

**Research Article****Study of Correlation of Preoperative Clinical, Laboratory, Sonological and Peroperative Findings in Gall Stone Disease****Jitendra Singh Yadav<sup>1\*</sup>, Akshara Gupta<sup>2</sup>, Prashant Shrivastava<sup>3</sup>, Achal Gupta<sup>4</sup>, Nikhil Chopra<sup>5</sup>, Deepanshu Sharma<sup>6</sup>**<sup>1,5,6</sup>PG student, Department of Surgery, Gajara Raja Medical College, Gwalior (M.P.)-474009, India<sup>2</sup>Associate Professor, Department of Radiodiagnosis, Gajara Raja Medical College, Gwalior (M.P.)-474009, India<sup>3</sup>Associate Professor, Department of Surgery, Gajara Raja Medical College, Gwalior (M.P.)-474009, India<sup>4</sup>Professor and Head, Department of Surgery, Gajara Raja Medical College, Gwalior (M.P.)-474009, India**\*Corresponding author**

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**Abstract:** Gallstone disease is the pathologic state of stones or calculi within the gall bladder lumen and biliary tree. A common digestive disorder worldwide, worldwide occurrence varies from 6-20%. The definitive management of symptomatic gallstones is surgical. The two surgical approaches are conventional and laparoscopic. Important intraoperative considerations during laparoscopic cholecystectomy include time taken for surgery, the degree of difficulty encountered during surgery and conversion to conventional/open cholecystectomy (OC). Most common reason for conversion to laparotomy (open through a midline or subcostal skin incision) is the inability to identify important anatomic structures due to distorted anatomy from previous surgeries, inflammation or anatomic anomalies/variations. Other potential causes for conversion are intraoperative complications (vascular, bowel or bile duct injury). It is helpful to determine the risk of conversion of an LC to OC beforehand. This may allow the patients to be better prepared for the surgery and to plan their absence from work. Also, such prediction may allow a surgeon to be better prepared, to take extra precautions to reduce intraoperative complications and to convert from LC to OC at an earlier stage. It may therefore, be useful to assess and determine reliable pre-operative factors which may predict the duration and degree of difficulty in performing cholecystectomy and may predict conversion of laparoscopic to open cholecystectomy. The study was a prospective randomized study done in the department of surgery in our institution for a period of one year. Total 100 patients diagnosed with cholelithiasis and undergoing laparoscopic cholecystectomy were included in the study. Patients were examined for a detailed preoperative history, physical examination and preoperative biochemical and radiological investigations and correlation to various peroperative parameters was done. It was concluded that properly performed preoperative workup might help to plan a better and laparoscopic cholecystectomy.

**Keywords:** Gall stone disease, Cholecystectomy, Cholelithiasis, Laparoscopic cholecystectomy.

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**INTRODUCTION**

Gallstone disease is the pathologic state of stones or calculi within the gall bladder lumen and biliary tree. A common digestive disorder worldwide, worldwide occurrence varies from 6-20%. The highest incidence is seen in Sweden, where 50% of the people have gall stones by the age of 70 years [1]. Patients with asymptomatic gallstones develop complications at an annual rate of 1-2%. In symptomatic patients, the complication rate increases to 1-3% [2]. The definitive management of symptomatic gallstones is surgical. The two surgical approaches are conventional and laparoscopic. First successful removal of gallbladder was done by Carl Langenbuch in 1882 for stone disease [5]. Attempts at laparoscopic cholecystectomy (LC) was started in the early 1980s and although the first documented laparoscopic cholecystectomy was

performed by Erich Muhe in Germany in 1985 [6], number of workers credit Philip Mouret from France as pioneer of first human laparoscopic cholecystectomy.

Important intraoperative considerations during laparoscopic cholecystectomy include time taken for surgery, the degree of difficulty encountered during surgery and conversion to conventional/open cholecystectomy (OC). Most common reason for conversion to laparotomy (open through a midline or subcostal skin incision) is the inability to identify important anatomic structures due to distorted anatomy from previous surgeries, inflammation or anatomic anomalies/variations. Other potential causes for conversion are intraoperative complications (vascular, bowel or bile duct injury). It is helpful to determine the risk of conversion of an LC to OC beforehand [3]. This

may allow the patients to be better prepared for the surgery and to plan their absence from work [4]. Also, such prediction may allow a surgeon to be better prepared, to take extra precautions to reduce intraoperative complications and to convert from LC to OC at an earlier stage. The problem lies in pre-operative identification of the subset of patients with symptomatic cholelithiasis who may turn up in difficult laparoscopic cholecystectomy and may subsequently require conversion to open cholecystectomy. It may therefore, be useful to assess and determine reliable pre-operative factors which may predict the duration and degree of difficulty in performing cholecystectomy and may predict conversion of laparoscopic to open cholecystectomy.

#### MATERIALS AND METHODS

The study was a prospective randomized study done in the department of surgery in our institution for a period of one year. Total 100 patients diagnosed with cholelithiasis and undergoing laparoscopic cholecystectomy were included in the study. Patients were kept fasting overnight and the surgery was performed under general anesthesia. The selected patients were explained well about the procedure and written informed consent was obtained. The patients were informed about the chance of conversion to open cholecystectomy. Pre-operative history taking included age of the patient in years, sex of the patient, duration of pain in right upper abdomen, whether the patient experienced pain abdomen in last fifteen days, history of jaundice, diabetes mellitus, pancreatitis, and history suggestive of acute cholecystitis. Pre-operative clinical examination included calculation of body mass index with the formula – weight in kilogram divided by height of the patient in meter squared, palpation of gall bladder per abdominally and if tenderness was present in right hypochondrium. Pre-operative lab investigations apart from those necessary for fitness included blood sugar level (fasting) and estimation of serum enzyme levels of Serum Aspartate Transaminase (AST), Alanine Transaminase (ALT) and Alkaline phosphatase (ALP). The value was said to be deranged if it was outside the range for normal recommended. Pre-operative transabdominal sonography was done as a routine in the pre-operative workup. The patient were fasted overnight to see for maximal distension of the gall bladder. The ultrasonography was done on B mode, grey scale and real time scan with 3.5 MHz probe. It included number and size of gall stones in gall bladder, if the gall stones were impacted in gall bladder lumen, if the gall bladder was contracted with its wall thickness and evidence of fatty liver. The various pre-operative factors were correlated to the time taken per-

operatively, per-operative difficulty encountered and conversion to open surgery. Also, various pre-operative ultrasonological findings were correlated with intra-operative findings.

#### RESULTS

Out of 100 patients included in the study, there were 8 male and 92 female patients with a mean age of 39.8 years.

Out of 100 patients, 50 patients were operated between 45-60 minutes. 10 patients underwent surgery in less than 45 minutes, 40 patients underwent surgery in more than 60 minutes, out of which, in 5 patients (5%), the total time taken for surgery (calculated as start of abdominal port placement till the closure of port sites) was more than 75 minutes. The mean duration of surgery was 59.52 minutes. In 15(15%) of patients, the surgery was described as difficult by the operating surgeon based on one or more of the objective parameters, while it was easy in the rest of patients. In 9 (9%) patients, the laparoscopic surgery was not progressing satisfactorily and was converted to open approach. The reasons for conversion were dense adhesions in the Calot's triangle and intraoperative bleeding.

The factors having a significant association with the duration of surgery were age of the patient, gender, last episode of pain abdomen <15 days prior to surgery, history of nausea, diabetes mellitus, cholecystitis, previous abdominal surgeries, BMI>30 kg/sq meter, clinically palpable gall bladder and increased gall bladder wall thickness on USG while the factors having a significant association with increased per-operative difficulty were age of the patient, gender, last episode of pain abdomen <15 days prior to surgery, history of jaundice, cholecystitis, previous abdominal surgeries, BMI>30 kg/sq meter and clinically palpable gall bladder (Table 1).

Various pre-operative ultrasound findings were analysed and were compared with operative findings. The findings which were significantly correlated were impacted GB stones, increased wall thickness, empyema gall bladder, cystic duct stone erosion into CBD/adjacent structures and anatomical variations of cystic duct/CBD (Table 2).

The only variable which was statistically correlated with conversion from laparoscopic to open surgery included impacted gall stones on pre operative USG. All other variables were statistically insignificant.

**Table 1: Analysis of variables**

Variable	Number of patients	Patients with increased duration of surgery	Significant/ Non significant	Patients with increased difficulty of surgery	Significant/ Not significant
Age	100	20	Significant	15	Significant
Gender	Male-8 Female-92	Male-5 Female-5	Significant	Male-3 Female-09	Significant
Duration of pain abdomen > 6 months	34	06	Non significant	09	Non significant
Pain abdomen within last 15 days of surgery	24	10	Significant	07	Significant
History of nausea	52	17	Significant	13	Non significant
History of jaundice	08	04	Non significant	01	Significant
History of diabetes mellitus	06	03	Significant	01	Non significant
History of cholecystitis	09	03	Significant	02	Significant
History of pancreatitis	03	01	Non significant	01	Non significant
History of previous abdominal surgeries	35	16	Significant	05	Significant
History of hypertension	27	04	Non significant	03	Non significant
History of other comorbidities	25	11	Non significant	07	Non significant
Elevated BP	09	02	Non significant	02	Non significant
BMI > 30 kg/sqm	12	10	Significant	02	Significant
Palpable GB	03	03	Significant	01	Significant
Right hypochondrium tenderness	29	06	Non significant	03	Non significant
Elevated blood sugar	04	02	Non significant	00	Non significant
Deranged RFT	19	02	Non significant	02	Non significant
Deranged LFT	33	09	Non significant	06	Non significant
Elevated ALP	11	01	Non significant	01	Non significant
Single GB stone	21	01	Non significant	13	Non significant
Impacted stones	06	02	Non significant	00	Non significant
Largest stone > 2 cm	11	02	Non significant	00	Non significant
Contracted GB	18	05	Non significant	03	Non significant
GB wall thickness >=equal to 4 mm	18	07	Significant	05	Non significant
Wall echo shadow	44	10	Non significant	09	Non significant

**Table 2: List of variables**

Sl. No.	Variables
1.	Impacted GB stones
2.	Increased wall thickness
3.	Empyema gall bladder
4.	Cystic duct stone erosion into CBD/adjacent structures
5.	Anatomical variations of Cystic duct/CBD

**DISCUSSION**

Cholecystectomy is the treatment for symptomatic cholelithiasis. Laparoscopic cholecystectomy remain the gold standard procedure. Laparoscopic approach can be technically difficult in some patients, which if identified pre-operatively or early during the surgery can certainly reduce the incidence of avoidable

complication. Operation on the biliary tree are among the most common abdominal procedure performed. Gallstones are the common cause of biliary tract disease in adult. First described in 1882 by Langenbuch, Open Cholecystectomy (OC) has been the primary treatment of gallstone disease for the most of the past century. By 1993 the laparoscopic approach was declared the gold

standard by the National Institute of Health (NIH) consensus conference. Few important intraoperative considerations during laparoscopic cholecystectomy are duration and difficulty in performing the procedure and conversion to open cholecystectomy. The problem lies in pre-operative identification of the subset of patients with symptomatic cholelithiasis who may turn up in difficult laparoscopic cholecystectomy and may subsequently require conversion to open cholecystectomy. This study was done to assess various demographic, historical, clinical, biochemical and radiological factors, review the current literature available on this subject and to analyze the data to be able to predict factors which will influence the difficulty and time taken in performance of laparoscopic cholecystectomy and which may predict conversion of laparoscopic to open surgery. This study also analysed sonological findings with intra-operative findings.

### CONCLUSIONS AND RECOMMENDATIONS

The following conclusion were drawn from the study-

- The incidence of symptomatic cholelithiasis is more in female than in males.
- As the age of patient increases, the mean per-operative duration as well as difficulty increases. The maximum mean per-operative duration and difficulty is in the age group of 65 years and above.
- A definite increase in operative duration and difficulty is seen in male patients.
- There is a definite and significant increase in duration of surgery in patients with frequent nausea and history of jaundice.
- The mean per-operative difficulty and duration is definitely higher in diabetics or patients with deranged blood sugar in pre-operative period.
- Patients with history of acute cholecystitis will have increased operative time and difficulty.
- Patients with history of previous abdominal surgeries (laparoscopic/open) will also have increased duration and difficulty in procedure.
- Obesity/ BMI > 30 kg/sq meter is significantly associated with increased duration and difficulty of surgery.
- The mean per operative duration and difficulty is higher in those with clinically palpable gall bladder.
- This study has shown an increase in mean duration and difficulty in surgery in patients with multiple stones, contracted gall bladder and increased wall thickness, although a statistical significance could not be demonstrated. However, the mean per-operative difficulty does not alter with size, impaction of calculi in gall bladder or wall echo shadow sign.
- Increased duration or time taken during surgery may not be taken as a marker of a

difficult surgery. It is usually possible to perform laparoscopic cholecystectomy without much difficulty by patient dissection. Measures to define the surgery "difficult" should be clearly and objectively defined and should be based on time taken during surgery.

- The average rate of conversion from laparoscopic to open surgery is usually low. Impacted gallstone was the only independent variable which influences conversion from laparoscopic to open surgery.

### Recommendations

- The need for conversion of laparoscopic cholecystectomy to open approach should not be taken as a failure or a complication, but perceived as an attempt to avoid the undue complications.
- Patients with symptomatic cholelithiasis who wish to undergo laparoscopic cholecystectomy should be adequately counselled in the pre-operative period. Adequate pre-operative preparation should be made accordingly and patient should be informed about the likelihood of extended postoperative hospital stay, conversion to open surgery, increased surgery time and increased post-operative care.
- Laparoscopic surgeons need to schedule their operation list according to the presumption of time taken for laparoscopic approach in a particular case and predicted per-operative difficulty and preparation for conversion to open surgery should be there.
- Although USG is a sensitive and adequate imaging modality for assessing the gall bladder wall, calculi and cystic duct anatomy, it is not a reliable imaging modality to assess intrahepatic lesion/ CBD and hence MRCP/ CECT/ Triple phase CT abdomen should be resorted to if there is a re-operative indication of intra-hepatic/ CBD delineation.
- Objective criteria should be defined to assess a surgery as difficult and time taken in performance of surgery should not be taken as a marker of difficult surgery.

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