



## Study of Clinical and Sonological Parameters Affecting Outcome of Difficult Laproscopic Cholecystectomy

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### ABSTRACT

*Easy availability and portability of ultrasound has made the detection of indications of cholecystectomy more easy and early Laparoscopic cholecystectomy is the gold standard care for the treatment of symptomatic gallbladder disease. In our study total of 356 patients undergone laparoscopic cholecystectomy or laparoscopic converted to open cholecystectomy, mean age group most commonly affecting is 40.98 years, with male to female ratio 1:2.06. Most common symptom found is pain in right hypochondrium, while most common presentation was chronic calculus cholecystitis. In our study 42 cases required conversion to open ie. conversion rate (12.35%), with dense chronic adhesions being the common reason found in (33.3%). Our study found significant association for conversion with previous episodes of acute cholecystitis and pancreatitis, gall bladder wall thickness.*

### INTRODUCTION

“Why to punish the skin, the fat and the muscles when all you want is the gall bladder” (Modified from the Time, March 23, 1992) Further technological advances in laparoscopy like introduction of a quartz rod, automatic insufflator device capable of monitoring

intraabdominal pressure development of thermo coagulation, high volume irrigation aspiration system, endoloop applicator, knot tying techniques and instruments have perfected the techniques and instruments have perfected the technique over the years.

Today due to further advances in technology, laparoscopic cholecystectomy is possible with robotic assistance.

The era of scarless surgery has started in 2004 with development of 'natural orifice transluminal endoscopic surgery'. Cholecystectomy can be done using this novel route through transgastric or transvaginal route.

On the other hand continuous development occurred in ultrasonography since, John Wild (1914-2009) "father of medical ultrasound" first used ultrasound to assess the thickness of bowel tissue as early as 1949. Since that time due to advances in ultrasound to assess the thickness of bowel tissue as early as 1949. Since that time due to advances in ultrasound has made it easily available everywhere in portable form. Easy availability and portability of ultrasound has made the detection of indications of cholecystectomy more easy and early.

Laparoscopic cholecystectomy is the gold standard care for the treatment of symptomatic gallbladder disease. Laparoscopic cholecystectomy decreases postoperative pain, allows earlier oral intake, shortens hospital stay, enhances earlier return to normal activity, and improves cosmesis over open cholecystectomy. Laparoscopic cholecystectomy today can be a straightforward operation, but may also be an operative approach fraught with underlying complexities. Anatomic variations and the severity of underlying biliary disease make laparoscopic cholecystectomy challenging in many clinical situations. At present, there are few

contraindications to laparoscopic cholecystectomy like uncorrectable coagulopathy for symptomatic cholelithiasis. However, approximately 2-15% patients require conversion to open surgery for various reasons. Identifying preoperative variables predicting conversion to open surgery improves patient counselling, planning of convalescence, and postoperative expectations. In addition the surgeon can appropriately predict operative time while maintaining a lower threshold for conversion when intraoperative difficulties are encountered in patients with high risk of conversion. These predictive factors of conversion also improve patient safety; minimize the intraoperative complications and enhance the cost effective approach of cholelithiasis.

#### AIMS AND OBJECTIVES

1. To study the preoperative clinical factors that can predict difficult laparoscopic cholecystectomy.
2. To study the preoperative sonologic factors that can predict difficult laparoscopic cholecystectomy.
3. To study the usefulness of these preoperative predictive factors of difficult laparoscopic cholecystectomy which may help in appropriate planning of the patient, surgeon and institution as well as in conversion to open cholecystectomy.

#### RESULTS AND DISCUSSION

Our study was done at government medical college and hospital and we studied total 356

patients having cholelithiasis and undergone laparoscopic cholelithiasis and laparoscopic converted to open cholecystectomy.

**Age and sex incidence** –the incidence of cholelithiasis found to be highest in 31-40 years age group i.e.31.46%.mean age in our study is 40.4 years. This is supported by Malhotra et al (1968),Wani et al (1995),Shyamalal et al(1995),all of them reported maximum incidence in age group of 30-40 years.In our study male were 116 and females were 240.In each age group female predominates in our study ,with male to female ratio 1:2.06. this is supported by the study of Malhotra et al (1968).,Wani et al (1995),Shyamalal et al (1995) have reported sex ratios as 1:2,1:4.40,1:5.97 respectively.

**Incidence of haemolytic disorders** our study reports 8.99% incidence of haemolytic disorders in cholelithiasis, incidence of sickle cell disease being 4.49% which compares well with that of the study of Barette and connor et al(1968) and study of Billa et al (1991).The incidence of sickle cell disease in different series viz.Barrette and connor[10%] (1968),William pokorny et al[50%] (1984)and Walker et al(2000)[23.8%],Billa et al(1991)[10.37%].

**Symptomatology and clinical signs in present series** most commonly is pain in abdomen that to in right hypochondriac region seen in 96.06% which is comparable to Ananth Krishnan et al(1976)and 94.9% in the series Wani et al(1995).Dyspepsia was second most common symptom in our series seen in 236 cases i.e.66.29% ,comparable with the incidence of

67.87% reported by Wani et al(1995).the next symptom commonly seen were nausea or vomiting and fever amounting to 55.05% and 31.46% respectively.

**Different presentations of cholelithiasis** – cases of choledocholithiasis were excluded from our study.In our study chronic calculus cholecystitis accounted for 244 cases out of 356 cases i.e 68.53% where as acute on chronic cholecystitis with or without past history of similar complaints accounted for 76 cases out of 356 cases i.e 21.34% Thus chronic calculus cholecystitis was the commonest presentation(68.53%) in our study ,comparable to Wani et al(1995)(74.82%).Least commonly seen is gall bladder perforation found in 1 case i.e. 0.56% Ganey et al reported 1.2% incidence of gall bladder perforation.

**Surgical procedure done** in our study out of 356 patients 298 patient had undergone laparoscopic cholecystectomy,42 cases required conversion to open cholecystectomy,16 cases directly posted for open cholecystectomy. conversion rate in our study is 12.35% which is comparable to studies of Avinash Supe et al(2005)(11.4%),Peters JH et al(1994)(14%),Kumar A et al(1996)(14.3%).

**Operative time** In our study mean operative time required for laparoscopic cholecystectomy is 74.56min,while that required for converted procedures is 154.28 min. This is comparable to Porte RJ et al in 1996.,who reported mean time for laparoscopic cholecystectomy was 75 min.

**Rate of conversion and reasons for conversion** In our study of 356 patients 298 patients had undergone laparoscopic cholecystectomy,

42(11.79%) cases required conversion to open cholecystectomy, the reasons for conversion were as follows dense adhesions(14 cases),bleeding(10 cases),acute inflammation(6cases),inability to delineate anatomy(4cases)suspected common bile duct injury(4 cases),calculi spillage(2 cases),equipment problems(2 cases).16 patients directly posted for surgery, Conversion rate(12.35%)in our study is comparable to study of Avinash Supe et al(2005)studied 105 patients having conversion rate of 11.4% ,Peters JH (1994) have conversion rate of 14%.We can conclude that conversion is neither a failure nor a complication but it is an attempt to minimize complications.

**Relationship between moderate bleeding with gall bladder wall thickness and previous acute cholecystitis (AC) or pancreatitis (AP)** in our study, it is observed that, there is significant association between moderate bleeding and gall bladder wall thickness >3mm and previous acute cholecystitis or pancreatitis. Increased gall bladder wall thickness on preoperative ultrasonography represents the present inflammation or fibrosis due to previous attacks of cholecystitis. previous attacks of inflammation causes increased adhesions in operative area and very high chances of bleeding which hampers visibility and increases chances of complications.

**Relationship between gall bladder stone size >1cm with difficulty in extraction** In our study ,there is significant association between gall bladder stone size >1 cm and difficulty extraction(p value <0.05).This is supported by the study of Avinah supe et al(2005).In gall bladder

with stone size >1 cm there is difficulty in extraction of gall bladder from 10mm port which is usually used.

**Relationship between GB wall thickness & conversion of LC:** In our study ,a gallbladder wall thickness of more than 3 mm was significantly associated with difficult surgical preparation leading to conversion and with the histopathologic report of chronic or acute inflammation (p value<0.05)Avinash supe et al(2005) inferred that preoperative factors responsible for conversion to open cholecystectomy are obesity, gender, past history of acute cholecystitis or acute pancreatitis, past h/o of upper abdominal surgery and gall bladder wall thickness >3 mm.

**Relationship between male sex and conversion** we found significant association with male sex and conversion to open cholecystectomy(p v value <0.01)this is supported by study of B.J.Ammori, M.Larvin ,et al and Liu et al(2001) &Michael Rosen et al(2002) also found obesity as independent predictor of obesity.

**Relatinship between past history of acute cholecystitis or pancreatitis conversion:** we found significant association between past history of acute cholecystitis or pancreatitis and conversion(p value <0.01).This is supported by N.A.Kama et al(2001),Avinash Supe et al(2005)studies.

**Relationship of conversion to open cholecystectomy with various parameter on univariate analysis** on univariate analysis, four factors were found to be significantly associated

with conversion .These factors are-past history of wall thickness >3mm ,obesity, male gender. acute cholecystitis or pancreatitis, gall bladder

**Table 1.Age and Sex Wise Distribution**

AGE GROUP	MALE	FEMALE	TOTAL NO.OF PATIENTS	PERCENTAGE
11-20	30	16	46	12.92%
21-30	8	28	36	10.11%
31-40	36	76	112	31.46%
41-50	14	54	68	19.10%
51-60	14	34	48	13.48%
61-70	14	28	42	11.79%
71-80	0	4	4	1.12%
TOTAL	116	240	356	100%

**Table 2 Incidence of Heamolytic Anemia**

TYPE	NO OF CASES	PERCENTAGE
SICKLE CELL DISEASE	16	4.49%
SICKLE CELL TRAIT	16	4.49
HEREDITARY SPHEROCYTOSIS	0	0
THALASSEMIA	0	0
TOTAL	32	8.99%

**Table 3 Symptomatology**

SYMPTOMPS	NO.OF CASES	PERCENTAGE
PAIN IN RIGHT HYPOCHONDRUM	308	86.51%
PAIN IN RIGHT HYPOCHONDRUM &EPIGASTRIUM	24	6.74%
PAIN IN EPIGASRTIUM	8	2.24%
GENERALISED PAIN IN ABDOMEN	2	0.56%
DYSPEPSIA	236	66.30%
NAUSEA OR VOMITING	196	55.05%
FEVER	112	31.46%

**Table 4 Clinical Signs**

SIGNS	NO OF CASES	PERCENTAGE
TENDERNESS IN RIGHT HYPOCHONDRIUM	124	34.83%
TENDERNESS IN RIGHT HYPOCHONDRIUM& EPIGASTRIUM	42	11.79%
GENERALISED TENDERNESS ALL OVER ABDOMEN	8	2.24%
MURPHYS SIGN POSITIVE	118	33.14%
GUARDING	8	2.24%
FEVER	24	6.74%
GALLBLADDER PALPABLE	16	4.49%
SPLEEN PALPABLE	16	4.49%

**Table 5 Different Presentation Of Cholelithiasis**

PRESENTATION	NO OF CASES	PERCENTAGE
CHRONIC CALCULUS CHOLECYSTITIS	244	68.53%
ACUTE ON CHRONIC CHOLECYSTITIS	76	21.34%
ACUTE CALCULUS CHOLECYSTITIS	10	2.8%
HEAMOLYTIC ANEMIA WITH SPLENOMEGALY	16	4.49%
EMPHYEMA GALLBLADDER	8	4.49%
GALL BLADDER PERFORATION	2	0.56%
TOTAL	356	100%

**Table 6 Surgical Procedures Done**

GROUP	NO.OF PATIENTS	PERCENTAGE
LAPAROSCOPIC CHOLECYSTECTOMY	298	83.70
LC TO OC	42	11.79
OPEN CHOLECYSTECTOMY	16	4.49

**Table 7** Reasons for Conversion of Lc To Oc

REASONS	PRESENT STUDY	PERCENTAGE
ADHESIONS/CHRONIC INFLAMMATION	14	33.3%
ACUTE INFLAMMATION	6	14.28%
ABERRANT ANATOMY	4	9.52%
BLEEDING	10	23.8%
BILIARY TRACT INJURY	4	9.52%
DEVICE FAILURE/MECHANICAL PROBLEMS	2	4.76%
BOWEL INJURY	-	-
TORN GALL BLADDER	-	-
CALCULI SPILLAGE	2	4.76%
CONVERSION RATE	42	12.35%

**Table 8** Relationship Between Moderate Bleeding And (Gb)Gall Bladder Wall Thickness

PARAMETER	GB WALL THICKNESS>3MM	GB WALL THICKNESS >3MM	TOTAL	CHI SQUARE VALUE	P VALUE	RESULT
MODERATE BLEEDING	34	12	46	29.157	0.00	SIGNIFICANT
MILD BLEEDING	54	240	294			
TOTAL	88	252	340			

**Table 9** Relationship between Moderate Bleeding and Previous acute Cholecystitis(Ac) Or Pancreatitis (Ap)

PARAMETER	PREVIOUS AC/AP PRESENT	PREVIOUS AC/AP ABSENT	TOTAL	CHI SQUARE VALUE	P VALUE	RESULT
MODERATE BLEEDING	32	14	46	29.608	0.00	SIGNIFICANT
MILD BLEEDIN	42	232	294			
TOTAL	74	246	340			

**Table 10** Relationship Between Gall Bladder Stone Size and Difficulty In Extraction

PARAMETER	DIFFICULTY IN EXTRACTION PRESENT	DIFFICULTY IN EXTRACTION ABSENT	TOTAL	CHI SQUARE VALUE	P VALUE	RESULT
STONE SIZE >1CM	104	26	130	75.72	0.00	SIGNIFICANT
STONE SIZE <1CM	14	154	168			
TOTAL	118	180	298			

**Table 11** Relationship Between Gall Bladder Wall Thickness & Conversion Of (Lc) Laparoscopic Cholecystectomy

OPERATION	GB WALL THICKNESS <3MM	GB WALL THICKNESS >3MM	TOTAL	CHI SQUARE	P VALUE	RESULT
LC	248	50	298	48.341 WITH 1 DEGREE OF FREEDOM	0.000	SIGNIFICANT
LC TO OC	4	38	42			
TOTAL	252	86	340			

**Table 12** Relationship Between Male Gender and Conversion of Laparoscopic Cholecystectomy

OPERATION	MALE	FEMALE	TOTAL	CHI SQUARE	P VALUE	RESULT
LC	76	222	298	12.814 WITH 1 DEGREE OF FREEDOM	0.000	SIGNIFICANT
LC TO OC	28	14	42			
TOTAL	104	236	340			

**Table 13.** Relationship Between Obesity (Bmi >30kg/M) And Conversion

OPERATION	BMI >30	BMI <30	TOTAL	CHI SQUARE VALUE	P VALUE	RESULT
LC	38	260	298	47.28 WITH 1 DEGREE OF FREEDOM	0.000	SIGNIFICANT
LC TO OC	34	8	42			
TOTAL	72	268	340			



**Table 14** Relationship between Previous Acute Cholecystitis(Ac) Or Pancreatitis and Conversion(Ap)

OPERATION	PREVIOUS AC OR AP (YES)	PREVIOUS AC OR AP (NO)	TOTAL	CHI SQ VALUE	P VALUE	RESULT
LC	58	240	298	37.143	0.000	SIGNIFICANT
LC TO OC	36	6	42			
TOTAL	94	246	340			

**Table 15** Relationship of Conversion to Open Cholecystectomy with Various Parameters on Univariate Analysis

PARAMETER	CHI SQUARE	P VALUE	RESULT
PAST HISTORY OF ACUTE CHOLECCYSTITIS	37.143	0.000	SIGNIFICANT
GALL BADDER WALL THICKNESS >3MM	48.341	0.000	SIGNIFICANT
OBESITY	47.28	0.000	SIGNIFICANT
MALE GENDER	12.814	0.000	SIGNIFICANT

## CONNCLUSIONS

1. Clinical factors like previous acute cholecystitis or pancreatitis, obesity, male gender are significant risk factors of conversion. These factors can be helpful to predict difficult laparoscopic cholecystectomy and likelihood of conversion of laparoscopic cholecystectomy.
2. Ultrasonographic findings of gallbladder wall thickness >3 mm is a significant factor of conversion and it is also associated with other factors like adhesions, mass formation ad local infection .Hence, it may be helpful in prediction of difficult laparoscopic cholecystectomy and conversion to open cholecystectomy.
3. Patients with high predicted risk of conversion could be operated on either by or under supervision of more experienced surgeon.
4. In patients with high predicted risk of conversion surgeon may take early decision to convert to open cholecystectomy or surgeon may directly go or open cholecystectomy; this may shorten the duration of surgery and associated morbidity.
5. With proper preoperative assessment of clinical and sonographic parameters the best possible results can be imparted to the patient undergoing lap cholecystectomy.

Thus we can infer that conversion is neither failure nor a complication but it is an attempt to minimize the complications.

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