



EVALUATION OF PREOPERATIVE ULTRASONOGRAPHY AS A PREDICTOR OF DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY: A TEACHING HOSPITAL BASED STUDY.

Dr Praveen Kumar Tripathi

Assistant Professor, Department Of Radiology, Major SD Singh Medical College And Hospital, Farrukhabad, UP.

ABSTRACT

Background: Laparoscopic cholecystectomy has rapidly become the procedure of choice for routine gallbladder removal and is currently the most commonly performed major abdominal procedure worldwide. **Subjects and Methods:** 76 patients of cholelithiasis, selected from surgical OPD of Major SD Singh Medical College and Hospital, who fulfilled all inclusion and exclusion criteria for the study underwent elective laparoscopic cholecystectomy. Ultrasonography was done pre-operatively on all cases by a single radiologist in the same settings. **Results:** Twenty six out of seventy six (34.2%) laparoscopic cholecystectomy surgeries were difficult. Of the 26 difficult laparoscopic cholecystectomy surgeries, gall bladder adhesions, difficult Calot dissection, spillage of bile and stones, bleeding leading to hindering of vision, abnormal biliary tree anatomy and intra-hepatic gall bladder was observed in 95.2%, 90.4% patients respectively. Out of the 26 difficult laparoscopic cholecystectomies, 3.9% were converted to open cholecystectomy. **Conclusion:** Difficult laparoscopic cholecystectomy can be predicted based on preoperative ultrasonography findings of gallbladder wall thickness, pericholecystic collection, number of gall stones, impacted stones in gall bladder and gall bladder transverse diameter.

KEYWORDS : Difficult laparoscopic cholecystectomy and ultrasonography.

INTRODUCTION

Laparoscopic cholecystectomy has rapidly become the procedure of choice for routine gallbladder removal and is currently the most commonly performed major abdominal procedure worldwide.[1] Cholecystectomy was considered as the surgical procedure for cholelithiasis in 1882, when its pioneer Carl Johann August Langenbuch performed the first cholecystectomy in a 43-year-old male patient who suffered from gallstone disease over past 16 years. Cholelithiasis (gall stone disease) is a wellknown disease worldwide. Its estimated incidence is 1.39/100 person/year, varying little between populations.[2] Ultrasonography is the most common screening test for cholecystitis and cholelithiasis. Cholecystectomy is considered the treatment of choice for symptomatic gall stone disease. Laparoscopic cholecystectomy (LC) has gradually replaced open cholecystectomy (OC) in the treatment of symptomatic gall stone disease and accepted as the gold standard.[3] Better cosmetic results, short hospital stay, early recovery and return to physical activity and work, all have contributed to the popularity of this technique.[4] In the beginning, patients with acute cholecystitis, empyema, gangrenous gallbladder, cirrhosis patients and Mirizzi syndrome, previous upper abdominal surgery, and morbid obesity were considered as contraindications for carrying out LC. Ultrasonography is the most common noninvasive, safe, and highly accurate screening test for cholecystitis and cholelithiasis. It can also help surgeons to get an idea of potential difficulty to be faced during surgery in that particular patient.[5] On the basis of ultrasound findings, surgeons can select the cases appropriate for their skills aiming at reducing operative complications and minimize operative time. Based on ultrasonographic findings, certain preoperative factors can reliably predict the chances of conversion to the open procedure and the danger of certain complications so that the surgeon and the patient are mentally prepared.[6] Laparoscopic cholecystectomy (LC) is very commonly performed surgical intervention. Acute or chronic cholecystitis, adhesions due to previous upper abdomen surgeries, Mirizzi's syndrome and obesity are common clinical conditions that can be associated with difficult cholecystectomy. In this study, we evaluated and scored the patients with difficult surgical exploration during laparoscopic cholecystectomy. According to intraoperative findings difficult laparoscopic cholecystectomy (DLC) cases will be classified as Class I difficulty: Adhesion of omentum majus, transverse colon, and duodenum to the fundus of the gallbladder. Class II difficulty: Adhesions in Calot's triangle and difficulty in dissection of cystic artery and cystic duct. Class III difficulty: Difficulty in dissection of

gallbladder bed (scleroatrophic gallbladder, hemorrhage from liver during dissection of gallbladder, cirrhotic liver). Class IV difficulty: Difficulty in exploration of gallbladder due to intraabdominal adhesions including technical problems. Laparoscopic cholecystectomy (LC) is the standard of care for patients with cholelithiasis. Several randomized controlled trials and systematic reviews have demonstrated the effectiveness and safety of LC for the treatment of symptomatic cholelithiasis. The rapid acceptance of LC as the standard of care for patients with gallstones has been attributed to several benefits including decreased patient morbidity, faster recovery, and shorter hospital stay when compared to open cholecystectomy. LC is one of the first laparoscopic procedures performed by surgical trainees. Despite the establishment of formal training in laparoscopic surgery and the improvement in laparoscopic technology, still, there is a perception that performance of LC in teaching hospitals with continuous inflow of trainees may be attended with difficult LC, increased conversion, and complication rates. While several studies have reported a variable assembly of different preoperative and operative risk factors associated with difficult LC and conversion to open cholecystectomy,[7,8] the performance of surgical trainees with different training backgrounds has not been adequately addressed. Although conversion of LC to open cholecystectomy is considered an important outcome of LC, however, currently, conversion rate is less common (2.6%–5.2%) than other surrogate parameters of difficult LC such as operative time more than 60 min, adhesions in the Triangle of Calot, cystic artery injury, or spillage of stones.[9] This study was conducted to look for some predictive factors on ultrasonography of gallbladder that can give the surgeon some idea about the potential difficulty and complications that may be encountered during the course of laparoscopic cholecystectomy. Aim of the current study was to see whether preoperative ultrasonography can predict a difficult laparoscopic cholecystectomy. Objective is to develop an ultrasound based scoring system for predicting an easy or difficult laparoscopic cholecystectomy and also to compare it with surgical findings.

SUBJECTS AND METHODS

This present study was conducted in the Department of Radiology, Major SD Singh Medical College and Hospital, Farrukhabad during the period from April, 2017 to September, 2018. 76 patients of cholelithiasis, selected from surgical OPD of Major SD Singh Medical College and Hospital, who fulfilled all inclusion and exclusion criteria for the study underwent elective laparoscopic cholecystectomy. Ultrasonography was

done pre-operatively on all cases by a single radiologist in the same settings. Age between 21&70 yrs Gender: Both males as well as females, Symptomatic gallstone disease patient. Patients willingly giving consent will be included in the study. Following were excluded from the study: Patients with common bile duct stone, acute cholecystitis, acute pancreatitis, known carcinoma gallbladder, peritonitis, cholangitis and where reason for conversion to open cholecystectomy is equipment failure, anaesthetic complications or presence of other co-morbidities and contraindication to laparoscopic surgery were excluded from the study. Ultrasound findings of 76 patients will be taken for the study. Four operative parameters (time taken, biliary leakage, duct or arterial injury, and conversion) will be analyzed. LC classified as easy or difficult based on criteria of difficult LC. DLC will be classified as class I to class IV based on DLC criteria. The following ultrasound findings will be analyzed: GB wall thickness, pericholecystic collection, distended GB, impacted stones, multiple stones, CBD diameter and liver size.

RESULTS AND DISCUSSION

The mean age and sdo of the patients was 46.7 ± 11.2 years. Total of 76 cases studied, out of which 23 cases (30.3%) were males and 53 cases (69.7%) were females. Twenty six out of seventy six (34.2%) laparoscopic cholecystectomy surgeries were difficult. Of the 26 difficult laparoscopic cholecystectomy surgeries, gall bladder adhesions, difficult Calot dissection, spillage of bile and stones, bleeding leading to hindering of vision, abnormal biliary tree anatomy and intra-hepatic gall bladder was observed in 95.2%, 90.4% patients respectively. Out of the 26 difficult laparoscopic cholecystectomies, 3.9% were converted to open cholecystectomy.

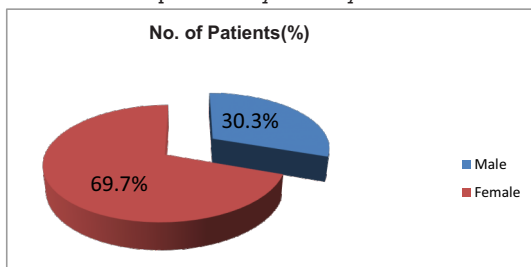


Fig. 1 : Shows the percentage of gender distribution.

Table 1: Diagnostic accuracy of pre-operative ultrasonographic findings and incidence of difficult laparoscopic cholecystectomy.			
Gender distribution		Common Bile Duct Diameter	
SEX	No. of patients(%)	3-4mm	6(7.9)
Male	23(30.3)	4-5mm	26(34.2)
Female	53(69.7)	5-6mm	29(38.2)
Wall thickness		6-7mm	15(19.7)
1-2mm	23(30.3)	Operating Parameters	
2-3mm	31(40.8)	< 1 hrs	53(69.7)
3-4mm	8(10.5)	1-2hrs	15(19.7)
4-5mm	7(9.2)	2-3hrs	8(10.5)
5-6mm	7(9.2)	> 3hrs	0(0.0)
Gall bladder transverse diameter		Biliary Leakage/Spillage of Stones	
2-3cm	46(60.5)	Present	15(19.7)
3-4cm	15(19.7)	Absent	61(80.3)
4-5cm	8(10.5)	Adhesion In Triangle of Calot	
5-6cm	7(9.2)	Present	26(34.2)
Pericholecystic fluid		Absent	50(65.8)
Present	15(19.7)	Duct or Artery Injury	
Absent	61(80.3)	Present	41(53.9)
Impacted stones		Absent	35(46.1)
Present	29(38.2)	Conversion to Open	
Absent	47(61.8)	Present	3(3.9)
Multiple stones		Absent	73(96.1)

Present	50(65.8)	-	-
Absent	26(34.2)	-	-

Aim of the current study was to see whether preoperative Ultrasonography can predict a difficult laparoscopic cholecystectomy. Objective is to develop an ultrasound based scoring system for predicting an easy or difficult laparoscopic Cholecystectomy and also to compare it with surgical findings. Indian literature lacks studies on predictive use of ultrasonography, unlike western literature. Sanders RC in their study found that the finding of gallbladder wall thickening is suggestive evidence of acute cholecystitis, but it is not a pathognomonic finding.[10] Mittalgodu Anantha Krishna Murthy Vivek, Alfred Joseph Augustine, and Ranjith Rao in their study came to the conclusion that features like distended or contracted gallbladder, intra-peritoneal adhesions, structural anomalies or distortions and the presence of a cirrhotic liver are signs that are associated with subsequent difficulties during the surgery.[11] Serdar Yol, Adil Kartal, showed in his study that in men with symptomatic gallbladder stones, inflammation and fibrosis occur more than they do in women with the same disease. This translates into difficult dissections during laparoscopic cholecystectomy and a higher rate of conversion to open surgery in male patients.[12] Prashant S Dhanke, Subodh P Ugane, in their study came to the conclusion that prior hospitalization, BMI > 27.5, palpable gallbladder, thick gallbladder wall on USG, impacted stone at the neck and pericholecystic collection are strong predictors of difficult laparoscopic cholecystectomy. Furthermore, keeping in mind that the scoring system was applied as a whole the proposed scoring system had a positive prediction value for easy prediction of 94.05% and for difficult prediction of 100%. [13] Urbano, D, Di Nardo, R., De Simone, in their study showed that preoperative investigations do not seem to be useful in predicting biliary and vascular complications, whose prevention lies in the adoption of correct surgical technique and a low threshold for conversion.[14] Ravindra Nidoni, Tejaswini V Udachan, in their study That difficult laparoscopic cholecystectomy and conversion to open surgery can be predicted preoperatively based on number of previous attacks of cholecystitis, WBC count, Gall bladder wall thickness and Pericholecystic collection.[15] The study has some limitations. The study was conducted on a limited patient population of seventy six. Although ultrasound is the best modality for diagnosis of gall stones, it is operator-dependent. A high level of skill and experience is needed to acquire good-quality images and make accurate diagnoses. In this study, although ultrasonography of the abdomen was performed by a team of sonologists who were well versed with it, some degree of deviation of the values of the ultrasonographic parameters was expected. Image quality and accuracy of diagnosis is limited with obese patients, overlying subcutaneous fat attenuates the sound beam and a lower frequency transducer is required (with lower resolution) thus affecting the values considered.

CONCLUSION

Difficult laparoscopic cholecystectomy can be predicted based on preoperative ultrasonography findings of gallbladder wall thickness, pericholecystic collection, number of gall stones, impacted stones in gall bladder and gall bladder transverse diameter. Although ultrasound is the best modality for diagnosis of gall stones, it is operator-dependent. A high level of skill and experience is needed to acquire good-quality images and make accurate diagnoses.

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