallbladder.
4. Acutely inflamed gallbladder.

The unclear anatomy had made the structures' identification difficult and hence the dissection is hazardous and may carry risk of injury to biliary passages.

The procedure of LSTC includes excision of the anterior wall of the gallbladder using cautery dissection, leaving the posterior wall of the gallbladder in situ; sometimes the posterior wall of the gall bladder can beexcised. All gall stones 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.

Postoperatively, patients were followed up at least one year.

DATA MANAGEMENT AND STATISTICAL ANALYSIS

Data of all cases were checked for any error or inconsistency then 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 statisticalanalysis.

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.

Request Forma
Consultant surgeon:
Patient's name:
Age:
Sex:
Clinical presentation:
History Notes:

Operative Notes:
Operative time:
Intraoperative blood loss:
Spillage of stones:
Liver injury:
Ports' insertion injury:

Postoperative Notes:
Duration of hospital stay:

Publisher: SARC Publisher

Bile leak:
Wound infection:
Right shoulder pain:
Chest infection:
Subphrenic collection:
Need of ERCP:
Other notes:

RESULTS

This study included 50 patients who were 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.

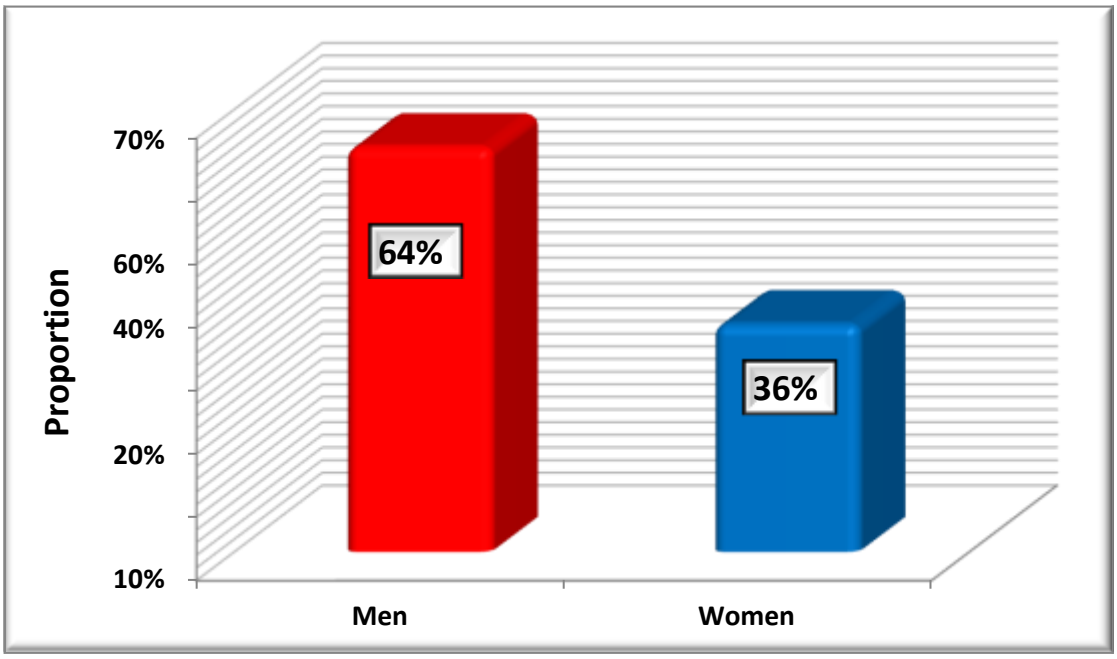

Figure 1: Gender distribution of cases (N=50)

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 (due to failed ERCP trail) in 8 (16%), acute cholecystitis in 5 (10%), and empyema of gall bladder in3 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**

Publisher: SARC Publisher

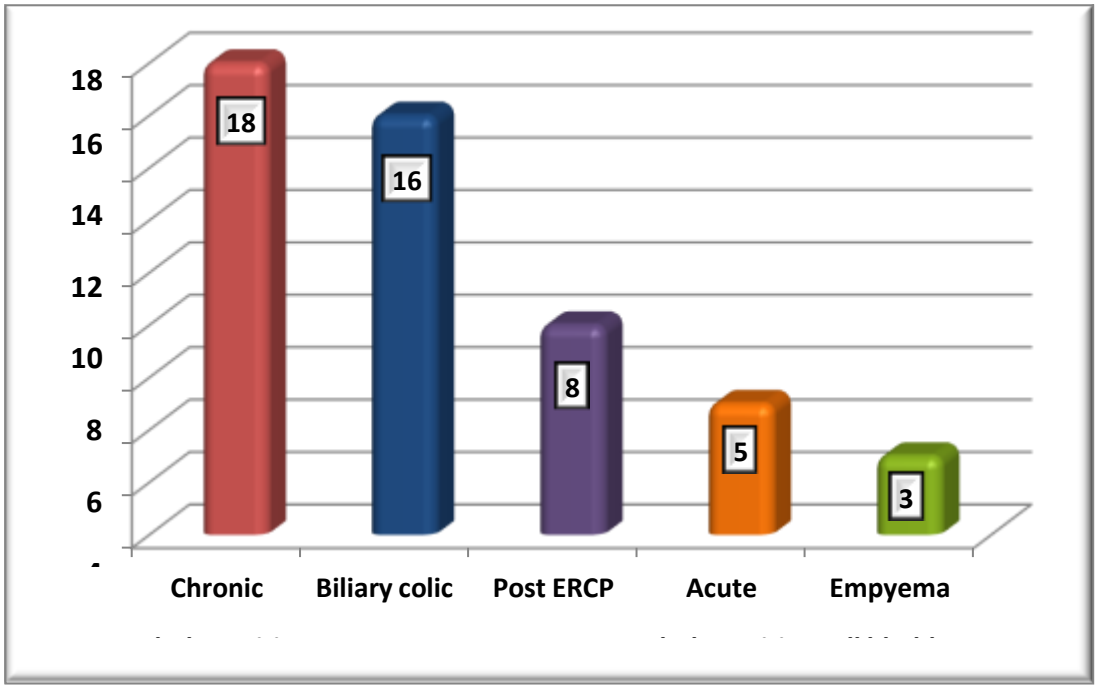

Figure 2: Distribution of clinical presentation among cases

The distribution of clinical presentation by gender had been statistically significant shown (P<0.05) that acute cholecystitis was more common among females while the opposite was true regarding chronic cholycystitis which is more in males; One male (2%) and 4 females (8%) with acute cholecystitis; 13 males (26%) and 5 females (10%) with chronic cholecystitis.

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

Table 2: Distribution of clinical presentation by gender

	Male		Female		
Clinical presentation	**N**	**%**	**N**	**%**	**P.value**
Chronic cholecystitis	13	26.0	5	10.0	**0.02 Sig***
Acute cholecystitis	1	2.0	4	8.0	**0.04 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**	

*** Sig.**: significant. ** **Not sig.**: not significant.

With regard to age of presentation in 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 and 6 females with age group (26-35) year; 18 patients (36%) as 11 males and 7 females with age group (36-45) year; 11 patients (22%) as 9 males and 2 females with age group (46-55) year; 3 patients (6%) as 1 male and 2 females with age group (56-65) year; 3 patients (6%) as 2 males and 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 notsignificant as shown in table 3.

Publisher: SARC Publisher

Table 3: Distribution of age at presentation by gender, 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.**						

Regarding intraoperative events; 20 patients (40%) had spillage of stones into the peritoneal cavity which were removed individually by grasper and suction. 8 patients (16%) had bleeding from the dissected edge of the gall bladder which was controlled by clipping and cauterization. 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%) had no specific intraoperative events as shown in table 4.

Table 4: Distribution of Intraoperative events among cases

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

About postoperative complications; 8 patients (16%) had postoperative bile leak. Those patients were with different presentations preoperatively as 4 of them (8%) presented with acute cholecystitis; 3 (6%) presented with biliary colic and 1 (2%) presented with empyema of gall bladder. None of them presented with chronic cholecystitis or with post ERCP CBD stones, as shown in table 5.

Table 5: Postoperative bile leak distributed according to preoperativeclinical presentation

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

In 6 of them (12%), the leak was 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.

Regarding 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. Four patients (8%) developed right side shoulder pain due to CO**2** pneumoperitoneum which resolved after 2 days, 2 patients (4%) had postoperative chest infection managed conservatively and resolved spontaneously. Few weeks later, 1 patient (2%) developed subphrenic collection which was managed by ultrasound guided drain insertion; but 3 weeks later open

Publisher: SARC Publisher

drainage for complete healing was required. No other complications were reported in our study as well as no death was reported as in figure 3.

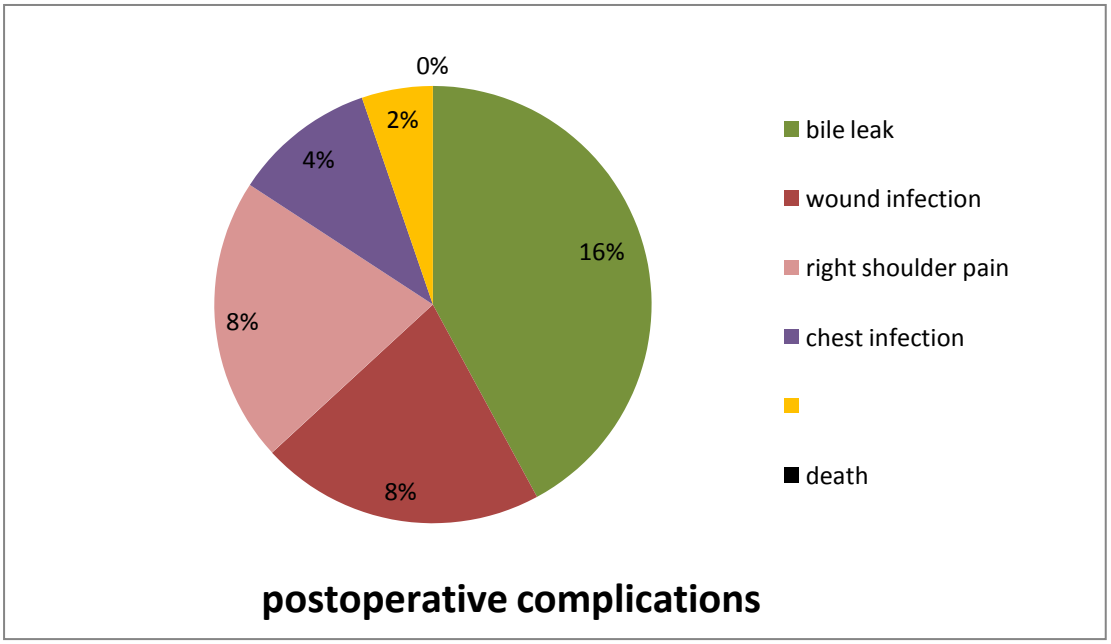

Figure 3: % of postoperative complications

Hospital Stay

35 patients (70%) were discharged from hospital with drain 24 – 48 hours postoperatively and drain removed 48 – 72 hours postoperatively. The remaining 15 patients (30%) needed more postoperative care and hospital stay longer than 48 hours due to postoperative complications and remain until their problems resolved; 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

Postoperativecomplication	No. ofcases	% of cases	Hospital Stay (days)	Mean Hospital stay(Days)
Temporary Bile leak	6	12.0	5 – 7	5.4±0.78
Wound infection	4	8.0	3	3±0
Need of ERCP	2	4.0	21 – 28	24.5±4.9
Chest Infection	2	4.0	4 – 5	4.5±0.71
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 had LSTC without cystic duct ligation, due to difficult anatomy of the structures in Calot's triangle. This dissection rendered difficult in the presence of acute or chronic inflammation, dense omental adhesions with associated higher rates of injury to biliary passages.

In this study, the operating time ranges between 60 – 180 min. with a median of 90 min. while Nathanson, showed that the operating time is less in classical laparoscopic cholecystectomy which was 45 min. (range 35 – 55 min.) due to several factors:

1. Straight forward dissection of Calot's triangle in classical laparoscopic cholecystectomy compared to the more time consuming dissection in this study.
2. The more time required for retrieving the spillage of the gall stones in LSTC without cystic duct ligation while this spillage may rarely happen in classical laparoscopic Cholecystectomy with improving hand skills and experience (Nathanson, L.K. *et al*., 1991).

Singh and Ohri showed that the operating time varied from 30 min. to
2.5 hours in cases where open conversion had

Publisher: SARC Publisher

taken place; so more operating time required than in LSTC without cystic duct ligation (Singh, K. *et al*., 2005).

Muqim reported 3.9% bile leak after laparoscopic cholecystectomy with cystic duct ligation with 2% of them due to major bile duct injury (Muqim, R. *et al*., 2008); And A. S. Wolf reported that the bile leak had reduced from 9% to 1.5% in laparoscopic cholecystectomy with open conversion with subsequent definitive repair took place during open surgery (Wolf, A. S. *et al*., 2009).

While in this study; the bile leak was 16% with no bile duct injury. Twelve percent of patients respond to conservative management and the remaining 4% needed further intervention by ERCP 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. As seen in table 5, the bile leak had occurred in patients who presented preoperatively with acute cholecystitis (8%), biliary colic (6%) and empyema of the gall bladder (2%) due to dilated edematous cystic duct. Most bile leaks were managed expectantly and took about one week to settle spontaneously (Singh, K. *et al*., 2000).

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 in the remaining (84%) in whom 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. (Krahenbuhl, L. *et al*., 2001)

In this 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, biliary colic and empyema of the gall bladder. This was also seen by Kologlu M. and his colleagues when they had done an open conversion to cases with difficulties during Laparoscopic cholecystectomy (Kologlu, M. *et al*., 2004).

L.Shariyeh 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 (Shariyeh, A, 2004). While in this study the 8 patients (16%) who had intra-operative bleeding was from the dissected edge of the gall bladder and 2 patients (4%) had bleeding from minor liver injury which was controlled easily by clipping andcauterization.

Rooh had reported 10% spillage of stones in laparoscopic Cholecystectomy (Muqim, R. *et al*., 2009); while in this study the rate of spillage was 40% during dissection of the wall of the gall bladder. This spillage had gone out without any sequel but led to an increase in operating time for retrieving the stones associated by suction irrigation of the operative field.

Windberge reported chest infection and ports' site infection of 0.8% and 4.8% respectively in laparoscopic cholecystectomy (Windberge, U.B. *et al*., 1999), while in this study there was 4% incidence of postoperative chest infection and 8% had port site infection probably due to longer operating time and increasing incidence of spillage of stones and bile leak.

A. S. Wolf reported a mortality rate of 1.5% in laparoscopic cholecystectomy with open conversion (Wolf, A. S. *et al*., 2009), while in this 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; Moreover, the rates of conversion to open surgery can be reduced significantly by adopting a policy of LSTC for selected patients (Chowbey, P.K. *et al*., 2000).

CONCLUSION

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

Publisher: SARC Publisher

conversion to open cholecystectomy when dissection of Calot's triangle is deemed unsafe.

RECOMMENDATIONS

We recommend the use of LSTC as a safe alternative to open conversion in laparoscopic cholecystectomy when difficulties are encountered in dissection of Calot's triangle.

Further Studies should be conducted in other centers using larger samples for more detailed evidence.

ABBREVIATIONS:-

Abbr.	Meaning
LSTC	Laparoscopic Subtotal Cholecystectomy
Lap. Chole.	Laparoscopic Cholecystectomy
LFT	Liver Function Test
RFT	Renal Function Test
RBS	Random Blood Sugar
CBP	Complete Blood Picture
CXR	Chest X-Ray
U/S	Ultrasound scan
N/G tube	Nasogastric tube
ERCP	Endoscopic Retrograde Cholangiopancreatography
CBD	Common Bile Duct

REFERENCES

1. Cuschieri, A., Dubois, F., Mouiel, J., Mouret, P., Becker, H. and Buess, G, *et al*. "The European experience with laparoscopic cholecystectomy." *Am J Surg* 162 (1991):385-7.
2. Beldi, G. and Glattli, A. "Laparoscopic subtotal cholecystectomy for severe cholecystitis." *Surg Endosc* 17(2003): 1437–1439.
3. Michalowski, K., Bornman, P.C., Krige. J.E., Gallaher, P.J. and Terblanche, J. "Laparoscopic subtotal cholecystectomy in patients with complicated acute cholecystitis or fibrosis." *Br J Surg*, 85(1998): 904–906.
4. Southern Surgeons Club. "A prospective analysis of 1518 laparoscopic cholecystectomies." *N Engl J Med* 324(1991):1073.
5. Kane, R.L., Lurie, N., Borbas, C., Morris, N., Flood, S. and McLaughlin, B, *et al*. "The outcomes of elective laparoscopic and open cholecystectomies." *J Am College of Surg*, 180 (1995):136-45.
6. Cottier, D.K., McKay, C. and Anderson, J.R. "Subtotal cholecystectomy." *Br J Surg* 78(1991): 1326–1328.
7. Ransom, K. J. "Laparoscopic management of acute cholecystitis with subtotal cholecystectomy." *Am Surg*, 64(1998): 955–957.
8. Nathanson, L.K., Easter, D.W. and Cuschieri, A. "Ligation of the structures of the cystic pedicle during laparoscopic cholecystectomy." *Am. J. Surg*. 161(1991):350.
9. Singh, K. and Ohri, A. "Laparoscopic cholecystectomy. Is there a need to convert?" *J Min Access Surgery* 1(2005): 59 –62.
10. Muqim, R. *et al*. World journal of Laparoscopic Surgery, Tawany 1(2008): 1 - 5.
11. Wolf, A.S, *et al*. "Surgical outcomes of open cholecystectomy in the laparoscopic era." *Amer J Surg* 197(2009): 781 – 784.
12. Krahenbuhl, L., Sclabas, G., Wente, M.N., Schafer, M., Schlumpf, R. and Buchler, M.W. "Incidence, risk factors, and prevention of biliary tract injuries during laparoscopic cholecystectomy in Switzerland." *World J Surg*, 25(2001):1325-30.
13. Kologlu, M., Tutuncu, T., Yuksek, Y.N., Gozalan, U., Daglar, G. and Kama, N.A. "Using a risk score for conversion from laparoscopic to open cholecystectomy in resident training." *Surgery* 135(2004):282-7.
14. Shariyeh, A. "Laparoscopic cholecystectomy; early and late complications and their treatment." *Langenbecks Arch* 389(2004): 164 – 171.
15. Windberge, U.B., Auer, R. and Keplinnger, F, *et al*. "The role of intra abdominal pressure on splanchnic and pulmonary hemodynamic and metabolic changes during CO2 pneumoperitoneum." *Gastrointest. Endosc*, 49(1999): 84 – 91.
16. Chowbey, P.K., Sharma, A., Khullar, R., Mann, V., Baijal, M. and Vashistha, A.

Publisher: SARC Publisher

"Laparoscopic subtotal cholecystectomy: a review of 56 procedures." *J Laparoendosc Adv Surg Tech A* 10 (2000): 31–34.
17. Cheung, W, *et al*. "ACS SURGERY (principles & practice)." *WebMD Inc* 5.12 (2003): 770-779 .
18. Hannan, E.L., Imperato, P.J., Nenner, R.P. and Starr, H. "Laparoscopic and open cholecystectomy in New York State: Mortality complications, and choice of procedure." *Surgery* 125(1999):223-31.
19. Southern Surgeons Club. "A prospective analysis of 1518 laparoscopic cholecystectomies." *N Engl J Med* 324 (1991):1073-8.
20. Saha, S.K. "Ligating the cystic duct in the laparoscopic cholecystectomy." *Amer J Surg*, 179(2000): 494-6.
21. Kumar, A., Thombare, M.M., Sikora, S.S., Saxena, R., Kapoor, V.K. and Kaushik, S.P. "Morbidity and mortality of laparoscopic cholecystectomy in an institutional setup." *J Laparoendosc Surg* 6 (1996):393-7.
22. Kaushik, R.S. "Bleeding Complications in Laparoscopic surgery." *Dobin Kaushik* 6.3(2010): 59–65.

Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
Al-Yassiri, K.R., Hamza, H.Z. and Abdulhassan, Z.A. "Laparoscopic Subtotal Cholecystectomy without cystic Duct Ligation." *Sarcouncil Journal of Medicine and Surgery* 2.5 (2023): pp 1-9.

Publisher: SARC Publisher