Section: Radiodiagnosis

Original Research Article

BEYOND GALLSTONES: MULTIMODALITY IMAGING SPECTRUM OF GALLBLADDER PATHOLOGIES IN NORTHEAST INDIA

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ABSTRACT

Background: Gallbladder disease encompasses cholelithiasis as well as inflammatory, degenerative, proliferative, and neoplastic conditions, including perforation and cholecystoenteric fistula. Imaging findings may overlap, making accurate diagnosis challenging. Gallbladder carcinoma is particularly concerning in North-Eastern India because of its frequent late presentation. Ultrasonography is the initial imaging modality, whereas CT and MRI/MRCP provide information in complicated and suspected malignant disease. The objective is to evaluate the spectrum of gallbladder pathologies using multimodality imaging and correlate imaging findings with operative and histopathological diagnoses.

Materials and Methods: This retrospective observational study was conducted at the Department of Radiodiagnosis, Jorhat Medical College and Hospital, Assam, from January to June 2026. Forty patients with suspected gallbladder disease who underwent cholecystectomy and histopathological examination were included. All patients underwent ultrasonography, while 28 (70.0%) additionally underwent CT and/or MRI/MRCP. Imaging findings were analysed and correlated with surgical and histopathological findings.

Result: The study included 24 males (60%) and 16 females (40%), aged 21–78 years. Chronic calculous cholecystitis was the commonest diagnosis (15, 37.5%), followed by acute cholecystitis (7, 17.5%). Gallbladder adenocarcinoma occurred in 3 patients (7.5%), with hepatic infiltration in two. Other diagnoses included xanthogranulomatous cholecystitis (2), adenomyomatosis (3), cholesterol polyps (3), empyema (1), and perforation with fistula (1). Gallstones were detected in 31 patients (77.5%). CT/MRI demonstrated wall thickening, abnormal enhancement, intramural nodules, mucosal disruption, intraluminal lesions, hepatic invasion, collections, perforation, and fistulous communication.

Conclusion: Gallbladder disease has a broad imaging spectrum. Ultrasound remains the cornerstone, while CT and MRI/MRCP improve characterization of suspected malignancy and complications.

INTRODUCTION

Gallbladder disease is among the commonest indications for abdominal imaging and surgery worldwide. Cholelithiasis is by far the best-known entity, and in routine practice a sonographic diagnosis of "gallstones" is often regarded as the end point of the evaluation. However, the gallbladder is affected by a much wider range of disorders, including acute and chronic cholecystitis, empyema, adenomyomatosis, cholesterol polyps, xanthogranulomatous cholecystitis and gallbladder carcinoma.[1,2] Many of these conditions coexist with gallstones and may be overlooked if the examination stops at stone detection.

Ultrasonography is the initial imaging modality of choice because it is widely available, non-invasive, inexpensive and highly accurate for demonstrating gallstones, wall abnormalities, pericholecystic inflammation and biliary dilatation.[5,6] Careful attention to wall thickness, mural stratification, intraluminal masses and local extension provides

important clues to the underlying pathology.[7] However, ultrasound has recognised limitations in complicated disease, and contrast-enhanced CT and MRI with MRCP are frequently needed to characterise wall abnormalities, stage suspected malignancy, and demonstrate perforation, abscess formation and fistulous communications.[12,18,20,21]

Gallbladder carcinoma is uncommon overall but carries a poor prognosis because it is frequently diagnosed at an advanced stage, and high incidence rates have been reported from northern and north-eastern India, including registries in Assam.[3,4,16] Xanthogranulomatous cholecystitis is an important inflammatory mimic that can show marked wall thickening, intramural nodules and extension into adjacent liver, closely resembling carcinoma.[8,9] In addition, untreated or neglected acute and chronic cholecystitis may progress to perforation (classified by Niemeier into acute free, subacute and chronic types) or to cholecystoenteric fistula, with the risk of gallstone ileus.[17,18,19] Recognising these overlapping and complicated appearances across modalities is essential for the radiologist.

Most published reports address either gallstone disease or gallbladder carcinoma in isolation, and multimodality imaging series illustrating the full spectrum of gallbladder pathology from North-East India remain limited. The present study aims to document the spectrum of surgically and histopathologically proven gallbladder pathologies encountered in routine practice, to illustrate the corresponding ultrasound, CT and MRI appearances with particular attention to gallbladder carcinoma, perforation and fistula, and to emphasise the importance of looking beyond gallstones.

MATERIALS AND METHODS

Study Design and Setting: This retrospective observational study was conducted in the Department of Radiodiagnosis, Jorhat Medical College and Hospital, Jorhat, Assam, for a period of 6 months from January 2026 to June 2026. Forty consecutive patients with suspected gallbladder pathology who underwent cholecystectomy with histopathological examination were identified from the hospital information system. All patients had undergone ultrasonography. Contrast-enhanced CT and/or MRI with MRCP were performed in 28 patients (70.0%) when clinically indicated, namely suspected malignancy, suspected complications (perforation, abscess, fistula, gallstone ileus), or equivocal ultrasound findings.

Ultrasound Protocol: Ultrasonography of the hepatobiliary system was performed using a curvilinear transducer, with the patient fasting whenever clinically feasible. The gallbladder was assessed in multiple planes for distension, wall thickness, wall stratification, stones, sludge, polyps, intraluminal masses, pericholecystic fluid, adjacent hepatic changes and biliary dilatation. Colour Doppler was used when required to assess mural vascularity.

CT Protocol: CT of the abdomen was performed on a 160 slice multidetector scanner. Unenhanced and post-contrast acquisitions were obtained after intravenous administration of non-ionic iodinated contrast (1.5 ml/kg at 3–4 ml/s) in the portal venous phase, with 1–2 mm slice thickness reconstructions and multiplanar (coronal and sagittal) reformats. Oral contrast was not routinely used.

MRI/MRCP Protocol: MRI was performed on a 1.5T scanner. The protocol included axial T1-weighted in-phase/opposed-phase, axial and coronal T2-weighted (with and without fat saturation), diffusion-weighted imaging, MRCP (2D/3D heavily T2-weighted) and dynamic post-gadolinium T1-weighted fat-suppressed sequences.

Image Analysis: The imaging studies were systematically evaluated for the following characteristics.

Ultrasound:

- Gallstones: Presence and number of calculi, with mobility and posterior acoustic shadowing.
- Wall thickness and morphology: Wall thickness (>3 mm considered thickened), diffuse or focal thickening, regularity and mural stratification.
- Distension, sludge and Murphy sign: Presence of distension, echogenic sludge and sonographic Murphy sign where documented.
- Pericholecystic fluid and intraluminal lesions: Free fluid or inflammatory change around the gallbladder; polypoid or mass-like lesions with wall attachment and Doppler vascularity.
- Local extension and biliary tree: Adjacent hepatic infiltration, regional lymphadenopathy, and common bile duct caliber.

CT and MRI/MRCP:

- Wall enhancement and mucosal line: Pattern of wall enhancement, continuity of the mucosal line, and intramural hypoattenuating (T2-hyperintense) nodules or bands.
- Mass and local invasion: Mass replacing the gallbladder, intraluminal enhancing polypoid lesion, direct hepatic invasion, vascular and adjacent organ involvement.
- Nodal and distant disease: Regional/periportal lymphadenopathy and peritoneal or hepatic metastases.
- Perforation: Gallbladder wall defect, focal wall bulge, pericholecystic collection or abscess, intrahepatic abscess and free intraperitoneal fluid, classified according to Niemeier (type I, acute free perforation; type II, subacute with pericholecystic abscess; type III, chronic with cholecystoenteric fistula).17
- Fistula: Abnormal communication between the gallbladder and the duodenum, stomach, colon or biliary tree, with gas in the gallbladder or biliary tree (pneumobilia), ectopic gallstone and bowel obstruction (Rigler triad).19

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- Biliary tree: Biliary dilatation, stones and strictures on MRCP.

Relevant clinical information, including age, gender, presenting symptoms and operative details, was collected from the hospital information system. The imaging findings were correlated with the operative and histopathological diagnoses, which were taken as the reference standard. Gallbladder carcinoma was diagnosed on histopathology; perforation and fistula were confirmed at surgery.

Inclusion Criteria:

1. Patients with suspected gallbladder disease who underwent ultrasonography, with or without CT/MRI, during the study period.
2. Patients subsequently undergoing cholecystectomy with available histopathological examination.
3. Patients with adequate imaging and complete clinical records.

Exclusion Criteria:

4. Patients with isolated extrahepatic biliary disease without gallbladder involvement.
5. Patients without histopathological confirmation.
6. Patients with inadequate or non-diagnostic imaging or incomplete clinical records.

RESULTS

A total of 40 patients with histopathologically proven gallbladder disease were included in the study. The study population comprised 24 males (60%) and 16 females (40%), with an age range of 21–78 years. The largest proportion of patients belonged to the fifth and sixth decades of life (21 patients, 52.5%). The clinical presentation was dominated by right upper quadrant pain, dyspepsia and fever, with a smaller subset of patients presenting with jaundice or constitutional symptoms.

All 40 patients underwent ultrasonography, and 28 patients (70.0%) additionally underwent CT and/or MRI/MRCP: CT alone in 20, MRI/MRCP alone in 2 and both in 6 patients.

On histopathology, inflammatory and calculous disease constituted the majority of cases (31 patients, 77.5%), with chronic calculous cholecystitis the most frequent diagnosis (15 patients, 37.5%), followed by acute cholecystitis (7 patients, 17.5%). Benign proliferative and polypoid lesions were seen in 6 patients (15.0%), comprising adenomyomatosis (n=3) and cholesterol polyps (n=3). Gallbladder adenocarcinoma was diagnosed in 3 patients (7.5%), two of whom (5.0%) had hepatic infiltration. Other less frequent diagnoses included xanthogranulomatous cholecystitis (n=2, 5.0%), gallbladder empyema (n=1, 2.5%), gallbladder perforation with fistula formation (n=1, 2.5%) and chronic cholecystitis with focal intestinal metaplasia (n=1, 2.5%). The distribution is summarised in [Table 2].

Ultrasound Findings: Gallstones were demonstrated in 31 patients (77.5%), while 9 patients (22.5%) had no sonographically demonstrable stones. Gallbladder wall thickening greater than 3 mm was the most frequent associated abnormality (24 patients, 60.0%), followed by gallbladder distension (14 patients, 35.0%), sludge (9 patients, 22.5%) and pericholecystic fluid (8 patients, 20.0%). A polypoid or intraluminal lesion was seen in 6 patients (15.0%). Irregular focal wall thickening was identified in 5 patients (12.5%), adjacent hepatic infiltration in 3 (7.5%), biliary dilatation in 3 (7.5%) and regional lymphadenopathy in 2 (5.0%).

CT and MRI Findings: Among the 28 patients who underwent CT and/or MRI, the findings included gallbladder wall thickening with abnormal enhancement, intramural nodules, focal mucosal disruption, hepatic invasion and pericholecystic collections. The distribution of CT/MRI findings is summarised in [Table 4]. CT/MRI changed the ultrasound-based diagnosis in 8 of the 28 patients (28.6%) by demonstrating perforation, fistula, hepatic invasion or nodal disease.

Gallbladder Carcinoma: Gallbladder adenocarcinoma was confirmed on histopathology in 3 patients (7.5%), of whom 2 (5.0%) had hepatic infiltration. On ultrasound, the suspicious features were focal irregular wall thickening with loss of mural stratification and adjacent hepatic infiltration [Figure 6]. Ultrasound showed adjacent hepatic involvement in 3 patients overall [Table 3]: two were carcinomas and the third was xanthogranulomatous cholecystitis. On CT/MRI, the pattern of disease was mass replacing the gallbladder / focal-diffuse asymmetric wall thickening / intraluminal polypoid mass in 1, 1 and 1 patients respectively. Regional lymphadenopathy was seen in 1, biliary dilatation in 1 and 2 patients had coexisting gallstones.

Table 1: Demographic Characteristics of the Study Population

Variable	Category	Number of Patients (n)	Percentage (%)
Age (years)	21–30	4	10.0
	31–40	6	15.0
	41–50	10	25.0
	51–60	11	27.5
	61–70	6	15.0
	≥71	3	7.5
	Total	40	100
Gender	Male	24	60.0
	Female	16	40.0
	Total	40	100

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Age Range	21–78 years	—	—

Table 2: Histopathological Spectrum of Gallbladder Disease

Histopathological / Final Diagnosis	Number of Patients (n)	Percentage (%)
Inflammatory and Calculous Disease		
Chronic calculous cholecystitis	15	37.5
Acute cholecystitis	7	17.5
Chronic cholecystitis without significant acute inflammation	4	10.0
Xanthogranulomatous cholecystitis	2	5.0
Empyema of gallbladder	1	2.5
Gallbladder perforation with fistula formation	1	2.5
Chronic cholecystitis with focal intestinal metaplasia	1	2.5
Benign Proliferative and Polypoid Lesions		
Adenomyomatosis	3	7.5
Cholesterol polyp	3	7.5
Malignant Lesions		
Gallbladder adenocarcinoma with hepatic infiltration	2	5.0
Gallbladder adenocarcinoma without hepatic infiltration	1	2.5
Total	40	100

Table 3: Major Ultrasonographic Findings

Ultrasound Finding	Number of Patients (n)	Percentage (%)
Gallstones	31	77.5
Gallbladder wall thickening >3 mm	24	60.0
Gallbladder distension	14	35.0
Sludge	9	22.5
Pericholecystic fluid	8	20.0
Polypoid/intraluminal lesion	6	15.0
Irregular focal wall thickening	5	12.5
Adjacent hepatic infiltration	3	7.5
Biliary dilatation	3	7.5
Regional lymphadenopathy	2	5.0

Table 4: CT and MRI Findings

CT/MRI Finding	Number of Patients (n)	Percentage (%)
Total patients who underwent CT and/or MRI: 28 (percentages calculated out of 28)		
Gallbladder wall thickening with abnormal enhancement	20	71.4
Intramural hypoattenuating/T2-hyperintense nodules or bands	4	14.3
Mucosal line disrupted	3	10.7
Mass replacing/filling the gallbladder	2	7.1
Intraluminal enhancing polypoid lesion	3	10.7
Direct hepatic invasion	2	7.1
Regional/periportal lymphadenopathy	3	10.7
Gallbladder wall defect	1	3.6
Pericholecystic collection/abscess	4	14.3
Intrahepatic abscess	1	3.6
Free intraperitoneal fluid	5	17.9
Gas in gallbladder lumen/wall or pneumobilia	1	3.6
Abnormal gallbladder–bowel/biliary communication (fistula)	1	3.6
Ectopic gallstone/bowel obstruction	1	3.6
Biliary dilatation (on MRCP/CT)	3	10.7

Table 5: Gallbladder Carcinoma and Perforation with Fistula Formation

Entity	Number of Patients (n)	Percentage (%)
Gallbladder carcinoma	3	7.5
of which with hepatic infiltration	2	5.0
Gallbladder perforation with fistula formation	1	2.5

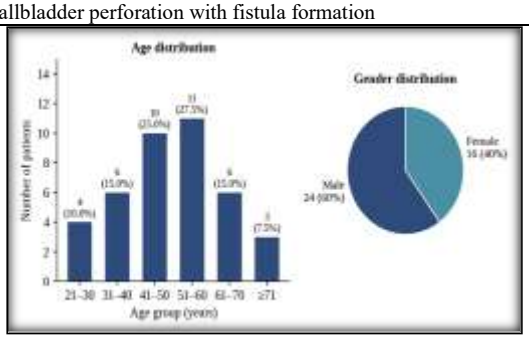


Figure 1: Demographic distribution of the study population

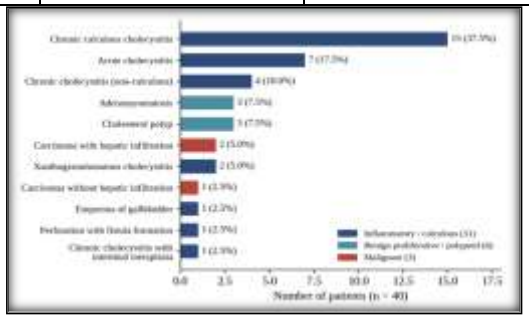


Figure 2: Distribution of histopathological diagnoses in patients with gallbladder disease

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Gallbladder Perforation with Fistula Formation: One patient (2.5%) had gallbladder perforation with fistula formation, classified as Niemeier type III, with acute cholecystitis on histopathology (counted under inflammatory disease in [Table 2]). A gallbladder wall defect was not demonstrated on ultrasound but was demonstrated on CT/MRI. The fistulous communication was between the gallbladder and the colon, with associated pneumobilia. Perforation and fistula formation were confirmed at surgery [Figure 10].

The frequency of gallbladder carcinoma (including hepatic infiltration) and of perforation with fistula formation is summarised in [Table 5].

The age and sex distribution of the study population is depicted in [Figure 1]. The distribution of histopathological diagnoses is depicted in [Figure 2], while the major ultrasonographic findings are summarised in [Figure 3].

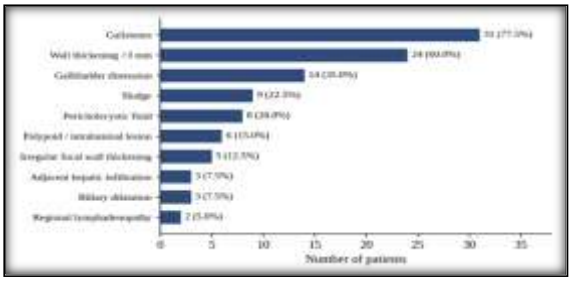


Figure 3: Distribution of major ultrasonographic findings

Representative Cases:

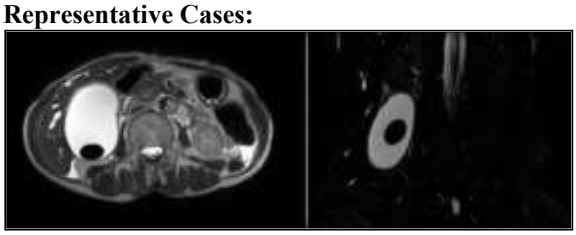


Figure 4: A 46-year-old female presented with right upper quadrant pain. MRI images (Figure 4, Origin-Department of Radiodiagnosis, Jorhat Medical College and Hospital) demonstrate a distended gallbladder containing a dependent hypointense calculus, with associated gallbladder wall thickening, consistent with acute cholecystitis.

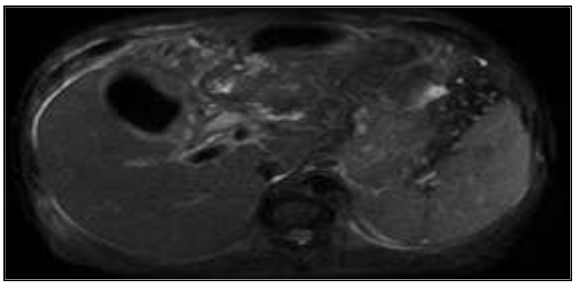


Figure 5: A 54-year-old male presented with acute right upper quadrant pain and fever. MRI images (Figure 5, Origin-Department of Radiodiagnosis, Jorhat Medical College and Hospital) revealed a distended gallbladder with irregular wall thickening and intraluminal signal-void foci corresponding to gas, with adjacent inflammatory changes, consistent with emphysematous cholecystitis.

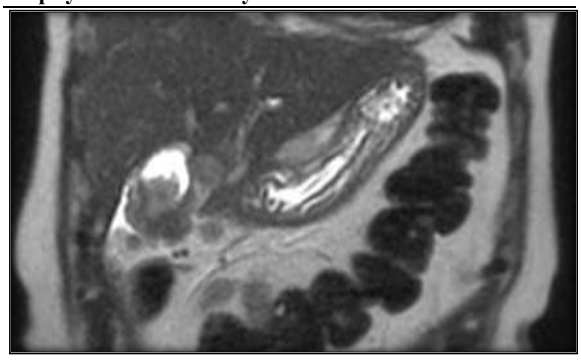


Figure 6: A 58-year-old female presented with right upper quadrant pain. MRI images (Figure 6, Origin-Department of Radiodiagnosis, Jorhat Medical College and Hospital) demonstrated focal polypoidal asymmetric gallbladder wall thickening with loss of mural stratification. Histopathology confirmed gallbladder adenocarcinoma.



Figure 7: A 54-year-old male presented with acute right upper quadrant pain and fever. MRI images (Figure 7, Origin-Department of Radiodiagnosis, Jorhat Medical College and Hospital) revealed a partially distended gallbladder with multiple calculi, marked wall thickening, consistent with chronic calculus cholecystitis.

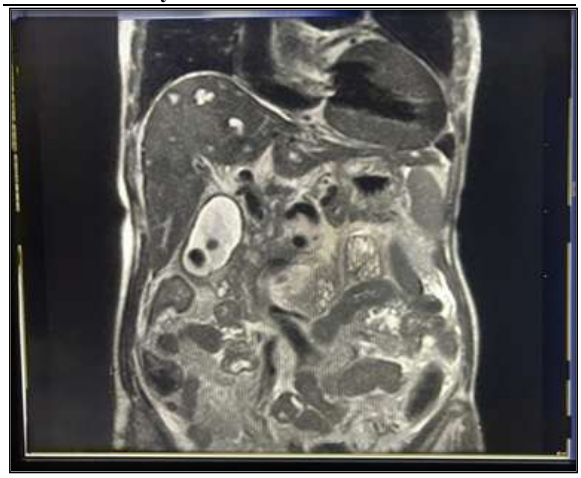


Figure 8: A 54-year-old male presented with acute right upper quadrant pain and fever. MRI images (Figure 8, Origin-Department of Radiodiagnosis, Jorhat Medical College and Hospital) revealed a distended gallbladder with calculi and sludge, wall thickening, consistent with acute cholecystitis.

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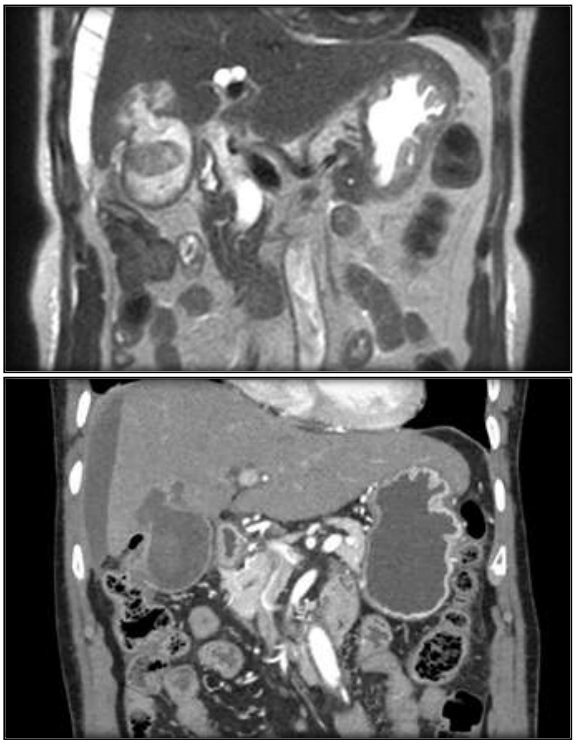


Figure 9: A 56 year-old male with gallbladder adenocarcinoma with hepatic infiltration. CT/MRI images (Figure 9, Origin-Department of Radiodiagnosis, Jorhat Medical College and Hospital) showed a soft tissue mass lesion in the gallbladder with focal mucosal disruption and hepatic invasion. Histopathology confirmed adenocarcinoma.



Figure 10: A 54-year-old female presented with acute right upper quadrant pain and fever. Contrast-enhanced CT (Figure 10, Origin-Department of Radiodiagnosis, Jorhat Medical College and Hospital) demonstrated gallbladder wall defect with pericholecystic collection and a fistulous communication between the gallbladder and colon with pneumobilia consistent with gallbladder perforation with fistula formation (Niemeier type III), confirmed at surgery.

DISCUSSION

Gallbladder disease is far more diverse than the term "gallstones" implies. In the present study, multimodality imaging with histopathological correlation demonstrated a broad spectrum of pathologies in a North-Eastern Indian population, including chronic and acute inflammation, empyema, adenomyomatosis, cholesterol polyps, xanthogranulomatous cholecystitis, gallbladder carcinoma and, in one patient, perforation with fistula formation. Although inflammatory and calculous disease accounted for most cases (77.5%), nearly one in four patients (22.5%) had a benign proliferative lesion or carcinoma rather than inflammatory disease, underlining the need for a systematic approach to gallbladder imaging.[1,2]

The largest proportion of our patients were in the fifth and sixth decades, with a male predominance of 60%. Gallstone disease classically shows a female predominance in most series.[1,2] and the male preponderance here probably reflects the referral pattern of a tertiary-care centre and the surgically selected nature of the cohort rather than a true difference in disease distribution. The age profile is nevertheless in keeping with the known rise in both gallstone disease and gallbladder malignancy with advancing age.[3,15]

Chronic calculous cholecystitis was the most frequent diagnosis, in keeping with the established link between cholelithiasis and chronic gallbladder inflammation.[1,2] Gallstones were demonstrated on ultrasound in 77.5% of our patients, but the remaining 22.5% had no sonographically demonstrable stones, yet had histopathologically proven disease including inflammation, polyps and adenomyomatosis. This illustrates that the absence of stones does not exclude significant gallbladder pathology, and that wall thickening, intraluminal lesions and focal abnormalities must be actively sought.

Ultrasound remains the first-line investigation. Acute cholecystitis and its complications (empyema and perforation with fistula formation) accounted for 22.5% of our cases, and gallbladder distension, wall thickening, pericholecystic fluid and, where elicited, a positive sonographic Murphy sign were the key features, in line with the diagnostic criteria of the Tokyo Guidelines.[5,6] Gallbladder wall thickening is, however, a non-specific finding that may also occur in hepatic, cardiac, renal and hypoalbuminaemic states and must always be interpreted in clinical context.7 Where ultrasound is equivocal or a complication is suspected, contrast-enhanced CT and MRI/MRCP provide a more complete assessment of wall enhancement, the mucosal line, adjacent organs and the biliary tree.[20,21]

Adenomyomatosis and cholesterol polyps were the commonest benign proliferative lesions, together accounting for 15% of our series. Focal wall thickening with comet-tail artefacts and intramural echogenic foci (Rokitansky–Aschoff sinuses) are useful clues to adenomyomatosis on ultrasound and MRI,[13] whereas small non-shadowing, non-mobile intraluminal lesions attached to the wall typically represent cholesterol polyps, for which size and growth are the principal determinants of management.[14]

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Xanthogranulomatous cholecystitis, seen in two of our patients, remains an important inflammatory mimic of gallbladder carcinoma. Marked, often irregular wall thickening, intramural hypoechoic (hypoattenuating) nodules and extension into the adjacent liver can be indistinguishable from malignancy on ultrasound, and an intact mucosal line with intramural nodules on CT/MRI favours xanthogranulomatous cholecystitis.[8,9] This overlap was evident in our series, and because the distinction frequently cannot be made on imaging alone, histopathology, and often intra-operative frozen section, remains decisive.

Gallbladder adenocarcinoma was identified in three patients (7.5%), two of whom (5.0%) had hepatic infiltration. On ultrasound, the features raising suspicion were irregular asymmetric wall thickening, loss of normal mural stratification, a mass replacing or filling the gallbladder, adjacent liver invasion and regional lymphadenopathy.[10,11] CT and MRI classically show three patterns: a mass replacing the gallbladder, focal or diffuse asymmetric wall thickening, and an intraluminal polypoid mass, with direct liver invasion, nodal disease and biliary obstruction often present at diagnosis.[10,12,20] Cross-sectional imaging is therefore essential for staging and resectability assessment. Gallbladder cancer is frequently diagnosed late because early disease is subtle and symptoms resemble those of benign biliary disease, and it has a particularly high incidence in parts of northern and north-eastern India, including the Kamrup, Cachar and Dibrugarh registries of Assam.[3,4,15,16] One additional patient showed chronic cholecystitis with focal intestinal metaplasia, a change regarded as part of the metaplasia–dysplasia–carcinoma sequence.[10,15] reinforcing the value of histopathological examination of every cholecystectomy specimen.

Gallbladder perforation is a serious complication of acute cholecystitis. Niemeier classified it as acute (type I, free perforation with generalised peritonitis), subacute (type II, pericholecystic abscess with localised peritonitis) and chronic (type III, with cholecystoenteric fistula), a classification still in use.[17,18] Ultrasound may show only non-specific features such as distension, wall thickening, stones and pericholecystic fluid, and in one series the wall defect was not demonstrated on ultrasound in any patient, whereas CT showed the perforation site in a proportion of cases.[18] The wall defect is the most specific sign, with a focal wall bulge, pericholecystic collection, intrahepatic abscess and free fluid as supportive findings, and CT or MRI/MRCP is usually needed to demonstrate these and to guide urgent management. In our study, one patient (2.5%) had perforation, which was accompanied by fistula formation, Niemeier type III.

Cholecystoenteric fistula is the typical chronic (type III) outcome of long-standing stone disease and inflammation, with the gallbladder adhering to the duodenum, colon or stomach and a stone eroding through the wall.[17,19] Gallstone ileus results when the stone obstructs the bowel, and the Rigler triad of pneumobilia, bowel obstruction and an ectopic gallstone, seen in only a minority of cases on plain radiographs, is demonstrated in most cases on CT, which is therefore the investigation of choice.19 MRI and MRCP are useful for showing the biliary-enteric communication and associated biliary pathology.21 In our series, a single patient (2.5%) had fistula formation with colon after perforation.

The present study highlights the value of a structured multimodality approach. Rather than reporting gallbladder disease solely as cholelithiasis or cholecystitis, evaluation of wall morphology, focal lesions, enhancement, local extension and complications increases diagnostic confidence and identifies patients who require urgent intervention or careful surgical planning.

The principal strength of this study is the inclusion of a broad range of gallbladder pathologies, including carcinoma, perforation and fistula, with imaging–pathology correlation in a region where such data are limited. However, there are certain limitations. It was a retrospective single-centre study with a relatively small sample size. Only surgically managed patients with histopathological confirmation were included, which introduces selection bias and may overestimate the proportion of complicated and neoplastic disease compared with the general population. CT and MRI were performed only in a subset selected on clinical grounds, so the comparison between modalities is descriptive and not a head-to-head diagnostic accuracy analysis. Nevertheless, the findings provide useful insight into the varied manifestations of gallbladder disease in North-East India and reinforce the importance of looking beyond gallstones.

CONCLUSION

Gallbladder disease encompasses a diverse spectrum of inflammatory, benign proliferative, complicated and malignant pathologies that extends well beyond gallstones. In this North-Eastern Indian series, calculous and inflammatory disease predominated, while adenomyomatosis, cholesterol polyps, xanthogranulomatous cholecystitis, gallbladder carcinoma, perforation and fistula formed important less-common entities, and a substantial minority of patients had no demonstrable stones. Ultrasound remains the cornerstone of initial assessment, and CT and MRI/MRCP are indispensable for characterising suspected malignancy and complicated disease. Systematic multimodality evaluation of wall morphology, enhancement, intraluminal lesions, local extension and complications can help distinguish routine inflammatory disease from conditions that mimic or represent malignancy, and histopathological

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correlation remains essential for definitive diagnosis.

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