



## STUDY TO ASSESS THE EFFICACY OF USG IN PREDICTING THE CONVERSION FROM LAPAROSCOPIC TO OPEN CHOLECYSTECTOMY

### General Surgery

**Jagwinder Singh\*** Senior Resident, Dr. RKGMC, Hamirpur (H.P.) \*Corresponding Author

**Vishal Gautam** Surgeon, Civil Hospital, Tauni Devi, Hamirpur (H.P.)

**Puneet Mahajan** Professor, Indira Gandhi Medical College, Shimla (H.P.)

**Arun Chauhan** Associate Professor, Indira Gandhi Medical College, Shimla (H.P.)

### ABSTRACT

**Background:** Gall stone disease is one of the most common disease affecting the digestive tract. The prevalence of cholelithiasis is 2-29% in India, and approximately 1-2% will develop symptoms and require cholecystectomy every year.<sup>1</sup> Ultrasonography is the most common non-invasive, safe, and highly accurate screening test for diagnosing cholecystitis and cholelithiasis. Prediction of the risk of conversion is an important aspect in the planning for surgery, as it will concomitantly prolong hospital stay, increased post-operative pain, and increase the cost for the patient. This study was done to assess the efficacy of gall bladder wall thickness parameter on ultrasound as a predictive tool to predict conversion of laparoscopic to open cholecystectomy. **Methods:** This is a prospective observational study done at Indira Gandhi Medical College, Shimla on five hundred patients who underwent laparoscopic cholecystectomy during the period from April 1, 2019, to March 31, 2020. Data from 500 patients was retrieved, compiled, summarised and analysed statistically. **Result:** Five hundred patients were included in the study. 21% were males and 79% were females. Maximum patients i. e., 27.40% were in 5th decade. Female to Male ratio was 3.76: 1. 6% of the cases were converted from laparoscopic cholecystectomy to open cholecystectomy. Only 2% cases had GB wall thickness more than 3 mm. Among them, 30% cases were converted to open procedure. Patients who had Gb wall thickness of more than 3 mm had mean duration of surgery of 42 minutes while patients with normal Gb wall thickness had mean duration of surgery of 31.52 minutes **Conclusion:** A simple preoperative prediction tool using sonographic gall bladder wall thickness > 3 mm might warn the surgeon to prepare better and be more vigilant to avoid complications by having a lower threshold for conversion.

### KEYWORDS

Gall stone disease, Laparoscopic cholecystectomy, Cholelithiasis, Open cholecystectomy, Biliary colic

### INTRODUCTION

Gall stone disease is one of the most common disease affecting the digestive tract. Its prevalence varies from place to place. Gallstone disease is common and affects 10-15% of the adults in western populations with most patients remaining asymptomatic. The prevalence of cholelithiasis is 2-29% in India, and approximately 1-2% will develop symptoms and require cholecystectomy every year.<sup>[1]</sup> Gallbladder-related disease is one of the commonest indications for elective surgery<sup>[2]</sup>.

First elective open cholecystectomy was done by Carl Langenbuch in 1882. Philippe Mouret performed first elective laparoscopic cholecystectomy in France on March 17, 1987.<sup>[3]</sup> In India, just 2 years after its birth, the first LC was done in India by T. E. Udwardia in 1989.<sup>[4]</sup>

Laparoscopic cholecystectomy has become the gold standard for the surgical management of gallstone disease.<sup>[5]</sup> Laparoscopic Cholecystectomy has advantages over open cholecystectomy such as shorter hospital stay, less pain in the postoperative period, better aesthetic effects and early return to work.<sup>[6]</sup> Ultrasonography is the most common non-invasive, safe, and highly accurate screening test for diagnosing cholecystitis and cholelithiasis. It can also help surgeons to get an idea of potential difficulty to be faced during surgery in a particular patient, ultrasonography is the modality of choice for measuring gall bladder wall thickness because it is economical, easily available, and non-invasive with accuracy of 92%. Gallbladder wall thickness, CBD diameter, contraction of GB and stone impaction show significance with the prediction of difficult laparoscopic cholecystectomy and conversion to open procedure.<sup>[7]</sup> There is a 3.6 to 13.9 percent conversion rates from Laparoscopic to open cholecystectomy in various studies.

Prediction of the risk of conversion is an important aspect in the planning for surgery, as it will concomitantly prolong hospital stay, increased post-operative pain, and increase the cost for the patient.

Preoperative prediction of difficult laparoscopic cholecystectomy benefits patients as they can opt to undergo open cholecystectomy. The surgeon can directly perform the classical open cholecystectomy in the patients with presumed difficult surgery thus saving operating time and the conversion rate. Many studies have been published with scoring systems to predict difficult LC, but most of them are complex, use large number of determining factors, and they are difficult to use in day-to-

day practice. In addition, many of these scoring systems cannot be applied preoperatively<sup>[8]</sup>. Lot of studies have been published in the Western literature on the predictive use of ultrasonographic GB wall thickness, but little data exist about Indian patients. The present study was done to assess the efficacy of gall bladder wall thickness parameter on ultrasound as a predictive tool to predict conversion of laparoscopic to open cholecystectomy.

### Methods

This Prospective observational study was conducted in the Department of Surgery, Indira Gandhi Medical College, Shimla with involvement of 500 patients.

### Inclusion Criteria

1. All patients with symptomatic gallbladder stone disease between 18-75 years of age.

### Exclusion Criteria

1. Patients on anticoagulants.
2. Patients with carcinoma gallbladder or coexisting malignancy.
3. Patients with severe COPD or CAD being unfit for laparoscopic cholecystectomy.
4. Pregnant patients with cholelithiasis.
5. Patients with previous major upper abdominal surgery.
6. Patients with cirrhosis of liver.

### OBSERVATION AND RESULTS

In the present study of 500 patients who underwent Laparoscopic cholecystectomy, the age of our patients ranged from 18 to 75 years and mean was 44.51 +/- 13.5 SD years. In our study, 395 were females and 105 were males. The ratio of male to female patients was 1:3.76.

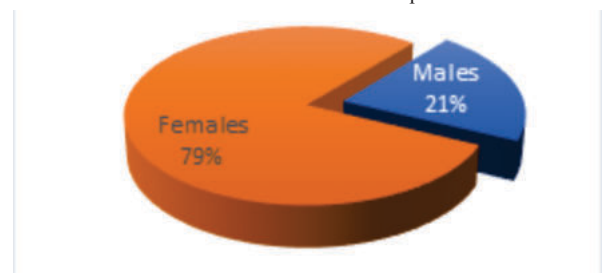
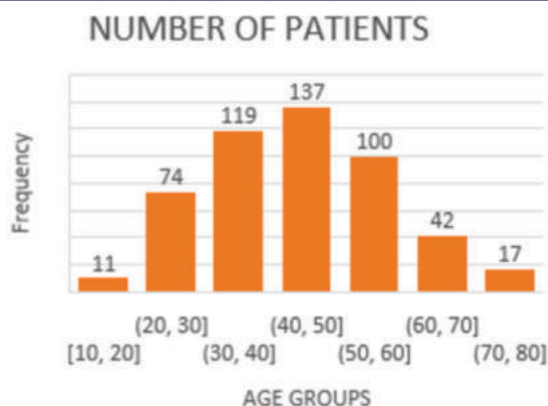
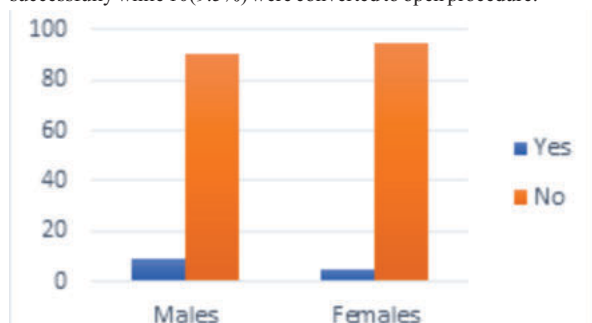


Fig 1. Overall Distribution Of Gender



**Fig 2. Age Incidence And Distribution**

In total of 500 cases, who underwent laparoscopic cholecystectomy, 470(94%) were completed successfully while 30(6%) were converted. In a total of 395 female patients who underwent laparoscopic cholecystectomy 375(94.9%) were completed successfully while 20(5.1%) were converted. Among 105 male patients who underwent laparoscopic cholecystectomy 95(90.5%) were completed successfully while 10(9.5%) were converted to open procedure.

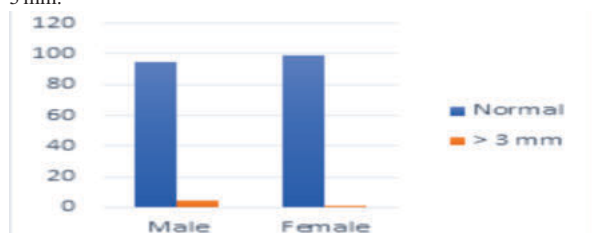


**Fig 3. Laparoscopic To Open Conversion And Its Distribution In Gender**



**Fig 4. Gall Bladder (GB) Wall Thickness**

Among total of 500 patients who underwent laparoscopic cholecystectomy with preoperative sonographic gallbladder wall thickness measurements, 10(2%) patients had GB wall thickness more than 3mm and 490 patients (98%) had GB wall thickness less than 3 mm. Out of 10 patients with increased GB wall thickness 5(50%) were males and 5(50%) were females. Among total of 105 male patients present in study 5(4.8%) had sonographic Gb wall thickness of more than 3 mm and 100(95.2%) had sonographic Gb wall thickness of less than 3 mm. Among 395 female patients 5(1.3%) had Gb wall thickness of more than 3 mm and 390(98.7%) had Gb wall thickness of less than 3 mm.



**Fig 5. GB Thickness And Its Distribution In Gender**

**Table 1. GB Thickness And Surgery Outcome**

| Gb WALL THICKNESS | SURGERY OUTCOME |                        | TOTAL |
|-------------------|-----------------|------------------------|-------|
|                   | LC              | LAP. TO OPEN ONVERSION |       |
| < 3 MM            | 463             | 27                     | 490   |
| > 3 MM            | 7               | 3                      | 10    |
| TOTAL             | 470             | 30                     | 500   |

Among total of 500 patients, 10 patients had Gb wall thickness of more than 3 mm of which total of 3 patients needed conversion to open procedure with conversion rate of 30%, remaining 7 patients were successfully completed. Total of 490 patients had Gb wall thickness of less than 3 mm, out of which 27 patients needed conversion while 463 patients were completed successfully.

Among total of 500 patients, patients who had Gb wall thickness of more than 3 mm also had mean duration of surgery of 42 minutes while patients with normal Gb wall thickness had mean duration of surgery of 31.52 minutes.



**Fig 6. GB Thickness And Duration Of Surgery**

## DISCUSSION

Gallstones represent a significant public health problem in modern society, affecting 10% to 15% of the adult population [1]. Open cholecystectomy, first performed by Carl Langenbuch in 1882, has been the primary treatment of gallbladder disease through the early 1990s. [2] Currently it is estimated that over 90% of cholecystectomies are performed using the laparoscopic approach. [9] Although conversion has been considered a "complication" by some, it should be regarded as mature judgement, accepting a potentially longer hospital stay to avoid a disastrous complication.

Prediction of the risk of conversion is an important aspect in the planning for surgery, as it will concomitantly prolong hospital stay, recovery and increase the cost for the patient. It may also benefit patients as they can be informed the possibility of complications, which mentally prepares the patients and they can adjust their expectations accordingly. Additionally, the surgeon can directly perform the classical open cholecystectomy in the patients with presumed difficult surgery thus saving operating time and the conversion rate. Many studies have been published with a scoring system to predict difficult Laparoscopic Cholecystectomy, but most of them are complex, use large number of determining factors, and they are difficult to use in day today practice and many of these scoring systems cannot be applied preoperatively.

In our study, we studied pre-operative sonographic gallbladder wall thickness as a predictor for conversion from laparoscopic to open cholecystectomy using 3 mm as a cutoff and various other general parameters related to Gall bladder stone disease.

In our study maximum incidence of symptomatic cholelithiasis was seen in the age group of 41-50 years i.e., 137 patients [27.40%] followed by 31-40 years i.e., 119 patients [23.8%]. Similar finding was reported by B. J. Abdul Hussein et al. who reported a mean age of 41.2 years [10], Daradkeh et al reported a mean age of 47.2 years [11] whereas Bingener et al reported a mean age of 40 years [12]. In this study, ratio of males to females was 1:3.76, 105 were male [21%] and 395 were female [79%]. Multiple studies have repeatedly shown that cholelithiasis is much more common in females compared to males. [10,13]

In our study 9.50% males required conversion to open procedure as compared to 5.10% in females. This finding was to similar studies of Thyagarajan et al [14] who reported 17.67% conversion in males vs. 5.64% in females, Genc V et al [15] who reported 5.65% conversion in males vs. 2.25% in females and BJ Abdul Hussein et al [10] who reported 9.5% conversion in males vs. 2.1% in females. It has been observed that male patients have more intense inflammation or fibrosis following repeated inflammatory attacks, resulting in more difficult

dissection in the Calots triangle as well as during dissection of GB from the liver.

Conversion to open technique in the present study was 6.0%. A comparison of rates of conversion with other studies vary between as high as 16% to as low as 2.9% which is comparable to the conversion rate of 6.0% in our study. The causes of conversion were frozen calots triangle anatomy, dense adhesions between GB, omentum, liver, duodenum and stomach, cystic artery bleed, transverse colon perforation and complicated anatomy due to mirizzi syndrome.

In the present study, the conversion rate in patients with GB wall thickness > 3mm was around 30% which is similar to reported in multiple other studies in which the conversion rate of various studies ranges from 1.5% to 42%. The thickened gall bladder is a sign of present inflammation or fibrosis due to chronic cholecystitis. Increased gall bladder wall thickness is associated with difficult dissection due to difficulty in grasping of the gallbladder at Calot's triangle as well as from its bed as well as makes manipulation of GB difficult, and this also makes the dissection at Calot's triangle and limits the extent of anatomical definition<sup>[17]</sup>. Thickened GB wall was identified as a risk factor in LC to OC conversion in almost many studies.

In our study the mean duration in successful laparoscopic cholecystectomies was 31.52 minutes and in the converted cases was 42 minutes. Wagih Ghnnam et al reported mean duration of laparoscopic cholecystectomy was 43 minutes while conversion to open cholecystectomy took 118 minutes.<sup>[18]</sup>

## REFERENCES

- Shaffer EA. Epidemiology and risk factors for gall stone has the paradigm changed in the 21st century. *Curr Gastroenterol Rep*. 2005;7(2):132-140.
- Keulemans YC, Venneman NG, Gouma DJ. New strategies for the treatment of gallstone disease. *Scand J Gastroenterol*. 2002; 236:87-90.
- Reynolds W. The first laparoscopic cholecystectomy. *JSJL: Journal of the society of laparoscopic surgeons*. 2001; 5(1):89-94.
- Singh K, Ohri A. Difficult laparoscopic cholecystectomy: A large series from north India. *Indian J Surg* 2006;68:205-08
- Jani K et al. Twenty years after Erich Muhe: Persisting controversies with the gold standard of laparoscopic cholecystectomy. *J Minim Access Surg*. 2006 Jun;2(2) 49-58.
- Keus F, Gooszen HG, van Laarhoven CJ. Open, small-incision, or laparoscopic cholecystectomy for patients with symptomatic cholelithiasis. An overview of Cochrane hepato-biliary group reviews. *Cochrane Database Syst Rev*. 2010;20(1):CD008318.
- Daradkeh SS, Suwan Z, Abu-Khalaf M. Preoperative ultrasonography, and prediction of technical difficulties during laparoscopic cholecystectomy. *World J Surg*. 1998; 22:75-7.
- Gupta N, Ranjan G, Arora M, Goswami B, Chaudhary P, Kapur A, et al. Validation of a scoring system to predict difficult laparoscopic cholecystectomy. *Int J Surg*. 2013;11(9):1002-6.
- Ingraham AM, Cohen ME, Ko CY, Hall BL. A current profile and assessment of North American cholecystectomy: results from the American college of surgeons national surgical quality improvement program. *J Am Coll Surg*. 2010; 211:176-186.
- Abdul Hussein, B., Hussein, Y., Nawar, A. and Al-Naggar, R., 2015. Conversion Rate of Laparoscopic Cholecystectomy to Open Surgery at Al Karamah Teaching Hospital, Iraq. *Surgical Science*, 06(05) : 221-226.
- Daradkeh S. Laparoscopic cholecystectomy: Analytical study of 1208 cases. *J Hepatogastroenterology* 2005; 52:1011-4
- Bingener-Casey, Richards ML, Strodel WE, Schwesinger WH, Sirinek KR. Reasons for conversion from laparoscopic to open cholecystectomy: a 10-year review. *J Gastrointes Surg* 2002;6: 800-5.
- Ahirwar, S., 2020. Case Series Of 200 Laparoscopic Cholecystectomy, Their Intra-Operative Finding And Post-Operative Complication.
- Thyagarajan, M., Singh, B., Thangasamy, A. and Rajasekar, S. (2020). Risk factors influencing conversion of laparoscopic cholecystectomy to open cholecystectomy.
- Genc, V., Sulaimanov, M., Ciipe, G., Basceken, S., Erverdi, N., Gurel, M., Aras, N. and Hazinedaroglu, S., 2011. What necessitates the conversion to open cholecystectomy? A retrospective analysis of 5164 consecutive laparoscopic operations. *Clinics*, 66(3) : 417-420.
- Aggarwal S et al. Role of gallbladder wall thickness in predicting laparoscopic operability prior to cholecystectomy: a retrospective analysis. *International Surgery Journal. Int Surg J*. 2018 May;5(5):1885-1888
- Leary et al. Beware the contracted gallbladder e Ultrasonic predictors of conversion. *The Surgeon Journal of the Royal Colleges of Surgeons of Edinburgh, and Ireland*. 2012.11.001
- Ghnnam, W., Malek, J., Shebl, E., Elbeshry, T. and Ibrahim, A., 2010. Rate of conversion and complications of laparoscopic cholecystectomy in a tertiary care center in Saudi Arabia. *Annals of Saudi Medicine*, 30(2) : 145-148.