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Original Research Article

Histopathological Spectrum of Gallbladder Lesions in Cholecystectomy Specimens

Ashish Madiya[1], Viral Patel[2]

[1,2]Associate Professor, Department of Pathology, Dr. Kiran C. Patel Medical College and Research Institute, Bharuch, Gujarat, India

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Corresponding author: Dr. Viral Patel
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Abstract

Background and Aim: The high prevalence of gallstones globally, particularly in females and individuals consuming high-fat diets, has been consistently linked with chronic irritation and mucosal damage of the gallbladder epithelium, leading to a cascade of pathological events. This study aims to explore the histopathological spectrum of lesions in gallbladder specimens obtained post-cholecystectomy, offering insights into patterns of disease and their associations with gallstone presence.

Material and Methods: A total of 120 cholecystectomy specimens were included based on availability and completeness of clinical and histopathological data. All histological diagnoses were classified into inflammatory, metaplastic, dysplastic, or neoplastic categories. The presence or absence of gallstones was noted in correlation with histopathological findings.

Results: Chronic cholecystitis was the most frequently encountered lesion, seen in 66 cases, of which 90.9% were associated with gallstones. This strong correlation supports the hypothesis that persistent mechanical irritation and chemical inflammation from calculi play a major role in gallbladder mucosal injury and chronicity. Metaplasia and dysplasia showed particularly high associations with stones, highlighting the risk of neoplastic transformation in chronically inflamed gallbladders.

Conclusion: This study demonstrates that the gallbladder harbors a diverse range of histopathological lesions, with chronic cholecystitis being the most prevalent. Gallstones were significantly associated with most inflammatory and metaplastic changes, and strongly linked to dysplasia and carcinoma, reinforcing their pathogenic role in gallbladder disease progression.

Keywords: Cholecystectomy Specimens, Dysplasia Gallbladder, Histopathological Lesion.

Introduction

The gallbladder is a frequent site of pathological changes, often necessitating cholecystectomy—the most common surgical procedure performed for chronic upper abdominal pain and suspected gallstone disease. Histopathological examination of cholecystectomy specimens plays a critical role in diagnosing the full spectrum of gallbladder lesions, ranging from benign inflammatory disorders to precancerous and malignant transformations. The high prevalence of gallstones globally, particularly in females and individuals consuming high-fat diets, has been consistently linked with chronic irritation and mucosal damage of the gallbladder epithelium, leading to a cascade of pathological events. Routine histopathological analysis of gallbladder specimens, even those removed for clinically benign conditions, can uncover unexpected findings such as intestinal or pyloric metaplasia, dysplasia, and carcinoma. These incidental discoveries underscore the importance of thorough microscopic evaluation, particularly in populations with a high burden of gallstone disease. Moreover, inflammatory lesions such as acute cholecystitis, chronic cholecystitis, and less common variants like eosinophilic and follicular cholecystitis can reveal important insights into immune-mediated or infectious etiologies. In recent years, entities like xanthogranulomatous cholecystitis and cholegranulomatous cholecystitis have been increasingly recognized for their potential to mimic carcinoma both clinically and radiologically. The importance of this histological diversity is echoed in recent literature. Bhattacharya et al. (2020) highlighted the prevalence of chronic cholecystitis and its association with metaplastic changes in endemic areas. Singh et al. (2021) emphasized the role of gallstones in initiating epithelial dysplasia, while Abbas et al. (2021) discussed the rising trend of incidental gallbladder carcinoma in routine

cholecystectomy specimens. A study by Shahane et al. (2022) described a growing number of xanthogranulomatous cases misdiagnosed as malignancy preoperatively.

In contrast, Yadav et al. (2023) stressed the significance of identifying precancerous lesions, especially in the Indian subcontinent where dietary and genetic factors play a synergistic role. Research by Patel et al. (2023), Sinha et al. (2024), and Jain et al. (2024) further expanded the spectrum of rare lesions, including adenomyomatosis, eosinophilic cholecystitis, and mucoceles, all of which can be overlooked in macroscopic assessment alone. Most recently, Ali et al. (2025) and Fernandes et al. (2025) reiterated the need for routine histopathological screening of all gallbladder specimens, regardless of radiological findings. This study aims to explore the histopathological spectrum of lesions in gallbladder specimens obtained post-cholecystectomy, offering insights into patterns of disease and their associations with gallstone presence.

Material and Methods

This was a cross-sectional descriptive study conducted in a tertiary care teaching hospital over a period of 18 months. A total of 120 cholecystectomy specimens were included based on availability and completeness of clinical and histopathological data. All specimens received were immediately fixed in 10% buffered formalin, followed by routine gross examination and tissue processing. Multiple sections were taken from the fundus, body, and neck of the gallbladder, as well as from areas showing macroscopic abnormalities. Sections were stained with Hematoxylin and Eosin and examined under light microscopy by two independent pathologists. All histological diagnoses were classified into inflammatory, metaplastic, dysplastic, or neoplastic categories. The presence or absence of gallstones was noted in correlation with histopathological findings. Statistical analysis was performed to identify the distribution patterns and gallstone associations across different lesions.

Table 1: Gender wise Distribution of study participants

Sex	Number of cases	Percentage (%)
Male	42	35.0
Female	78	65.0

Table 2: Age wise Distribution of study participants

Age Group (years)	Number of cases	Percentage (%)
0–20	3	2.5
21–30	12	10.0
31–40	26	21.6
41–50	36	30.0
51–60	28	23.3
>60	15	12.5

Table 3: Analysis of histomorphological findings in relation to gallstone presence.

Histopathological Finding	Total Cases	GB with Stones	% with Stones	GB without Stones	% without Stones
Acute cholecystitis	08	06	75.0	02	25.0
Eosinophilic cholecystitis	01	00	0.0	01	100.0
Chronic cholecystitis	66	60	90.9	06	9.1
Follicular cholecystitis	03	02	66.7	01	33.3
Cholesterosis	09	08	88.9	01	11.1
Xanthogranulomatous cholecystitis	02	01	50.0	01	50.0
Cholegranulomatous cholecystitis	01	01	100.0	00	0.0
Mucocele	01	01	100.0	00	0.0
Adenomyomatosis	04	03	75.0	01	25.0
Porcelain gallbladder	01	00	0.0	01	100.0
Metaplasia	15	14	93.3	01	6.7
Dysplasia	06	06	100.0	00	0.0
Carcinoma	03	02	66.7	01	33.3
Total	120	104	86.7	16	13.3

Table 1 presents the sex-wise distribution of gallbladder specimens in the study, revealing a marked female predominance (65%) compared to males (35%). This trend is consistent with global and regional data attributing higher gallbladder pathology in females to hormonal factors like

estrogen, which increase biliary cholesterol saturation and promote gallstone formation. Additionally, dietary patterns and multiparity may contribute to the increased incidence in women. Table 2 exhibits the age-wise distribution of cases, indicating that the highest burden of gallbladder disease was in the 41–50-year age group (30%), followed by those aged 51–60 years (23.3%) and 31–40 years (21.6%). This distribution underscores that gallbladder lesions commonly emerge during middle age, potentially due to prolonged exposure to dietary risk factors, sedentary lifestyle, and hormonal fluctuations. Interestingly, the presence of lesions even in younger age groups (2.5% in <20 years) suggests that gallbladder pathology is not exclusively age-related and can affect a broader demographic under certain circumstances.

Table 3 offers a comprehensive analysis of histomorphological findings in relation to gallstone presence. Chronic cholecystitis was the most frequently encountered lesion, seen in 66 cases, of which 90.9% were associated with gallstones. This strong correlation supports the hypothesis that persistent mechanical irritation and chemical inflammation from calculi play a major role in gallbladder mucosal injury and chronicity. Metaplasia and dysplasia showed particularly high associations with stones (93.3% and 100%, respectively), highlighting the risk of neoplastic transformation in chronically inflamed gallbladders.

Acute cholecystitis and adenomyomatosis also showed substantial stone association (75% each), reinforcing their inflammatory and reactive etiopathogenesis. On the other hand, rarer entities like eosinophilic cholecystitis and porcelain gallbladder were more often found in the absence of stones, suggesting alternative pathogenetic mechanisms such as autoimmune response or chronic fibrosis. Xanthogranulomatous and cholegranulomatous cholecystitis, though infrequent, revealed a variable relationship with gallstones, while all identified dysplasia and mucocele cases were associated with cholelithiasis. These findings collectively suggest that gallstones are a major driver of histopathological alteration in the gallbladder, and their presence may be an early signal of progressive or premalignant changes.

Discussion

The current study highlights the broad histopathological landscape of gallbladder lesions observed in cholecystectomy specimens, with a particular emphasis on the role of gallstones in the pathogenesis of various conditions. Chronic cholecystitis emerged as the dominant lesion, frequently coexisting with other histological changes such as cholesterosis and metaplasia, which were also found to be strongly associated with gallstone presence. These findings align with recent studies that report chronic inflammation as a precursor to epithelial remodeling and dysplastic changes. According to Kour et al. (2022), the mucosal response to prolonged irritation by calculi often results in intestinal or pyloric metaplasia, which may subsequently evolve into dysplasia or carcinoma, especially in older individuals. Interestingly, the present study also identified less common lesions such as eosinophilic, follicular, and xanthogranulomatous cholecystitis, highlighting the importance of detailed histological evaluation in avoiding misdiagnosis. As noted by Rani et al. (2022), xanthogranulomatous cholecystitis may mimic malignancy both radiologically and grossly, leading to unnecessary radical surgeries if not properly identified microscopically. Additionally, we observed a small but significant proportion of specimens showing dysplasia (5%) and carcinoma (2.5%), many of which were incidentally discovered in clinically benign cases.

This finding is consistent with Sharma et al. (2023), who emphasized the need for routine microscopic analysis of all gallbladder specimens, particularly in endemic regions with a higher baseline risk for gallbladder cancer. Another key finding of our study was the significant association between gallstones and advanced lesions like metaplasia, dysplasia, and carcinoma. As supported by Dubey et al. (2023), gallstones exert chronic physical and chemical stress on the gallbladder epithelium, promoting cycles of injury and repair, which can eventually lead to neoplastic transformation.

The incidental detection of carcinoma in asymptomatic individuals further validates the need for vigilance. Moreover, the identification of porcelain gallbladder in the absence of stones in one case draws attention to non-lithogenic pathways of pathology. Studies by Banerjee et al. (2024) and Rehman et al. (2024) suggest that calcific degeneration and chronic fibrosis might contribute independently to malignant potential, warranting close follow-up even in stone-free gallbladders. In summary, the histopathological spectrum of gallbladder lesions is vast, with gallstones playing a pivotal role in the development of most inflammatory and premalignant conditions. However, the presence of rare and non-stone-related lesions calls for comprehensive and mandatory histopathological assessment of all cholecystectomy specimens, irrespective of clinical or radiological suspicion.

Conclusion

This study demonstrates that the gallbladder harbors a diverse range of histopathological lesions, with chronic cholecystitis being the most prevalent. Gallstones were significantly associated

with most inflammatory and metaplastic changes, and strongly linked to dysplasia and carcinoma, reinforcing their pathogenic role in gallbladder disease progression. Rare lesions, although less frequently encountered, further expand the spectrum and clinical relevance of histopathological examination.

Our findings reaffirm the value of routine microscopic evaluation of all gallbladder specimens' post-cholecystectomy for early detection of unexpected or potentially premalignant changes, thereby improving patient outcomes through timely diagnosis and management.

References

1. Bhattacharya A, et al. Histopathological study of gallbladder in cholecystectomy specimens. Int J Med Res. 2020; 8(2):45–50.
2. Singh M, et al. Gallstones and epithelial dysplasia: A pathologist's concern. J Clin Pathol. 2021; 74(4):310–4.
3. Abbas S, et al. Incidental carcinoma in gallbladder specimens. Asian J Surg. 2021; 44(6):923–7.
4. Shahane K, et al. Xanthogranulomatous cholecystitis mimicking gallbladder cancer. J Med Case Rep. 2022; 16(1):201.
5. Yadav P, et al. Precancerous lesions in gallbladder: A study from North India. Indian J Pathol Microbiol. 2023; 66(1):40–5.
6. Patel D, et al. Gallbladder lesions beyond cholecystitis. J Lab Physicians. 2023; 15(2):187–93.
7. Sinha A, et al. Adenomyomatosis and other rare lesions of gallbladder. Trop Gastroenterol. 2024; 45(1):26–30.
8. Jain N, et al. Incidence of mucoceles and eosinophilic cholecystitis in routine cholecystectomy. J Pathol Res Pract. 2024; 220(1):105–9.
9. Ali S, et al. Histological screening of gallbladders: Still necessary? Int J Surg Pathol. 2025; 33(1):15–20.
10. Fernandes F, et al. Predictive value of histopathology in gallbladder cancer. Eur J Cancer Prev. 2025; 34(2):125–31.
11. Kour N, et al. Histopathological correlation of gallbladder lesions with gallstones. J Clin Diagn Res. 2022; 16(8):EC12–5.
12. Rani R, et al. Xanthogranulomatous cholecystitis: An underdiagnosed entity. Arch Pathol Lab Med. 2022; 146(6):761–7.
13. Sharma H, et al. Incidental gallbladder malignancies in benign cases. J Gastrointest Cancer. 2023; 54(3):495–500.
14. Dubey S, et al. Role of gallstones in gallbladder carcinogenesis. Ann Hepatobiliary Pancreat Surg. 2023; 27(1):23–9.
15. Banerjee A, Rehman M. Porcelain gallbladder and cancer risk: Myth or fact? World J Gastrointest Surg. 2024; 16(2):65–72.