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ORIGINAL ARTICLE

GALLBLADDER DISEASES: COMPLICATIONS AND RISK FACTORS, A RETROSPECTIVE STUDY IN REHMAN MEDICAL INSTITUTE (RMI), PESHAWAR, PAKISTAN

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ABSTRACT

Background: Gallbladder pathologies significantly contribute to global morbidity, with cholelithiasis, calculous/acalculous cholecystitis, gangrene, and perforation representing common conditions. This study aimed to identify complications and risk factors influencing surgical outcomes in gallbladder disease patients.

Materials & Methods: We retrospectively analysed 42 patients undergoing open/laparoscopic cholecystectomy at Rehman Medical Institute (August 2021–July 2022). Statistical analysis used SPSS v26.

Results: Among patients (24 male, 18 female; mean age 58.74±16.049 years), abdominal pain (95.2%), nausea/vomiting (78.6%), and fever (61.9%) were predominant symptoms. Diagnoses included: Cholecystitis (54.8%), Gangrenous perforation (19.1%), Empyema (9.5%). Comorbidities (hypertension, diabetes, ischemic heart disease) showed peak prevalence in males aged 61–70 years ($p<0.05$).

Conclusion: Cholecystitis was the predominant pathology, with advanced age, leucocytosis, and cardiometabolic comorbidities serving as key risk factors. Early diagnosis and cholecystectomy remain critical for mitigating complications, particularly in elderly males.

KEY WORDS: Cholecystectomy; Cholecystitis; Gallbladder; Complications; Diseases; Empyema; Perforation.

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INTRODUCTION

The gallbladder, a pear-shaped structure situated beneath the liver at the junction of its right and left lobes, functions primarily as a bile reservoir.[1,2] Gallbladder pathologies contribute substantially to global disease burden, with prevalence varying significantly based on geographic region, race, and ethnicity.[3,4] Common conditions include cholelithiasis, calculous cholecystitis, and acalculous cholecystitis. These disorders impose considerable healthcare costs, even in Western nations where gallstones affect approximately 10-20% of European and American populations. Pakistan reports a comparable estimated prevalence of 10%. [3,5] In the United States alone, nearly one million new diagnoses occur annually, accompanied by approximately 600,000 cholecystectomies.[3,4]

Although cholecystectomy, among the most frequently performed abdominal surgeries globally, typically has low serious complication rates, potential risks include surgical site infection from bile leakage or intraoperative contamination.[5] Treatment decisions for symptomatic gallbladder stones often depend on clinical presentation. Indigestion or intermittent abdominal discomfort may not warrant surgery, whereas recurrent biliary colic or severe inflammation (e.g., acute cholecystitis) necessitates urgent intervention.[6–8] Epidemiological studies must first establish disease frequency to identify population-specific risk factors. [7]

Acute cholecystitis represents the most prevalent complication of biliary stones. [8] Its severe form,

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termed gangrenous or necrotizing cholecystitis, demands emergency surgery. This condition involves transmural inflammation, mucosal abscess formation, and gallbladder wall necrosis, complicating 2–30% of acute cholecystitis cases.[9,10] with mortality rates reaching 0.2–0.9%.[11] Research consistently identifies male gender, advanced age, cardiovascular disease, and diabetes as significant risk factors for gangrenous cholecystitis.[11,12]

Secondary acute cholecystitis develops in 1–2% of gallstone patients, with 2–11% of these cases progressing to gallbladder perforation.[13,14] Classified under the Neimeier system (Table 5), perforation is rare but life-threatening, exhibiting mortality rates ranging from 12% to 42%.[13,14] Established epidemiological associations for adult gallbladder disease include female sex, racial background, and obesity. The latter correlation being particularly well-documented.[15] This study aimed to identify both complications and predisposing risk factors influencing mortality and morbidity in surgically managed gallbladder disease patients.

MATERIAL AND METHODS

We conducted a retrospective analysis of medical records from 42 patients who underwent cholecystectomy (open or laparoscopic) for gallbladder diseases at Rehman Medical Institute between August 2021 and July 2022. Exclusion criteria comprised significant comorbidities, chronic hepatitis B/C infection, acute pancreatitis, or documented coagulation disorders.

Prior to data collection, predetermined risk factors hypothesized to influence morbidity and mortality were selected, including diabetes mellitus, hypertension, cardiovascular disease, and renal impairment. Data variables encompassed: Demographic characteristics, Chronic medical conditions, Relevant clinical history, Preoperative physical examination findings, Initial laboratory results, Preoperative imaging studies. Data was analysed by SPSS 26: continuous variables as mean ±SD; categorical variables as frequencies (percentages). Results are tabulated and graphed. Chi-square tests assessed associations (significance threshold: $p \leq 0.05$).

RESULTS

A cohort of 42 patients undergoing cholecystectomy (open or laparoscopic) for gallbladder pathologies was analyzed retrospectively. The sample comprised 24 male and 18 female patients aged 24–85 years (mean age: 58.74 ±16.049 years). Most patients (62%) were aged 41–70 years, while 21.4% were >70 years. Males predominated clinically (n=24, M:F ratio 4:3), particularly in the 61–70 year subgroup (Fig 1).

Regarding clinical presentation, abdominal discomfort was the most prevalent symptom (n=40, 95.2%), followed by nausea/vomiting (n=33, 78.6%) and fever (n=26, 61.9%). Only two patients (4.8%) reported diarrhoea. Approximately 65% exhibited ≥3 concurrent symptoms (Table 1).

Diagnostic distribution revealed acute cholecystitis (calculous/acalculous) in 54.8% of cases. Other pathologies included: Gangrenous perforated gallbladder (19.1%), Empyema (9.5%), Gallbladder sludge (7.1%), Disseminated malignancy (7.1%), Gallbladder polyp (2.4%). Comorbidities (ischemic heart disease, hypertension, diabetes mellitus) showed significant age and gender associations (p=0.000, 0.001, and 0.002 respectively), with highest prevalence in males aged 61–70 years (Fig 2).

Among 15 coexisting gallbladder perforation and cholelithiasis cases, Type I perforation predominated (n=13, 86.7%; Niemeier classification - Table 5), followed by Type II (n=2, 13.3%). No Type III perforations were identified (Table 2).

Preoperative imaging findings are detailed in Table 3 (ultrasound) and Table 4 (CT). All patients achieved uneventful postoperative recovery without complications.

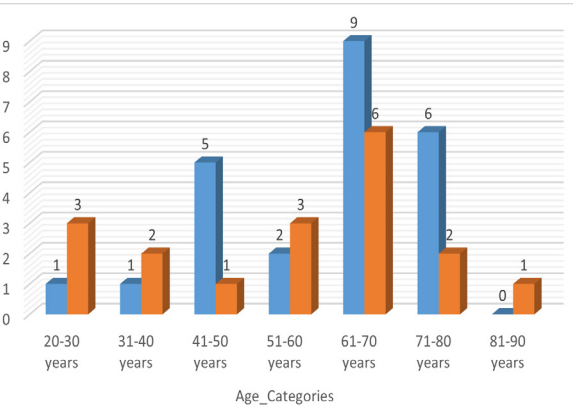
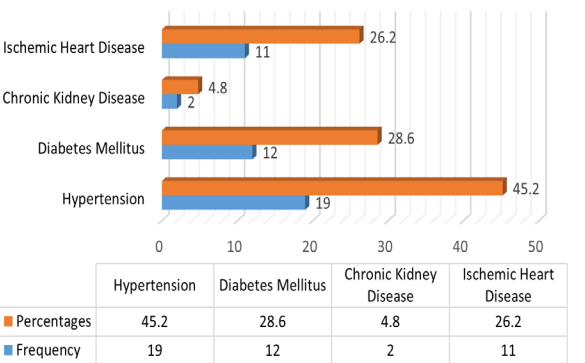


Figure 1: Age and sex distribution of the study population.



	Hypertension	Diabetes Mellitus	Chronic Kidney Disease	Ischemic Heart Disease
Percentages	45.2	28.6	4.8	26.2
Frequency	19	12	2	11

Figure 2: Frequency & Percentages of comorbidities in patients with Gallbladder Disease (p>0.05)

Table 1: Patients' demographic and characteristic findings

Age-Categories	Frequency	%age
20-30 years	4	9.5
31-40 years	3	7.1
41-50 years	6	14.3
51-60 years	5	11.9
61-70 years	15	35.7
71-80 years	8	19.0
81-90 years	1	2.4
Gender		
Male	24	57.1
Female	18	42.9
Presenting Complains		
Abdominal Pain	40	95.2
Nausea, Vomiting	33	78.6
Loose motion	2	4.8
Fever	26	61.9
Lab Findings		
WBC		
Less than 4000	1	2.5
4000 to 15000	25	59.5
More than 15000	12	31.6
Diagnosis		
Calculus Cholecystitis	07	16.7
Acalculous Cholecystitis	17	40.5
Gallbladder Sludge	03	7.1
Gangrenous perforated Gallbladder	07	16.7
	04	9.5
Empyema Gallbladder	01	2.4
Gallbladder Polyp	03	7.1

Table 2: Frequency and valid percentage of different types of gall bladder perforation.

Type of Perforation	Frequency	Valid %age
Type 1	13	86.7
Type 2	02	13.3
Type 3	0	0

Table 3: Ultrasound Findings

Ultrasound Findings	Frequency & (Percent)	P- Value
Wall thickening and edema	11 (27.5)	0.329
Pericholecystic fluid collection	6 (15)	0.254
Gallbladder with sludge and calculi	24 (60.0)	0.010

Table 4: CT-Scan Findings

CT-Scan Findings	Frequency & (percentage)	P-Value
Wall thickening and edema	15 (37.5)	0.123
Irregular or absent gallbladder wall	10 (25)	0.459
Empyema	02 (5)	0.004

Table 5: Defining gallbladder perforation according to Niemeier classification.

Type	Onset	Explanation
Type 1	Acute	Gallbladder perforation into the peritoneal cavity with no protecting adhesions
Type 2	Subacute	Perforated gallbladder surrounded by an abscess that is walled off by adhesions
Type 3	Chronic	Fistula formation between the gallbladder and some other viscera

DISCUSSION

Our study demonstrated high comorbidity prevalence (hypertension, diabetes mellitus, ischemic heart disease), suggesting these conditions may predispose individuals to gallbladder pathologies. Timely diagnosis remains critical for mitigating severe complications.[9] Retrospective analysis of 42 cholecystectomy patients (open/laparoscopic) at RMI revealed demographic patterns consistent with established literature: mean age 58.74±16.049 years, with 62% aged 41-70 years and peak incidence in the 61–70-year subgroup. Male predominance (57.1%, n=24; M:F 4:3) aligned with studies from SKBZ Hospital, CMH Muzaffarabad, and Balıkesir University.[10,11] Gallbladder diseases showed clear age dependence, with elderly patients disproportionately affected consistent with findings from Taiwan (50-60 years) and Indian studies (61-65 years).[2,9]

Current literature questions the diagnostic specificity of clinical symptoms for acute cholecystitis. [13] While Parker et al. note non-specific indicators like RUQ pain and leukocytosis[12], our data associates advanced age, leukocytosis, and cardiometabolic comorbidities with disease severity.[9,11] Diagnostically, admission ultrasound proved non-specific for wall abnormalities but retained utility for surgical triage.[11,14] Contrast-enhanced CT demonstrated superior accuracy in detecting wall thickening and discontinuity.[15] Pathologically, cholecystitis (acute/chronic) accounted for 54.8% of cases, followed by

gangrenous perforation (19.1%), empyema (9.5%), sludge (7.1%), malignancy (7.1%), and polyps (2.4%). This distribution parallels Nalanda Medical College reports (57.1% cholecystitis, male predominance).[16]

Gallbladder perforation (GBP), a rare complication (~3% of acute cholecystitis) occurred in 15 patients (41-80 years; peak 61-70 years; M: F=7:8). This aligns with Mysore Medical College data (peak 61-65 years, female predominance) (2). Surgical findings confirmed GBP in 35.7% of cholecystectomies, with Niemeier type I (peritonitis-associated; 86.7%) predominating over type II (abscess-localized; 13.3%). No type III (fistula-forming) cases occurred. GBP mortality (12-42%) underscores its severity.[17,18,19] Cholecystectomy remains definitive management, with laparoscopic approach demonstrating favourable safety in our cohort.

CONCLUSION

This retrospective analysis identified cholecystitis (calculus and acalculous) as the predominant gallbladder pathology (54.8%), followed by gangrenous perforation (19.1%) and empyema (9.5%). Key predisposing factors include advanced age and comorbid conditions, hypertension, diabetes mellitus, and ischemic heart disease, which appear central to disease pathogenesis in our population, particularly among males.

Early and precise diagnosis remains critical for mitigating severe complications such as perforation. Ultrasonography, while limited in specificity for wall abnormalities, effectively informs surgical triage decisions. Computed tomography provides superior diagnostic accuracy for complex cases.

Our findings reinforce cholecystectomy as the definitive therapeutic intervention, with laparoscopic approach demonstrating favorable outcomes. Enhanced clinical awareness and systematic screening of high-risk demographics (elderly males with cardiometabolic comorbidities) may reduce disease progression and complications.

Limitations:

1. **Retrospective Design:** As a medical record-based study, this analysis is inherently susceptible to selection and information bias due to documentation inconsistencies and non-standardized data recording.
2. **Limited Sample Size:** With only 42 cases, the statistical power to detect significant associations between risk factors and outcomes was constrained, particularly for subgroup analyses.
3. **Single-Center Data:** Findings from Rehman Medical Institute may not be generalizable to broader populations due to regional healthcare disparities and demographic specificities.

REFERENCES

1. Williams NS, O'Connell PR, McCaskie A, editors. Bailey & Love's Short Practice of Surgery [Internet]. 27th ed. Boca Raton (FL): CRC Press; 2021. p. 24. Available from: https://www.taylorfrancis.com/chapters/mono/10.1201/9781315111087-67/gallbladder-bile-ducts-professor-sir-norman-williams-professor-ronan-connell-professor-andrew-mccaskie
2. Ramachandra ML, Jabbar FA. Gall bladder perforation: occurrence, clinical presentation, diagnosis and their outcome: a retrospective study in a tertiary care hospital in South India. Int Surg J. 2019;6(2):369. https://doi.org/10.18203/2349-2902.isj20190385
3. Amreek F, Hussain SZM, Mnagi MH, Rizwan A. Retrospective analysis of complications associated with laparoscopic cholecystectomy for symptomatic gallstones. Cureus. 2019;11(7):e5152. https://doi.org/10.7759/cureus.5152
4. Acalovschi M, Lammert F. The growing global burden of gallstone disease. World Gastroenterol News [Internet]. 2022;17(4):6–8. Available from: https://www.worldgastroenterology.org/publications/e-wgn/e-wgn-expert-point-of-view-articles-collection/the-growing-global-burden-of-gallstone-disease
5. Goyal V, Nagpal N, Gupta M, Kapoor R. A prospective study to predict the preoperative risk factors for conversion of laparoscopic to open cholecystectomy. Int J Contemp Med Surg Radiol. 2017;2(4):148–52.
6. Friedman GD. Natural history of asymptomatic and symptomatic gallstones. Am J Surg. 1993;165(4):399–404. https://doi.org/10.1016/S0002-9610(05)80930-4
7. Indar AA, Beckingham IJ. Acute cholecystitis. BMJ. 2002;325(7365):639–43. https://doi.org/10.1136/bmj.325.7365.639
8. Chandler CF, Lane JS, Ferguson P, Thompson JE, Ashley SW. Prospective evaluation of early versus delayed laparoscopic cholecystectomy for treatment of acute cholecystitis. Am Surg. 2000;66:896–900. https://doi.org/10.1177/000313480006600921
9. Wang AJ, Wang TE, Lin CC, Lin SC, Shih SC. Clinical predictors of severe gallbladder complications in acute acalculous cholecystitis. World J Gastroenterol. 2003;9(12):2821–3. https://doi.org/10.3748/wjg.v9.i12.2821
10. Mehraj A, Dar AH, Adnan Z, Anis M, Bashir S, Altaf A. Gender-based outcome of acute cholecystitis. J Surg Pak (Int). 2017;22(1):8–11. https://doi.org/10.21699/jsp.22.1.3
11. Derici H, Kamer E, Kara C, Ünalp HR, Tansuğ T, Bozdağ AD, et al. Gallbladder perforation: clinical presentation, predisposing factors, and surgical outcomes of 46 patients. Turk J Gastroenterol. 2011;22(5):505–12. https://doi.org/10.4318/tjg.2011.0246

12. Parker LJ, Vukov LF, Wollan PC. Emergency department evaluation of geriatric patients with acute cholecystitis. Acad Emerg Med. 1997;4(1):51–5. https://doi.org/10.1111/j.1553-2712.1997.tb03643.x
13. Trowbridge RL, Rutkowski NK, Shojania KG. Does this patient have acute cholecystitis? JAMA. 2003;289(1):80–6. https://doi.org/10.1001/jama.289.1.80
14. Menakuru SR, Kaman L, Behera A, Singh R, Katariya RN. Current management of gall bladder perforations. ANZ J Surg. 2004;74(10):843–6. https://doi.org/10.1111/j.1445-1433.2004.03186.x
15. Sood BP, Kalra N, Gupta S, Sidhu R, Gulati M, Khandelwal N, et al. Role of sonography in the diagnosis of gallbladder perforation. J Clin Ultrasound. 2002;30(5):270–4. https://doi.org/10.1002/jcu.10071
16. Ahmad ME. Incidence of the complications, factors predisposing to, and the rate of conversion of laparoscopic cholecystectomy to open cholecystectomy. Int J Curr Res Med Sci. 2017;5(10):28660–3.
17. Shi X, Jin S, Wang S, Tao W, Wang G. Gallbladder perforation in a patient with alcoholic liver cirrhosis and asymptomatic gallstones. Medicine (Baltimore). 2018;97(18):e10414. https://doi.org/10.1097/MD.0000000000010414
18. Date RS, Thrumurthy SG, Whiteside S, Umer MA, Pursnani KG, Ward JB, et al. Gallbladder perforation: case series and systematic review. Int J Surg [Internet]. 2012;10(2):63–8. https://doi.org/10.1016/j.ijsu.2011.12.004
19. Khan SA, Gulfam, Anwer AW, Arshad Z, Hameed K, Shoaib M. Gall bladder perforation: a rare complication of acute cholecystitis. J Pak Med Assoc. 2010;60(3):228–9.

CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	JA, AK
Acquisition, Analysis or Interpretation of Data:	JA, AK, ZAK, KSB, SR
Manuscript Writing & Approval:	JA, AK, ZAK, KSB, SR, MM

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.