e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(9); 514-517

Original Research Article

Determination of the Gallbladder Wall Thickness in Patients with Cholecystitis and Cholelithiasis by Ultrasonography

Manish Kumar Singh[1], Rahul Singh[2], Ramjee Thakur[3]

[1]SMO, Health Department Bihar Govt., Senior Resident, Department of Surgery, Patna Medical College and Hospital, Patna, Bihar.

[2]Assistant Professor, Department of Surgery, Narayana Medical College and Hospital, Sasaram, Bihar

[3]Retd. Associate Professor, Upgraded Department of Surgery, Darbhanga Medical College and Hospital, Laheriasarai, Bihar

Received: 25-06-2023 / Revised: 28-07-2023 / Accepted: 30-08-2023

Corresponding author: Dr. Rahul Singh

Conflict of interest: Nil

Abstract:

Background: Due to the involvement of experts with experience in the field of imaging diagnosis and the advancement of technologies for ultrasonography (US), the concept of the thickening of the gallbladder wall, which is a contentious topic for sonographers and is frequently found and taken into consideration, has been changing recently. The purpose of the study was to estimate the epidemiology by using ultrasonography to measure the gallbladder (GB) wall thickness in patients with cholecystitis and cholelithiasis.

Methods: This case-control study took place in a hospital. The study included individuals with cholecystitis and cholelithiasis between the ages of 15 and 70, of either sex. In the fasting condition, the thickness of the GB wall was measured. The study used 50 samples in total, 36 cases (with diseased bladders) and 14 controls (with normal bladders).

Results: More than one-third of cases (38.9%) were between 30 and 40 years. The mean age of cases and controls was 42.22 ± 12.81 and 35.43 ± 11.85 years, respectively. More than one-third of both cases (36.1%) and controls (35.7%) were males. The GB wall thickness was significantly (P = 0.005) higher among the cases (4.06 ± 2.28 mm) than that of controls (2.22 ± 0.67 mm). Full distention of the GB was in more than half of both cases (69.4%) and controls (57.1%). Partial distended was in 11.1% of cases and in 21.4% of controls. Contracted (8.3%) and over distended (2.8%) were only seen among cases. The GB wall thickness of ≥3 mm was among 66.7% of patients and in 14.3% of controls. The GB wall thickness of <3 mm was 92% lower in cases compared to controls (odds ratio = 0.08, 95% confidence interval = 0.01–0.43, P = 0.001).

Conclusion: Patients with cholecystitis and cholelithiasis were shown to have thicker GB walls on ultrasonography compared to the control group.

Keywords: Carcinoma, cholecystitis, cholelithiasis, epidemiology, gallbladder wall thickness, ultrasonography.

Introduction

Acute cholecystitis is the medical term for an acute inflammation of the gallbladder wall. In many cases, the underlying cause of acute calculous cholecystitis is an obstruction in the cystic duct caused by an impacted stone in the cystic duct or neck of the gallbladder.

Acute acalculous cholecystitis, which is a kind of acute cholecystitis, can also appear independently of cholelithiasis. Patients who do not previously have biliary symptoms, such as colic pain, are extremely unlikely to develop acute cholecystitis [1].

Aside from acute pyelonephritis, cholecystitis, pancreatitis, diverticulitis, heart failure, and hepatitis are other illnesses that can cause thickening of the gallbladder walls [2]. Due to its accessibility, affordability, and safety, ultrasonography is the first imaging technique used to diagnose and evaluate the biliary system [3, 4, 5]. In the Pre-operative (24 to 48 hours) period before surgery, ultrasound may be used as a secure and efficient alternative to intraoperative endoscopic retrograde cholangio pancreatography (IERC) [6].

Materials and Methods

This was a hospital-based case–control study conducted at Upgraded Department of Surgery, Darbhanga Medical College and Hospital, Laheriasarai, Bihar from January 2017 to December 2017. The study (cases) included patients with cholecystitis and cholelithiasis between the ages of 15 and 70, regardless of

gender. The previous night, all patient cases (36) and controls (14) were instructed to abstain from food and liquids. When individuals had additional abdominal disorders detected by ultrasonography, control groups (normal gallbladder) were gathered. We measured the GB wall thickness while fasting. In total, the study included 50 patients, 36 cases, and 14 controls. Frequencies, percentages, and mean and standard deviation are used to present the results. The relationships of categorical variables between cases and controls were discovered using the Chi-square test. The difference in GB wall thickness between patients and controls was compared using the unpaired t-test. It was determined the odds ratio (OR) and its 95% confidence interval (CI). It was deemed statistically significant at P <0.05. The SPSS software 16.0 version (Chicago, Inc., IL, USA) was used for the entire analysis.

Results

More than one-third of cases (38.9%) and 28.6% of controls were between the age group of 30 and 40 years. The average age of cases and controls was 42.22 ± 12.81 and 35.43 ± 11.85 years, respectively. More than half of both cases (63.9%) and Controls (64.3%) were females. No significant (P > 0.05) difference was observed in age and gender between cases and controls showing comparability of the groups in terms of age and gender [Table 1].

Smoking was in 13.9% in cases and in14.3% in controls. Alcohol habit was in 11.1% of cases and in 7.1% of controls [Table 2]. The GB wall thickness was significantly (P = 0.005) higher among cases (4.06 ± 2.28) than that of controls (2.22 ± 0.67) [Table 3]. GB wall thickness ≥3 mm was among 66.7% of patients and in 14.3% of controls.

The GB wall thickness <3 mm was 92% lower in cases compared to controls (OR = 0.08, 95% CI = 0.01–0.43, P = 0.001) [Table 4]. A full distention of the GB was among more than half in both cases (69.4%) and controls (57.1%). Partial distended was seen in 11.1% of cases and in 21.4% of controls. Contracted distention was observed in 8.3% of cases only [Table 5].

Table 1: Distribution of demographic profile of patients between cases and controls

Demographic Profile	Cases (n=36), n (%)	Control (n=14), n (%)	p-value
Age (years)			0.17
<30	4(11.1)	5(35.7)	
30-40	14(38.9)	4(28.6)	
41-50	10(27.8)	4(28.6)	
>50	8(22.2)	1(7.1)	
Mean±SD	42.22±12.81	35.43±11.85	
Gender			
Male	13(36.1)	5(35.7)	0.97
Female	23(63.9)	9(64.3)	

aChi-square test. SD: Standard deviation

Table 2: Distribution of personal habit between cases and controls

Personal Habit	Cases (n=36), n(%)	Control (n=14), n(%)	p-valuea
Smoking	5(13.9)	2(14.3)	0.91
Alcohol	4(11.1)	1(7.1)	
None	27(75.0)	11(78.6)	

aChi-square test.

Table 3: Comparison of the mean gallbladder wall thickness between cases and controls

Groups	Gallbladder thickness (mm), mean±SD
Cases	4.06±2.28
Controls	2.22±0.67
Pa	0.005*

aUnpaired t-test, *Significant, SD: Standard deviation

Table 4: Comparison of the gallbladder wall thickness between cases and controls

Gallbladder thickness (mm)	Cases (n=36), n(%)	Control (n=14), n(%)	OR (95%CI), Pa
<3	12(33.3)	12(87.7)	0.08(0.01-0.43), 0.001*
≥3	24(66.7)	2(14.3)	

aChi-square test. *Significant. OR: Odds ratio, CI: Confidence interval

Table 5: Comparison of distention of the gallbladder between cases and controls

Distention of gallbladder	Cases (n=36), n (%)	Control (n=14), n (%)	OR (95%CI), Pa
Contracted	3(8.3)	0(0.0)	NA
Full	25(69.4)	8(57.1)	
Overdistended	1(2.8)	0(0.0)	
Partial distended	4(11.1)	3(21.4)	
None	3(8.3)	3(21.4)	

aChi-square test. NA: Not applicable (being >1 0s in controls)

Discussion

Despite being rare, gall bladder cancer is the fifth most frequent gastrointestinal malignancy and is discovered in 1% to 3% of cholecystectomy specimens.[7] 2.5 fresh cases are identified annually per 100,000 people. The significant death rate associated with GB is a result of the disease typically being discovered at an advanced stage. This is because there aren't many symptoms.[8]

The prevalence of GBC is particularly high in Chile, Poland, India, and Japan. Both North Indian women (21.5/100,000) and female Native American Indians (14.5/100,000) are found to have a high incidence of GBC. [9] In the current study, 28.6% of controls and 38.9% of cases were between the ages of 30 and 40. The mean ages of the cases and controls were, respectively, 42.22±12.81 and 35.43±11.85 years. According to Agrawal et al., patients with acute and chronic cholecystitis tended to be between the ages of 30 and 40, with an average age of 37. [10]

In this study, there were more women than men, which was similar with the study of Agrawal et al., in which 70% of the patients with acute and chronic cholecystitis were women.[10] According to Hasan et al.[11], the youngest patient in this series was 28 years old and the oldest was 79 years old.

Reported that female is more affected than male these ratioare 1:5 1:2. In this study, the GB wall thickness of ≥3 mm was among 66.7% of patients and in 14.3% of controls. The GB wall thickness of <3 mm was 92% lower in cases compared to controls (OR = 0.08, 95%CI = 0.01–0.43, P = 0.001). Agrawalet al. [6] observed that the GB wall was >3 mm in 25.5% of patients with acute calculus cholecystitis and >3 mm in 24.5%of patients with chronic calculous cholecystitis. Engel et al. [12] reported that majority of healthy individuals (97%) had the gallbladder wall thickness of <2 mm. Hasan et al. [11] reported that there was a strong correlation between cholelithiasis and GBC, with gallstones found in nearly 80% of all cases. GBC can be as focal or diffuse asymmetric wall thickening in 20%–30% cases.[13]

The maximum thickness for a typical GB wall, according to numerous writers, is 3 mm. However, in individuals who have not been fasting properly, the parietal thickness may be more than this threshold. This is a result of the smooth muscle of the organ contracting.[8] When chronic cholecystitis has been present for a long time, GB contraction is observed.[14] In this study, more over half of both patients (69.4%) and controls (57.1%) had a completely distended GB. 11.1% of cases and 21.4% of controls had partial distension. 8.3% of cases had contracted distention, which was the only case.

Conclusion

Patients with cholecystitis and cholelithiasis were shown to have thicker GB walls on ultrasonography compared to the control group. All cases where the GB wall thickness is 7 mm or above should undergo a biopsy for histological investigation in order to rule out the presence of cancerous GB and improve prognosis.

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