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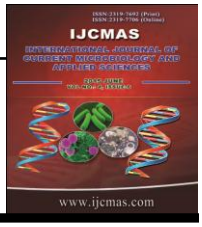


**Original Research Article**

# The impact of the gall bladder wall thickness on surgical management in patients undergoing cholecystectomy - A prospective study

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Laparoscope, Gall bladder, Cholecystectomy, Sonography, Patient

**A B S T R A C T**

Laparoscopic cholecystectomy is established as the primary procedure for the vast majority of patients with benign gall bladder disease. The aim of the study was to evaluate the impact of gallbladder wall thickness, on the outcome of cholecystectomy and to evaluate any intra or postoperative complications related to it. This prospective clinical trial conducted in patients undergoing cholecystectomy by open or laparoscopic method in a single surgical unit of M.B. Govt. Hospital, Udaipur between March, 2014 and November, 2014. Abdominal sonography performed in 48 patients before cholecystectomy. The surgeon re-verified sonography findings in the operating room. Out of 48 patients with cholecystolithiasis on sonography, we encountered straightforward normal cholecystectomy in 26 patients (54.16%) and difficult cholecystectomy in 22 patients (45.83%).

## Introduction

Gallbladder wall thickening is an indicator of cholecystitis in patients presenting with symptoms of gallstone disease. The aim of the study was to evaluate the impact of gallbladder wall thickness, on the outcome of cholecystectomy and to evaluate any intra or postoperative complications related to it.

The normal gallbladder wall should measure less than 3mm (Khan *et al.,* 2012). While a thickened gallbladder wall is one sign of cholecystitis (acute cholecystitis, chronic cholecystitis, acalculous cholecystitis, xanthogranulomatous cholecystitis, adenomyomatosis cholecystitis), there are number of other normal and pathologic states which can lead to this finding as well: e.g., normal contracted gallbladder, gallbladder carcinoma, hypoalbuminemia, alcoholic liver disease, increased portal venous pressure, acute viral hepatitis, heart failure, renal disease, ascites etc.

A normal gallbladder can exhibit a thickened wall of 4-5mm due to contraction alone. Typically this will occur in the setting of a lower-than-normal gallbladder volume. Hypoalbuminemia is a major culprit in gallbladder thickening alone or as a secondary mechanism in patients with cirrhosis, heart failure or renal disease. Other speculated mechanisms of gallbladder wall thickening in the disease states above are increased portal venous pressure and generalized edema.

Gallbladder wall thickening is often evident in adenomyomatosis, cholecystitis and gallbladder cancer as well. In these settings the gallbladder wall diameter is directly a part of the pathology, and not a side effect of some other process (Wegener *et al.,* 1987; van Breda *et al.,* 2007).

It is one of the major factors in determining the type of surgical procedure that may need to be performed while dealing with gall stone disease.

## Patients and Methods

This study was conducted in patients undergoing cholecystectomy by open or laparoscopic method in a single surgical unit of M.B. Govt. Hospital, Udaipur.

This prospective study included all patients undergoing cholecystectomy irrespective of age, sex, physique or parity.

Indication for cholecystectomy was for a pathology requiring cholecystectomy alone e.g. gall stone disease, or cholecystectomy was performed as an allied procedure for a surgical procedure like Whipple's procedure, choledochal cyst excision, etc.
Parameters observed in each patient were-

1. Detailed history of the patient with special emphasis on symptoms of biliary colic, history of previous attacks of colic, jaundice, history suggestive of pancreatitis etc.
2. History of comorbid conditions including DM, HT, significant illnesses and previous symptoms.
3. General physical examination.
4. Abdominal examination.
5. Routine Investigations, including CBC, BT, CT, PT, INR, HIV, $HB_sAg$, Blood Urea, S. creatinine, Blood Sugar etc.
6. Findings of specific investigations like Ultrasonography (USG) of abdomen, MRI, MRCP, LFTs and HPE were noted. Findings on certain imaging studies like CECT abdomen or MRI/ MRCP were noted whenever performed, because these studies were not performed in all patients undergoing cholecystectomy.
7. Intra operative finding including gall bladder wall thickness, number of stones, empyema gall bladder, adhesions, Calot's triangle anatomy, cut section appearance, level of difficulty, duration of surgery, etc. The duration of each procedure was recorded starting just after insertion of the three parts till removal of all ports, i.e. time of insertion of ports and time of closure of port sites were not recorded.
8. Post operative morbidity / Mortality

### Histomorphological study

Histomorphological study was carried out on relatively fresh samples by light microscopic method in a standard fashion.

### Gallbladder wall thickness measurement:

The thickness of the gall bladder wall was measured by fine dissecting method. A longitudinal incision was made by sharp B-P blade through the peritoneal smooth surface of the gall bladder from fundus to neck and interior of the gall bladder cleaned with jets

of tap water. Then the thickness of gall bladder wall was measured in mm with the help of digital slide caliper at 3-5 different places and the maximum value was accepted for inclusion in the study. For taking measurements the non peritoneal surface was not chosen due to rough and irregular surface[1].

**Results and Discussion**

Out of 48 patients with gall bladder disease we encountered straight forward normal cholecystectomy in 26 patients (54.17%). There were 21 patients (80.77%) with normal gall bladder wall thickness and 5 patients (19.23%) with thick wall gall bladder. There were adhesions in 10 patients (38.46%) but most of them were easy to separate from the gall bladder. No postoperative complications were recorded apart from the usual, mild abdominal pain mostly at wound sites. We put a suphepatic tube drain in only six patients and it was removed the following day with only a few milliliters of blood. The duration of cholecystectomy ranged from 25–40 minutes.

We encountered difficulties at cholecystectomy in 22 (45.83%) of whom (31.82%) has normal gall bladder wall thickness while (68.18%) had thick walled gall bladders. Difficulty at cholecystectomy as a dependent variable was based on following operative parameters - duration of surgery, bleeding, and dissection of calot's triangle, dissection of gall bladder wall, adhesions and difficulty of gall bladder extraction.

We faced adhesions in 90.91% of all those "difficult" procedures and they were dense and not easy to separate from the gall bladder and nearby structures and therefore required time for safe dissection to free the operative field. We left a suphepatic tube drain in 13 patients (59.69%) and all were removed within 24 hours. The duration of a "difficult" cholecystectomy was > 40 minutes.

Gall bladder wall thickness was an important predictor of difficulties during cholecystectomy. We encountered such difficulties in 20 (41.67%) of patients with gall bladder wall thickness greater than 3 millimeter. These findings were in agreement with study done by Ali Dawood (Dawood *et al.,* 2011).

All histopathological examination of the gall bladder revealed chronic inflammation except one case of malignancy and one of acute or chronic cholecystitis. According to previous study done by Wibbenmeyer (Wibbenmeyer *et al.,* 1995) showed that only 1% of the cholecystectomy performed for cholelithiasis result in incidental finding of gall bladder carcinoma.

Now-a-days laparoscopic cholecystectomy is considered as a gold standard for the treatment of symptomatic gall stones, but the procedure is technically more demanding than the classical open cholecystectomy especially in difficult cholecystectomy (Corr *et al.,* 1994; Escallon *et al.,* 1985; Liu *et al.,* 1996).

The aim of the study was to evaluate the impact of gallbladder wall thickness, on the outcome of cholecystectomy and to evaluate any intra or postoperative complications related to it.

Our study shows that gall bladder wall thickening can predict difficulty during cholecystectomy, we found that thickened gall bladder wall are the most accurate predictors of potential operative difficulty, confirming the experience of European

surgeons who reported that a thickened gall bladder wall was associated with a technically difficult operation and prolonged operation time. The findings of this study are in agreement with those reported by Corr (Corr *et al.,* 1994), who found a significant association between a thickened gall bladder wall and operative difficulty.

On the part of patients benefit, they can be informed of possibility of complications and conversion to the open procedure. The patient can be mentally prepared better and can adjust his or her expectations accordingly. In addition, the surgeon can directly perform the classical open cholecystectomy in the patients with presumed difficult surgery thus saving operating time and the conversion rate.

A study by Fuchs (Fuchs *et al.,* 1942) found that laparascopy may even be advantageous for patients who are difficult to operate on. Although conversion to laparotomy alone does not worsen patients' outcome, several reasons support the preoperative assessment of the feasibility of laparoscopy. It is important to have some idea about the individual patient's risk when obtaining informed consent. Also cost efficiency aspects should be considered because the equipment for an unsuccessful laparoscopy is expensive. Identifying potential difficulties is especially important in a teaching hospital where an open cholecystectomy has become a rare procedure (Schauer, 1994) and requires an experienced surgeon.

Jantsch (1987) reported that a thickened gall bladder wall of more than 4 mm frequently indicates acute cholecystitis. In 84% of the patients with a gall bladder wall thickening (> 4 mm) a that study, surgeons encountered surgical difficulties. Similar findings have been reported by Gai and Thiele (1992).

In our study, a gall bladder wall thickness of more than 3 mm was significantly associated with difficult surgical preparations and with the histopathologic report of chronic inflammation.

The inflamed gall bladder wall becomes friable and the enlarged vessels are more likely to break. Inflammation may also lead to bleeding that compromises orientation and the visual exposure at surgery, forcing surgeons to change the operative access.

Thickening of the gall bladder wall to > 3 mm that is related to ongoing acute inflammation and inflammatory infiltration of the neck and Calot's triangle are other important causes of difficulty during cholecystectomy (Cwik *et al.,* 2000; Eldar *et al.,* 1998; Fried *et al.,* 1994; Michalowski *et al.,* 1998; van der Steeg *et al.,* 2011).

**Table.1** Predictors & value of findings for patients undergoing cholecystectomy

| **Level of Difficulty** | **Number of patients** | **Laparoscopic / Open Cholecystectomy** | | **Thickness of Gall Bladder Wall** | | **Presence of Adhesions** | **Requirement of Drain** | **Duration of Operation (in min)** |
|---|---|---|---|---|---|---|---|---|
| | | **Lap** | **Open** | **> 3 mm (Thick)** | **≤ 3 mm (Thin)** | | | |
| Normal | 26 | 15 | 11 | 5 | 21 | 10 | 6 | 25-40 |
| Difficult | 22 | 8 | 14 | 15 | 7 | 20 | 13 | > 40 |

**Fig.1** Gall bladder wall thickness measurement in mm with help of digital Vernier caliper



**Fig.2** USG finding of normal gall bladder wall thickness


**Fig.3** USG finding of thickened gall bladder wall thickness

**Fig.4** Percentage of different type of operations

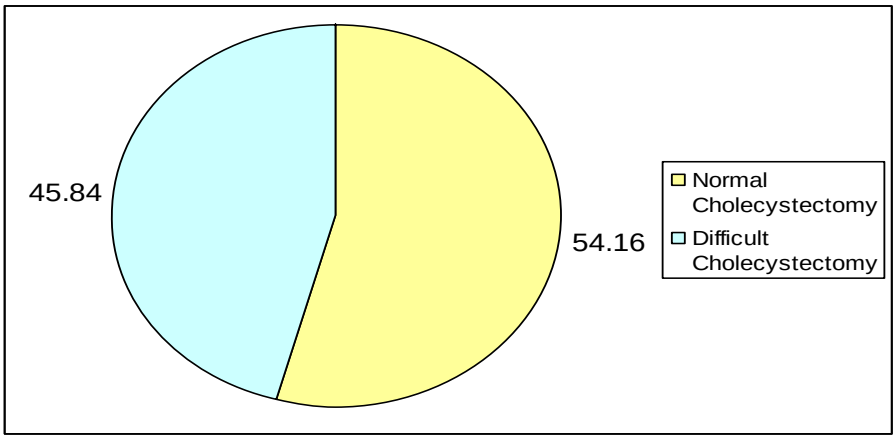


**Fig.5** Percentage of gall bladder wall thickness in different operations

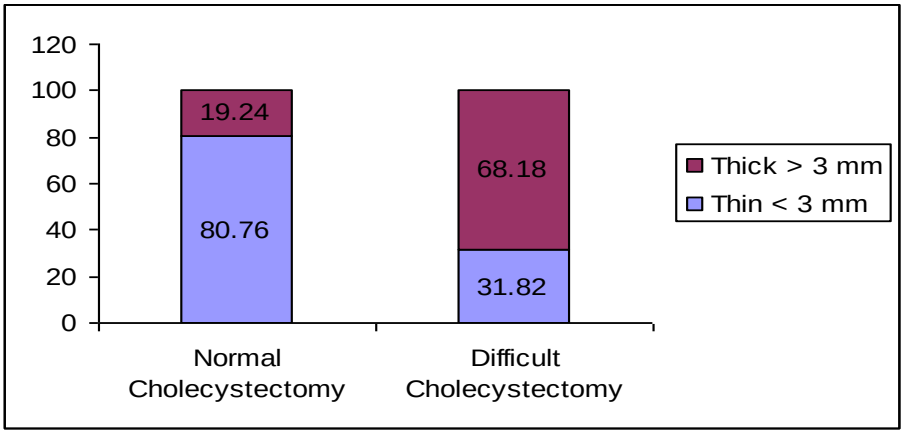
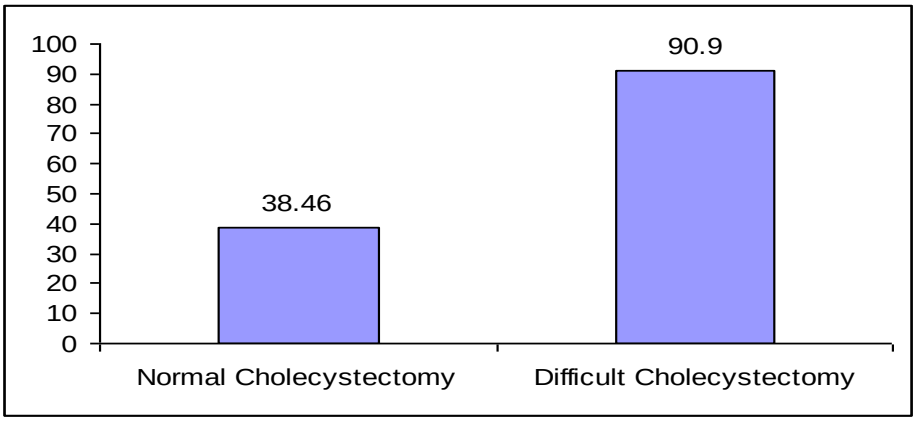



**Fig.6** Presence of adhesions around gall bladder in different types of operations




Difficulty during cholecystectomy has been associated with a longer operative time, the use of more anesthetics, increased overall morbidity, a higher rate of infective complications, longer recovery time, longer hospital stay, higher cost, and greater patient dissatisfaction (Lipman *et al.*, 2007; Cho *et al.*, 2004; Trondsen *et al.*, 1998; Shapiro *et al.*, 1999; Ilie *et al.*, 2009).

Thus, the ability to predict preoperatively the technical difficulties that may occur during surgery in order to choose between the laparoscopic or the open approach is desirable.

In conclusion, an accurate preoperative or intra operative diagnostic tool is mandatory for planned gall bladder surgery to provide information for the selection of the most appropriate approach and to avoid intra operative difficulties. It appears that gall bladder wall thickening is the best predictor for difficulty during cholecystectomy.

Now-a-days laparoscopic cholecystectomy is considered as a gold standard for the treatment of symptomatic gall stones, but the procedure is technically more demanding than the classical open cholecystectomy especially in difficult cholecystectomy. The main aim of this study

was to evaluate some preoperative factors, which can reliably predict the difficulty during cholecystectomy. Gall bladder wall thickness was an important predictor of difficulties during cholecystectomy. We encountered such difficulties in 20 (41.67%) patients with gall bladder wall thickness greater than 3 millimeter. In our study, we found a good correlation between gall bladder wall thicknesses with difficult during cholecystectomy.

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