Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i4.6057

THE STUDY OF LAPAROSCOPIC SUBTOTAL CHOLECYSTECTOMY FOR DIFFICULT GALLBLADDERS IN CHRONIC CHOLECYSTITIS

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ABSTRACT

Background: Laparoscopic subtotal cholecystectomy (LSTC) is a bailout procedure that is undertaken when it is not safe to proceed with a laparoscopic total cholecystectomy owing to dense adhesions in Calot's triangle. **Aim and Objective:** To find out whether our technique of laparoscopic modified subtotal cholecystectomy (LMSC) is suitable with an acceptable morbidity and outcome. **Material and Methods:** A retrospective analysis of prospectively collected data on 60 consecutive patients who underwent cholecystectomy was done at a different hospital in Bhuvneswar and Puri, Odisa, India. The study included both elective and emergency cholecystectomies in adult patients. The data is as follows: Patient's demographics, operative details, including intra- and postoperative complications, and postoperative stay, including follow-up, were recorded and analyzed. **Result: Of the** 60 patients undergoing LMSC, 26 (43.33%) were males and 34 (57.67%) were females [mean age 51 (20–70) years]. Fifty-two (86.67%) patients were elective, and eight (13.33%) underwent emergency operations [Table 1]. None from this group needed conversion to an open procedure.The patients who underwent LMSC often had multiple pathological findings that prompted the procedure: 50 (83.33%) had dense adhesions, 20 (33.33%) had acute inflammation, 21 (35%) had severely contracted GB, 13 (21.67%) had empyema of the GB, 6 (10%) had Mirizzi's syndrome, and 3 (5%) had gangrenous GB. The mean operating time for LMSC was 124 (50–140) minutes. **Conclusion:** Our technique of LMSC avoided conversion in 6.7% of patients, and we believe that it is feasible and safe for difficult GBs with a positive outcome.

Keywords: laparoscopic, cholecystectomy, cholelithiasis, Calot's triangle,

Introduction:

Since the introduction of laparoscopic cholecystectomy in the field of general surgery and our understanding of the many advantages it offers, this approach has quickly established itself as the treatment of choice in patients with cholelithiasis, as it is considered an effective procedure with low morbidity and mortality rates. [1-2] Laparoscopic cholecystectomy (LC) was introduced into the field of general surgical practice in the late 1980s and is universally accepted as the 'gold standard'

treatment for symptomatic gall bladder (GB) diseases.[3-4] However, conversion that minimizes the risk of biliary and vascular injury is required in 5-20% of cases [5], especially in patients with dense omental adhesions at the Calot's triangle, fibrosed and shrunken GBs, empyema, and gangrene of the GB. [6] During laparoscopic cholecystectomy, surgeons are often faced with complex situations, such as Mirizzi's syndrome, severe cholecystitis, and liver cirrhosis, where anatomical structures cannot be properly identified and a critical view of safety cannot be achieved. This leads to greater surgical risk and the possibility of bile duct injury. [7]

The identification and safe dissection of Calot's triangle are essential to minimize or avoid vascular or biliary damage, and conversion is the adopted norm when the biliary anatomy is unidentifiable. [8] The available evidence still shows an increased incidence of biliary and vascular injury even with an open approach, and the conversion does not necessarily improve the exposure- sure of biliary anatomy but definitely increases postoperative morbidity that includes pain, wound infection, delayed mobility, increased incidence of adhesion, and incision hernia. [9] Retrograde ('fundus first') cholecystectomy is a safe and accepted option for difficult GBs with an open approach. Laparoscopic retrograde cholecystectomy (LRC), although technically feasible, is a much more complex procedure; hence, it is not widely practiced but may be considered an alternative to conversion in cases where there is distorted biliary anatomy. [0-11] We present here a single-institution experience of our technique of laparoscopic modified subtotal cholecystectomy (LMSC) that avoided conversion for difficult GBs with a positive long-term outcome.

Material and methods

This is a retrospective study of prospectively collected data on 100 consecutive patients ages 20–70 who underwent cholecystectomy in the upper gastrointestinal unit and both sexes of different hospitals Hospital of Bhuvneswar and Puri, Odisa, India. The study included both elective and emergency cholecystectomies in adult patients. Patient demographics, operative details (reason for modified subtotal cholecystectomy), duration of the procedure, length of stay, and immediate and long-term complications were recorded. This was a retrospective observational study, and this study was deemed to be a service evaluation, so no further ethics approval was required. The patients were counseled and consented to prior to the surgery, and routine preoperative investigations included hematological, biochemical, and ultrasonographic analyses. Magnetic resonance cholangiopancreatography (MRCP), computed tomography (CT), and endoscopic retrograde cholangiopancreatography (ERCP) were performed when indicated. The decision to adopt our technique of LMSC was made on the basis of intraoperative findings where it was felt unsafe to approach the Calot's triangle due to severe inflammatory changes, distorted anatomy, or afrozen' triangle to avoid vascular or biliary damage.

Our operative technique

The patients are placed in the reverse Trendelenburg position with 15°–20° left-sided rotation, and the surgeon stands on the left to operate. Two 12-mm and two 5-mm ports are placed in their standard positions for LC. The assessment of the right upper quadrant is followed by a careful dissection of the omentum, colon, stomach, and/or duodenal adhesions to expose the GB; the failure to achieve exposure to the GB results in conversion. In those patients where the 'critical view of safety' (ability to identify or expose the structures at the Calot's triangle) cannot be achieved, LMSC is undertaken to avoid a conversion. In our 'fundus first approach', the fundus is opened using a monopolar diathermy to allow drainage of pus, infected bile, or stones, which are either aspirated or collected in a bag. This is followed by the diathermysterior wall attachment to the liver provides traction, while the anterior wall is dissected down to the Hartmann's pouch and is transected. splitting of the GB into two halves. The GB posterior wall attachment to the liver provides traction, whidamage, anterior wall is dissected down to the Hartmann's pouch and is transect The liver is then retracted against a tonsil swab to avoid damage and the posterior GB wall is freed from the liver bed with the help ocauterized. rmy. If the posterior wall is difficult to separate from ensures liver bed (i.e.,,cases with minimizesor intrahepatic GBs), it is cauterstructures, of

opinion, the 'inside view of the gallbladder' al- lows safe dissection and avoids or minimises the risk of damage to the portal structures and also allows on-table or cholangiography (OTC) to be washout in performed, cases. This is followed by an intracorporeal stitcor endoloop closure of the cystic duct/small GB remnant. A thorough wash out is performed and a sub-hepatic drain is inserted prior to port site wound closure using the standard technique.

All patients who undergo LMSC receive 72 h of 1.2 g of coamoxiclav or 750 mg of cefuroxime (if allergic to penicillin) three times daily and three days of a single dose of Gentamicin (3-5 mg/kg of body weight), and all patients receive low-molecular-weight heparin 40 mcg subcutaneously 6 h after surgery. Drains are removed in 24–48 h on observation of minimal serous or serosanguineous drainage (<50 mL) and are only left longer in patients with drainage of bile requiring ERCP and stenting after the surgery. In this study, all patients who underwent LMSC were contacted over the telephone and were re-viewed in a clinic if indicated.

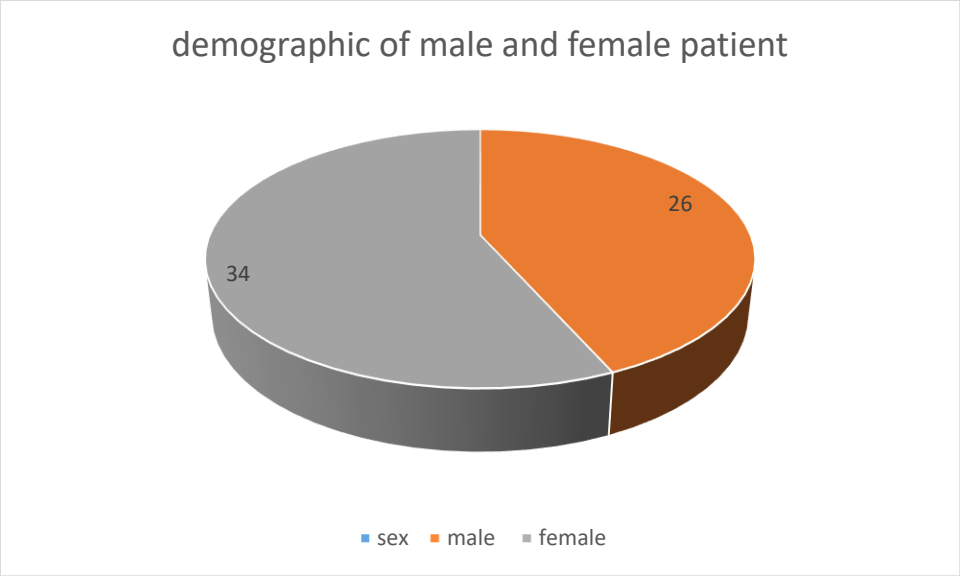
Observation and Result

Of the 64 patients undergoing LMSC, 25 (39%) were males and 39 (61%) were females [median age 54 (21–80) years]. Fifty-seven (91%) patients were elective, and seven (11%) underwent emergency operations [Table 1]. None from this group needed conversion to an open procedure.

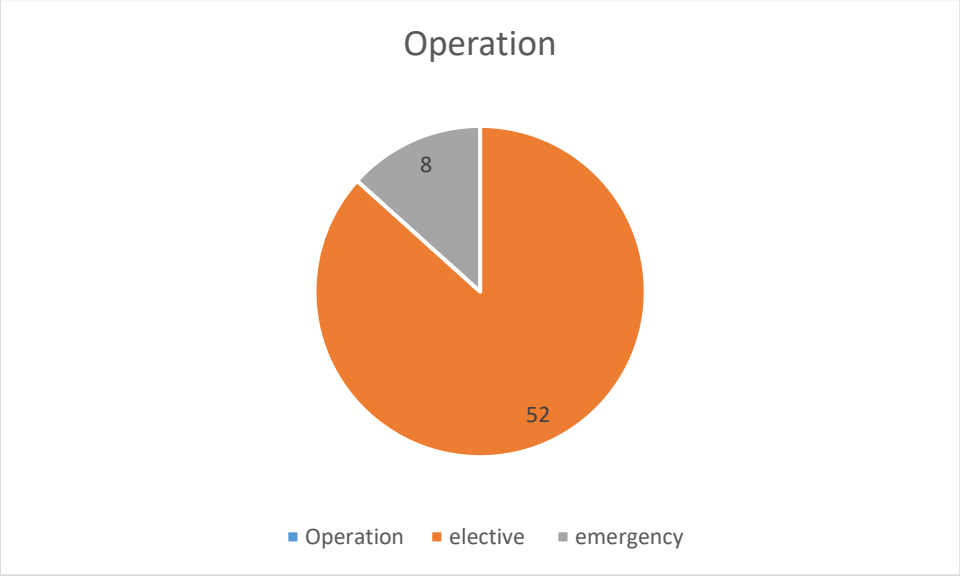
Table No. 1: Patient Demographics, Indications, and Outcomes

Patient demographics		Patients (60)	Percentage (%)
Sex	**Male**	26	43.33
	Female	34	56.66
Age	**Both sexes**	Range- 20-70	Median- 51
Operation	**Elective**	52	86.67
	Emergency	8	13.33
Operative time		Range: 50-140 min	Median. 124
Operative findings	**Acute inflammation**	20	33.33
	Gangarene	3	5
	Dense adhesion	50	83.33
	empyema	13	21.67
	Contracted gall bladder	21	35
	Mirizzi's syndrome	6	10
Operative method	**Sticched**	49	81.67
	endoloop	11	18.33
Duration of stay in the hospital		Range: 1–15 days	Median: 1 day
Complication	**Total**	9	15
	Bile leak	3	5
	Stricture	1	1.67
	Port site hernia	1	1.67
	CBD stone	3	5
Readmission	**Collection**	1	1.67
	Post-OP collection	2	3.33
	Post-op pain	4	6.67
Postoperative ERCP	**Total**	7	11.67
	CBD stone and stent	3	5
	Removal	0	
	Bile leak	2	3.33
	CBD stricture	2	3.33

Of the 60 patients undergoing LMSC, 26 (43.33%) were males and 34 (57.67%) were females [mean age 51 (20–70) years]. Fifty-two (86.67%) patients were elective, and eight (13.33%) underwent emergency operations [Table 1]. None from this group needed conversion to an open procedure.



The patients who underwent LMSC often had multiple pathological findings that prompted the procedure: 50 (83.33%) had dense adhesions, 20 (33.33%) had acute inflammation, 21 (35%) had severely contracted GB, 13 (21.67%) had empyema of the GB, 6 (10%) had Mirizzi's syndrome, and 3 (5%) had gangrenous GB. The mean operating time for LMSC was 124 (50–140) minutes [Table 1].



The median length of stay for laparoscopic and open cholecystectomies (laparoscopic converted to open and all open procedures) was 1*(0–15) days and 5*(1–12) days, respectively. The median follow-up for patients undergoing LMSC was 30 (8–72) months. 7 (11.67%) patients required postoperative ERCP [3 (5%) for common bile duct (CBD) stones and stent removal, two (3.33%) for bile leak, and 2 (3.33%) for CBD stricture]; there were 6 (10%) re-admissions [46.67%) for pain and 2 (3.33%) for a collection]. [Table 1]

Discussion

Erich Mühe performed the first laparoscopic cholecystectomy on September 12, 1985, in Germany [11], but it was not until the 1990s that the laparoscopic approach became the gold standard for cholecystectomy. It is now among the most commonly performed elective day-case procedures. [13] Nevertheless, one of the major complications is bile duct injury, a catastrophic complication that can even reduce long-term survival. Injuries to the hepatic pedicle are more common in patients with dense adhesions in Calot's triangle. In these patients with a difficult Calot's triangle, LSTC has become more popular as an alternative option in cases where previously a conversion to open cholecystectomy would have been performed. [14] The laparoscopic approach offers the advantage of better illumination and magnification in addition to reduced pain and other complications associated with open surgery, and STC allows for control of the disease process without putting patients at undue risk.

In the prelaparoscopic era, the 'fundus first approach' ending in subtotal cholecystectomy for difficult GBs was well accepted as a safe and definitive procedure. [15] Although LC is currently accepted as the 'gold standard' treatment for GB diseases, it may still be considered unsafe and dangerous by some when faced with difficult biliary anatomy, thus resorting to an open procedure. However, there are concerns that the newer generation of surgeons may have little or no experience with the open procedure, and conversion would not necessarily provide a better anatomical view, especially for patients with a higher BMI, potentially posing an even higher risk of complications. [16] Bilio-vascular injury for LC is less than 1%, with bile duct and vascular injury recorded individually at 0.6% and 0.25%, respectively. [17] The evidence has already shown open procedures to be associated with increased postoperative morbidity due to the higher incidence of wound infection, postoperative pain, slow recovery, and a prolonged hospital stay. Common reasons for conversion include dense fibrotic adhesions at the Calot's triangle, fibrosed GB, empyema, and gangrene of the GB, which lead to unclear anatomy and difficulties in dissecting the Calot's triangle. [18]

The surgical strategy may be changed to LRC when there are dense fibrotic adhesions at the Calot's triangle, a fibrosed GB, Mirizzi's syndrome, an empyema or gangrene of the GB, or unclear biliary anatomy. [19] In our series, the majority of the patients had dense adhesions at the Calot's triangle, leading to unidentifiable biliary anatomy. In addition, 35% had contracted GB, 21.67% had empyema of the GB, 10% had Mirizzi's syndrome, and 5% had gangrenous GB. Several operative techniques have been described to address difficult biliary anatomy. [20] They include excision of the anterior wall of the GB and leaving the posterior wall attached to the liver; [8] excision of both the anterior and posterior GB walls following dissection; and the GB being divided at Hartmann's pouch. [19] Irrespective of the technique, the GB stump is either left open [21] or closed using endoloop, an intracorporeal stitch [19], or stapled. [22] The mucosa of the posterior wall of the remnant GB is diathermized [23] or left alone [24] with or without a drain *in situ*.

Our technique of LMSC in bisecting the GB and carrying it down to the Hartmann's pouch has distinct advantages:

- The posterior wall of the GB attached to the liver allows safe traction for better exposure and dissection and avoids the risk of liver damage,
- 'Inside view of the gall bladder' allows clear identification of the GB mucosa and junction between the Hartmann's pouch and the cystic duct for safe dissection and subsequent transection or suture application.
- This approach allows dissection to be performed well away from the vital portal structures and thus avoids any biliovascular injuries.

LRC has been demonstrated to be safe and effective for avoiding major bile duct injuries. [25] A common complication after LRC is bile leak, which has been reported in up to 15% of cases [8, 23] either from the open cystic duct stump or from the remnant posterior wall. We advocate routine closure of the cystic duct stump or GB remnant through the application of either an endoloop or an

intracorporeal absorbable suture and have recorded a 5% incidence of bile leak, which is favorable compared to the published literature.

The other concerns raised about LRC include the neo-formation of gallstones or retained gallstones in the remnant GB and the slippage of gallstones into the CBD. [8] Literature has reported recurrent symptomatic GB disease to occur in up to 5% of patients.[20] In our series with a median follow-up of 30 months, no neo-formation of gallstones has been recorded, and as described above, the 'inside view of the gallbladder' and selective use of an on-table cholangiogram avoided the complication of retained gallstones in the remnant GB. Three (5%) patients who had CBD stones identified during the on-table cholangiogram were successfully treated through ERCP in the immediate postoperative period. Other known complicationsne (3.33%)include had developed a CBD stricture, which was treated succ2–4%. ly endoscopically. recorded includes CBD stricture, with an overall reported incidence of 2-4%. Here, only one (3.33%) patient had developed a CBD stricture, which was treated successfully endoscopically.

LMSC, although shown to be safe and effective for avoiding major bile duct injury, is definitely technically more challenging than a simple LC and should be approached with caution. There still remains a controversy as to whether conversion to an open procedure or closure with referral to a specialist upper GI/HPB unit is most suitable in difficult cases. A multicentric, randomized, controlled study would possibly prove the benefits of LMSC to the wider community for universal acceptance. Although a retrospective and single-center study is considered a weakness, this study demonstrates LMSC as a feasible and safe alternative to conversion for difficult GBs with a positive outcome.

Conclusions

LSTC is an acceptable alternative for patients with a "difficult" Calot's triangle. Although LSTC can be associated with bile leaks (which can mostly be managed non-operatively), this would still outweigh the risk of sustaining a bile duct injury when attempting a total cholecystectomy in a difficult operative field.

Strengths and Limitations of the Present Study

There are a few drawbacks to the study. In the present study, only 20–70-year-old subjects participated in the research, with a reduced sample size. Hence, in the feature, we would like to include an increase in the number of participants to reach a concrete conclusion. The present study had an impact on understanding the LMSC as a feasible and safe alternative to conversion for difficult GBs with a positive outcome.

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