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Dr. Kavleen Patel
Department of Pathology, GMERS, Sola Civil, Gujarat, India

Dr. Bharkha Harwani
Department of Pathology, GMERS, Sola Civil, India

Dr. Nilesh Shah
Associate Professor, Department of Pathology, GMERS, Sola Civil, India

Corresponding Author:
Dr. Kavleen Patel
Department of Pathology, GMERS, Sola Civil, Gujarat, India

Histopathological spectrum of gall bladder lesions along with clinico-radiological correlation: A cross-sectional study

Kavleen Patel, Bharkha Harwani and Nilesh Shah

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Abstract
Cholecystectomy is an extremely common procedure, making the gall bladder a routine specimen for histopathological examination (HPE) in India. This cross-sectional study, conducted at a tertiary care centre, aimed to analyze the histopathological spectrum of 126 cholecystectomy specimens over six months and correlate these findings with clinical and radiological data. A male-to-female ratio of 1:4.25 was observed, with the highest incidence in the 31-40 year age group. Chronic cholecystitis was the most prevalent diagnosis (98 cases). Notably, three cases of adenocarcinoma and three cases of xanthogranulomatous cholecystitis weres identified, which were not conclusively diagnosed pre-operatively. This underscores a critical challenge: malignancy and other significant pathologies can be clinically and radiologically insidious, often mimicking benign conditions. The results emphatically highlight the indispensable role of thorough gross and microscopic HPE in achieving an accurate diagnosis. Routine histopathological examination is therefore essential, as it directly influences subsequent treatment decisions, prognosis, and ultimate patient outcomes, ensuring that occult malignancies and other significant lesions are not missed.

Keywords: Cholecystectomy, histopathology, gall bladder carcinoma, chronic cholecystitis, xanthogranulomatous cholecystitis

Introduction
Cholecystectomy is one of the most common surgery performed at any tertiary care centre in India due to which gall bladder (GB) becomes a routine specimen received for histopathological examination (HPE).
The estimated prevalence of gall bladder diseases in India is 2-29% (1, 2, 3) and has a marked geographical variation with being seven times more common in north India than south India [1, 2].
This significant difference in geographical distribution was attributed to environmental factors, diet and lifestyle [1].
More than 95% of gall bladder disease can be attributed to gall stones [4, 5].
In high income countries 10 to 20% of adult population is affected by gall stones with an estimated 20 million people in United states leading to more than 700,000 cholecystectomies performed annually at a cost of approx $6 billion [4].
Also gall bladder carcinoma has been recorded between 5.8 to 6.0% of all the cancers in India [6].
Pre- operative diagnosis of gall bladder carcinoma is exception rather than the rule, occurring in fewer than 20% of patients [4].
Although, clinical and radiological findings can help in diagnosing a gall bladder disease but many a times, malignancy or any other additional findings can be clinically insidious and radiologically mimic benign condition and thus are labelled the same.
The purpose of this study is to highlight the importance of gross and microscopic findings of routine cholecystectomy specimens for an accurate and confirmatory diagnosis.
HPE studies thus influence treatment decisions, prognosis and patient outcomes [5].

Aims & Objectives
To study histopathological spectrum of gall bladder lesions in cholecystectomy specimens.
To correlate histopathological findings with clinical and radiological findings.

Material & Methods

This is a cross-sectional study carried out at a tertiary care centre which included 126 cholecystectomy specimens received at the Department of Pathology, GMERS Medical College and Hospital, SOLA over a period of 6 months from July 2024 to December 2024.

Inclusion criteria

All well preserved and properly labelled cholecystectomy specimens that were excised for clinically or radiologically diagnosed gall bladder disease and sent to department of pathology.

Exclusion criteria

Specimens received in a poorly preserved or autolysed state and improperly labelled were excluded from the study.

The gall bladder specimen was sent to histopathology department in properly labelled container filled with 10% formalin along with lab request forms.

Clinical details like age, gender, clinical findings along with radiological findings were noted.

Overnight fixation in formalin was carried out

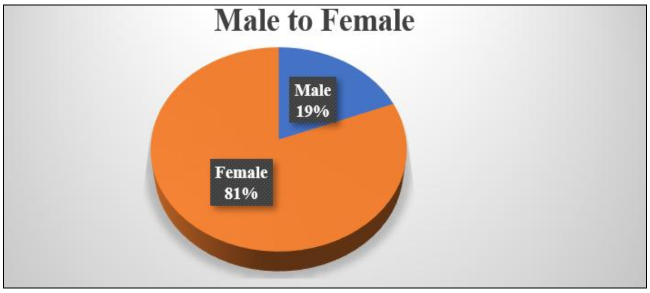
Gross examination of specimen was done and representative full thickness wall sections, one from fundus, one from body & one from neck were submitted. Additional sections were submitted when any focal lesion or any grossly suspicious thickened area of wall was present.

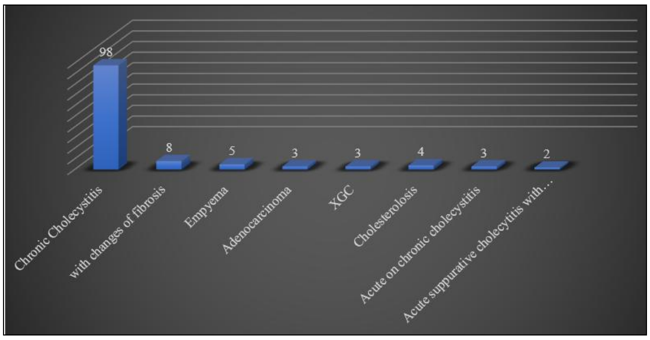
Sections were processed and were further subjected to Haematoxylin and Eosin stain.

Slides were examined microscopically.

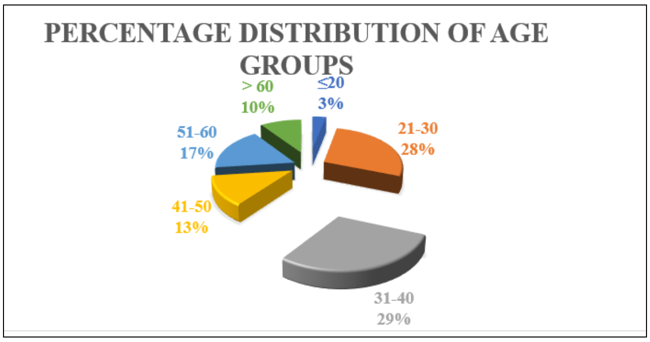
Results

Out of 126 cases, 24 were male and 102 were female. So, male to female ratio was 1: 4.25. Maximum Histopathological diagnoses were of chronic cholecystitis (CC) (98), followed by CC with changes of fibrosis (8), empyema (5), cholesterolosis (4), Adenocarcinoma of gall bladder (3), Xanthogranulomatous cholecystitis (3) (XGC), Acute on chronic cholecystitis (3), Acute suppurative cholecystitis with perforation (2). Maximum number of cases were in age group of 31-40 (37) followed by 21-30 (35).



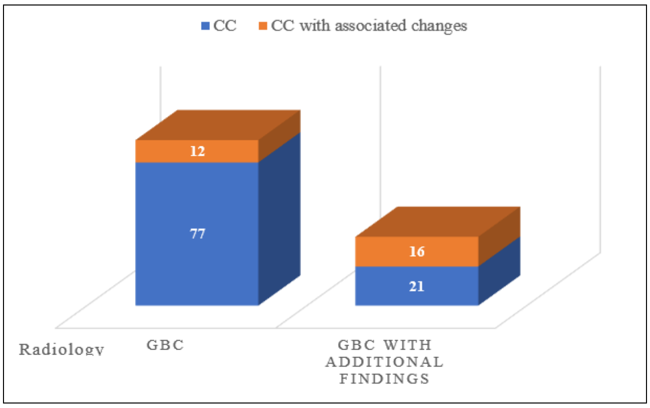


Age group	Cases
≤20	4
21-30	35
31-40	37
41-50	16
51-60	22
> 60	12



Histopathological findings		Age Group				
	≤20	21-30	31-40	41-50	51-60	>60
Chronic cholecystitis	3	31	30	13	13	8
Cholecystitis with changes of fibrosis	1		3		4	
Empyema		1	1	1	1	1
Adenocarcinoma			1	1		1
Xanthogranulomatous cholecystitis		1			2	
Cholesterolosis		1	1	1	1	
Acute on chronic cholecystitis			1		1	1
Acute suppurative cholecystitis with perforation		1				1

Histopathological findings	Male	Female
Chronic cholecystitis	19	79
Cholecystitis with changes of fibrosis	1	7
Empyema	1	4
Adenocarcinoma	1	2
Xanthogranulomatous cholecystitis	0	3
Cholesterolosis	0	4
Acute on chronic cholecystitis	1	2
Acute suppurative cholecystitis with perforation	1	1



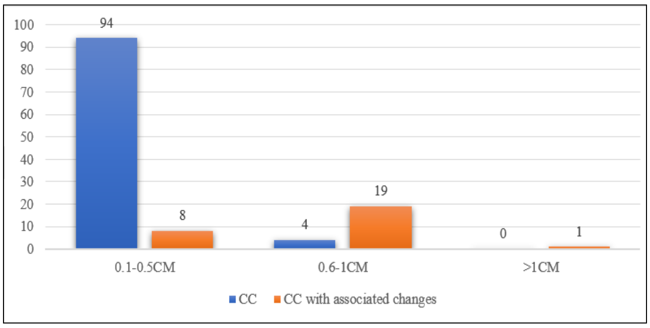
In radiological findings of all the patients, gall stones were identified, with 89 cases consisted of mobile gall bladder calculi (GBC), 16 cases had associated distended GB, 7 cases had changes of acute calculous cholecystitis, 4 cases had associated wall thickening, 4 cases had associated collapsed GB, 3 cases had associated sludge, 1 case had choledocholithiasis, 1 case of GBC post ERCP stent and 1 case of GBC with sludge along with focal wall calcification and thickened wall.

In miscellaneous findings, 1 case of GBC post ERCP stent and 1 case of GBC with sludge along with focal wall calcification and thickened wall both were labelled CC on histopathology. While one case of choledocholithiasis was labelled XGC.

In gross findings, 102 specimens had maximum wall thickness (mwt) in range of 0.1 - 0.5 cm, 23 specimens in range of 0.6 to 1 cm and 1 case had thickness greater than 1 cm. Mucosa of 64 cases was bile stained and of 62 cases was congested.

Histopathological findings	Gross findings					
	Maximum wall thickness			Mucosa		Other gross findings
	0.1 - 0.5cm	0.6-1cm	>1 cm	Bile stained	Congested	
Chronic cholecystitis	94	4		57	41	
Cholecystitis with changes of fibrosis	3	5		2	6	Fibrosed white area present.
Empyema	1	4		0	5	Necrotic mucosa with pus flakes
Adenocarcinoma	0	3		0	3	Yellowish white tumour area
Xanthogranulomatous cholecystitis	0	3		1	2	
Cholesterolosis	3	1		4		Yellow flakes on mucosa
Acute on chronic cholecystitis	1	2		0	3	
Acute suppurative cholecystitis with perforation	0	1	1	0	2	Perforation and pus flakes on outer surface.

Histopathological findings	Clinical symptoms				
	Abdominal pain	Associated nausea & vomiting	Associated dyspepsia	Associated fever & vomiting	Associated with jaundice
Chronic cholecystitis	71	14	9	4	0
Cholecystitis with changes of fibrosis	4	4	0	0	0
Empyema	2	3	0	0	0
Adenocarcinoma	3	0	0	0	0
Xanthogranulomatous cholecystitis		2	0	0	1
Cholesterolosis	4	0	0	0	0
Acute on chronic cholecystitis	1	2	0	0	0
Acute suppurative cholecystitis with perforation	2	0	0	0	0

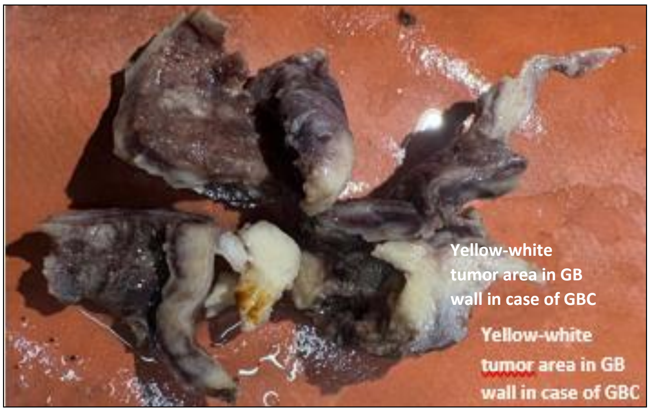


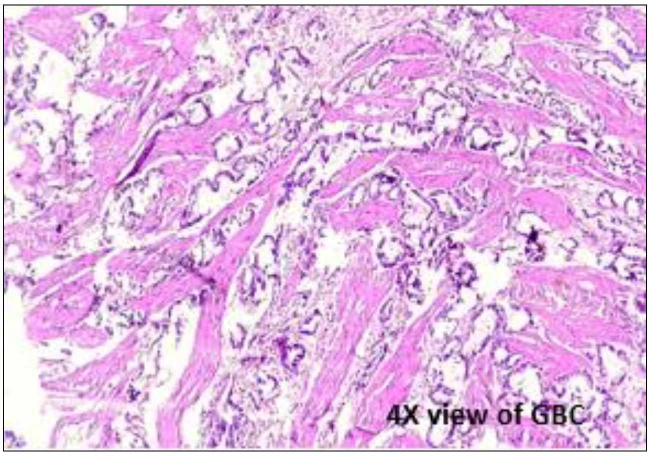
In symptoms, all the patients had complaint of abdominal pain out of which 87 patients had no associated complaint, 25 patients had associated nausea and vomiting, 9 had associated dyspepsia, 4 had associated fever along with vomiting and 1 patient had associated jaundice.

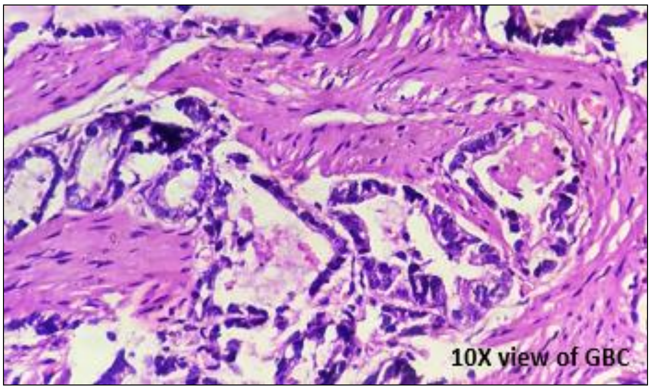
Out of 126 specimens, stones were received only in 39 specimens, rest of the specimens were already cut open and were received devoid of any stones.

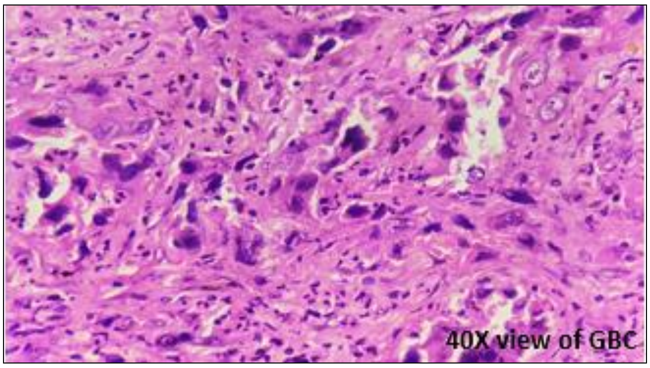
Out of 39 specimens, 26 specimens had yellow coloured calculi, 10 had black coloured calculi and 3 had brown coloured calculi.

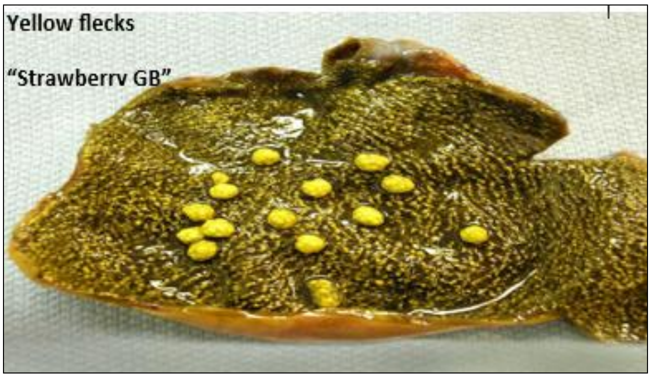
All the 3 cases of adenocarcinoma were found incidentally, out of which one patient (65/F) had tumour m: 1.5 x 1.2 x 1 cm in wall of GB which was grossly invading serosa, microscopically no evidence of lymphovascular (LVI) or perineural invasion (PNI) and was moderately differentiated. Second patient (40/M) had tumour present grossly throughout the wall of GB with maximum wall thickness 0.7 cm, microscopically tumour cells were reaching up to serosa with presence of both LVI & PNI and was poorly differentiated. Third patient (50/F) had its GB received in pieces and out of all the pieces, the maximum wall thickness was 0.7 cm with tumour part been present in the wall, microscopically tumour cells reached up to serosa, no evidence of PNI & LVI and was well differentiated.

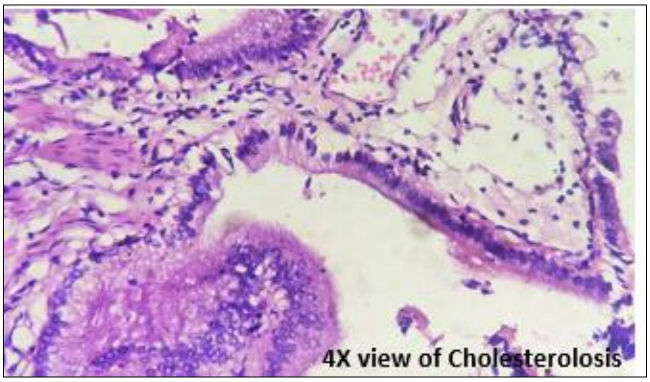


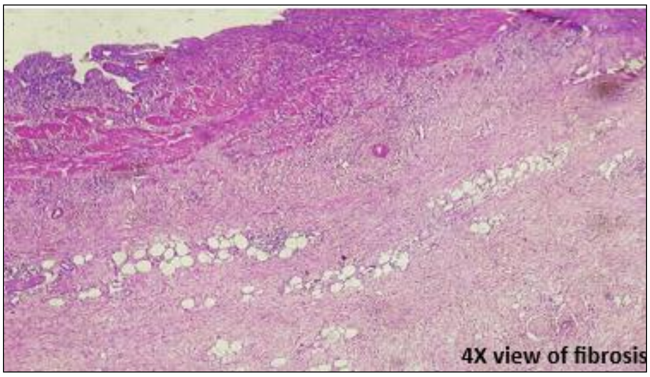












Discussion

In our study, maximum number of patients (81%) were female. It may be because of estrogen exposure, including oral contraceptive use and during pregnancy which increases expression of hepatic lipoprotein receptors and stimulates hepatic HMG-CoA reductase activity, enhancing both cholesterol uptake and biosynthesis [4] which may ultimately result in gall stone formation. GB stone was found radiologically in all the patients which indicates that majority of the gall bladder diseases can be attributed to gall stones. 98 (77.7%) cases were labelled CC making it the most common diagnosis. Most number of patients (29%) were found in 4th decade of life followed by 3rd decade (28%). Their were total 76 patients that were ≤ 40 years i.e. up to 4th decade of life. Out of which 64 (84%) patients had chronic cholecystitis and 12 patients (16%) had associated changes. There were 50 patients above 40 years of age i.e. beyond 4th decade of life. Out of which 34 patients (68%) had chronic cholecystitis and 16 patients (32%) had associated changes, which clearly indicates that complications associated with cholecystitis increases with increasing age. In radiological findings of 89 patients (71%) gall bladder calculi was found without any associated changes making it the commonest radiological finding followed by distended gall bladder which was found in 16 patients (13%). Out of the GB specimen of 89 patients 77 were diagnosed CC on histopathology and 12 patients had associated changes. Remaining 37 patients who radiologically had additional changes in GB associated with gall stones, GB specimens of 21 patients were diagnosed chronic cholecystitis without any associated changes and 16 specimens had associated changes with CC. There were 3 (2.4%) incidental diagnoses of adenocarcinoma of GB which were suspected to be benign lesions of gall bladder both clinically and radiologically. One was a 65-year-old female with radiological finding of gall bladder calculi. Second was 40-year-old male with radiological finding of gall stone with sludge. Third was 50-year-old female with radiological finding of gall stone with wall thickening. All the 3 had a common complaint of abdominal pain which is indistinguishable from presenting complaints of CC. These findings do mark certain pitfalls in diagnosing malignancy clinically and radiologically. The tumour can present as a poorly circumscribed mass but many a times it diffusely infiltrates the wall of gall bladder, simulating the appearance of CC [4]. Also 2 patients were beyond 4th decade of life and 1 patient was on verge of completing 4th decade (40 year) which shows that the risk of gall bladder malignancy is higher with increasing age. 102 (81%) specimens had mwt in range of 0.1 - 0.5 cm, out of which 94 were labelled chronic cholecystitis and 8 (7.84%) specimens had associated changes with chronic cholecystitis. 23 specimens had mwt in range of 0.6 to 1 cm out of which 4 had CC and 19 (82.6%) had associated changes with CC including 3 specimens of adenocarcinoma. 1 specimen had thickness greater than 1 cm which was labelled acute suppurative cholecystitis with perforation. This finding clearly signifies the importance of mwt as increase in wall thickness creates high chances of secondary changes or complications associated with CC including malignancy. Out of 126 patients, 87(69%) had presenting complaint of abdominal pain making it the most common clinical symptom.

Conclusion

Though, clinical and radiological findings help in providing a provisional diagnosis, incidental findings of gall bladder disease most importantly carcinoma of gall bladder are not uncommon and can be only identified on histopathology. Hence, histopathology plays a very significant role in deciding management and prognosis of a patient and not even a single specimen of gall bladder should be ignored for histopathological investigation.

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