J. Dhaka National Med. Coll. Hos. 2025; 31 (01): 08-13

ORIGINAL ARTICLE

Diagnosis of chronic calculus cholecystitis using ultrasonography and co-related with per operative findings and histopathological findings in adult

Jamal Abdul Naser[1*], Md. Afzal Hosssain[2], Shamima Jahan[1], Md. Aminullah[3], Farjana Basher Annee[4]

[1]Department of Surgery, Dhaka National Medical College, Dhaka, Bangladesh, [2]Department of Urology, Dhaka National Medical College, Dhaka, Bangladesh, [1]Department of Surgery, Dhaka National Medical College, Dhaka, Bangladesh, [3]Department of Paediatric Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, [4]Department of Paediatric Dentistry, Dhaka National Medical College, Dhaka, Bangladesh.

Abstract

Background: Gall bladder diseases are most commonly secondary to cholelithiasis. While most cases of gall stones are asymptomatic, some cases may progress to severe symptomatic disease occasionally into malignancy. Early and accurate diagnosis allows prompt treatment and reduces both morbidity and other complications.

Objectives: To access the clinical diagnosis of chronic cholecystitis using ultrasonography and co-relation with per operative findings and histopathological examination findings.

Methods: This is a descriptive type of observational study which was conducted at department of Surgery, Dhaka National Medical College Hospital, over a period of 12 months from 6th December 2017 to 5th December 2018. Total 150 patients clinically diagnosed of chronic cholecystitis with laboratory profile, imaging proven in surgery department of Dhaka National Medical College Hospital were included.All patient underwent laparoscopic cholecystectomy but few patients needed conversion into open cholecystectomy due to severe adhesion with surrounding structures. Resected gall bladder was sent for histopathological examination. Comparison was done by tabulation and graphical presentation in the form of tables, pie chart, bar diagrams etc.

Results: In this study, Ultrasonography findings revealed that, gallbladder size was normal in 97(64.66%), contracted in 47(31.33%), distended in 6(4%) patients. Most of the patients gall bladder wall thickness was within normal limit (1-3 mm)found in 137(91.33%) who is diagnosed clinically as a case of chronic calculus cholecystitis. Thick wall gall bladder found in 13(8.66%) patients. Gallbladder contains multiple stone in 99(66%), single stone in 32(21.33%), biliary sludge in 19 (12.66%) patients. Both Wall-Echo-Shadow and Peri-cholecystitic fluid was present in 4(2.6%) patients separately. Per operatively, Gall bladder found distended in 9(6%) patients among them 7(4.66%) were mucocele and 2(1.33%) were empyema. Normal sized gall bladder found in 92 (61.33%) and contracted in 49(32.66%) patients. Normal wall thickness found 126(84%) patients and rest 24(16%) had thick gall bladder wall. Gallbladder contains multiple stone in 102(68%) patients. Single stone and biliary sludge found in 29(19.33%) and 19(12.66%) respectively. No adhesion presents in 39(26%) cases and adhesions in Callot's triangle found in 47.33%. Adhesions with inferior surface of liver, non visualisation of Callot's triangle anatomy and partially intrahepatic gall bladder found in 14.66%, 09.33% and 02.66% patients respectively. Due to difficulty, 7(4.66%) cases need to convert into open cholecystectomy. Histopathological findings revealed that, 135 (90%) specimens showed evidence chronic cholecystitis, 9.33% acute cholecystitis. Only 1 (0.66%) gallbladder showed evidence of adenocarcinoma of papillary variety along with cholelithiasis.

Conclusions: Ultrasonography is a good diagnostic tool in the diagnosis of chronic calculus cholecystitis and can be used at all level of health care center. All the cholecystectomy specimens operated for symptomatic gall stone diseases are must sent for histopathological examination to rule out incidental gall bladder carcinoma.

Keywords: Chronic calculus cholecystitis, ultrasonography, histopathological examination.

Introduction

Chronic calculus cholecystitis is the predominant benign disease of the gallbladder, commonly observed in middle-aged females.[1] Chronic cholecystitis nearly invariably occurs in conjunction with cholelithiasis. Approximately 20 million individuals in the USA are afflicted with gallstones, resulting in over one million hospital admissions and 700,000 surgical interventions annually.[2] Gallstones are found in roughly 6.5% of males and 10.5% of females.[3] The incidence of gallstones escalates with advancing age. By age 70, 15% of men and 24% of women possess gallstones, with these figures rising to 24% and 35%, respectively, by age 90.[4] Chronic calculus cholecystitis is a prevalent illness necessitating surgical intervention and is typically linked to numerous consequences if not addressed. More than 70% of individuals with gallstones exhibit no symptoms.[5] Most stones are unintentionally discovered during normal abdominal ultrasonography.[6] The annual chance of experiencing symptoms or consequences associated with gallstones is roughly 1–4%.[7] The predominant consequences of gallstones encompass biliary colic, acute cholecystitis, common bile duct stones, and gallstone pancreatitis.[8] The most prevalent manifestation of gallstone disease is biliary colic pain. The pain commences abruptly in the epigastric area or right upper quadrant and may extend to the back in the interscapular region.[9] Intolerance to fatty foods and flatulent dyspepsia are prevalent. Patients may occasionally exhibit fever, nausea, vomiting, anorexia, jaundice, and abnormal intestinal transit. Accurate diagnosis of "symptomatic" gallstone patients is crucial, as the primary justification for cholecystectomy is an episode of pain. The diagnosis is corroborated by results from abdominal ultrasonography and laboratory tests.[10]

Gallbladder disease is generally diagnosed using imaging techniques. These diagnostic approaches possess advantages and disadvantages, and their accuracy significantly fluctuates. A particular approach may be favored over another based on the specific gallbladder illness or the symptoms exhibited.[11] Transabdominal ultrasonography is the definitive method for diagnosing gallbladder stones.[11] The method is non-invasive, readily accessible, and demonstrates exceptional sensitivity and specificity (exceeding 95%) for identifying gallstones larger than 2 mm.[8] Ultrasonography offers supplementary data regarding stone dimensions, quantity, and mobility within the gallbladder. [12] The gallbladder volume and wall thickness, specifically a diffuse thickening of the gallbladder wall exceeding 3 mm, may be observed in cases of acute or chronic cholecystitis.[13]

Cholecystectomy, conducted via either laparoscopic or open technique, is the final treatment for cholecystitis in the United States.[14] Laparoscopic cholecystectomy is increasingly utilized as the treatment for cholecystitis, associated with reduced morbidity, mortality, hospital duration, and costs compared to open cholecystectomy. Complications of laparoscopic cholecystectomy included bile duct injury, intestine and vascular injuries, postoperative bile leak from the cystic duct, conversion to open cholecystectomy, port site wound infection, and port site hernia.[15]

Histopathological examination findings are crucial for the confirmed diagnosis of chronic calculus cholecystitis and are important to exclude malignancy. Notwithstanding significant advancements in addressing gastrointestinal tumors, gallbladder cancer continues to be a malignancy with a dismal prognosis. In addition to its aggressive biological behavior, the absence of screening methods and dependable biomarkers for early detection significantly contribute to the typically delayed diagnosis of gallbladder cancer, often discovered incidentally following cholecystectomy.[16]

Materials & Methods

A hospital based descriptive type of observational study was conducted over a period of twelve months from 6th December 2017 to 5th December 2018 in the Department of Surgery, Dhaka National Medical College Hospital after obtaining requisite consent from the patients. Total 150 patients clinically diagnosed as chronic calculus cholecystitis with proper history taking, physical examination, laboratory profile, ultrasonography proven in surgery department of Dhaka National Medical College Hospital were enrolled for this study. Patient investigations report and ultrasonography report were observed. Patients underwent laparoscopic cholecystectomy and per operative findings were co-related with

***Correspondence:** Dr. Jamal Abdul Naser, Assistant Professor, Department of Surgery, Dhaka National Medical College, Dhaka, Bangladesh, Email: regan1121@yahoo.com

Received: 27.05.2024 **Accepted:** 26.02.2025

ultrasonography report and specimen (resected gall bladder) was sent for histopathological examination. Histopathology report was observed and co-relation done with clinical diagnosis. The gathered data were input into the computer and analyzed utilizing SPSS (version 20.1).

Results

Table-I: Ultrasonographic findings of chronic cholecystitis patients (n=150)

USG findings	Number of patients	Percentage (%)
Gall bladder size:		
Normal:	97	64.66
Contracted:	47	31.33
Distended:	06	04
Wall thickness of gallbladder:		
1-3 mm	137	91.33
>3 mm	13	8.66
Gallbladder content:		
Biliary sludge	19	12.66
Single stone	32	21.33
Multiple stone	99	66
Wall-Echo-Shadow of gall bladder	04	2.6
Peri-cholecystitic fluid collection	04	2.6

Ultrasonography findings revealed that, gallbladder size was normal in 97(64.66%), contracted in 47(31.33%), distended in 6(4%) patients. Most of the patients gall bladder wall thickness was within normal limit (1-3 mm)found in 137(91.33%). Thick wall gall bladder found in 13(8.66%) patients. Gallbladder contains multiple stone in 99(66%), single stone in 32(21.33%), biliary sludge in 19(12.66%) patients. Both Wall-Echo-Shadow and Peri-cholecystitic fluid was present in 4(2.6%) patients seperately.

Table-II: Per operative findings of laparoscopic cholecystectomy (n=150)

Per operative findings	Number of patients	Percentage (%)
Gall bladder size:		
Normal:	92	61.33
Contracted:	49	32.66
Distended:	09	06
Wall thickness of gallbladder:		
Normal	126	84
Thickened	24	16
Gallbladder content:		
Biliary sludge	19	12.66
Single stone	29	19.33
Multiple stone	102	68
Adhesion with surrounding structures:		
No adhesion	39	26
Adhesions in Callot's triangle	71	47.33
Adhesions with inferior surface ofliver	22	14.66
Non visualisation of Callot's triangle anatomy	14	09.33
Partially intrahepatic GB	04	02.66
Mucocele	07	4.66
Empyema	02	1.33
Needs to convert into open cholecystectomy	07	4.66

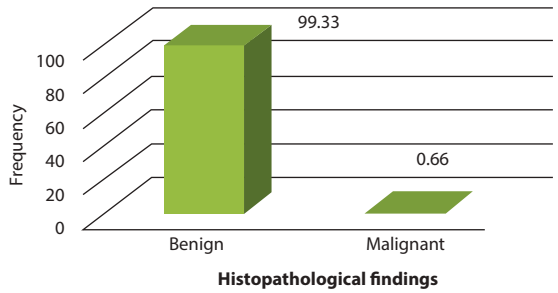
All 150 patient underwent laparoscopic cholecystectomy. Gall bladder found distended in 9(6%) patients among them 7(4.66%) were mucocele and 2(1.33%) were empyema. Normal sized gall bladder found in 92 (61.33%) and contracted in 49(32.66%) patients. Normal wall thickness found 126(84%) patients and rest 24(16%) had thick gall bladder wall. Gallbladder contains multiple stone in 102(68%) of patients. Single stone, biliary sludgefound in 29(19.33%) and 19(12.66%) respectively. No adhesion presents in 39(26%) cases and adhesions in Callot's trianglefound in 47.33%. Adhesions with inferior surface of liver, non visualisation of Callot's triangle anatomy and partially intrahepatic gall bladder found in 14.66%, 09.33% and 02.66% patients respectively. Due to difficulty, 7(4.66%) cases need to convert into open cholecystectomy.

Table-III: Histopathological findings of the patients (n=150)

Histopathological findings	Number of patients	Percentage (%)
Evidence of chronic inflammation with variable mucosal changes and metaplastic change	135	90%
Oedematous gall bladder with features of acute inflammation.	14	9.33%
Adenocarcinoma of varying differentiation along with cholelithiasis	1	0.66%

135 (90%) specimens showed evidence chronic cholecystitis, 14(9.33%) acute cholecystitis. Only 1 (0.66%) gallbladder showed evidence of adenocarcinoma of varying differentiation along with cholelithiasis.

Figure-I: Pattern and type of calculus cholecystitis according to histopathological findings (n=150)



Total 149(99.33%) of patients proven benign causes of calculus cholecystitis by histopathology findings and 1(0.66%) was malignant cause.

Table-IV: Co-relation of ultrasonographic features of chronic calculus cholecystitis and histopathological feature (n=150)

Ultrasonographic finding	Histopathological feature			p-value
Gall bladder wall thickness	Features of chronic inflammation	Features of acute inflammation	Features of malignancy	
1-3 mm = 137	133	4	00	<0.00001
>3 mm = 13	2	10	01	<0.00001
Total = 150	**135**	**14**	**01**	

Result shows relation of Ultrasonographic features of chronic calculus cholecystitis with histopathological feature. Amongst the 137 patient's sonography result, 133 patient shows chronic cholecystitis is consistent with histological findings and 4 patients shows features of acute inflammation who might have acute on chronic cholecystitis. Among 13 cases of thick wall gall bladder, 2 cases found chronic inflammation, 10 cases found features of acute inflammation which might be due to recent acute attack is consistent with histopathology result. Single case found features of malignancy in histopathology and gall bladder wall of that patient was thick. The chi-square statistic is 89.012. The p-value is 0.00001. This result is significant at p< .00001. So ultrasonographic finding is significant in evaluation of chronic calculus cholecystitis.

Discussion

Gallstones are found in roughly 8% of the population, and several individuals possess tiny gallstones without exhibiting any symptoms. Merely 10-20% of these individuals will exhibit symptoms. In this study, Ultrasonography findings revealed that, gall bladder size is normal in 97(64.66%) and contracted in 47(31.33%), distended in 6(4%) of the patients. Most of the patients gall bladder wall is within normal limit (1-3 mm) found in 137(91.33%)patients suggestive of chronic cholecystitis and thick-walled gallbladder was found in 13(8.66%) patients. Gall bladder contains multiple stone in 99(66%), single stone in 32(21.33%), biliary sludge in 19(12.66%) patients.

The findings align with the results of a study conducted in Bangladesh. Hasan MM et al. reported that patients with cholecystitis were assessed with sonography to ascertain wall thickness. 36 (12%) individuals exhibited thick-walled gallbladders, while 10 (3.33%) patients presented with constricted gallbladders. The incidence of cancer was elevated (84.62%) in patients with a thick-walled gallbladder.[17] Ultrasonography is the preferred approach for examining the gallbladder, demonstrating good sensitivity in identifying wall thickening. The ultrasonographic findings in the early stages of gallbladder cancer are modest and significantly overlap with those of acute and chronic cholecystitis. Characteristics such as a thicker gallbladder wall, gallbladder stones or CBD stones, a gallbladder mass, and a pericholecystic collection may be observed in both benign gallbladder conditions and gallbladder malignancies.[18] Intra operatively adhesions (47.33%) were significantly more with calot's triangle and inferior surface of liver (14.66%). Difficulties during procedure such as non visualisation of Callot's triangle anatomy (09.33%), partially intraparechymalgallbladder (02.66%), mucocele (04.66%) and empyema (01.33%) were found. Due to difficulties, needs to convert into open cholecystectomy 7(4.66%) cases. Gall bladder carcinoma is the most common malignancy of the biliary tract and the sixth most common malignancy of the gastrointestinal tract worldwide.[19]

As a result of the aggressive nature of the disease and the late onset of symptoms, the majority of patients are diagnosed at an advanced stage. The prognosis is often unfavorable, with reported five-year survival rates below 5%.[20,21] The initial phase of carcinoma is usually identified accidentally due to inflammatory symptoms associated with concurrent cholelithiasis or cholecystitis.[22] The challenges in preoperative diagnosis of gallbladder carcinoma have led to a rise in accidental instances of gallbladder carcinoma during and following laparoscopic cholecystectomy.[22, 23] The literature review indicated that 0.19% to 3.3% of patients who underwent laparoscopic cholecystectomy for cholelithiasis were diagnosed with gallbladder cancer.[24-27] A study of laparoscopic cholecystectomy

cases in Kolkata, India, found an incidence of 0.59% for incidental gallbladder cancer.[28] In our study, 135 (90%) of the specimens exhibited indications of chronic cholecystitis, while 14 (9.33%) demonstrated acute cholecystitis. Only one gallbladder (0.66%) had indications of adenocarcinoma with varied degrees of differentiation, accompanied with cholelithiasis. In total, 149 patients (99.33%) were diagnosed with benign causes of calculus cholecystitis based on histopathological findings, whereas 1 patient (0.66%) was identified with malignant causes.

Conclusion

Chronic calculus cholecystitis is a common problem in surgical practice. For early diagnosis accurate history taking, clinical examinations and investigations are vital. Ultrasonography is a good initial investigation for diagnosis of gallbladder diseases. In spite of normal ultrasonography report, severe adhesion can be found during operation and have to convert into open cholecystectomy. It is a standard practice that all the cholecystectomy specimens operated for symptomatic gall stone diseases are sent for histopathological examinationas incidental gall bladder carcinoma can be found.

References

1. Rakesh BH,Rajendra GC. A prospective clinicopathological study of 50 cases of chronic calculous cholecystitis in the local population. Journal of Evolution of Medical and Dental sciences. 2013;2(35):6706–16.
2. Steiner CA, Bass EB, Talamini MA, Pitt HA, Steinberg EP. Surgical rates and operative mortality for open and laparoscopic cholecystectomy in Maryland. N Engl J Med. 1994; 330: 403–8.
3. Fischer JE, ed. Mastery of surgery. 5 ed. Philadelphia: Lippincott Williams & Wilkins 2007.
4. Attili AF, Carulli N, Roda E, Barbara B, Capocaccia L, Menotti A, Okoliksanyi L, Ricci G, Capocaccia R, Festi D, et al. Epidemiology of gallstone disease in Italy: prevalence data of the Multicenter Italian Study on Cholelithiasis (M.I.COL.). Am J Epidemiol.1995;141: 158–65.
5. Portincasa P, Moschetta A, Petruzzelli M, Palasciano G, Di Ciaula A, Pezzolla A. Gallstone disease: symptoms and diagnosis of gallbladder stones. Best Pract Res ClinGastroenterol. 2006;20: 1017–29.
6. T. Sauerbruch, G. Paumgartner. Gallbladder stones: management. The Lancet 1991;338(8775):1121 -1124.
7. Gurusamy KS, Davidson BR. Surgical treatment of gallstones. Gastroenterol Clin North Am. 2010;39:229–44.
8. Ahmed A, Cheung R, Keeffe E. Management of Gallstones and Their Complications. Am Fam Physician. 2000 Mar 15;61(6):1673-1680.
9. Beckingham I J. Gallstone disease BMJ 2001; 322 :91 doi:10.1136/bmj.322.7278.91
10. Shaffer EA and Romagnuolo J. The Biliary System. First principles of Gastroenterology: The Basis of Disease and Approach to management, 5th Ed. 461-496.
11. Carlo L. Rosen, David F.M. Brown, Yuchiao Chang, Chris Moore, Nathan J. Averill, Lauren J. Arkoff, Charles J. McCabe, Richard E. Wolfe. Ultrasonography by emergency physicians in patients with suspected cholecystitis. The American Journal of Emergency Medicine. 2001;19(1):32-36.
12. Fitzgerald EJ and A. Toi A. Pitfalls in the ultrasonographic diagnosis of gallbladder diseases. Postgrad Med J 1987 Jul;63(741):525–532.
13. Barbosa ABR, Souza LRMF, Pereira RS, D'Ippolito G. Gallbladder wall thickening at ultrasonography: how to interpret it? Radiol Bras. 2011 Nov/Dez;44(6):381–387.
14. Csikesz, N. G., Tseng, J. F., & Shah, S. A. Trends in surgical management for acute cholecystitis. J.Surgery 2008;144(2):283-289.
15. Deziel, D.J. et al. Complications of laparoscopic cholecystectomy: A national survey of 4,292 hospitals and an analysis of 77,604 cases. The American Journal of Surgery 1993; 165(1):9–14.
16. Seretisa C, Lagoudianakisa E, Gemenetzisa G, Seretisb F, Pappasc A, Gourgiotisa S. Metaplastic Changes in Chronic Cholecystitis: Implications for Early Diagnosis and Surgical Intervention to Prevent the Gallbladder Metaplasia-Dysplasia-Carcinoma Sequence. J Clin Med Res. 2014;6(1):26-29.
17. Hasan MM, Laila SZ, Mamun MH. Incidence of Gallbladder Carcinoma in Thick-Walled Gallbladder in Comparison with that of Normal Thickness– A Study of 300 Cases. Journal of Bangladesh College of Physicians and Surgeons 2016;34(4):193-196.

18. Martins-Filho ED, Batista TP, Kreimer F, Martins AC, Iwanaga TC, Leao CS. Prevalence of Incidental Gallbladder Cancer in a Tertiary-Care Hospital from Pernambuco, Brazil. ArqGastroenterol. 2015; 52:247-249.

19. Fong Y, Heffernan N, Blumgart LH. Gallbladder carcinoma discovered during laparoscopic cholecystectomy. Aggressive resection is beneficial. Cancer.1998;83:423-427.

20. Choi SB, Han HJ, Kim CY, Kim WB, Song TJ, Suh SO, et al. Incidental gallbladder cancer diagnosed following laparoscopic cholecystectomy. World J Surg. 2009;33(12) :2657-2663.

21. Albores-Saavedra J, Henson DE. Tumors of the Gallbladder and Extrahepatic Bile Ducts. Washington DC Armed Forces Institute of Pathology 1986:108. Atlas of Tumor Pathology, Second series Fascicle. 22.

22. Ferrase AG, Solej M, Enrico M, Falcone A, Catalano S, Pozzi G, et al. Diagnosis of incidental gallbladder cancer after laparoscopic cholecystectomy: our experience. BMC surgery 2013;13:19-22.

23. Zhang WJ, Xu GF, Zou XP. Incidental gallbladder carcinoma diagnosed during or after a laparoscopic cholecystectomy. World J surgery. 2009;33:2651-2656.

24. Ahn Y, Park CS, Hwang S, Jang HZ, Choi KM, Lee SG. Incidental gallbladder carcinoma after cholecystectomy: when should be suspect it preoperatively and what are the predictors of patient survival? Ann Surg Treat Res. 2016;90(3):131-138.

25. Clemente G, Nuzzo G, De Rose AM, Giovanini I, LaTorre G, Ardito F. Unexpected gallbladder cancer after laparoscopic cholecystectomy for acute cholecystitis; a worrisome picture. Journal of gastrointestinal surgery 2012; 16:1462-1468.

26. Bertran E, Heise K, Andia ME, Ferreccio C. Gallbladder cancer: incidence and survival in a high-risk area of Chile. Int J Cancer 2010; 127:2446-2454.

27. Zhang WJ, Xu GF, Tian ZQ, Wu GZ, Wang H, Guan WX. Surgical approach does not influence the outcome of incidental gallbladder carcinoma. Int J Clin Exp Med 2015; 8(1):869-875.

28. Tantia O, Jain M, Khanna S, Sen B. Incidental carcinoma gallbladder during laparoscopic cholecystectomy for symptomatic gall stone disease. Surg Endos. 2009; 23:2041-2046.