

## Original Research Article

# Laparoscopic cholecystectomy an analysis of 787 cases with reference to predictors on level of difficulty and the influence of early conversion to reduce IBDI and other complications

Suresh Kalyanasundar\*, Ashok Bhatnagar

Department of General Surgery, SMS and R, Sharda University, Greater Noida, Uttar Pradesh- 201306, India

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**\*Correspondence:**

Dr. Suresh Kalyanasundar,

E-mail: [satyasomya@yahoo.com](mailto:satyasomya@yahoo.com)

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### ABSTRACT

**Background:** Laparoscopic cholecystectomy is the most common major elective surgical procedure all over the globe. The complications associated with the procedure also become important for surgeons to manage well, strive to prevent them from occurring.

**Methods:** The study was prospective and involved 787 cases in a period of 60 months starting from January 2013 to January 2017 which were diagnosed to have cholelithiasis sonologically, features to suggest acute cholecystitis and a normal CBD, with normal liver function tests, clinical examination did not reveal a palpable lump in the right hypochondrium and the history of acute pain was less than 72 hours.

**Results:** The total number of cases 787 and 127 (16%) there were complications of which 0.2 % was biliary injuries and rest were nonbiliary. IBDI occurred in 02cases in this series which is 0.25% and 125 cases there was Nonbiliary complications. The incidence of iatrogenic bile duct injury (IBDI) in LC is 0.4%- 1.3 % compared to 0.2%- 0.3% for OC. 108 cases were converted to an open procedure (13%) and the average rate globally 5 % to 10%.

**Conclusions:** LC should be planned in all cases of cholelithiasis, it is helpful to preoperatively and operatively grade the cases for the operative ease and cases which fall in the category of extreme it is better to resort to conversion early or even a planned open surgery. The low complication rate especially biliary is because of a careful planning preoperatively and operatively as per prediction scales which we used, a low tolerance to conversion and because of adopting the practice of subtotal cholecystectomy.

**Keywords:** Conversion, IBDI, LC, Operative predictors, Preoperative grading

## INTRODUCTION

LC is the most common MIS procedure all over the world. Biliary complications associated with the same have reduced but in many teaching institutions they are more than the open cholecystectomy era. The morbidity associated with a biliary complication is a burden on the patient and /or the resources of the hospital.<sup>1,2</sup> It also brings about loss of work and in many cases the patient gets to be a biliary cripple so the aim should be to reduce

the biliary complication rate to be lower than the open era. Incidentally IBDI are the leading cause of malpractice suits filed against the doctor.<sup>3</sup>

The purpose of this study was twofold to apply preoperative and operative parameters in all cases which indicates us the level of difficulty and to reemphasize the need to adopt simple measure of conversion to an open procedure rather than resorting to measures of trying to continue by the laparoscopic method and also in selected

cases if need be to resort to open or laparoscopic subtotal cholecystectomy which in our experience on follow up has not had any adverse effects.<sup>3-6</sup>

**METHODS**

The study was prospective and involved 787 cases in a period of 60 months starting from January 2013 to January 2017 as detailed in Table 1 which were diagnosed to have cholelithiasis sonologically, features to suggest acute cholecystitis and a normal CBD, with normal liver function tests, clinical examination did not reveal a palpable lump in the right hypochondrium and the history of acute pain was less than 72 hours.

Other exclusions were patients who wanted open cholecystectomy by choice, cases which had associated choledocholithiasis and cases which were converted due to technical and instrumentation failure.

**Table 1: Total number of laparoscopic cholecystectomy January 2013 to January 2017.**

Years	2013	2014	2015	2016	2017	Total
No. of LC	120	138	157	184	188	787
Males	35	47	54	62	62	32.6%
Females	85	91	103	122	126	67.4%

**Table 2: Co-morbid conditions.**

Condition	Number	Percentage of total
HTN on medication	118	15%
DM on OHA's	86	11%
Both HTN and DM	63	08%
Obesity class I and II*	275	35%
Hypothyroidism	24	03%

Cases which were taken up were preoperatively assessed and were ASA Grades I to III 77% were ASA I, 16% were ASA II and rest ASA III 07%. The youngest patient was 11 years and oldest patient was 77 years. Comorbid

associations were hypertension controlled, diabetes alone with HbA1C < than 8% both hypertension and DM, Obesity Grade I and II as per the WHO classification (WHO Pg. 9, 2000) and hypothyroidism the numbers are detailed as in Table 2.

**RESULTS**

LC was attempted in all 787 patients and the indication being chronic cholelithiasis, GB polyp, and acute calculus cholecystitis. Conversion rate in this series numbered 108 (14%) and complications encountered in 127 cases this in comparison to many series is higher. There was a good correlation with the preoperative factors predicting the level of difficulty to complete the operative procedure laparoscopically.

The clinical features outlined in Table 4 were applied and 560 (71%) cases were in the easy category and there was no conversion in this category, 153 cases were in the difficult category of which 34 (22%) needed conversion and 74 (9%) cases were in the very difficult category and the conversion rate was 100%.

The operative factors outlined in Table 5 were adopted in the series and on classifying, mild cases numbered 235 (30%) and moderate cases numbered 325 (41%) and none needed conversion. Severe cases numbered 151 (19%) and there was a conversion rate of 22.5% and in the last category of extreme cases numbering 76 (10%), the conversion rate was 100%. The most important fall out of the study is IBDI was there only in 02 cases which is 0.2% as against average rates in most series being for LC is 0.4% - 1.3 %.

**DISCUSSION**

Cases underwent an elective laparoscopic cholecystectomy using the standard technique of 04 ports under general anesthesia uneventfully of which 108 cases (14%) where converted to an open procedure due to reasons which have been shown in Table 3.

**Table 3: Reasons for conversion.**

Reason	Number
Dense adhesions obscuring the Calot's triangle	50 (M 30 and F 20) 43%
Mirrizi's syndrome	03(M 01and F 02) 2.5%
Uncontrolled bleeding from cystic artery pedicle	17(M 12 and F 07) 15%
Uncontrolled gallbladder bed bleeding	17 (M 10 and F 05) 15%
Buried gall bladder	13 (M 12 and F 05) 13%
Thickened gall bladder wall	06 (M 03 and F 03) 05%
Small bowel injury puncture	01(M)
Cautery burn small intestine	01(F)
Total	108 (65-males,43-females)

43% cases were converted for dense adhesions obscuring the anatomy of Calot's triangle. The other major group 17% was due to hemorrhage as has been the experience in various studies.

Other causes were thickened GB wall even after aspiration (porcelain GB), Mirrizi syndrome which needed open subtotal cholecystectomy.

Also, there were bowel injuries while dissecting down the adhesions and cautery burns of the small gut needing opening and a resection anastomoses. Of the 787 cases under this study 127 cases had complications as mentioned in Table 4.

**Table 4: Complications of LC in this series.**

Complication	Number
Small bowel puncture	01
Small bowel cautery injury	01
Liver bed bleeding	25
Cystic artery slippage	25
Hemorrhage from omental vessel bleeding	01
Anomalous right hepatic artery injury	01
Subcutaneous emphysema	03
Omental prolapse	01
Gall stone spill	30
Clip spill	15
Iatrogenic GB perforation	22
Biliary injury	02
Total	127

We incorporated preoperative assessment scale of multiple factors based on a research paper the parameters of which are given as Table 5, 6 and found it a useful guide to anticipate level of difficulty.<sup>3,4</sup>

**Table 5: Scoring factors used for grading the patient parameters.**

Aspect	Score	Maximum score
<b>History</b>		
<b>Age</b>		
<50 years	0	1
>50 years	1	
<b>Sex</b>		
Male	1	1
Female	0	
H/O hospitalization for Ac Cholecystitis Yes/No	4/0	4
<b>Clinical parameters</b>		
<b>BMI</b>		
<25	0	2
25-27.5	1	
> 27.5	2	
<b>Abdominal scars</b>		
No	0	2
Infraumbilical	1	
Supraumbilical	2	
<b>Palpable GB</b>		
No	0	1
Yes	1	
<b>Sonography</b>		
<b>Wall thickness</b>		
< 4mm	0	2
> 4mm	2	
<b>Pericholecystic collection</b>		
No	0	1
Yes	1	
<b>Impacted stone</b>		
No	0	1
Yes	1	

Score: 0 to 5 easy, 6 to 10 difficult, 11 to 15 very difficult.

**Table 6: Operative grading system for cholecystitis severity.**

<b>GB appearance</b>	
Adhesions < than 50%	1
Adhesions more than 50% covering the GB	3
Maximum	3
<b>Distension/Contraction</b>	
Distended GB (or contracted shriveled GB)	1
Unable to grasp with atraumatic laparoscopic forceps	1
Stone ≥1 cm impacted in Hartman's Pouch	1
<b>Access</b>	
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 >30 minutes	1
Total Max	10

Degree of difficulty, A- Mild <2, B- Moderate 3-4, C- Severe 5-7, D- Extreme 8-10.

As per the preoperative factors detailed in Table 5:

- 560 cases were in the easy category (71%), number converted nil
- 153 cases were in difficult category (19%), number converted 34 (22%)
- 74 cases were in very difficult category (10%), number converted 74 (100%).

As per the factors detailed in Table 6:

- Mild cases were 235 in number (30%), number converted nil
- Moderate cases were 325 in number (41%), number converted nil
- Severe cases were 151 in number (19%), number converted 34 (22.5%)
- Extreme cases were 76 in number (11%), number converted 76 (100%).

LC commonest surgical procedure all over the globe for symptomatic cholelithiasis and acute cholecystitis.<sup>1-3</sup> The procedure has all the advantages of MIS as compared to its elder sister the famed old open cholecystectomy. However, the rate of biliary injuries to the ductal systems are almost double as compared to the open cholecystectomy. With the availability of ultrasound, the diagnosis of gall stone disease has almost quadrupled and hence the need of LC has also increased and the need to reduce biliary complications at least to levels of OC is very important. The reasons which have been attributed for the biliary injuries has been a visual misperception of the regional anatomy and which is why the IBDI occurs even in the hands of experienced surgeons and the subconscious feeling of failure to perform the surgery as a minimally invasive procedure, but the cost of managing a IBDI is much more than the above reasons hence conversion to an open procedure is never to be discouraged especially when the regional anatomy is distorted or abnormal.

Two research studies enumerating a scoring system for preoperative prediction of difficulty and another study detailing the level of difficulty were found to be very useful which have been detailed in Table 5 and operatively in Table 6 definitely gave us what to expect and has guided us in being more careful and with a low threshold for conversion to an OC the biliary injuries could be reduced substantially which explains the higher conversion rate 14% as compared to other reports.<sup>4-8</sup> Following conversion fundus first approach was adopted, followed by identifying the CHD and CBD and then ligate the pedicle doubly without trying to identify the cystic artery and cystic duct separately was done in all 50 cases where the anatomy was obscured because of adhesions and in 05 cases we had to resort to subtotal cholecystectomy.<sup>9</sup>

Follow up was scheduled as 04 weeks, 03 months, 01 year and 02 years and in patients complaining of pain after 03 months an ultrasound of abdomen was done which was normal.

## CONCLUSION

LC should be planned in all cases of cholelithiasis, it is helpful to preoperatively and operatively grade the cases for the operative ease and cases which fall in the category of extreme it is better to resort to conversion early or even a planned open surgery. Early conversion saves time and also reduces the chance of IBDI thus reducing morbidity and mortality associated with the most common surgical procedure done. Subtotal cholecystectomy is a viable option and should be done if need be as the chances of recurrent cholecystitis is almost nil.

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