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Original Research Article

Our experience with retrograde technique in difficult laparoscopic cholecystectomy

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ABSTRACT

Background: Gall bladder pathologies are some of the commonly encountered conditions in one's surgical practice. Cholecystectomy is among the routinely performed procedures in most surgical units. Laparoscopic surgery is preferred to open cholecystectomy because of its various advantages. In straightforward cases, the antegrade technique is routinely employed. The retrograde technique is generally reserved for the difficult cases. The retrograde technique may be used safely with adequate experience, thus reducing the need for conversion into open surgery.
Methods: Total 100 cases of consecutive difficult laparoscopic cholecystectomies were included in this study, which were operated using retrograde technique.
Results: Out of the 100 patients 79 were females and 21 were males. Mean age of the patients was 44.2 years. Out of the 100 cases, 98 cases could be successfully managed using the retrograde technique. 2 cases were converted to open surgery. Bleeding was encountered in 3 cases, which was successfully managed laparoscopically. Bile duct injury was seen in 1 case which was managed after conversion.
Conclusions: With adequate surgical expertise and proper instrumentation, retrograde dissection technique may be safely used in difficult laparoscopic cholecystectomy, reducing the rate of conversion to open surgery.

Keywords: Difficult laparoscopic cholecystectomy, Retrograde dissection, Fundus first method

INTRODUCTION

Laparoscopic cholecystectomy was first introduced by Eric Muhe in 1985, through a direct-view laparoscope. Ever since Kato et al reported that the gallbladder could be successfully separated from the cystic bed via dissection of the calot's triangle, laparoscopic cholecystectomy has gained wide acceptance, and today, it has become the gold standard treatment for gallstone disease.[1]

Since decades, many questions are being addressed, regarding how to make laparoscopic cholecystectomy safer in surgical practice thereby reducing the complications and conversion rates. Several guidelines on laparoscopic cholecystectomy have emerged for elective, emergency surgeries and also for concomitant bile duct interventions. However, not many articles have addressed the aspects on making the laparoscopic procedure less technically demanding and safer.[2]

The standard technique involves cephalad traction on the gall bladder to elevate the liver and expose calot's triangle for further dissection. While this is a rapid and simple technique, this manoeuvre may cause distortion of the biliary anatomy. Also, this manoeuvre may not be possible in all the cases. The importance of traction on the neck of the gallbladder to open out calot's triangle has been brought to our attention by Hunter. Strasberg's

writings on the "critical view of safety" have been helpful in this regard.[3]

There are some cases where the standard retraction of the gall bladder fails to expose the calot's triangle or allow safe dissection and this may result in bile duct injury, bleeding and conversion to open surgery. A low threshold for conversion is definitely a marker of good practice, however conversion is associated with both short-term and long-term morbidity.

During open surgery, retrograde or "fundus first" dissection is used routinely by many surgeons. Even when a laparoscopic cholecystectomy is converted to an open operation, retrograde dissection is generally used. But while performing a laparoscopic cholecystectomy, this technique is generally reserved for the difficult cases. Retrograde laparoscopic cholecystectomy appears to have been under-utilized, possibly because in the early days of laparoscopy surgeries, instrumentation was inadequate. However, with good instrumentation readily available, the gallbladder can be safely mobilized using the fundus first technique, whilst the liver is kept elevated by a retractor.[3]

The aim of this study was to evaluate if the retrograde laparoscopic cholecystectomy technique is safe and feasible. Previous studies have shown that the fundus first technique is cost-effective and also that it simplifies the procedure and facilitates patient rehabilitation.[2] We are publishing our data after completing laparoscopic cholecystectomy using retrograde technique in hundred difficult cases of laparoscopic cholecystectomy.

METHODS

We have compiled data from 100 consecutive cases of laparoscopic cholecystectomy done using the retrograde technique for difficult cholecystectomy from August 2016 to January 2020 at our institute.

Intra-operative findings were assessed and co-related with the difficulty prediction scoring system (sugrue scale) given in (Table 1).[4,5] Decision to perform the retrograde laparoscopic cholecystectomy was made intra-operatively. Degree of difficulty: mild <2, moderate 2-4, severe 5-7, extreme 8-10.

Cases with scores of 5 or more were selected for Retrograde laparoscopic cholecystectomy and were included in this study.

Cases with conventional antegrade dissection were excluded from this study. Cases in which cholecystectomy was done along with other procedures, cases suspected with abnormal CBD anatomy and malignancies were also excluded from this study.

Laparoscopic cholecystectomy was done using standard technique with 4 ports. A 30-degree telescope and a high definition camera monitor were used as standard in all cases. The initial step was to place a grasper on the fundus of the gallbladder and elevate the liver to expose the calot's triangle. Once exposed, calot's triangle was fully dissected to expose the arterial and biliary structures. The scoring was also done during this period. If this area could not be exposed adequately or dissected properly then a retrograde or "fundus first" dissection was carried out. The idea was to use the Retrograde technique in cases where the score was 5 or more, i.e when it was difficult to establish the anatomy of the calot's triangle.

Table 1: Difficulty predictive scoring.

Intra-operative finding	Score
Gallbladder appearance	
Adhesions < 50% of GB	1
Adhesions burying GB (Max 3)	3
Distension/Contraction	
Distended GB (or contracted shrivelled GB)	1
Unable to grasp with atraumatic laparoscopic forceps	1
Stone ≥1 cm impacted in Hartman's Pouch	1
Access	
BMI >30	1
Adhesions from previous surgery limiting access	1
Severe sepsis/complications	
Bile or Pus outside GB	1
Time to identify cystic artery and duct >90 minutes	1
Total	10

A combination of sharp dissection using electrocautery, blunt and hydro dissection were used to expose the cystic artery and bile duct. Cystic duct was clipped using clips and divided. Cystic artery was divided between clips. The cystic artery proper was not clearly seen due to fibrosis in a few cases and was managed with diathermy dissection close on the gallbladder wall. On several occasions moderate bleeding from the artery occurred near the neck of the gallbladder. It was controlled using clips or diathermy. Venous type bleeding from the gallbladder bed in the liver was controlled by pressure and absorbable haemostatic gauze.

Drain was used in cases of acute cholecystitis when severe inflammation was noted, cases of empyema or where suspicion of bile leak was present.

A literature search was carried out using the key words Difficult laparoscopic cholecystectomy, retrograde dissection, fundus first method, on the PubMed database.

RESULTS

Out of the 100 patients, 71 were females and 29 were males (Table 2). Age of patients ranged from 23 to 62 years with mean age of 44.2 years. 67 patients were in the

severe difficulty score group (score 5-7), of which 47 patients were females and 20 patients were male, and, 33 patients were in the extreme difficulty score group (score 8-10), of which 24 were females and 9 were male patients (Table 3).

Table 2: Case distribution based on age group and sex.

Age group (years)	Females	Males	Total
21-30	1	0	1
31-40	9	5	14
41-50	44	12	56
51-60	14	10	24
61-70	3	2	5
Total	71	29	100

Majority of the cases were elective (84%). Most common diagnosis was cholelithiasis (84%), of which one patient had a large stone impacted at the neck of the gall bladder. There were 12 patients with acute cholecystitis of <72 hrs duration, included in this study. Total 4 patients had empyema, of which, one case showed some gangrenous changes.

Table 3: Case distribution based on Difficulty predictive score.

Score	Females	Males	Total
5-7	47	20	67
8-10	24	9	33
Total	71	29	100

Total 5 patients had previous abdominal surgery (3 patients had undergone open appendicectomy, 1 patient had undergone laparoscopic appendicectomy and 1 had undergone laparoscopic left sided inguinal hernia repair).

Total 98 cases were completed successfully laparoscopically using the retrograde technique. Mean operating time was 64.2 minutes. Bleeding was encountered in 3 cases. One was venous bleed which was controlled with a combination of pressure and cautery. There was arterial bleed in 2 cases. Bleeding was from minor branches, which was managed with clips. We had to convert to open surgery in 2 cases, one with gangrenous gall bladder, because the tissue was very friable to grasp with the instruments. The second one was with a suspected bile duct injury. Upon conversion, it was noted to be a partial injury and was primarily repaired without any post-operative sequelae.

Drain was kept in 19 cases i.e 17 laparoscopy cases and both the open cases. Of these, drain was removed on the first post-operative day in all the laparoscopy cases and one converted patient and on the second post-operative day in the other open case.

All patients were observed in the post-operative ward on the day of surgery. They were mobilized and shifted to the ward by evening. 81 patients were discharged on the first post-operative day. 17 patients were discharged on the second post-operative day. For 1 open case, drain was removed on the second post-operative day and was discharged the next day. For the other patient who underwent open surgery, drain was removed on the third post-operative day and was discharged on the fourth post-operative day. There was no mortality in the study group.

DISCUSSION

Advantages of laparoscopic cholecystectomy over open surgery like minimal post-operative pain, faster recovery, shorter hospital stay, decreased morbidity and better cosmesis, have already been well documented.[6]

Eric Muhe introduced the laparoscopic cholecystectomy through a direct-view laparoscope.[1] Reddick-Olsen published the technique of fundic traction to expose calot's triangle.[3] Kato et al described the dissection of the calot's triangle first, followed by the separation of the gallbladder from the liver bed, maintaining the exposure by cephalad traction on fundic serosa, which had been left attached to the liver, using a grasper.[7]

Martin et al described the use of a malleable laparoscopic liver retractor. They noted that once the liver is retracted, dissection of the gallbladder can commence either at the fundus or at calot's triangle.[7] Ainslie et al. noted that liver retraction and retrograde dissection conferred an advantage in difficult cholecystectomy because the angle between the cystic duct and bile duct opened up and thus contributed to the lower conversion rate without bile duct injuries.[3]

In more straightforward cases, grasping the fundic serosa will help in maintaining the necessary exposure, but most surgeons would not use fundus-first dissection in these "easy" cases. In some difficult cases, the standard technique of fundic traction fails to provide adequate exposure and it would result in conversion to an open surgery to avoid complications like bile duct injury or bleeding. However, these cases are often just as difficult during open surgery, and bile duct injuries may occur even after converting to open surgery. The magnified view through the scope may actually be an advantage in the difficult laparoscopic cholecystectomy so long as adequate exposure can be obtained. Obviously, if there is significant haemorrhage, failure to expose the gallbladder or inability to define the calot's triangle laparoscopically, then conversion must be considered.[3]

There have been a few articles highlighting the advantages and disadvantages of the laparoscopic retrograde cholecystectomy. Various authors have reported that the retrograde technique is safe in patients with acute or chronic inflammation and even suggested that it decreases the rate of bile duct injury and also helps

to avoid open surgery to an extent. Mahmud et al reported that the use of retrograde dissection technique in difficult cases reduced the conversion rate from a potential 5.2% to 1.2%.[3]

Some authors have recommended the routine use of retrograde technique rather than reserving it just for the difficult cases. Cengiz et al randomized 80 elective patients to compare the two dissection techniques and found that retrograde laparoscopic cholecystectomy combined with ultrasonic dissection was quicker and associated with less nausea and pain.[2] Neri et al reported that retrograde laparoscopic cholecystectomy was an easier and faster technique to perform.[3]

Although various investigators have described this technique differently, it may be noted that all have supported the same process of avoiding calot triangle area during initial dissection and starting at the fundus of the gallbladder. A review of more than a thousand patients from multiple studies indicates safety and efficacy of this technique in both elective and emergency laparoscopic cholecystectomy.

The retrograde or fundus-first technique is now increasingly reported for difficult cases of cholecystectomy. Surgeons are able to easily identify the GB neck and cystic duct with this technique, thus reducing injuries to cystic artery or the bile duct, needless to say, reducing the associated morbidity.[8,9]

CONCLUSION

Although it is still not accepted as the standard approach for performing laparoscopic cholecystectomy, the retrograde technique may be used quite safely in difficult gall bladder surgeries. The same technique that has stood the test of time and used safely in open surgeries may be used in laparoscopic surgeries too with success and safety.

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