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Original Research Article

Laparoscopic subtotal cholecystectomy: a safe approach in difficult cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy (LC) has been recognized as the new "gold standard" for the treatment of symptomatic gallstone disease. In order to prevent serious bile duct and vascular injuries, conversion is advocated for unclear anatomy at the Calot's. Our aim was to assess the safety and effectiveness of laparoscopic subtotal cholecystectomy (LSC) in difficult cholecystectomy in order to reduce the incidence of bile duct injury and conversion rates.
Methods: An analysis of retrospectively collected data of 452 patients who underwent LC was done at our Hospital during the period of January 2010 to December 2013. In few cases of difficult GB when Calot's could not be dissected, laparoscopic retrograde cholecystectomy (LRC) was attempted and if that failed we adopted the technique of LSC.
Results: A total of 452 patients were included. The median age was 48 years. All the 452 patients were posted for LC. Of the 452 patients, 404 patients underwent LC and the remaining 48 patients had difficult GB. Among the 48 patients having a difficult GB, 44 cases underwent LSC (3 cases underwent LSC Type-1 and 41 cases underwent LSC Type-2) and the remaining 4 cases underwent conversion to open cholecystectomy. The mean operative time was 130mins and median post op stay was 2 days.
Conclusions: In our technique of LSC the conversion rates were <1% with no bile duct injury and believe that it is feasible and safe for operating on difficult GB's.

Keywords: Laparoscopic cholecystectomy, Laparoscopic retrograde cholecystectomy, Laparoscopic subtotal cholecystectomy

INTRODUCTION

Laparoscopic cholecystectomy(LC) has been recognized as the new "gold standard" for the treatment of symptomatic gallstone disease.[1,2] Whichever approach (open/laparoscopic) is used, performing standard cholecystectomy requires safe dissection of the structures in Calot's triangle. The risk of bilio-vascular injury is greatly increased while dissecting in Calot's triangle, particularly in the presence of acute or chronic inflammation, dense omental adhesions, cirrhotic liver, or gangrene of the gallbladder the practical response to encountering a difficult LC procedure is to perform conversion to an open procedure.[3,4] Retrograde cholecystectomy is a safe and accepted option for difficult GB's with the open technique. Laparoscopic retrograde cholecystectomy (LRC) though technically feasible, is a much more complex maneuver and hence not widely practised, but can be considered an alternative to conversion in cases where there is distorted biliary anatomy.[5,6] However, conversion does not necessarily improve exposure or facilitate cystic duct identification.

In addition this may result in increased postoperative pain, delayed mobility, prolonged hospitalization, adhesion formation and incisional hernia formation.[7] Laparoscopic subtotal cholecystectomy (LSC) has been reported to be a safe and feasible alternative to conversion to open surgery during difficult laparoscopic cholecystectomy.[8,9] It is performed in the following types:[10,11]

- TYPE I-On encountering difficult gall bladder bed
- TYPE II-On encountering difficult CALOT'S
- TYPE III-On encountering difficult hilum with difficult GB bed.[11]

The practical approach of LSC along with operative cholangiogram avoids the need of or potentially hazardous dissection in the area of Calot's triangle and confirming the existence of a common bile duct stone.

Hence this study, aim was to assess the safety and effectiveness of this approach in difficult cholecystectomy in order to reduce the incidence of conversion rates and prevent bile duct injury.

METHODS

This is a retrospective study of 452 patients who underwent cholecystectomy in the department of general surgery at our hospital between January 2010 and December 2013. The study included both emergency and elective cholecystectomies. The case notes for patients who underwent LSC were retrieved and analysed for demographic data, operative findings, the duration of the procedure, the duration of hospitalization, complications and long-term outcomes.

The patients were counseled and consented prior to the surgery and routine preoperative investigation (haematological analysis, biochemical analysis, USG-abdomen) was done. Magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP), CECT-abdomen was performed when indicated. The technique of LSC was adopted based on the intra op findings when a difficult Calot or a difficult GB bed was encountered due to severe inflammation/distorted anatomy/frozen Calot or cirrhotic liver, in order to avoid biliovascular injuries.

Operative procedure

The patients are placed in the reverse Trendelenburg position with 20^0 left tilt and surgeon standing to the left of the patient to operate. Totally four ports were used, Two 10mm ports placed in umbilicus and epigastric region and Two 5mm ports placed in right subcostal, mid clavicular line and anterior axillary line. Following the insertion of camera into the abdomen, assessment of the right upper quadrant of the abdomen is done followed by meticulous dissection of the structures adherent to GB in order to expose it. Failure to achieve critical view of saftey (CVS) inspite of spending more than 20mins in exposure of the Calot's, LRC was attempted. Following which Failure to complete total cholecystectomy even after adapting LRC, we opted for LSC.

In our technique of LSC type-1 (Figure 1) following achievement of CVS at the Calots's , the cystic artery and the cystic duct is clipped and divided. On failure to dissect the GB from the liver bed, an incision on the infundibulum of the GB is taken anteriorly using a monopolar diathermy, to extract the stones and evacuate the infected bile/pus which are either aspirated or collected in a endo bag. This is followed by diathermy splitting of the GB into two halves. Following this the anterior wall of the GB is excised leaving behind the posterior wall of the GB attached to the liver. The mucosa of the posterior GB wall along with the infundibulum was ablated. An intracorporeal suturing of the infundibulum was done with 2.o absorbable sutures.

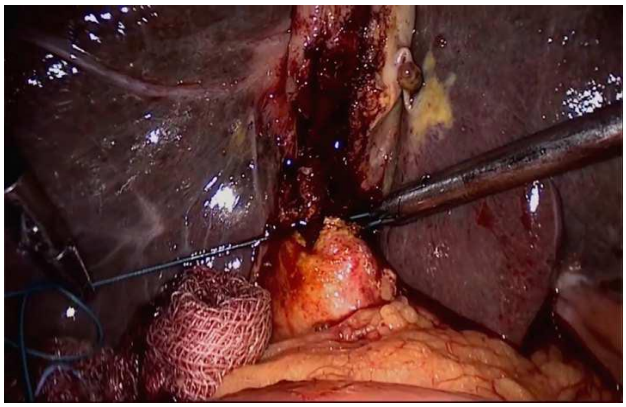

Figure 1: LSC type -1.

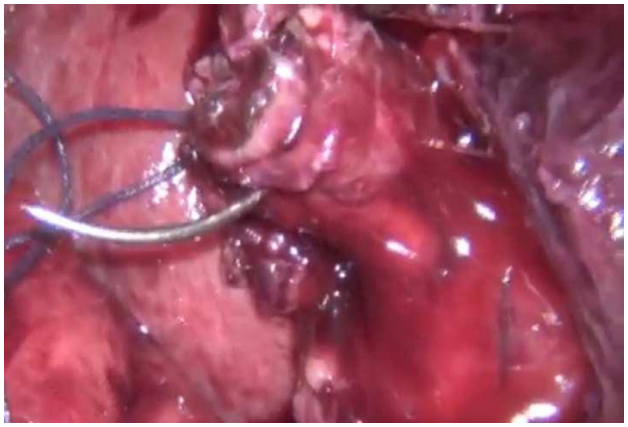

Figure 2 : LSC type-2.

The technique of LSC type-2 (Figure 2) was adopted in cases where dissection at Calot's was dangerous . In this case the Calots triangle is not dissected and nor cystic duct or cystic artery is clipped. We first decompressed the GB through fundus and a circumfrential incision is given over the infundibulum using a monopolar diathermy.

Later the Infundibulum was incised circumfrentially and the area of cystic duct was milked out. The stump mucosa was electrofulgurated and the remaining gall bladder wall was sutured/endolooped to close the mouth of the GB. A Subhepatic drain was often placed in both the procedures. Most of the drains were removed following 24/48hrs after surgery except for 2 cases which had a post op bile leak,and were removed after 6 and 9 days post op. In this study all patients who underwent LSC were contacted telephonically and reviewed when indicated.

RESULTS

Out of 452 patients subjected to LC, 404 underwent total LC. In the remaining 48 patients total LC could not be completed inspite of attempting LRC and these patients ended up in LSC. 44 patients with difficult GB underwent successful LSC, and the remaining 4 patients out of the 48 difficult GB underwent conversion. Of the 48 patients undergoing LSC, 31 were females and 17 were males with the median age being 52 (24-76 years). 39 cases were posted on elective basis and the remaining 9 pateints underwent emergency operation (Table 1). Of the 44 patients who underwent LSC, 6 cases underwent LSC type-1 and 38 cases underwent LSC type-2. 44 Patients who underwent LSC had the following intra operative findings due to which the technique of LSC type - 1/type - 2 was adopted: 15 cases had acute inflammation, 13 cases had contracted GB, 12 cases had frozen Calot, 2 cases had gangerene of the GB, 1 case had empyema of GB, and 1 case had contracted GB with cirrhosis of liver. Of the 44 cases who underwent LSC type-1/type-2 closure of the GB was done with pre-tied loop in 18 cases and intracorporeal suturing in 26 cases (Table 1).

Table 1: Total number of LSC 44 cases.

Sex	Male	17
	Female	31
Age	Male and Female	*52(24-76) years
Timing of surgery	Elective	39
	Emergency	9
Operative technique	LSC Type – 1	6
	LSC Type - 2	38
Operative findings	Acute inflammation	15
	contracted GB	13
	Frozen calot	12
	Gangerene	2
	Empyema	1
	Contracted GB with cirrhosis of liver.	1
GB stump Closure technique	Pretied loop	18
	Intracorporeal suturing	26
Operative time	LSC type – 1 / type - 2	*130 (50-160) mins
Length of post op hospitalization		2 (1-13) days
Complications	Total	3
	Bile leak	2
	CBD stones	1
Post op ERCP	Total	1
	CBD stones	1

There were 4 patients underwent conversion to open cholecystectomy due to 1 case of cystic artery bleed, 2 cases of severely distorted anatomy and 1 case of bowel injury.

The median operating time for LSC was 130mins (50-160mins). The median duration of postoperative hospitalization was 2 days (range 1- 13 days). 2 patients had post-op bile leak which resolved spontaneously with conservative management and the drain were removed following that. 1 patient required post-op ERCP and stenting due to CBD stones. Patients were followed up for a period of 3 years. Rest none of the patients were symptomatic nor had a readmission (Table 1).

DISCUSSION

Safely dissecting the structures in Calot's triangle to achieve "critical view of safety" when treating cases of cholecystitis, can pose a considerable challenge in both laparoscopic and open procedures. During open surgery, partial cholecystectomy with drainage of the gallbladder stump is occasionally used when the tissues in Calot's triangle prove hostile.[12] As in many other areas of surgical practice, the lessons of open surgery can be relearned and adapted to laparoscopy. Today LC has become the procedure of choice for symptomatic biliary disease, but it may still be unsafe to adopt in case of a difficult GB, thus resorting to conversion.

However in few cases even after conversion there is no better view of the anatomy or the surgical planes to do a total cholecystectomy, and potential posing to a greater risk of complications.[13] The primary reasons for conversion include factors such as difficulties in dissecting the tissues of Calot's triangle, an unclear anatomy, bleeding from the gallbladder fossa and bile duct injury.[14,15] Biliovascular injury for LC is <1% with bile duct and vascular injury being 0.6% and 0.25% respectively.[16,17]

The present results show that LSC represents a viable alternative to conversion when performing dissection in a difficult GB.

In our study, we have adopted only type -1 and type-2 techniques of LSC in difficult GB. When significant difficulty was encountered in dissecting the Calot's, LSC type-2 was adopted wherein cystic duct and cystic artery are not clipped, incision over the infundibulum is taken circumferentially and the whole GB is dissected from its liver bed. And in cases where difficulty was encountered while dissecting the GB from the liver bed then LSC type-1 technique was adopted where in cystic duct and cystic artery are dissected to attain CVS following which they are clipped and divided. Anterior wall of the GB is resected leaving behind the posterior wall of the GB attached to the liver, and the mucosa is ablated. We advocate routine closure of the cystic duct stump/the GB remanent either by using a pretied loop or by intracorporeal sturing technique. All the patients who underwent LSC had a subhepatic drain placed and were removed as when indicated.

Two patients had post operative bile leak. The bile leak resolved spontaneously with conservative management and the drains were removed following that. Other concern in LSC is about the neo formation of gall stones or retained stones in the remanent GB and slippage of gall stones into CBD.[18] According to a series,recurrent symptomatic GB disease accoured in upto 5% of patients. In our series, one patient had slippage of stone in CBD who underwent immediate post op ERCP and stenting for the same. None have been reported with neo formation of gall stones nor residual stones in the GB remanent in the follow up of 3 years. Another concern of LSC is that patients exhibiting complications of gallbladder cancer are not identified preoperatively. Gallbladder cancer is reportedly found unexpectedly in 0.2-0.8 % of patients undergoing laparoscopic cholecystectomy.[19,20] In our series of LSC, no cases of unexpected gallbladder cancer were identified. LSC should not be performed in patients with gallbladders with an increased wall thickness due to cancer, and gallbladder tumors must be excluded preoperatively. Importantly, no wound infections were identified in any patient undergoing LSC. Our study group was relatively small; however, this finding may simply reflect the reduced wound infection rates observed in laparoscopic surgery.[21]

CONCLUSION

LSC although shown to be safe and effective for avoiding major bile duct injury, is definitely technically more challenging than a simple LC. Hence should be approached with caution. There still remains a controversy as to whether conversion to open procedure or closure with referral to a specialist is most suitable in difficult cases. However, we have demonstrated that LSC is a viable technique that reduces the risk of bile duct injury and conversion rates in the most difficult cases of emergency or elective cholecystectomy while maintaining the other benefits of a laparoscopic approach which is comparable to other studies.

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