

## Difficult Laparoscopic Cholecystectomy-Can Pre-Operative Ultrasound Predict?

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### Original Research Article

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#### Article History

Received: 28.10.2017

Accepted: 07.11.2017

Published: 30.11.2017

#### DOI:

10.36348/sjimps.2017.v03i11.021



**Abstract:** Ultrasonography is the most common screening test for cholecystitis and cholelithiasis. It is easy, non-invasive, and safe and a highly accurate imaging technique that can also detect associated lesions of the liver, pancreas and common bile duct (CBD). Recent studies have demonstrated that laparoscopic removal of gallbladder may be accomplished with a morbidity and mortality rate comparable to or less than that of traditional open cholecystectomy. The present study was conducted to look for some predictive factors on ultrasonography of gallbladder that can give surgeon some idea about the potential difficulty and complications that may be encountered during the course of laparoscopic cholecystectomy. This study presents analysis of 51 patients of cholelithiasis, requiring elective cholecystectomy from 1st May 2008 to 30th April 2009. The study was conducted in the Department of Surgery and Department of Radio diagnosis, G.R. Medical College, Gwalior (M.P.). The ultrasonography of the patients was done on the day of surgery in the department of Radio diagnosis, G.R. Medical College, Gwalior. The patients were fasting overnight for the maximal distention of the gallbladder. The ultrasonography was done with 3.5 Mhz probe on Diatonic spectra color Doppler ultrasound on B mode, gray scale, real time scan. The mean gallbladder wall thickness in the study was 2.9 mm (maximum - 5.6 mm and minimum - 1.8 mm). There were 8 patients who had gallbladder wall thickness more than 4 mm. There were 7 (13.2%) patients with contracted gallbladder. There were 6 (11.76 %) patients with gallstone impacted at the neck of gallbladder or Hartman's pouch. There were only 2 patients with common bile duct diameter more than 6 mm. Out of total 51 cases 7 (13.72%) cases were converted to open procedure. Significant correlation was found between the independent ultra-sonographic parameters (that is gallbladder wall thickness, contracted gallbladder, stone impaction at the neck of gallbladder) with the difficult laparoscopic cholecystectomy and their subsequent conversion to open cholecystectomy. The most valuable assessment the ultrasound can provide is the gall bladder wall thickness, gall bladder size, CBD diameter and CBD stones and any abnormal anatomy of the biliary tract if present. Thick gallbladder wall is a finding, which may show that more adhesions may be found during surgery.

**Keywords:** Laparoscopic cholecystectomy (LC), open cholecystectomy (OC), USG

### INTRODUCTION

Cholecystectomy is the most common procedure performed on the biliary tract and the second most common major abdominal operation performed today.

Ultrasonography is the most common screening test for cholecystitis and cholelithiasis. It is easy, non-invasive, and safe and a highly accurate imaging technique that can also detect associated lesions of the liver, pancreas, common bile duct (CBD)

and kidneys. It detects gallstones with accuracy of more than 95% [1].

In 1987, Philippe Mouret performed the first laparoscopic cholecystectomy in Lyon, France [2]. Advantages of the laparoscopic approach include lower morbidity and mortality rates, reduced length of hospital stay, and earlier return to work. Disadvantages of laparoscopic cholecystectomy are the known complications like injury to common bile duct, bowel, iliac vessels etc., costly equipment, high conversion rates (10-50 %) in acute cholecystitis, difficulty in

management of simultaneous common bile duct stones and limitation of facility to the tertiary health care centres.

The present study was conducted to look for some predictive factors on ultrasonography of gallbladder that can give surgeon some idea about the potential difficulty and complications that may be encountered during the course of laparoscopic cholecystectomy resulting in their subsequent conversion to open procedure.

#### METHODS

The study was done on 51 patients of cholelithiasis, requiring elective cholecystectomy, attending surgical OPD of J.A. Group of Hospitals from 1st May 2008 to 30th April 2009. The study was conducted in the department of surgery and department of Radio diagnosis, G.R. Medical College, Gwalior (M.P.). All patients with symptomatic cholelithiasis were included. The selected patients were told about the procedure and written consent was taken. Ultrasonography was done with 3.5 Mhz probe on Diatonic spectra color Doppler ultrasound on B mode, gray scale, real time scan.

Patients were also informed about the possible conversion to open cholecystectomy. We analyzed the

ultrasound presentations of acute cholecystitis in patients who required conversion to open cholecystectomy and compared them with the ultrasound signs of acute cholecystitis in patients who had a completed laparoscopic cholecystectomy.

#### RESULTS

The mean age of the study is 33 years. The age group of the patients ranged from 16 years to 60 years. Out of which only 6 of the patient were males rest 45 were female patient. The mean gallbladder wall thickness in the study is 2.9 mm.

There were 8 patients with gallbladder wall thickness more than 4 mm. Seven patients (13.2%) with contracted gallbladder. The remaining 44 patients had either gallbladder of normal volume that is approx. 50 ml or more. There were 6 (11.76 %) patients with gallstone impacted at the neck of gallbladder or Hartman's pouch. The rest of the 45 (88.23%) patients had mobile gallstones.

There were only 2 patients with common bile duct diameter more than or equal to 6.0 mm. This could be due to the reason because the patients with common bile duct stones were excluded from the study.

**Table-1: Conversion of Laparoscopic cholecystectomy to open cholecystectomy**

		Frequency	Percent (%)
Conversion	No	44	86.27
	Yes	7	13.72
Total		51	100

Out of total 51 cases, 7(13.72%) cases were converted to open procedure. In the remaining 44(86.27%) cases the laparoscopic cholecystectomy was completed successfully (including the difficult cases which were not converted to open

cholecystectomy). The various reasons for conversion were dense adhesions in the Calot's triangle, cystic artery injury, dense adhesions of the gallbladder with the surrounding viscera that is duodenum and omentum.

**Table-2: Correlation between the gallbladder wall thickness and conversion to open cholecystectomy.**

	Number of cases converted to OC	Number of cases <i>not</i> converted to OC	Total
Gallbladder wall thickness more than 4 mm	3	5	8
Gallbladder wall thickness less than 4 mm	4	39	43
Total	7	44	51

The number of cases predicted to be difficult on ultrasonography was 8 patients out of which 3 were converted to open procedure while 5 not converted to open procedure.

Sensitivity of gallbladder wall thickness to predict the conversion to open Cholecystectomy =43%.

Specificity of gallbladder wall thickness to predict the conversion to open Cholecystectomy =89%.

**Table-3: Correlation of the gallbladder contraction with the conversion to the Open cholecystectomy**

	Number of cases converted to OC	Number of cases not converted to OC	Total
Number of cases with contracted gallbladder	2	5	7
Number of cases without contracted gallbladder	5	39	44
Total	7	44	51

The number of cases predicted to be difficult on ultrasonography was 7 patients out of which 2 were converted to open procedure while 5 not converted to open procedure. Sensitivity of contracted gallbladder to

predict difficult laparoscopic cholecystectomy=29% . Specificity of the contracted gallbladder to predict the difficult laparoscopic cholecystectomy =89%.

**Table-4: Correlation of the impaction of stone in the gallbladder neck with the conversion to the Open cholecystectomy**

	Number of cases converted to OC	Number of cases not converted to OC	Total
Number of patients with stone impacted at the neck of gallbladder	5	1	6
Number of patients without the impaction of stone at neck of gallbladder	14	31	45
Total	19	32	51

The number of cases predicted to be difficult on ultrasonography was 6 patients out of which 2 were converted to open procedure while 4 not converted to open procedure.

Sensitivity of the stone impaction at the neck to predict the conversion to open cholecystectomy=29% . Specificity of the stone impaction at the neck of the gallbladder to predict the conversion to open cholecystectomy=91%.

**Table-5: Multiple regression analysis for the conversion to Open Cholesteatoma**

Variable	Category	Reference category (1)	Correlation	Coefficient	Significance
Gallbladder wall thickness	<4.0mm >4.0mm	>4mm	0.55	0.69	0.02
Impaction of stone at the gallbladder neck	Yes No	Yes	0.32	0.84	0.012
Contracted gallbladder	Contracted Non contracted	Contracted	0.51	0.56	0.048
CBD size	>6mm <6mm	>6mm	0.25	0.59	0.08
Operative inference	Easy Difficult	Difficult	0.42	0.5	0.57
Conversion to open procedure	Yes No	Yes	0.46	0.8	0.61

Best correlation is shown by contraction of gallbladder, gallbladder wall thickness, and impaction of stone at the neck of gallbladder.

## DISCUSSION

Laparoscopy can be difficult in dense adhesions and distorted anatomy. The various features that increase the technical difficulty are adhesions in the Calot's triangle, distorted anatomy, empyema of gallbladder, contracted gallbladder, Mirizzi's syndrome,

previous upper abdominal operations, and acute cholecystitis. The conversion rates in various studies range from 1.5 % to 35 % [ 3 ] .

The various preoperative parameters in literature for predicting difficult laparoscopic cholecystectomy are *Gall Stone Size, Gallbladder Wall Thickness, Gallbladder Volume, Number of Stones, Common Duct Dilatation, And Stone Impaction at the Neck of Gallbladder*. Of these parameters only

gallbladder wall thickness, Common bile duct diameter, contraction of gallbladder and stone impaction shows the maximum correlation with the difficult laparoscopic cholecystectomy and its conversion to open cholecystectomy.

In our study a strong statistical correlation was found between pre-operative ultrasound and difficulty in laparoscopic cholecystectomy. Of the 20 cases predicted to be difficult on ultrasonography. 14 cases were difficult on surgery and out of the 14 cases, 6 cases were converted to open procedure, giving a positive predictive value of 68% for difficult cases on laparoscopic cholecystectomy, which is in agreement with the earlier studies [4,5].

Difficult dissection secondary to adhesions was the most common cause for the difficult laparoscopic cholecystectomy and its conversion to open cholecystectomy in our study. The other cause of conversion to open cholecystectomy was impaction of stone at neck.

The study shows that pre-operative ultrasound can predict operative difficulty for laparoscopic cholecystectomy to a good extent. The impaction of stone at the neck of gallbladder followed by the gallbladder wall thickness were the most accurate predictors of the potential operative difficult and conversion to open, procedure.

## CONCLUSION

Pre-operative ultrasonography is a good predictor of difficulty in laparoscopic cholecystectomy in majority of the cases. The most valuable assessment the ultrasound can give is gall bladder wall thickness, gall bladder size, CBD diameter and CBD stones and any abnormal anatomy of the biliary tract if present. Thick gallbladder wall is a finding, which may show that more adhesions may be found during surgery. Common bile duct dilatation may give an idea about the possibility of common bile duct stones. Contracted gallbladder is usually a non-functioning gallbladder due to repeated attacks of acute cholecystitis and a greater chance of adhesion must be expected.

## REFERENCES

1. Kumar, A., Chabra, A., & Bhushan, B. (2017). Evaluation of various pre-operative parameters for prediction of difficult laparoscopic cholecystectomy. *Journal of Advanced Medical and Dental Sciences Research*, 5(3), 91.
2. Trus, T. L., & Hunter, J. G. (1997). Minimally invasive surgery of the esophagus and stomach. *The American journal of surgery*, 173(3), 242-255.
3. Menzies, D., & Ellis, H. (1990). Intestinal obstruction from adhesions--how big is the

problem?. *Annals of the Royal College of Surgeons of England*, 72(1), 60.

4. Maher, J. W., Summers, R. W., Dean, T. R., Swift, J., Heitshusen, D., & Quinn, G. (1990). Early results of combined electrohydraulic shock-wave lithotripsy and oral litholytic therapy of gallbladder stones at the University of Iowa. *Surgery*, 108(4), 648-52.
5. Sackmann, M., Delius, M., Sauerbruch, T., Holl, J., Weber, W., Ippisch, E., & Paumgartner, G. (1988). Shock-wave lithotripsy of gallbladder stones. *New England journal of medicine*, 318(7), 393-397.