ORIGINAL RESEARCH ARTICLE

Conversion Rate of Laparoscopic to Open Cholecystectomy : A Prospective Study.

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Abstract:

Background: *Today laparoscopic cholecystectomy has replaced open cholecystectomy as the 'gold standard' in treatment of patients with symptomatic cholelithiasis. Advantages being relatively less pain, early ambulation, shorter hospital stay and lower incidence of incisional hernia. The condition of the patient, the level of experience of the surgeon, and technical factors all can play a role in the decision for conversion. This study was conducted in an effort to determine the conversion rate and also identify the factors responsible for conversion of laparoscopic to open cholecystectomy. Hence, these findings will allow us to preoperatively discuss the higher risk of conversion and allow for an earlier judgment and decision on conversion if intra-operative difficulty is encountered.*

Aims and Objectives: *To determine the rate of conversion and to identify the factors responsible for conversion of laparoscopic to open cholecystectomy.*

Material and Methods: *This was a prospective clinical study consisting of 285 patients undergoing laparoscopic cholecystectomy. All patients admitted in Department of general surgery, SSG Hospital, Vadodara attached to the Medical College Baroda from September 2013 to February 2016. Data was collected by meticulous history taking, careful clinical examination, appropriate radiological, haematological investigation, operative findings and follow-up of the cases.*

Results: *Females were the main sufferers of gallbladder disease in our study. There was a preponderance of cases in the 4th and 5th decades of life. Most of the patients presented with the chief complaint of pain abdomen in the right hypochondrium. The mean operation time was 62.5 minutes and in converted case was 100 minutes. The average length of post-operative hospital stay was 3.1 days. Out of 285 patients studied, 17 cases were converted to open cholecystectomy i.e, 6 %. Conversion was more common in diabetic patients (21.2%). The main intra-operative causes of conversion from laparoscopic cholecystectomy to open were difficulty in identifying the anatomy as a result of dense adhesions (41.2%) followed by hemorrhage in the Calot's triangle (17.5%), injury to the CBD (11.8%), Duodenal Injury (11.8%) and Instrument Failure (11.8%).*

Conclusion: *It can be reliably concluded that LC is the preferred method even in the difficult cases. Our study emphasizes that although the rate of conversion to open surgery and complication rate are low (6%) in experienced hands the surgeon should keep a low threshold for conversion to open surgery and it should be taken as a step in the interest of the patient rather than be looked upon as an insult to the surgeon.*

Key words: *Laparoscopic cholecystectomy; Bile duct injuries; Duration of surgery; Return to work; Hospital stay.*

Introduction:

Gallstones are among the most common gastrointestinal illness requiring hospitalization with a prevalence of 11% to 36% in autopsy reports. The optimal treatment for patients with symptomatic cholelithiasis is cholecystectomy [1].

Laparoscopic cholecystectomy is the procedure of choice for the majority of patients with gall bladder disease. These postulated advantages of laparoscopic cholecystectomy are the avoidance of large incision, shortened hospital stay and earlier return to work.

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The condition of the patient, the level of experience of the surgeon, and technical factors all can play a role in the decision for conversion. Inability to define the anatomy and difficult dissection are the leading reasons for conversion followed by other complications like bleeding.

The conversion rate for elective laparoscopic cholecystectomy is around 5%, whereas the conversion rate in the setting of acute cholecystitis may be as high as 30%.

Our purpose in this study was to determine the conversion rate and also identify the factors responsible for conversion of laparoscopic cholecystectomy to open cholecystectomy. Hence, these findings will allow us to preoperatively discuss the higher risk of conversion and allow for an earlier judgement and decision on conversion if intra-operative difficulty is encountered.

Material and Methods:

This was a prospective clinical study consisting of 285 patients undergoing laparoscopic cholecystectomy at Sir Sayajirao Gaekwad Hospital attached to Medical College Baroda from September 2013 to February 2016.

A written informed consent obtained from patients included in the study and data collected on printed Performa included age, gender, history of pain in right hypochondriac region, jaundice, previous abdominal surgery, obesity and concomitant diseases (DM, HTN), white blood cell (WBC) count, preoperative liver function tests, ultrasound findings of the gallbladder and suspicion of common bile duct stones.

Standard Laparoscopic cholycystectomy procedure performed. Adhesions of GB separated by blunt, sharp dissection and by use of suction cannula and gauze piece. Distended GBs decompressed by suction and aspiration. Cystic Duct and Cystic Artery identified, ligated and divided with endoclips. Wide Cystic Ducts suture ligated and divided. Fundus first method and sub total cholecystectomies performed for unclear anatomy of Calot's triangle. GBs dissected from GB fossa by use of hook/spatula/scissors. Hemostasis achieved by using monopolar/bipolar cautery. GBs extracted through port site. GB fossas re-examined and suction dried. Port closure used for port site bleeding. Skin closure was done with skin suture.

The common reported etiologies of such a conversion are uncontrollable bleeding, adhesions, inflammation, anatomical variations, common bile duct (CBD) injury, vascular injuries, trauma of bile duct and other hollow viscera, presence of malignant pathologies, and technical failures. Surgeons' experience, no progession for 30 minutes are the indications for conversion.

Inclusion criteria:

- All patients of cholelithiasis undergoing laproscopic cholecystectomy
- Patient's age >18 years

Exclusion criteria:

- Patients unfit for general anesthesia
- Age <18 years.

Results:

A prospective study was carried out in the Department of General Surgery, during the period from September 2013 to February 2016 in 285 patients undergoing laparoscopic cholecystectomy. The patients belonged to various surgical units in Sir Sayajirao Gaekwad General Hospital and full details of the patients were recorded in the proforma. Observations and analysis of all the parameters studies are as follows:

The mean age in this study was 41.3 years. The age group of the patients ranged from 18 years to 76 years. The maximum incidence was seen in the age group of 41-50 years followed by 31-40 years of age.

In 285 cases, 82 were males and 203 were females. The ratio of males to females 1:3. The above sex distribution shows that the gall bladder diseases have a higher frequency in female than in males.

Among a total of 82 male patients, 8 were converted (9.8%) whereas among 203 female patients, 9 were converted (4.4%).

Out of 285 patients, 204 patients (71.6%) had a chief complaint of pain in the right hypochondrium, 63 patients (22.1%) presented with epigastric pain and the remaining 18 patients (6.3%) were asymptomatic (incidental cholelithiasis).

68 patients presented with nausea along with pain abdomen and 22 patients presented with vomiting, whereas 31 patients presented with both. Jaundice was seen in 14 patients.

11.6% of patients suffered from Diabetes mellitus whereas 13.3% of patients were Hypertensive.

Out of total 33 patients who were diabetic, 7 patients underwent conversion (21.2%).

Out of total 38 patients who were hypertensive, 6 patient underwent conversion (15.8%).

On ultrasound, single calculi were noted in 198 patients whereas remaining 87 patients presented with multiple calculi. Peri-cholecystic fluid and gall bladder wall thickening was noted in 55 and 49 patients respectively.

Out of total 198 patients who had single calculi, 6 patients underwent conversion (3%).

Out of total 87 patients who had multiple calculi, 11 patients underwent conversion (12.6%).

Out of 55 patients who had peri-cholecystic fluid, 13 patients underwent conversion (23.6%).

Out of 49 patients who had thickened GB wall, 10 patients underwent conversion (20.4%).

Out of 285 patients, 252 patients presented with a diagnosis of Cholelithiasis of which 7 cases were converted (2.8%), and 33 patients presented with acute calculus cholecystitis of which 10 underwent conversion (30.3%).
The average duration of surgery was 62.5 min.
The average duration of post-operative hospital stay was 3.1 days. 221 patients were discharged by 3 days post-operatively, 46 patients stayed for 4-5 days and the remaining 18 patients stayed for more than 6 days. Average duration of post-op stay in successful cases was 2.6 days and in converted cases it was 10.8 days. Total laparoscopic cholecystectomies performed – 285.
Total cases converted to open procedure – 17 (6%).

Table -1 Reason For Conversion:

Reason for conversion	No. of cases	Percentage (%)
Difficult anatomy due to: - Dense adhesions of Calot's triangle - Anatomical variation	 7 1	 41.2 5.9
Bleeding from: - Calot's triangle (Cystic artery)	 3	 17.5
Common bile duct injury	2	11.8
Duodenal injury	2	11.8
Instrument failure	2	11.8

Discussion:

Cholelithiasis is a common disease entity. Frequent occurrence and serious complications of cholelithiasis have made this one of the most important surgically correctable diseases.
Open cholecystectomy has being a gold standard for the treatment of gallbladder diseases for more than 100 years since Carel Johann Langenbuch has performed first open cholecystectomy in 1882 [2]. First laparoscopic cholecystectomy in human has been performed in 1987 by Dr. Philip Mouret to become the new gold standard and almost replaced open cholecystectomy for the treatment of gallbladder disease.2 The first laparoscopic cholecystectomy in India was performed in 1990 at the JJ Hospital, Mumbai, followed by few months later in Pune by Dr. Jyotsna Kulkarni [3].
The main sufferers of gallbladder disease in our study were females as compared to males. Out of total 285 cases, 203 (71.2%) were females and 82 (28.8%) were males, which are very much similar to those observed by Frazee et al [4] and U. Berggren et al [5]. The reason for the high incidence among females could be that pregnancy and child birth have a definitive influence on biliary tract disease, acting by casual stasis as well as weight gain and consequent hypercholesteremia.
In our study, 9.8% males required conversion as compared to 4.4% females; this was similar to Brodsky et al6 also found male gender as a most significant determinant for conversion to Open Cholecystectomy.
In a study by Adbikardid Bedirli, Erdogan M. Sozuer et al [7] between 1993 to 2000, conversion to open cholecystectomy was required in 19 of 678 patients in non diabetic group (2.8%) and 13 of 184 patients in diabetic group (7.1%). In our study of 285 cases of laparoscopic cholecytectomy, conversion to open cholecystectomy was required in 10 of 252 patients in non diabetic group (4%) and 7 of 33 patients in diabetic group (21.2%). Hence there is a correlation in both the studies.
Today ultrasonograhy is the best non-invasive, economical and an easily available investigation. In this present study, 49 out of 285 patients showed a thickened gall bladder wall on ultrasonography, of which 10 patients (20.4%) were converted. Out of the remaining 236 patients in whom the gall bladder wall wasn't thickened, 7 patients (3%) were converted.
In a study by Pawan lal et al [8], they found a good correlation between gall bladder thickness and conversion to the open procedure (sensitivity of 41.18%) and a positive predictive value of 70.
In another study by Tayeb M et al [9], 58% of the patients with gallbladder wall thickness more than 3mm were converted to open cholecystectomy, suggesting gall bladder thickness as a good predictive factor for conversion.
In a retrospective analysis by Chahin F. [10] over a 3 year period of 557 patients who underwent laparoscopic cholecystectomy; 88 patients had acute cholecystitis. He concluded that conversion rates were 22% in patients with acute cholecystitis as compared to 5.5% in case of patients with chronic cholecystitis.
In present study of 285 patients, 33 patients (11.6%) had acute calculus cholecystitis, out of which 10 patients (30.3%) were converted.

According to Singh Kuldip, Ohri Ashish [2]; within 72 hours of symptoms the tissue planes are edematous and inflamed but are easier to dissect, having no adhesions at all. But after 72 hours, the tissue becomes more friable and becomes dangerous and risky to dissect till 3-4 weeks time when inflammation subsides and fibrosis sets in.

Prior acute cholecystitis results is a scarred and fibrosed GB, and in dense fibrotic adhesions that render laparoscopic dissection difficult. GB wall thickness is related to the inflammation or fibrosis that follows previous attacks of cholecystitis, and thus may reflect difficulty in delineation of the anatomy during surgery.

The average duration of surgery for laparoscopic cholecystectomy in our series was 62.5 minutes. In our study, the mean duration of surgery in converted cases was 100 minutes and successful laparoscopic operated was 60 minutes. In a study by Tayeb M, Raza Syed Ahsan et al [9] from 1997 to 2001, the mean duration of surgery in converted cases was 144 minutes and successful laparoscopic operated was 78 minutes.

Conversion to open technique is considered a major morbidity of LC as it loses its supremacy over open technique once the conversion takes place. The conversion rate in this study was 6% and this is comparable to the conversion rate of 2.6% to 14% reported in literature.

Table compares our conversion rate with some major published similar work.

Table: 2 Conversion rate of laparoscopic to open cholecystectomy

Study	Place	Year	No. of cases	Conversion rate
Our study (Jigar Shah et al)	India	2016	285	6%
Masoom Raza et al [11]	Karachi	2006	118	11.1%
Tarcoveanu et al [12]	Romania	2005	6985	3.2%
Ishiazaki et al [13]	Japan	2006	1179	7.5%
Dholia et al [14]	Larkana	2005	100	8.0%
Lim et al [15]	Singapore	2005	443	11.5%
Vecchio et al [16]	USA	1998	114005	2.2%
Tan et al [17]	Australia	2006	202	4.2%
Tayeb et al [9]	Karachi	2005	1249	7.5%
Magee et al [18]	UK	1996	149	10.0%
Saeed Hadi et al [19]	Yemen	2009	709	8.3%
Butt et al [20]	Lahore	2006	300	4%
Guraya et al [21]	Saudi Arabia	2004	549	2.9%

A comparative comparison of rates of conversion with other studies as mentioned above shows that the rate of conversion is high (7.5-16%) amongst studies from the Asian countries, whereas studies from Europe, USA and Australia are showing a decline in their conversion rates (2.6-4.2%).

With the passage of time the experience has grown, the laparoscopic technique has been understood and thus the conversion rate has reached a remarkably low level of 1-6%20. In our series, the conversion to open cholecystectomy was required in 17 patients with conversion rate of 6%. This rate is comparable to the results of most international studies published in early years of laparoscopic cholecystectomy (2-15%), but remains higher than those results reported recently in last five years (1-6%) [2]. This may be due to differences in institutional and individual practice including experience of operating team.

Difficult anatomy at Calot's triangle accounted for near one half of conversions (47.1%); we observed that individual anatomy was obscured primarily by dense adhesions (41.2%) and aberrant anatomy (5.9%) was also noted. The reasons of obscured anatomy were acute inflammation causing dense adhesions (88%) and aberrant anatomy (12%) Vecchio et al [16] and Magee et al [18] also found it as the most common reason for conversion observed in 41.5% and 48.5% of patients respectively.

Conclusion:

Laparoscopic Cholecystectomy is a safe and minimal invasive technique with 6% conversion rate. The main intra-operative causes of conversion from laparoscopic cholecystectomy to open were difficulty in identifying the anatomy as a result of dense adhesions (41.2%) and anatomical variations (5.9%) followed by bleeding in the Calot's triangle (17.5%), injury to the CBD (11.8%), Duodenal Injury (11.8%) and Instrument Failure (11.8%). It is therefore, mandatory to explain to the patients about the possibility of conversion to open technique at the time of taking consent for Laparoscopic Cholecystectomy. Conversion from laparoscopic to open procedure should not be considered a complication but rather a reflection of sound surgical judgement in difficult case.

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