

Clinical, operative and histopathological profile of patients undergoing cholecystectomy for calculous cholecystitis in a tertiary care hospital

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Abstract

Background:

Gallstone disease is a common hepatobiliary disorder and a major cause of surgical admissions. Cholecystectomy is the standard treatment for symptomatic calculous cholecystitis, and understanding its clinical, operative, and histopathological aspects is important for better management.

Aim:

To evaluate the clinical, operative, and histopathological profile of patients undergoing cholecystectomy and to identify factors associated with severe disease.

Materials and Methods:

This prospective cross-sectional study was conducted from 2024 to 2026 in a tertiary care hospital, including 85 patients with ultrasonographically confirmed gallstone disease. Clinical details, imaging findings, type of surgery, and histopathological results were recorded and analysed.

Results:

Most patients were females in the fourth and fifth decades of life. Multiple gallstones were observed in the majority of cases. Laparoscopic cholecystectomy was the most commonly performed procedure, while a smaller number required open surgery due to operative difficulty. Histopathological examination showed chronic cholecystitis in most cases, with a minority having acute on chronic cholecystitis. Severe inflammation was more frequently associated with multiple gallstones and open surgery.

Conclusion: Calculous cholecystitis commonly affects middle-aged females and is associated with multiple gallstones. Early diagnosis and timely surgical intervention help prevent complications and reduce operative difficulty.

Keywords: Calculous cholecystitis, Gallstone disease, Cholecystectomy, Laparoscopic cholecystectomy, Chronic cholecystitis, Histopathology, Operative difficulty

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INTRODUCTION

Gallstone disease is one of the most commonly encountered hepatobiliary disorders in routine surgical practice and continues to be a major cause of hospital admission in adults. The incidence of cholelithiasis has increased in recent years due to changing dietary habits, sedentary lifestyle, and increasing prevalence of metabolic disorders. Epidemiological studies have shown that gallstones occur more frequently in females, in middle age, and in individuals with associated risk factors such as obesity and diabetes mellitus¹. In the Indian population also, gallstone disease is being diagnosed with increasing frequency, and cholecystectomy remains one of the most commonly performed abdominal operations².

The formation of gallstones is a complex process involving several interacting factors, including supersaturation of bile with cholesterol, impaired emptying of the gallbladder, and chronic inflammation of the gallbladder wall³. Obstruction of the cystic duct by gallstones may lead to acute inflammation, while repeated episodes of irritation may result in chronic cholecystitis. The clinical presentation therefore varies from asymptomatic gallstones to acute cholecystitis and complicated gallbladder disease requiring surgical management⁴.

Cholecystectomy is the definitive treatment for symptomatic gallstone disease. Laparoscopic cholecystectomy has become the preferred surgical procedure because of reduced postoperative pain, early recovery, and shorter hospital stay when compared with

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open surgery⁵. However, in some patients, severe inflammation, dense adhesions, or distorted anatomy may make the procedure technically difficult and may necessitate conversion to open cholecystectomy. Identification of factors associated with severe gallbladder disease is therefore important for better surgical planning and management⁶.

Histopathological examination of the gallbladder plays an important role in understanding the severity and progression of gallstone disease. Chronic cholecystitis is the most frequent finding, but acute on chronic inflammation and other structural changes may be seen in advanced disease. These pathological changes may correlate with operative difficulty as well as with the clinical presentation of the patient⁷. Recent studies have also suggested that chronic inflammatory processes and infection may influence the course of gallstone disease and may contribute to more severe forms of cholecystitis⁸.

In view of the high number of patients undergoing cholecystectomy and the variation in clinical and operative findings, the present study was undertaken to evaluate the clinical, operative and histopathological profile of patients with calculous cholecystitis undergoing cholecystectomy in a tertiary care centre.

MATERIALS AND METHODS

Study design and setting

This was a prospective cross-sectional observational study conducted in the Department of General Surgery in collaboration with the Department of Pathology at a tertiary care teaching hospital between 2024 and 2026. The study included patients admitted with a diagnosis of calculous cholecystitis who underwent cholecystectomy during the study period.

Study population

All patients diagnosed with gallstone disease on the basis of clinical evaluation and ultrasonography and planned for surgical management were considered for inclusion. A total of 85 patients who satisfied the inclusion criteria and gave informed consent were included in the study.

Inclusion criteria

- Patients aged between 18 and 75 years
- Patients with clinically and ultrasonographically proven gallstone disease
- Patients undergoing laparoscopic or open cholecystectomy
- Patients willing to participate in the study

Exclusion criteria

- Patients with acalculous cholecystitis
- Patients with previous history of biliary surgery
- Patients who had received prior treatment for *Helicobacter pylori* infection
- Patients not fit for surgery
- Patients unwilling to participate in the study

Clinical evaluation

All patients were evaluated with detailed history and clinical examination at the time of admission. Relevant laboratory investigations were performed in all cases. Ultrasonography of the abdomen was done to confirm the presence of gallstones and to assess the number of stones and gallbladder wall changes.

Operative procedure

All patients underwent cholecystectomy after routine pre-operative assessment. Laparoscopic cholecystectomy was performed as the standard procedure. Open cholecystectomy was carried out in selected cases where laparoscopic surgery was not feasible due to severe inflammation, adhesions, or other operative difficulties. The type of surgery performed was recorded in each case.

Histopathological examination

Resected gallbladder specimens were preserved in formalin and sent to the Department of Pathology for histopathological examination. Sections from the gallbladder wall were stained with haematoxylin and eosin and examined under light microscopy. The findings were recorded as chronic cholecystitis or acute on chronic cholecystitis based on standard histopathological criteria. Presence of inflammatory changes and other mucosal alterations was noted.

Data collection

Data regarding age, sex, ultrasonographic findings, number of gallstones, type of surgery, and histopathological diagnosis were recorded in a structured proforma for all patients.

Statistical analysis

The collected data were entered in Microsoft Excel and analysed using Statistical Package for Social Sciences (SPSS) version 26.0. Categorical variables were expressed as frequency and percentage. Association between variables was analysed using Chi-square test. A p-value less than 0.05 was considered statistically significant.

Ethical considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all patients before inclusion in the study. Confidentiality of patient information was maintained throughout the study.

RESULTS

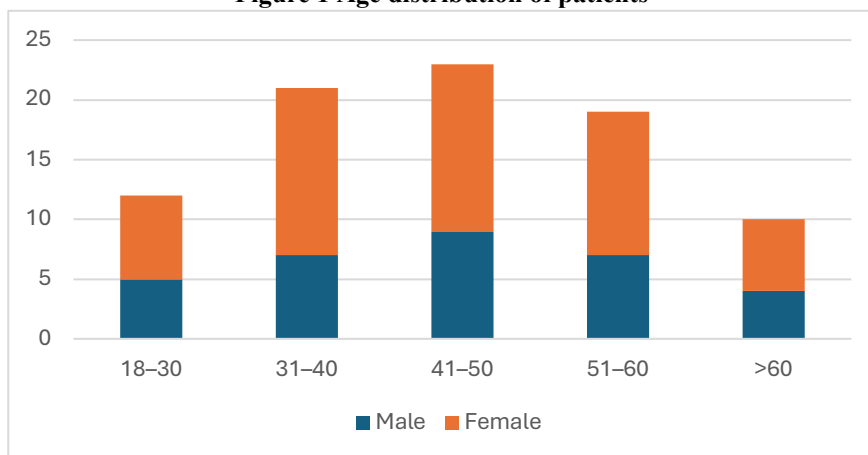
A total of 85 patients diagnosed with calculous cholecystitis and undergoing cholecystectomy were included in the present study. All patients satisfied the inclusion criteria and were evaluated clinically, radiologically, operatively, and histopathologically.

Table 1. Age and sex distribution of study population

Age group	Male	Female	Total	%
18-30	5	7	12	14.1
31-40	7	14	21	24.7
41-50	9	14	23	27.1
51-60	7	12	19	22.4
>60	4	6	10	11.7
Total	32	53	85	100

The age of the patients ranged from 18 to more than 60 years, with the majority of patients belonging to the fourth and fifth decades of life. Female patients were more commonly affected than males, showing a clear female predominance (Table 1, Figure 1).

Figure 1 Age distribution of patients



Ultrasonographic examination showed that multiple gallstones were present in the majority of patients, while a smaller proportion had a single gallstone (Table 2).

Table 2. Ultrasonographic findings

Finding	Number	%
Single gallstone	27	31.8
Multiple gallstones	58	68.2
Total	85	100

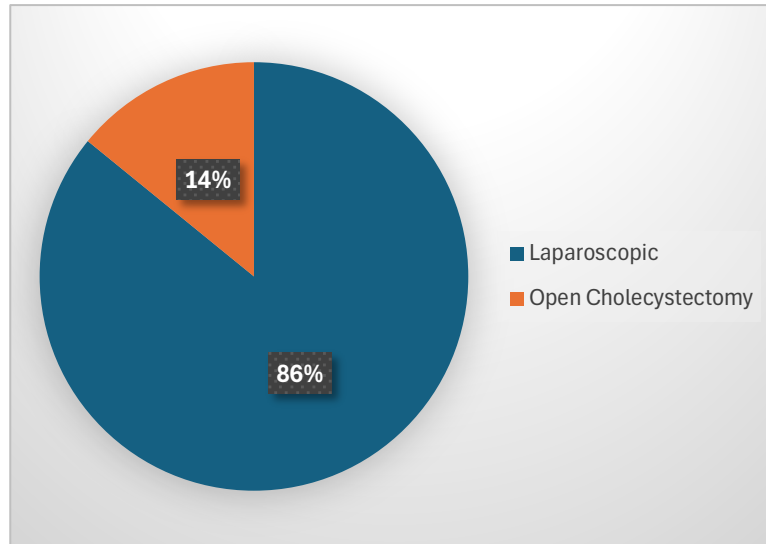
Laparoscopic cholecystectomy was the most performed procedure. Open cholecystectomy was required in a smaller number of cases, mainly in patients with severe inflammation and difficult operative findings (Table 3, Figure 2).

Table 3. Type of surgery performed

Surgery	Number	%
Laparoscopic	73	85.9
Open	12	14.1
Total	85	100

Figure 2 : Laparoscopy Vs Open Cholecystectomy

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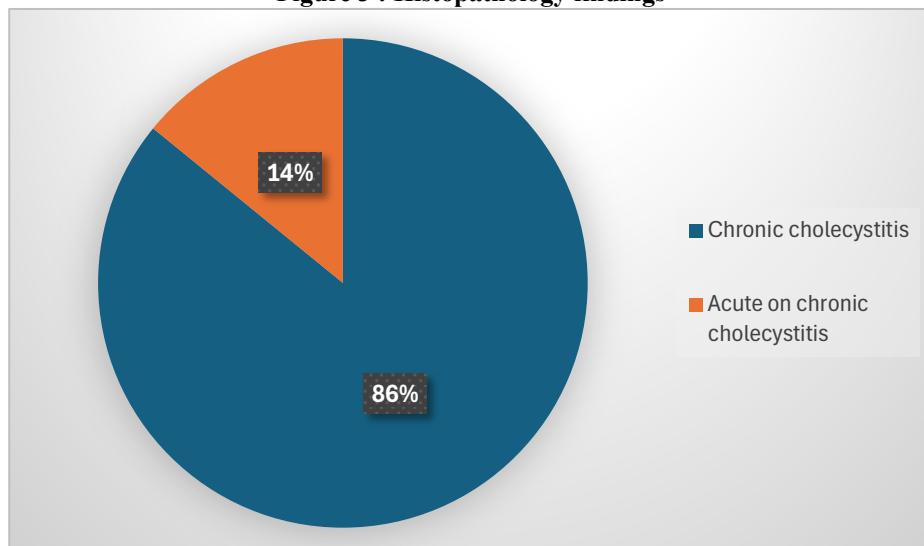


Histopathological examination of the resected gallbladder specimens revealed that chronic cholecystitis was the most frequent diagnosis. A smaller number of patients showed features of acute on chronic cholecystitis, indicating more severe inflammatory disease (Table 4, Figure 3).

Table 4. Histopathological findings

Diagnosis	Number	%
Chronic cholecystitis	73	85.9
Acute on chronic cholecystitis	12	14.1
Total	85	100

Figure 3 : Histopathology findings



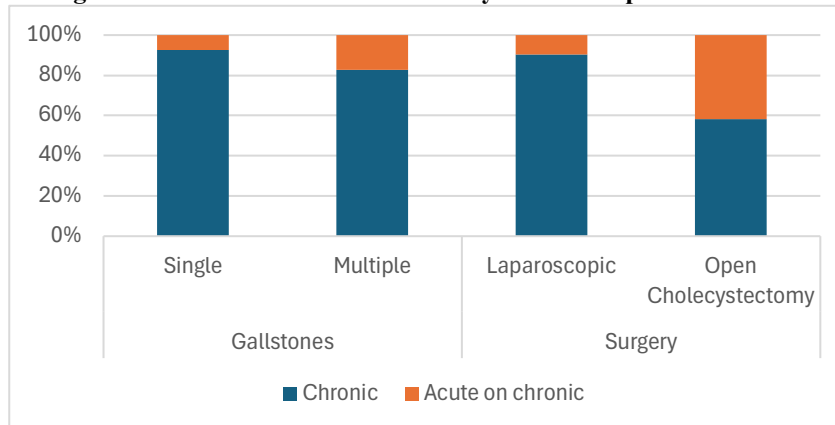
When the association between clinical and operative variables was analysed, acute on chronic cholecystitis was found more frequently in patients with multiple gallstones and in those who underwent open cholecystectomy. These findings suggest that severe inflammatory changes are associated with increased operative difficulty (Table 5/Figure 4).

Table 5. Association of severe cholecystitis with operative factors

Variable	Category	Chronic	Acute on chronic	Total
Gallstones	Single	25	2	27
	Multiple	48	10	58
Surgery	Laparoscopic	66	7	73

	Open	7	5	12
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Figure 4 : Association of severe cholecystitis with operative factors



DISCUSSION

Gallstone disease is one of the most common indications for abdominal surgery, and cholecystectomy remains one of the most frequently performed procedures in general surgical practice. In the present study, an attempt was made to analyse the clinical, operative and histopathological profile of patients undergoing cholecystectomy for calculous cholecystitis and to identify factors associated with severe disease.

In the present study, the majority of patients belonged to the fourth and fifth decades of life, with a mean age in the mid-forties. Similar age distribution has been reported by **Stinton and Shaffer**¹, who observed that gallstone disease is more common in middle-aged individuals due to prolonged exposure to metabolic and dietary risk factors. A clear female predominance was observed in the present study. This finding is in agreement with the observations of **Portincasa et al.**², who reported that hormonal influences, particularly the effect of oestrogen on cholesterol metabolism and bile composition, play an important role in the increased incidence of gallstones among females.

Ultrasonographic findings in the present study showed that multiple gallstones were more common than a single gallstone, indicating that gallstone disease in most patients represents a chronic process. Similar observations have been reported by **Shaffer**³, who described those repeated cycles of bile supersaturation, precipitation of cholesterol crystals and impaired gallbladder motility contribute to the formation of multiple stones. Long-standing gallstone disease may therefore lead to persistent irritation of the gallbladder wall and chronic inflammatory changes.

In the present study, laparoscopic cholecystectomy was the most commonly performed procedure, which reflects the current standard of care in the management of symptomatic gallstone disease. This is consistent with the recommendations described in standard surgical texts such as **Bailey and Love**⁴ and **Sabiston**⁵, where laparoscopic cholecystectomy is considered the procedure of choice because of reduced postoperative

pain, shorter hospital stay and early recovery. However, open cholecystectomy was required in a small number of cases, mainly in patients with severe inflammation and difficult operative findings. **Strasberg**⁶ has also reported that acute inflammation, dense adhesions and distorted anatomy are important causes of operative difficulty and may necessitate conversion to open surgery.

Histopathological examination in the present study revealed chronic cholecystitis as the most common finding, while acute on chronic cholecystitis was seen in a smaller proportion of cases. Similar results have been reported by **Diehl**⁷, who described chronic cholecystitis as the usual pathological outcome of repeated irritation of the gallbladder mucosa by gallstones. Persistent obstruction of the cystic duct and repeated inflammatory episodes may result in thickening of the gallbladder wall and fibrosis.

In the present study, acute on chronic cholecystitis was observed more frequently in patients with multiple gallstones and in those who required open cholecystectomy. This suggests that long-standing gallstone disease is associated with more severe inflammatory changes, which in turn may increase operative difficulty. Similar findings were reported by **Maurer et al.**⁸, who showed that chronic inflammation of the gallbladder may alter the structure of the gallbladder wall and make surgical dissection more difficult. **Fox**⁹ also suggested that persistent inflammatory changes in the gallbladder may contribute to progression of gallstone disease and increase the severity of cholecystitis.

Recent studies have further suggested that chronic inflammatory processes may influence the course of gallstone disease. **Cen et al.**¹⁰ reported that persistent inflammation can impair gallbladder motility and promote bile stasis, leading to progression of gallstone disease. A recent study by **Yao et al.**¹¹ also showed that patients with long-standing gallstone disease are more likely to develop multiple stones and severe inflammatory changes. These findings support the

observations of the present study, where severe histopathological changes were associated with multiple gallstones and increased operative difficulty.

Novelty of the present study

The present study provides a combined evaluation of clinical presentation, operative findings and histopathological changes in patients undergoing cholecystectomy in a tertiary care setting. Unlike many studies that focus only on prevalence of gallstones, the present study analysed the relationship between number of stones, severity of inflammation and type of surgery performed. The observation that patients with multiple gallstones were more likely to have acute inflammatory changes and require open surgery highlights the importance of careful pre-operative assessment in patients with long-standing gallstone disease.

Limitations

The present study was conducted in a single centre with a relatively small sample size, which may limit the generalisation of the results. Operative difficulty was assessed indirectly based on the type of surgery performed, and detailed intra-operative grading of severity was not used. Further multicentric studies with larger sample size are required to confirm these findings.

Clinical implications

Knowledge of the clinical and histopathological profile of gallstone disease helps the surgeon to anticipate operative difficulty and plan the procedure accordingly. Patients with multiple gallstones and features of acute inflammation should be evaluated carefully, as they may have a higher likelihood of complicated surgery. Early surgical intervention may help to prevent progression to severe cholecystitis and reduce operative complications.

CONCLUSION

The present study analysed the clinical, operative and histopathological profile of patients undergoing cholecystectomy for calculous cholecystitis. Gallstone disease was more common in females and in middle-aged patients, and multiple gallstones were observed in the majority of cases. Laparoscopic cholecystectomy was the most commonly performed procedure, while open surgery was required in patients with severe inflammatory changes.

Chronic cholecystitis was the most frequent histopathological finding, whereas acute on chronic cholecystitis was associated with increased operative difficulty. Patients with multiple gallstones were more likely to show severe inflammation and require open cholecystectomy.

Early diagnosis and timely surgical management may help to prevent progression to severe gallbladder disease and reduce operative complications.

REFERENCES

1. Stinton LM, Shaffer EA. Epidemiology of gallbladder disease. *Best Pract Res Clin Gastroenterol.* 2012;26(6):981–996.
2. Strasberg SM. Acute calculous cholecystitis. *N Engl J Med.* 2008;358(26):2804–2811.
3. Sabiston DC. *Textbook of Surgery.* 21st ed. Elsevier; 2022.
4. Bailey & Love. *Short Practice of Surgery.* 28th ed. CRC Press; 2022.
5. Schwartz SI. *Principles of Surgery.* 11th ed. McGraw-Hill; 2019.
6. Portincasa P, Moschetta A, Palasciano G. Cholesterol gallstone disease. *Lancet.* 2006;368:230–239.
7. Diehl AK. Epidemiology and natural history of gallstone disease. *Gastroenterol Clin North Am.* 1991;20:1–19.
8. Tandon RK. Gallstone disease in India: epidemiology and pathogenesis. *Indian J Gastroenterol.* 2000.
9. Maurer KJ, Rogers AB, Ge Z, et al. Bacterial infection and gallstone formation. *Gastroenterology.* 2005;129:480–492.
10. Fox JG. The role of bacteria in gallstone disease. *Helicobacter.* 2002;7:163–169.
11. Cen LW, Wu J, Pan JC, et al. Bidirectional association between *Helicobacter pylori* infection and gallstone disease. *Eur J Clin Invest.* 2022.
12. Yao SY, Hu YB, Xu LM, et al. *Helicobacter pylori* infection and risk of cholelithiasis. *World J Gastroenterol.* 2024.
13. Jiang X, Zheng T, Teng J, Shelat VG. Link between *H. pylori* and biliary tract disease. *Ann Hepatobiliary Pancreat Surg.* 2023.
14. Wang L, Chen J, Jiang W, et al. Meta-analysis of gallbladder disease and *H. pylori*. 2021.
15. Raza DM, Kumar H, Gawri A. Association of *H. pylori* with calculous cholecystitis. 2022.