A Profile of Fundus First Laparoscopic Cholecystectomy
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Abstract
Fundus first laparoscopic cholecystectomy is becoming an option with experienced laparoscopic surgeons to deal with difficult anatomy at Calot's triangle and thereby reducing the conversion rate and rate of complications. Fundus first laparoscopic cholecystectomy was done in 40 patients between three year. There were 26 female & 14 male patients with mean age of 36 years (range 29-64). Reasons for opting for fundus first method were: dense adhesions at Calot's triangle 26 patients, stones in Hartmann's pouch with short cystic duct 8 , small contracted gall bladder in 4 and Mirizzi's syndrome in 2 patients. Mean operating time was 96 minutes (range 80-135 mts). 3 Patients were converted to open cholecystectomy because of obscure anatomy, intraoperative hemorrhage and CBD injury. The Patient with CBD injury was managed by hepaticojejunostomy. 5 Patients developed postoperative biliary fistula and one Patient had prolonged ileus. Out of the 5 Patients 2 were managed with percutaneous drainage and the biliary leak stopped and 3 Patients required ERCP and stenting. The Patient with ileus was managed conservatively and was discharged on the 6th day. The average hospital stay was 4 days. Fundus first laparoscopic cholecystectomy offers the surgeon the same safety and versatility during laparoscopic cholecystectomy that it confers during open cholecystectomy. It is a viable and a safe option in the hands of an experienced laparoscopic surgeon and it helps in reducing the conversion rate and may also decrease the risk of injury to biliary system.

Key Words
Fundus First, laparoscopic Cholecystectomy

Introduction
Since the time Philipe Mouret in 1987 in France performed the first laparoscopic Cholecystectomy (LC) on a human patient, (1) we have come a long way & today laparoscopic cholecystectomy has become the gold standard for gall bladder surgery.(2,3) Over the last decade, many expert laparoscopic surgeons prefer to do laparoscopic cholecystectomy even in patients with significant peri ductal inflammation due to acute choleystitis or chronic, fibrotic, contracted 'burnt-out' gall bladders. It is important to identify the structures at the Calot's triangle at the time of cystic duct isolation. In the case where a stone is incarcerated in the neck of the gall bladder or where cystic duct is very short with firm adhesions around it, the operative anatomy of the biliary tree may not always be clear. In such cases, the incidence of vasculobiliary injury is very common in laparoscopic cholecystectomy than in conventional open surgery. The incidence of bile duct injury is 0.5% to 0.9% in LC as compared to 0.1% to 0.4% in open cholecystectomy.(4,5) In this respect the Fundus first laparoscopic cholecystectomy is considered as an alternative method to decrease vasculobiliary injuries and reduce conversion rate.(6) Further conversion to open cholecystectomy leads to the loss of advantages of this minimally invasive procedure and significantly increases the length of hospital stay as well as its cost.(7)

Therefore it was proposed to take up this retrospective study of Fundus first laparoscopic cholecystectomy in Patients with obscure anatomy at the calot's triangle with a view to evaluate its indications and clinical outcome.

Material and Methods
The study was carried out in a single surgical unit of...
the post graduate Dept. of Surgery, Govt. Medical College, Jammu, over a period of 3 years. A retrospective record of 40 patients initially taken for conventional laparoscopic cholecystectomy but due to difficult anatomy at the Calot’s triangle were done by using fundus first dissection method was kept and results analysed. The inclusion criteria for taking patient for LC was the presence of ultrasound proven gallstones. Patients were excluded from the study if there was evidence of common bile duct stones, a bilio-entric fistula, or evidence of carcinoma of the gall bladder and patients not fit for general anaesthesia. The procedure was explained to the patients & written informed consent obtained. The patients age ranged from 29-64 years (mean 36 years); 26 were females and 14 were males. Standard laparoscopic set was used. In all patients 4 trocars were used and the initial dissection done by the same technique as is done in conventional LC as described in the literature.(1-3) However after the initial dissection, it was found that dissection at the Calot’s triangle was difficult due to dense adhesions (26 cases), stones in Hartmann’s pouch with short cystic duct (8 cases), small contracted gall bladder (4 cases) and Mirizzi’s syndrome (2 cases). Therefore, it was decided to complete laparoscopic cholecystectomy by fundus first dissection. 30 degree telescope was used in all the patients. In 13 patients the liver could not be retracted safely using a simple grasping instrument so a closed grasper (7 cases) or suction canula (6 cases) was used. None of the patients required an additional port. The Fundus first laparoscopic cholecystectomy was carried out with dissection of the lateral attachment of the gall bladder liver junction, followed by dissection of the superior border of gall bladder-liver junction and then the medial border was dissected. Dissection of the triangle of the Calot’s was done at the end. Sharp dissection using electrocautery was used Initially however near the neck of the gall bladder blunt or hydrodissection was used. While doing dissection of the gallbladder from the liver, hemostasis of the liver bed was maintained. Once lower end of gall bladder was reached, it was milked withatraumatic forceps to prevent residual stones in the stump or migration of stones into CBD, intracorporal knots were used to ligate the stump in 3 cases, transfixation of stump with 2-0 polyglactin on needle was done in 25 cases and endolooping of stump could be carried out in 12 cases. Frequent use of irrigation and suction was must to keep the area clear. In 5 cases there was spillage of the stones and endobag (Finger glove) was used to retrieve them and extensive wash with saline was given. After removal of gall bladder a drain was kept in the morisson’spouch. Patients were put on third generation cephalosporins in addition to usual post-operative treatment.

**Results**

Of the 40 patients 26 (65%) were women and 14 (35%) were men. The mean age of the patients was 36 years (range 29-64 years). Reasons for doing Fundus first laparoscopic cholecystectomy was difficult dissection of the Calot’s triangle due to dense adhesions (26 cases), stone in Hartmann’s pouch with short cystic duct (8 cases), small contracted gall bladder (4 cases) and Mirizzi’s syndrome (2 cases). The mean operating time was 96 mts (range 80-135 mts). 3 Patients were converted to open cholecystectomy because of obscure anatomy, intraoperative hemorrhage and CBD injury. The Patient with CBD injury was managed by hepaticojejunostomy. 5 Patients developed postoperative biliary fistula and one Patient had prolonged ileus. Out of these 5 Patients 2 were managed with percutaneous drainage and the biliary leak stopped on the 8th and 12th day. 3 Patients required ERCP and stenting, the drain output in these Patients became nil on the 10th, 12th and 15th day. In all these 5 Patients check ultrasonography was done to see any intra-abdominal collection, once there was no collection the drain was removed. The Patient with ileus was managed conservatively and was discharged on the 6th day. In 5 cases, there was spillage of stones while removing gall bladder and endo bag (finger glove) was used to retrieve them. The average hospital stay was 4 days (range 1-15 days). There was no mortality. Histopathology showed: chronic cholecystitis in 34, xanthogranulomatous Cholecystitis in 4 and acute necrotizing cholecystitis in 2 gall bladder specimen. (Fig 1)

**Discussion**

After its introduction in 1987, laparoscopic cholecystectomy (LC) gained widespread acceptance and became the new gold standard for management of gall stone disease. During early learning phase there were reports of increased bile duct injuries,(8) however with Surgeons gaining experience it came down considerably. During LC when there is difficult anatomy at the calot’s triangle, dissection by conventional technique increases the risk of bile duct injuries.(9) In such situations the fundus first dissection method is recognized as a safe technique and it minimizes the risk of injuries to the biliary structures. (10-12) In addition several authors have reported that Fundus first laparoscopic cholecystectomy helps to avoid conversion to open surgery. The magnified view at laparoscopy is a big advantage. Conversion leads to the loss of advantages of minimal access surgery and significantly increases the length of hospital stay as well.
In our study, 3 patients (7.5%) were converted to open cholecystectomy due to obscure anatomy, intraoperative hemorrhage and CBD injury. This is more compared to 0% conversion rate by Kelly MD (13), Barham M (14) and 2.7% by Wang YC et al (15) but less than 14.8% by Gupta et al (16) and 20% by Tuveri et al. (17). The mean operating time in this study was 96 minutes (range 80-135 mts). This compares favourably with Martin IG et al. (6) (90 mts with a range of 35-240 mts.), Mahmud S et al. (18) (125 mts with a range of 50-230 mts.) and Tuveri M et al. (17) (65 mts with a range of 40-170 mts.). It is our observation that the operating time decreases as the experience of the surgeon to deal with difficult anatomy at the calot's triangle increases.

The mean duration of hospital stay was 4 days (range 1 to 15 days). This hospitalization compares favourably with 3.5 days by Lirici et al. (19) and 2.2 days by Kelly MD (13) The longer duration of hospital stay as compared to conventional laparoscopic cholecystectomy can be explained by the fact that most of the gall bladders had adhesions at the calot's triangle and dissection left a large area of raw surface and oozing, so drain had to be kept in the for a longer time in morison's pouch to evacuate postoperative fluid or blood. Secondly, the six patients with complications had longer stay, the longest being 15 days.

Table 1 Distribution of Cases According To Indications of Fundus First Dissection

<table>
<thead>
<tr>
<th>Indication</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense Adhesions At Calot’s</td>
<td>26</td>
</tr>
<tr>
<td>Hartmans Pouch Stones</td>
<td>08</td>
</tr>
<tr>
<td>With Short Wide Cystic Duct</td>
<td>04</td>
</tr>
<tr>
<td>Small Contracted Gall Bladder</td>
<td>02</td>
</tr>
<tr>
<td>Mirizzi’s Syndrome</td>
<td>02</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
</tr>
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Post-operative complication rate in our study was 16.2% (6/37). This is more as compared to a postoperative complication rate of 0% by Barham M, (14) 3% (1/33) by Huang SM et al. (20) and 3.5% (2/57) by Martin IG et al. (6) According to the literature postoperative biliary leak may be minor arising from a small accessory bile duct it is clinically insignificant and should be treated with percutaneous drainage. (21) On the other hand, a major leak due to injury to a main duct or retained stones in the CBD may result in biliary fistula, peritonitis, or bilioma. (22,23) In such cases ERCP helps in diagnosis and management. We had only 5 case of postoperative biliary fistula in our study. 5 Patients developed postoperative biliary fistula and one Patient had prolonged ileus. Out of the 5 Patients, 2 were managed with percutaneous drainage and the biliary leak stopped on the 8th and 12th day. 3 Patients required ERCP and stenting, the drain output in these Patients became nil on the 10th,12th and 15th day. In all these 5 Patients check ultrasonography was done to see any intra-abdominal collection, once there was no collection the drain was removed and the Patient discharged. The Patient with ileus was managed conservatively and was discharged on the 6th postoperative day.

The indications for doing fundus first dissection in our study were dense adhesions (24 cases), stones in the Hartmann's pouch with short cystic duct (8 cases), small contracted gall bladder (4 cases) and Mirizzi's syndrome (2 cases). In the study by Turcu F et al.(24) the indications...
were dense adhesions (14 cases), large hartmann’s stones (10 cases), short dilated cystic duct (3 cases) and mirizzi’s syndrome (3 cases). Similarly the indications in the study by Kelly MD (13) were contracted gallbladder (7 cases) and mirizzi’s syndrome (2 cases). Some authors have recommended the routine use of Fundus first laparoscopic cholecystectomy rather than reserving it for difficult cases. (25, 26) In our view, it should not be routine procedure as surgeons are not trained routinely for this method. Moreover, harmonic scalpel as recommended by these authors is not available in every setup and fundus first dissection is complex and requires more experience in technique and suturing. We recommend fundus first laparoscopic cholecystectomy only in difficult cases with definite indications as observed in our study.

Conclusion
Fundus first laparoscopic cholecystectomy is a safe and viable option in the management of difficult laparoscopic cholecystectomy with definite indications and should not be routine procedure because of technical difficulties. The use of standard trocars as used in conventional laparoscopic cholecystectomy, experienced laparoscopic surgeon and magnified view during surgery offer the flexibility in approach. Management of stump does not require endostapler essentially as it can be managed by suture tying. Fundus first laparoscopic cholecystectomy minimizes the risk of damage to the structures in and around calot’s triangle. It decreases the rate of conversion thereby giving the patient the benefits of laparoscopic surgery and also reduces the rate of bile duct injuries and other associated injuries. The procedure should be performed by experienced laparoscopic surgeon and conversion to open surgery is still an option and should not be deemed a failure.

References