FACTORS AFFECTING CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY TO OPEN SURGERY IN A TERTIARY HOSPITAL IN SOUTH INDIA

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ABSTRACT

BACKGROUND

Laparoscopic Cholecystectomy (LC) is most commonly performed hepatobiliary minimally access surgery worldwide. Laparoscopic cholecystectomy has become the standard treatment for symptomatic gallstone diseases. However, there still is a substantial proportion of patients in whom laparoscopic cholecystectomy cannot be successfully performed and for whom conversion to open surgery is required. The NIH postulated that the outcome of LCs would be greatly influenced by surgeon-specific factors such as training, experience, skill and judgment.⁽¹⁾ In addition numerous patient and disease-related factors, such as male gender, obesity, old age (>65), prior abdominal surgery, acute cholecystitis, choledocholithiasis and anomalous anatomy have been reported as significant risk factors for conversion to the open procedure.⁽²⁻⁵⁾

Although the rate of conversion to open surgery and the complication rate are low in experienced hands, the surgeon should not enter the Operating Room with idea of opening the abdomen in difficult case as failure or insult to the surgeon. Various preoperative factors can help in deciding the difficult gallbladder and conversion to open cholecystectomy. The aim of this study is to predict the difficulty of laparoscopic cholecystectomy and the possibility of conversion to open cholecystectomy before and during surgery using the clinical and ultrasonographic criteria in our setup.

MATERIALS AND METHODS

A prospective study was performed in SRM Medical College and Hospital of all patients who underwent LC during (May 2013 to October 2015) was performed. The LCs were performed by 12 trained certified surgeons. The decision to convert to open was made by the individual surgeon and the reason for conversion was extracted from the patient's medical record (operative report) prospectively. The inclusion and exclusion criteria defined. All operations were performed with the patient under general anesthesia with endotracheal intubation using either a 3- or 4-trocar technique.

RESULTS

Females were the main sufferers of gallbladder disease in our study. There was a preponderance of cases in the 3rd and 4th decades of life. Most of the patients presented with the chief complaint of pain abdomen in the right hypochondrium. The mean operation time was 81.7 minutes and the average length of post-operative hospital stay was 3.6 days. Among a total of 36 male patients, 5 were converted (13.8%), whereas among 46 Female patients, 7 were converted (15.2%).

Out of 112 patients studied, 12 cases were converted to open cholecystectomy, i.e. 10.7%. Conversion was more common in diabetic patients. The main intra-operative cause of conversion from laparoscopic cholecystectomy to open was difficulty in identifying the anatomy as a result of dense adhesions followed by hemorrhage in the Calot's triangle and non-visualization of junction of cystic duct with CBD and possible injury to the CBD. Anyhow no, post-operative CBD injury occurred.

KEYWORDS

Laparoscopic Cholecystectomy, Open, Conversion.

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METHODOLOGY

Source of Data

All patients undergoing laparoscopic cholecystectomy at SRM Medical College and Hospital from May 2013 to Oct 2015 and includes 112 patients. This is a prospective study conducted over 2.5 years.

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Methods of Collection of Data

All patients presenting with cholelithiasis without choledocholithiasis and with no contraindication for general anesthesia were included in the study. Medical records of all patients who underwent LC were reviewed. Data recorded included demographic information, past medical history, indication for operation, duration of operation, reason for conversion and post-operative complications.

Inclusion Criteria

- All patients with symptomatic cholelithiasis (Including acute cholecystitis).
- Patients presenting with acalculous cholecystitis.
- Age >18 years.

Exclusion Criteria

- Carcinoma of Gallbladder.
- Perforated Gallbladder.
- Patients unfit for general anesthesia.
- Previous upper abdominal surgery.
- Age <18 years.

RESULTS

Age Incidence

The mean age in this study was 43.4 years. The age group of the patients ranged from 21 years to 79 years. The maximum incidence is seen in the age group of 41-50 years followed by 31-40 years of age; 75% of patients belonged to ages between 31 and 60 (Table 1) and (Figure 1).

Age Group	No. of Patients	Percentage (%)
21-30	19	16.9 %
31-40	30	26.7 %
41-50	34	30.3 %
51-60	21	18.7 %
61-70	6	5.3 %
71-80	2	1.7 %

Table 1: Age Incidence

Fig. 1: Graphical representation of age incidence

Sex Incidence

In 100 cases, 32 were males and 68 were females. The ratio of male-to-female 1:2. The above sex distribution shows that the gallbladder diseases have a higher frequency in female than in males (Table 2).

Gender	No. of Patients	Percentage (%)
Male	36	32%
Female	76	68%

Table 2: Sex Incidence

Operative Parameters (Dependent Variables)

All cases underwent LC with assessment of the difficulties encountered in terms of:

- Duration of surgery (In min): Duration of surgery included the time from insertion of Veress needle to closure of the trocar insertion site and was evaluated as a continuous variable.

- Bleeding during surgery: Bleeding during surgery was graded as minimal, moderate or severe. Moderate bleeding was defined as bleeding leading to tachycardia of greater than 100/min without drop in blood pressure. Severe bleeding was defined as bleeding leading to tachycardia of greater than 100/min with a greater than 10mmHg drop in blood pressure.
- Access to peritoneal cavity: The operating surgeon described the access to peritoneal cavity as 'Easy' or 'Difficult.'
- Gallbladder bed dissection: The operating surgeon described gallbladder bed dissection as 'Easy' or 'Difficult.'
- Difficult extraction: Extension of incision for extraction. The operating surgeon described gallbladder extraction as 'Easy' or 'Difficult.'
- Conversion to open.

Sex and Surgery Outcome

Sex	No. of Patient	SURGERY OUTCOME			
		Successful		Converted	
		No. of Patients	%	No. of Patients	%
Male	36	31	86.1%	5	13.8%
Female	76	69	90.7%	7	9.3%

Table 3: Sex and Surgery Outcome

Fig. 2: Graphical representation of sex incidence

Fig. 3: Graphical representation of age and sex incidence

Fig. 4: Graphical representation of sex and surgery outcome

Among a total of 36 male patients 5 were converted (13.8%), whereas among 46 female patients 7 were converted (15.2%) (Figure 4).

Clinical Presentation

Presentation	No. of Cases	Percentage (%)
Epigastric pain	35	31.25%
Right hypochondrium	77	68.75%

Table 4: Clinical Presentation

Out of 112 patients, 73 patients (65.2%) had a chief complaint of pain in the right hypochondrium, 35 patients (31.2%) presented with epigastric pain and the remaining 4 patients (3.5%) were asymptomatic (Incidental cholelithiasis) (Table 4). Associated symptoms are shown in Table 5.

Fig. 5: Graph showing clinical presentation

Associated Symptoms

Symptoms	No. of Cases	Percentage (%)
Nausea	6	5.3%
Vomiting	16	14.2%
Nausea+Vomiting	23	20.5%
Jaundice	10	8.9%

Table 5: Associated Symptoms

Six patients presented with nausea along with pain abdomen and 16 patients presented with vomiting, whereas 23 patients presented with both jaundice was seen in 10 patients (Table 5).

Fig. 6: Graph showing associated symptoms

Comorbidity	No. of Patients	Percentage (%)
Diabetes Mellitus (DM)	12	8.9%
Hypertension (HTN)	6	5.3%
Ischemic Heart	1	1%
Epilepsy	1	1%
Bronchial Asthma	1	1%

Table 6: Comorbidities

Among these patients 9% of patients suffered from Diabetes mellitus, whereas 5% of patients were hypertensive patients (Table 6).

Fig. 7: Graph showing comorbidities

Conversion among Diabetic Patients

Fig. 8: Graphical representation of Conversion among diabetic patients

Out of total 12 patients who were diabetic, 3 patients underwent conversion (25%) (Figure 8).

Conversion among Hypertensive Patients

Fig. 9: Graphical representation of Conversion among hypertensive patients

Out of total 6 patients who were hypertensive, 1 patient underwent conversion (16%) (Figure 9).

Ultrasound Findings

USG Finding	No. of Cases	Percentage (%)
Single calculi	72	64.2%
Multiple calculi	40	35.7%
Peri-cholecystic fluid	20	16.9%
GB Wall thickening	22	19.6%

Table 7: Ultrasound findings

On ultrasound single calculi were noted in 72 patients, whereas remaining 40 patients presented with multiple calculi. Peri-cholecystic fluid and gallbladder wall thickening was noted in 22 patients (Table 7) and Figure 10.

Fig. 10: Graph showing ultrasound findings

Conversion in Patients with Single Calculi

Fig. 11: Graphical representation of conversion in Patients with single calculi

Out of total 72 patients who had single calculi, 5 patients underwent conversion (6.9%) (Figure 11).

Conversion in Patients with Multiple Calculi

Fig. 12: Graphical representation of Conversion in patients with multiple calculi

Out of total 40 patients who had multiple calculi, 7 patients underwent conversion (17.5%) (Figure 12).

Conversion in Patients with Peri-Cholecystic Fluid

Fig. 13: Graphical representation of conversion in patients with peri-cholecystic fluid

Out of 20 patients who had peri-cholecystic fluid, 4 patients underwent conversion (20%) (Figure 13).

Conversion in Patients with Gb Wall Thickening

Fig. 14: Graphical representation of conversion in patients with GB wall thickening

Out of 22 patients who had thickened GB wall, 4 patients underwent conversion (18.1%) (Figure 14).

Pre-operative Diagnosis and Surgery Outcome

Indication	Total no. Cases	No. of Cases		Percentage	
		Success-ful	Conver-ted	Success-ful	Converted
Cholelith-iasis	94	85	9	90.4 %	9.5 %
Acute cholecystitis	18	15	3	83.3 %	16.6 %

Table 8: Pre-operative diagnosis

Out of 112 patients, 94 patients presented with a diagnosis of Cholelithiasis of which 9 cases were converted (9.5%) and 18 patients presented with acute cholecystitis of which 3 underwent conversion (16.6%) (Table 8).

Duration of Surgery

Duration of Surgery	No. of Cases	Percentage (%)
Less than 70min	25	22.3 %
70 to 110min	76	67.8 %
More than 110min	11	9.8 %

Table 9: Duration of surgery

The average duration of surgery was 81.7min.

Fig. 15: Graphical representation of duration of surgery

DURATION OF POST-OPERATIVE HOSPITAL STAY

Duration of Post-operative Hospital Stay	No. of Cases	Percentage (%)
Up to 3 days	65	58.0 %
4- 5 days	38	34.0 %
6 days and more	9	8.0 %

Table 10: Duration of post-operative hospital stay

Duration of Post-operative Hospital Stay	No. of Cases	Percentage (%)
Upto 3 days	65	58.0 %
4-5 days	38	34.0 %
6 days and more	9	8.0 %

Table 10: Duration of post-operative hospital stay

The average duration of post-operative hospital stay was 3.6 days; 65 patients were discharged by 3 days post-operatively, 38 patients stayed for 4-5 days and the remaining 9 patients stayed for more than 6 days. Average duration of post-op stay in successful cases was 3.37 days and in converted cases it was 5.75 days (Table 10).

Fig. 16: Graphical representation of post-operative hospital stay

REASONS FOR CONVERSION

Total laparoscopic cholecystectomies performed-112, Total cases converted to open procedure – 12 (10.7%)

Reason for Conversion	No. of Cases	%
Difficult anatomy due to:		
- Dense adhesions of Calot's triangle	6	50 %
- Anatomical variation	1	8.3 %
Bleeding from:		
- Calot's triangle (Cystic artery)	2	16.6 %
- Injury to right gastric artery	1	8.3 %
Common bile duct injury	2	16.6 %

Table 11: Reasons for conversion

DISCUSSION

In the perspective of LC being the standard treatment of symptomatic cholelithiasis, preoperative prediction of the risk of conversion is an important aspect in the planning for laparoscopic surgery. Several studies have been published in the past years trying to assess risk factors for difficult LC.^(6,7,8)

The clinical profile of a patient can predict a difficult gallbladder surgery.

Conversion to open surgery is an indication of sound judgment of the surgeon in view of safety of the patient. Age is recognized as a risk factor of conversion.^(9,10,11,12, 13, 14,15,16) We and some other authors did not notice age to be associated with conversion rate.^(11,12) This varied opinion could be attributed to surgeon's experience and expertise. A 4.5% female and 6.3% male patients underwent conversion to open. Lien and Huang concluded that male gender is a risk factor for severe symptomatic cholelithiasis.⁽⁹⁾ in abdominal surgery has also been associated with a higher likelihood of conversion in numerous studies.^(7,8)

Most reports on conversion rates, however, have been published from highly specialized centers with extensive and special expertise in laparoscopic surgery.^(9,13,17,18) General surgical practice might have somewhat less favorable results.^(5,6) Conversion was especially high in patients with acute cholecystitis (47%). In comparison to other studies in India and western countries, the reason of conversion is same. Dense adhesions at the Calot's triangle and acute cholecystitis are two of the most important reasons for conversion to open procedure, as shown in the present study, Alsalamah et al. Ibrahim and Bingener showed more than half of the converted cases were due to adhesion.^[6,15] Dense adhesions at Calot's triangle signified chronic inflammation and were certainly due to the repeated attacks of inflammations in the area or due to previous intra-abdominal pathology or surgery.

Conversion remains in these circumstances a possible outcome of laparoscopic gallbladder surgery, it should be carried out bravely whenever surgeon feels that the field is unwell and it is not a matter of challenge to surgeon glory. Failure to identify the anatomy is the commonest cause of conversion, which might be either due to inflammatory process which disturbed Calot's triangle or anatomical variations or adhesion due to previous surgery.^[15] as found in our study.

CONCLUSION

It can be concluded that LC is the gold standard for the management of gall stone disease. With the advancement in equipment and gaining experiences in laparoscopy, most of the difficult gallbladder can be dealt laparoscopically. Preoperative risk factors can help to predict difficult gallbladder and conversion to OC. Male gender, single large stone, thick-walled gallbladder, previous abdominal surgery and contracted gallbladder are the factors that proved to be significant in our study. These factors can predict difficulty to be encountered during surgery and help in making a decision for conversion thus shortening the duration of surgery and preventing unnecessary complications.

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