



A Study on Factors Determining the Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy

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ABSTRACT

Laparoscopic cholecystectomy is now one of the most commonly performed operations of the digestive tract. Laparoscopic cholecystectomy offers increased safety in obese, faster operating time, decreased post-operative pain, and early initiation of enteral feeding, early ambulation, shorter hospital stay, decreased wound complications and shorter recovery time. But every technique is known to have advantages and drawbacks, similarly Laparoscopic Cholecystectomy also have drawbacks. The Congenital anomalies and variations in the Anatomy of the Gallbladder lead to conversion of laparoscopic cholecystectomy to open cholecystectomy. Our study was conducted on 302 patients where 20% of laparoscopic cholecystectomy was converted to open cholecystectomy. The study shows that even though Laparoscopic Cholecystectomy is now the Gold Standard, there are some critical situations which necessitate the traditional open cholecystectomy.

KEYWORDS

Laparoscopic Cholecystectomy (LC); Open Cholecystectomy (OC) ; Gall Bladder

Introduction: Laparoscopic cholecystectomy has become the Gold Standard for the treatment of Gallbladder diseases [1]. Gallstones found in the gallbladder or biliary tract are either symptomatic or asymptomatic. The most widely used treatment is surgical removal of gallbladder for the management of symptomatic gallstones [2]. Gallbladder is a pear-shaped organ that lies beneath right side of the liver and its main function is to gather and concentrate the bile juice. Removal of the gallbladder is not associated with any impairment of digestion in most patients [3-7]. Gallbladder problems are usually associated by the presence of gallstones that are small and hard. Gallstones may be formed due to various reasons main ones being if the bile is enriched with high levels of cholesterol, if the bile contains excess amount of bilirubin and if the gall bladder doesn't empty completely/properly[8,9]. The most common investigation used to diagnose gallstones is Ultrasound. The surgical removal of gallbladder is termed as Cholecystectomy [10-12]. Cholecystectomy could be of two types one is old and traditional -Open Cholecystectomy and the other is most commonly used -Laparoscopic Cholecystectomy (Figure 1). In most cases of LC, the patients get discharged the same day of cholecystectomy.

Although LC has shown immense benefits such as resume to work sooner, less pain, muscles need not be cut, less hospital stay, less bleeding, recover faster etc., still LC fail under certain anomalies and the distribution of right artery. In our study, we have gathered certain details on the factors under which LC is converted to open cholecystectomy (Figure 2) [13].



Figure 1: Figure showing Laparoscopic Cholecystectomy



Figure 2: Figure showing Open Cholecystectomy

The major anomalies that we may come across are:

1. Low junction between the cystic duct and common hepatic duct.
2. Cystic duct adherent to the common hepatic duct.
3. High junction between the common hepatic duct.
4. The cystic duct drains into right hepatic duct.
5. Long cystic duct that joins the common hepatic duct behind the duodenum.
6. Absence of cystic duct.
7. The cystic duct crosses posterior to the common hepatic duct and joins it anteriorly.
8. The cystic duct courses anterior to the common hepatic duct and joins it posteriorly.

Also the variations in the arterial supply to the gallbladder which require conversion are:

1. The cystic artery from the right hepatic artery, about 80-90%.
2. The cystic arteries, one from right hepatic artery and the other from common hepatic artery arises in rare conditions.
3. Two cystic arteries, one from left hepatic artery and one from right hepatic artery arise in rare conditions.
4. The cystic artery from the right hepatic artery (accessory or replacing) from the superior mesenteric artery, about 10%.
5. The cystic artery branching from the right hepatic artery and running anterior to the common hepatic duct in rare cases.
6. Two cystic arteries arising from the right hepatic artery may also be noticed in some cases where LC is reversed to open cholecystectomy.

Materials and Methods:

Study Type: The present clinical study is a retrospective analytical study conducted in all the 8 surgical units of Osmania General Hospital, Hyderabad.

Study Period: The study period is from January 2013 – December 2015.

Inclusion criteria: The patients who underwent LC (n = 302) in the study period were included.

The study population included all patients irrespective of age, gender or type of admission.

All patients who were converted to open (n = 20) were enrolled as cases.

They were considered as converted when LC was planned but due to some reason conversion to open Cholecystectomy was required.

A detailed proforma was developed to record information on demographic, admission details, present history, investigations, and ultrasound findings. The operative details like chief operating surgeons' designation, circumstances of conversion and postoperative complications were also recorded.

All the collected data was tabulated, analyzed and compared.

Admissions : The patients admitted from Surgical OPD were labeled as elective admissions. Those who were more symptomatic and were admitted from the causality department were labeled as emergency admissions.

Discussion & Results :

Conversion Rate: A total of 302 LCs were attempted in the study period, out of which 20 were converted to open; thus the conversion rate in the study was 6.62% (Figure 3).

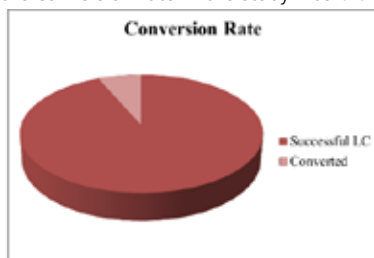


Figure 3: Successful LC and Converted Open

Year wise Distribution: Maximum LC were attempted during 2014 but the highest conversion rate during 2013 (7.07%). As the years passes our conversion rated decreased (Table 1).

Table 1: Year wise distribution of Cases (N = 302)

YEAR	2013	2014	2015
LC ATTEMPTED	99	103	100
CONVERTED	7	7	6
PERCENTAGE	7.07	6.79	6

Duration of Symptoms: Average duration of symptoms was of 296.3 days (9.88 months) with a range of 1095 days (3 years) to one day. 13 Cases (65%) had symptoms for only less than 90 days (3 months).

Comorbid Conditions: 9 patients had history of other significant medical illness. Of these 9 patients only 3 (33.33%) case who was a known type 2 diabetic developed wound infection. 5 patients have elective conversion, only one case who has type 2 diabetic had emergency conversion due to bleeding (Table 2).

Table 2: Comparison of Comorbid Conditions (N = 20)

Comorbid Condition	No of Cases	Percentage
Type 2 DM	3	15
Type 2 DM & HTN	4	20
Hypothyroidism	1	5
Old cases of Pulmonary TB	1	5

1. **Previous Surgeries:** History of a previous upper abdominal surgery was an associated risk factor for conversion. Even though in the present study 25% of patients had past surgical history, only 20% were abdominal surgeries and none were upper abdominal surgeries.
2. **Weight:** Obesity or weight more than 65Kg has been proposed as a risk for conversion. But our study shows obesity or weight more than 65 Kg is not a risk factor and 55% of converted patients carried 65 Kg or less body weight.
3. **Pre-operative investigations:**
4. **Liver Function Tests:** The study did not find any significant risk of conversion in elevated preoperative values of total bilirubin, transaminases and alkaline phosphatase.
5. **WBC count:** WBC count on the higher side have been stated as risk factors for conversion of LC to open cholecystectomy. None of our converted cases had WBC count more than 9800 cell/ml and only 5 cases had WBC count more than 9000 cell/ml indicating no association of conversion and High WBC count.
6. **Blood group:** Blood group distribution in the present study is comparable to the blood group distribution in the general population demonstrating no association of any ABO group with conversion.
7. **Ultrasound:** Cholelithiasis was diagnosed in all our converted cases by Ultra sound, thus demonstrating the sensitivity and accuracy with regards to diagnosis of cholelithiasis reaching 100%. Sonographic Gall bladder wall thickness of higher range, >3mm to >3.5mm is strongly associated with conversion.
8. **Indication for Undergoing LC:** Even though LC done in the setting of an active acute cholecystitis is associated with conversion rates, In our study most cases presented late and because LC equipment is not available in emergency block all the above mentioned cholecystitis cases received conventional LC after passing the golden window of 72 hours of symptomology.
9. **Access Trocar related complication conversions:** In literature trocar related complication like subcutaneous emphysema due to extra peritoneal insufflation, enteric injury or perforation port side bleeding, have been described.
10. **Type of Conversion:** Conversion from LC to OC was categorized as elective conversion or emergency (enforced) conversion. Elective conversion is defined as the decision by the surgeon, at any stage of the operation, to desist from laparoscopy and to resort to laparotomy before being forced to do so because of a major intraoperative complication (Figure 4).

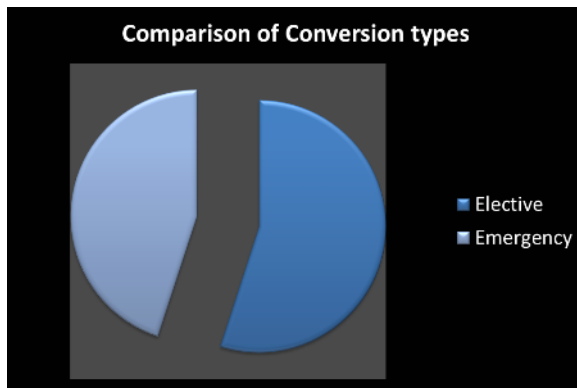


Figure 4: Comparison of Elective type to Emergency/Enforced type.

Reasons for Conversion:

Elective Conversion: There were 11 Elective conversions in this study. The most common grounds for conversion were inability to define anatomy due to adhesions in 08 of the 11 cases. Equipment failure due to poor visibility from the camera probe was the reason in one case. Two patients had an altered anatomy and cystic duct was short and thick in one case making it impossible to clip. To the other case gallbladder was intra hepatic.

Emergency Conversion: 09 were emergencies or enforced conversions. Most common was bleeding which occurred in 06 cases. There was bleeding from gallbladder bed in 2 cases from unknown area 1 case was reported and from dissected omentum in one case. In 2 cases the clip of the cystic artery slipped leading to torrential bleeding.

Iatrogenic organ injury was the reason in 3 cases. The anterior surface of the stomach was injured in one case while dissecting and in 2 cases CBD was injured during dissection which was identified intraoperatively (Table 3).

Table 3: Comparison of reasons for conversion

ELECTIVE REASONS			
		No of Cases	%
Inability to define anatomy due to ADHESIONS		8	40
EQUIPMENT FAILURE	Camera problem	1	5
	Short & Thick Cystic duct	1	5
ALTERED ANATOMY	Intra hepatic gallbladder	1	5
	TOTAL		11
EMERGENCY			
BLEEDING	Gallbladder bed	2	10
	Unknown	1	5
	Dissected omentum	1	5
	Cystic artery	2	10
CBD INJURY		2	10
INJURY TO OTHER VISCERA	Stomach	1	5
TOTAL		9	45

Post OP complications: In the converted cases included 7 (10.00%) patients developed wound infections, 4 was an emergency conversion while the other 3 were elective conversions. Wound infection and bile leaked complicated 1 (5.00%) case which was an emergency conversion. 1 (5.00%) patient developed hypovolemic shock due to intra operative blood loss and was also an emergency conversion.

Conclusion:

After analyzing the data from the present study and from literature search, we came to the following conclusions: Factors that are leading to the conversion of LC to OC are male gender, old age which are preoperative factors. Male gender showed high conversion rate and old age was also as-

sociated to high conversion.

On the contrast, yearly hospital conversion rate, type of admission, duration of symptomology, associated comorbid conditions, history of previous surgeries, abnormal LFT or WBC count, ABO blood group, sonographic wall thickness and indications of LC could not establish enough factors influencing conversion.

Intraoperative factors which influenced conversion are peri gallbladder adhesions, intraperitoneal bleeding, and altered anatomy and bile duct injuries.

An adhesion is most common factor observed leading to conversion of LC to open cholecystectomy as adhesions around the gallbladder which make the dissection of Calot’s triangle both unsafe and difficult.

Bleeding was second most common factor leading to conversion of the study. Altered anatomy due to anomalies of gallbladder, cystic duct and hepatic artery increase the risk of injury to adjacent structures was one of the important factors leading to conversion.

Bile duct injuries also contributed for the conversion that was identified intraoperatively.

Conversions are associated with increased hospital stay but not increased morbidity due to incidences of complications.

Conflict of Interest : None

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