

Original Article

# Gallbladder wall Thickness at Preoperative Sonography and its Impact on Operative Outcome of Laparoscopic Cholecystectomy

Gallbladder Wall Thickness at Sonography and its Impact of Laparoscopic Cholecystectomy

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## ABSTRACT

**Objective:** To explore the Gallbladder wall thickness at Preoperative Sonography and Its Impact on Operative Outcome of Laparoscopic Cholecystectomy.

**Study Design:** prospective observational study

**Place and Duration of Study:** This study was conducted at the department of general surgery Bacha Khan Medical Complex/Gajju Khan Medical College-SWABI from July 2023 to February 2024.

**Methods:** after taking permission from the ethical board of the institute. A total of 354 participants already diagnosed gallbladder diseases and planned for laparoscopic cholecystectomy were enrolled. Participants were categorized into four categories based on the gallbladder wall thickness determined by ultrasonography: normal thickness, which was up to 2 mm, mild thickness, which was 3–4 mm, moderate thickness, which was 5–6 mm, and severe thickness, which was more than 6 mm. A thickness of up to two millimeters was regarded as normal.

**Results:** The groups with moderate and severe wall thickness experienced higher conversion rate as well as intraoperative or post-surgical complications. The group that is significantly thicker has the highest incidence of complications. Consequences were seen in 100% of individuals in the significantly thickened group. Higher thickness groups had longer operating times and longer hospital stays after surgery. Gallbladder wall thickness as well as conversion rate, surgical complications, and duration of stay after surgery were all statistically significantly correlated.

**Conclusion:** It was concluded from our study that Gallbladder wall thickness at Preoperative Sonography results in a higher incidence of conversion to open procedures, increased surgical times, more intraoperative and postoperative problems, and a longer duration of hospital stay after surgery.

**Key Words:** Gallbladder; Wall thickness; Preoperative Sonography; Laparoscopic Cholecystectomy

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## INTRODUCTION

Open cholecystectomy has been replaced by elective laparoscopic cholecystectomy as the gold standard treatment for symptomatic gallstone disease.<sup>1</sup> Patients who have gallstone disease symptoms might be diagnosed with cholecystitis based on the thickness of their gallbladder wall.<sup>2</sup> The gallbladder wall Typically assessed by ultrasonography (USG) less than 3 mm.<sup>3</sup>

In 93% of individuals, USG measures the gallbladder wall thickness with an accuracy of within 1 mm. Cholecystitis is suggested if the gallbladder wall is thicker than 3 mm. This is the characteristic of cholecystitis, even though it is also present in many other disorders, such as gallbladder cancer & adenomyomatosis, where the gallbladder's width is directly related to the underlying pathology.<sup>4</sup> Predicting conversion and complications from laparoscopic cholecystectomy is crucial for gallstone disease treatment.<sup>5</sup> The preferred method for detecting gallstones is now abdominal ultrasonography, which is also helpful for recognizing any related biliary dilation that may be present. Due to its superficial position and lack of overlaying intestinal gas, GB diseases are frequently detected by USG. Although this finding is seen in a variety of different medical situations, gallbladder wall thickening is a common sonographic finding that has generated a lot of interest since it is thought to be a defining characteristic of acute cholecystitis.<sup>6</sup> One of the main determinants of the kind

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of surgical surgery used to treat gallstone disease is the thickness of the gallbladder wall. The purpose of this study was to determine Gallbladder wall thickness at Preoperative Sonography and Its Impact on Operative Outcome of Laparoscopic Cholecystectomy.

## METHODS

The current prospective observational study was carried out at the department of general surgery Bacha Khan Medical Complex/Gajju Khan Medical College-SWABI from July 2023 to February 2024 after taking permission from the ethical board of the institute. A total of 354 participants already diagnosed with gallbladder diseases and having planning for laparoscopic cholecystectomy were enrolled in the current study. Pregnant women and patients diagnosed with biliary enteric fistula, cholangitis, carcinoma gallbladder, acute biliary pancreatitis, perforated gallbladder, gallbladder polyps and portal hypertension were excluded. Information's like name of patients, sex, age, admission date, surgery and discharge date are among the basic patient information that were gathered. A thorough medical history, with particular attention to the patient's biliary colic symptoms, past colic episodes, jaundice, pancreatitis history, Co-morbidities, such as diabetes mellitus, hypertension, major diseases and past symptoms, abdominal examination, and general physical assessment were examined. All patients had symptoms that pointed to either simple or complex gallstone disease, including fever, flatulence, and discomfort in the right hypochondrium or epigastrium that became worse after eating. A sinologist performed a comprehensive examination on every individual and used abdominal ultrasonography to further assess them. Along with other indicators of gallstone disease, the thickness in the wall was evaluated at the fundus level. Participants were categorized into four groups based on the wall thickness of gallbladder determined by ultrasonography: normal thickness, which was  $\leq 2$  mm, mild thickness, which was 3–4 mm, moderate thickness, which was 5–6 mm, and severe thickness, which was more than 6 mm. A thickness of up to two millimeters was regarded as typical. Patients with gallstone disease were recommended to have a laparoscopic cholecystectomy. Based on the thickness of the gallbladder wall, those who were willing to have surgery were then split up into four groups. Depending on the patient's presentation and preferences, laparoscopic cholecystectomy procedures were then scheduled for either the same sitting or a separate time. Their length of hospital stay, rate of conversion to open procedure, duration of operation, and intraoperative results were all documented. Adhesions, bleeding, common bile duct damage, bile leak after surgery, and surgical site infection are the general categories into which intraoperative and postoperative problems were

categorized. All the data was analyzed by using SPSS version 24.

## RESULTS

A total of 356 individuals were enrolled in the current research age ranged from 18 to 90 years. 94(26.48%) of the subjects were between the ages of 41 and 50, 43 (12.0%) were older than 60 years. The average age at presentation was 45.01. With a standard deviation of 12.64 years, the mean age of men was 46.64 years, while the mean age of females was 45.01 years, with a standard deviation of 13.97 years. 93 (26.71%) of those included in our research who had laparoscopic cholecystectomy were men, and 263 (73.87%) were women (figure1).12 (4.51%) of the female participants and 10 (10.7%) of the male individuals had complications. In moderately thickened group the frequency of conversion was 40%. In the group of participants with highly thickened gall bladder walls, the frequency of conversion was 100%, whereas in patients with normal gall bladder wall thickness, it was 6.67%. The conversion rate and gallbladder wall thickness have a positive and statistically significant connection ( $p=\text{value}<0.0001$ ). The prevalence of conversion to open procedure and the correlation between gallbladder wall thicknesses is shown in table 1. 6% of the participants had intraoperative or postoperative complications. In the highly thickened group, the complications frequency was 100%, whereas it was 33.33% in the moderately thickened group. All individuals in the severely thickened group had complications. A significant statistical relationship of intraoperative and postoperative complications with gallbladder wall thickness was observed ( $p\text{-value}=\text{value}<0.0001$ ). The group that was considerably thickened had a longer mean operative time (126.4 mins), followed by the group that was moderately thickened (89 minutes), and the group that was normal had the shortest (52.97 minute). There is a statistically significant relationship between mean operating time and gallbladder wall thickness. The group with the thickest gallbladder wall, 11 ( $\pm 10.12$ ) days, had the longest postoperative hospital stay, the group with the moderate thickening (4.8 days), and the group with the normal gallbladder thickening had the shortest mean postoperative stay in hospital 2.8 ( $\pm 1.45$ ) days. Wall thickness of gallbladder and hospital mean postoperative stay had a significant statistical relationship ( $p\text{-value}=\text{value}<0.0001$ ). Time of surgery and postoperative stay in hospital and its association with gallbladder wall thickness is represented in table 2 while intra and postoperative complications in each group are represented in table 3.

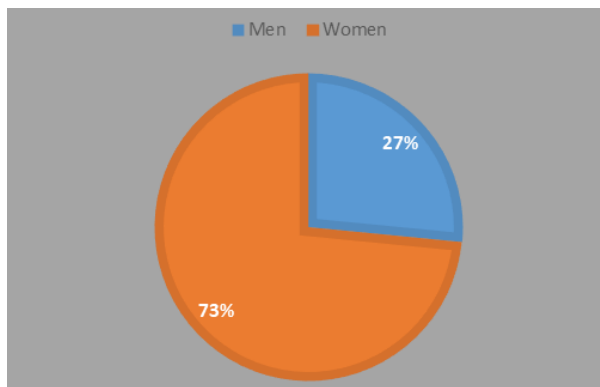


Figure No. 1: Percentage of Male and Female of in the study population.

Table No. 1: The prevalence of conversion to open procedure and the correlation between gallbladder wall thickness

Thickness of	Total no participants	Conversion	
		Yes (%)	No (%)

gallbladder			
Normal	248	2(11.1)	246(72.78)
Mild	86	4(22.22)	82(24.26)
Moderate	17	7(38.8)	10(2.9)
Sever	5	5(27.7)	0
Total	356	18(100)	338

Table No. 2: Operative time and postoperative hospital stay and its association with gallbladder wall thickness

Thickness of gallbladder	Duration of surgery Mean	Duration of Hospital stay after surgery Mean
Normal	52.98	2.80
Mild	60.60	3.0
Moderate	89	4.8
Sever	126	11
Value of p	Less than .0001	Less than .0001

Table No.3: Intra and postoperative complications in each group

Complications	Thickness of gallbladder				
	Normal	Mild	Moderate	Severe	Total
Normal	243	80	9	0	332
Leakage of bile	1	1	1	2	5
Hemorrhages	0	1	4	2	7
Jaundice	2	2	0	0	4
Infected wound	2	2	2	2	8
Total	248	86	16	6	356

## DISCUSSION

For gallstone disease, the use of laparoscopic cholecystectomy is currently the gold standard surgical treatment. However, a small percentage of them still end up becoming open operations because of poor surgical anatomy visibility brought on by inflammation, thick adhesions, irregular anatomy, as well as any other reason. Intraoperative or postoperative problems are rare in them. Both the surgeon and the patient's result may benefit from the identification of predicted indicators for conversion and complications.

In terms of demography, in our study female were dominant (73%) as compared to male (27%) in the ratio of 1:2.8, which is comparable to a study conducted in India by Chandra et al<sup>7</sup>, where the sex ratio was 1:1.64<sup>6</sup>. but was not similar with research conducted in the We studies.<sup>8</sup> Gallbladder wall thickness is an essential component for laparoscopic cholecystectomy, however other preoperative criteria have been discovered in the scientific literature for predicting of consequence. For gallbladder wall thickness, a professional radiologist uses ultrasound to determine the cutoff threshold, which is 2 millimeters. According to the current study's findings, the possibility of conversion to an open surgery and the likelihood of both intraoperative and

postoperative problems rise with the thickness of the gallbladder wall. In a similar vein, it increases the length of the hospital stay and the operating time. There was a 4.28% total conversion percentage to open procedure. It is 5–10% less than the published literature<sup>9</sup> and comparable to a Chandra et al research.<sup>7</sup> Similar to previous research, there was a positive correlation and a greater conversion rate in the group with thicker gallbladder walls. Dense inflammatory adhesions that developed subsequent to cholecystitis or empyema gallbladder were the cause of conversion in most instances. These adhesions caused conversion and prevented safe dissection. Both intraoperative and postoperative complications were accounted in the current study. Compared to intraoperative problems, postoperative complications appeared more common. Postoperative problems occurred 4% which is somewhat lower than the available literature.<sup>4</sup>

Only 4 individuals required retrograde endoscopic cholangiopancreatography (ERCP)-guided stenting; the most frequent postoperative complication was bile leak, which resolved on its own after the 10th postoperative day. The current research also considered postoperative duration of stay and surgical time as criterion. The group with normal wall thickness had the shortest mean operative duration, at 52.97 minutes with a standard

deviation of 9.27 minutes. Similar to the literature, the mean operating time increased as the thickness of the gallbladder wall increased.<sup>10</sup> the postoperative duration of the stay, which measures the outcome after surgery, was another factor that became part of this research. The group with the normal gallbladder thickness of the wall had the shortest mean postoperative duration (2.8 days with Standard deviation of 1.45 days), whereas the group with the substantially thickened gallbladder had the longest (11 days with SD of 10.12 days). Surgical site infection, postoperative discomfort, and postoperative bile leak were the contributing causes to the lengthening of stay. The duration of stay after surgery is somewhat longer than what has been documented in the literature.<sup>10</sup>

## CONCLUSION

It was concluded from our study that Gallbladder wall thickness at Preoperative Sonography results in a higher incidence of conversion to open procedures, increased surgical times, more intraoperative and postoperative problems, and a longer duration of hospital stay after surgery. Wall thickness of gallbladder, rate of complication, conversion rate, intraoperative duration, and postoperative hospital stay all exhibited positive correlations in our research.

### Author's Contribution:

Concept & Design of Study: Muhammad Ibrahim Shuja  
 Drafting: Faiz ur Rahman, Aamir Ali Khan  
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 Revisiting Critically: Muhammad Ibrahim Shuja, Faiz ur Rahman  
 Final Approval of version: By all above authors

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