



Original Article

Study of Histomorphological Spectrum of Gall Bladder Lesions in Cholecystectomy Specimens Received at Tertiary Care Centre: A Retrospective Study

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ABSTRACT

Introduction: Gall bladder is one of the most frequently received specimens in the histopathology lab. Gall bladder diseases (GBD) are highly prevalent and ranges from benign to malignant conditions and require surgical interventions. Histopathological examination of all cholecystectomy specimens is required irrespective of the underlying cause as incidental gall bladder carcinoma is found in about 0.51-1% cases. The current study focuses on to evaluate the different histopathological lesions seen in gall bladder specimens.

Aim: To study various morphological lesions of gall bladder and to correlate with demographic profile of patients.

Material & Methods: In this retrospective study all cholecystectomy specimens received in Department of Pathology Rama Medical College, Hapur U.P. from March 2024 to March 2026 were included and relevant clinical details of the patients and histopathological report data were collected from the histology lab record.

Results: In this study 3240 cases were analyzed, 81.5% cases were females and 18.5% cases were males. Non-neoplastic lesions were found in 97.3% of the specimens, while 3.7% cases were found neoplastic. Among the 90 neoplastic cases, 87 cases were malignant adenocarcinomas and 03 cases of adeno-squamous carcinoma. Out of 87 malignant cases, 28 cases were incidental diagnosis. Multiple specimens revealed premalignant lesions including reactive atypia and intestinal metaplasia.

Conclusion: Spectrum of histopathological lesions of gallbladder was vast and varied from inflammatory to malignant lesions. Routine histopathological examinations of all resected GB specimens were advised to identify the premalignant lesions such as reactive atypia that might escape in gross and radiological examination and adversely affect patient outcome.

Keywords: Adenosquamous carcinoma, Cholecystitis, Incidental, Lamina propria, Mixed/pure cholesterol stones.

INTRODUCTION

Gall bladder is the pear-shaped organ measuring 10 cm in length, 3 to 4 cm in diameter and wall thickness of around 1-2mm^[1]. There is absence of muscularis mucosa and submucosa in the GB wall and lamina propria contains small number of lymphocytes, plasma cells, and mast cells, while neutrophils and eosinophils are typically absent^[1,2]. Certain lifestyle habits, such as consumption of high-fat diets, reduced physical activity and obesity has led to increase the risk of GBD. These conditions are more prevalent among women in their fourth and fifth decade, though also seen in children and men^[3]. Wide spectrum of histopathological diseases is seen in gall bladder ranging from non-neoplastic conditions like congenital anomalies, calculi to inflammatory and neoplastic lesions^[4]. Most frequently encountered conditions are cholelithiasis consisting of mainly two types of gall bladder stones namely; pigment stone and cholesterol stone and prolonged stasis due to gall stone can have direct carcinogenic effect on gall bladder^[5]. Adenomatous hyperplasia,

adenomyomatous hyperplasia, adenomas and papillomas are some of the benign tumors and tumor-like lesions of gall bladder [6]. Adenocarcinoma of the gall bladder is the most common biliary tract malignancy [5,7]. Irrespective of the underlying lesion, all cholecystectomy specimens are sent for histopathological examination, as incidental gall bladder carcinoma are detected in about 0.51-1% of cases [3].

The present study was aimed to analyze the histomorphological spectrum of gall bladder lesion and to correlate with relevant clinical parameters, like, age, sex, presenting symptoms and preoperative radiological findings.

MATERIAL & METHODS:

This retrospective study was carried out in the Department of Pathology at Rama Medical College, Hapur, over a period of two years (March 2024- March 2026). Relevant clinical details of the patients and histopathological report data were obtained from the pathology requisition form and histopathological report register from the histology lab record room.

Inclusion criteria: All cholecystectomy specimens received in the Department of Pathology during the study period were included.

Exclusion criteria:

- The cases of secondary gall bladder carcinoma (metastasis), post chemotherapy and post radiotherapy gall bladder malignancy were not included.
- The cases with specimens not preserved in formalin or inadequately sampled were excluded.

All gallbladder specimens received in histology lab were fixed in 10% buffered formalin and were examined macroscopically, and then multiple sections were taken and were sent for processing under routine histopathology techniques. Three full thickness sections from the fundus, body and neck of gallbladder were studied under microscope for each case. All data was collected and analysis was done using SPSS software.

RESULTS & OBSERVATIONS:

In this retrospective study a total 3240 cases were analyzed, the highest incidence occurring in 30-40 years age group followed by 40-50 years, more commonly seen in females (81.5% cases) followed by males (18.5% cases) [Table-1]. The youngest patient in this study was a 15-year old girl, while the eldest was a 90-year old woman.

[Table 1]: Distribution of cases according to age and sex

Age Group	Total	Male	Female
10-20	123(3.8%)	42	81
21-30	816(25.2%)	148	668
31-40	842(26.0%)	105	737
41-50	760(23.5%)	121	639
51-60	439(13.5%)	64	375
61-70	181(5.6%)	73	108
71-80	73(2.3%)	41	32
81-90	6(0.2%)	4	2
SUM TOTAL	3240	598(18.5%)	2642(81.5%)

The histopathological examination revealed a plethora of lesions, non-neoplastic cases were more common accounting 97.3% cases than neoplastic cases consisting of 2.7% cases only [Table-2,3]. The chronic cholecystitis with cholelithiasis was the most common findings accounting 2375 cases; out of which 2150 cases had mixed/pure cholesterol stones of variables sizes while only 220 cases had pigment stones.

[Table- 2] Histopathological spectrum of non-neoplastic gall bladder lesions

Histopathological Diagnosis	Number of Cases	Percentage (%)
Chronic cholecystitis with cholelithiasis	2375	73.3
Acute on chronic cholecystitis	227	7.0
Cholesterolosis	145	4.5
Xanthogranulomatous cholecystitis	123	3.8
Cholecystitis with metaplasia	81	2.5
Mucocele	05	0.2
Adenomyomatous hyperplasia	174	5.4
Dysplasia (High grade and low grade)	20	0.3

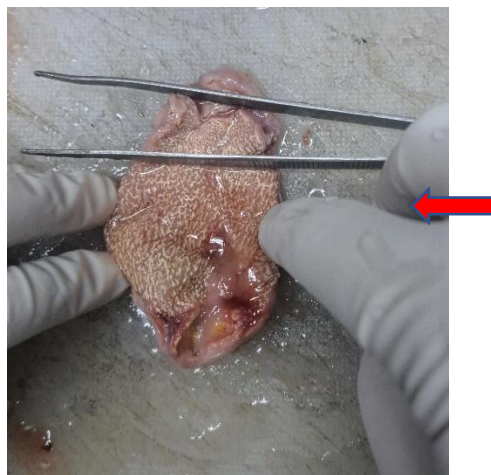
[Table- 3] Histopathological spectrum of neoplastic gall bladder lesions

Histopathological Cases	Number of Cases	Percentage (%)
Adenocarcinoma	87	2.68

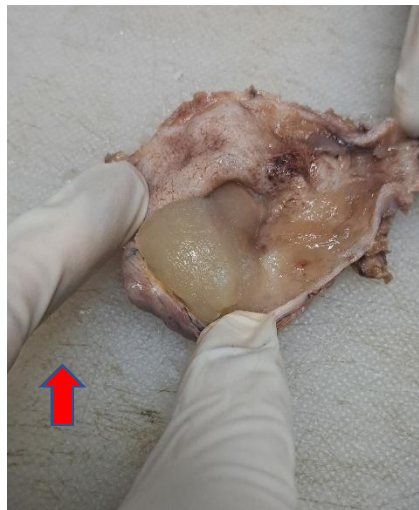
Adenosquamous carcinoma	03	0.02
Total	90	2.7



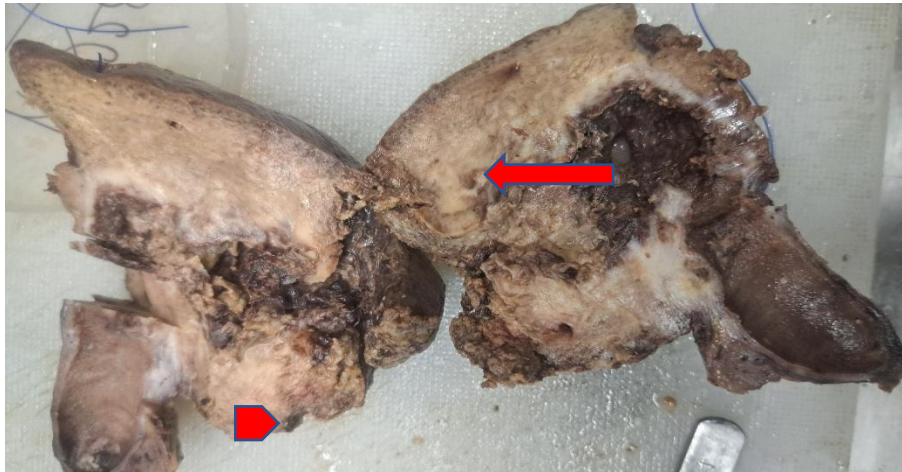
[Fig-1]: Cut open gall bladder with cholesterol stone.



[Fig-2]: Showing partially cut open gall bladder and mucosa having yellow streaks (arrow). [Cholesterolosis]



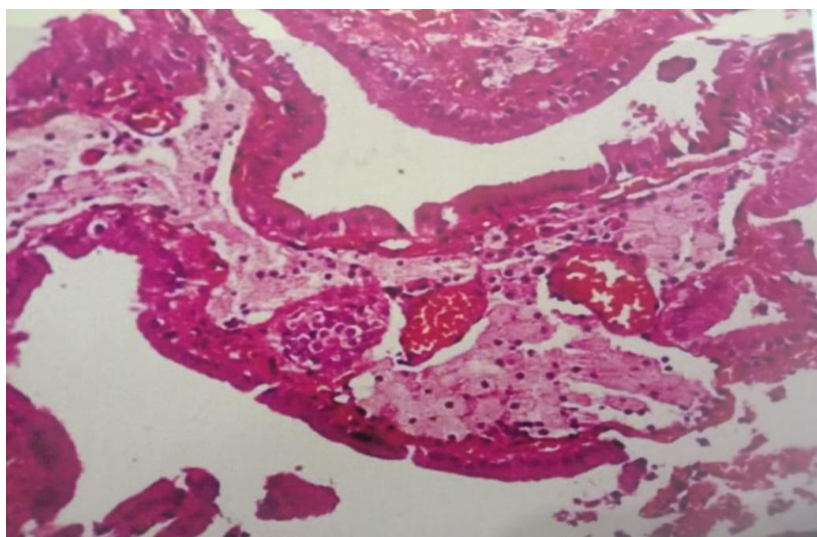
[Fig- 3]: Showing cut open specimen of gall bladder with lumen filled with mucoid material, absence of mucosal rugosity and thin mucosal wall (arrow). [Mucocele of Gall Bladder]



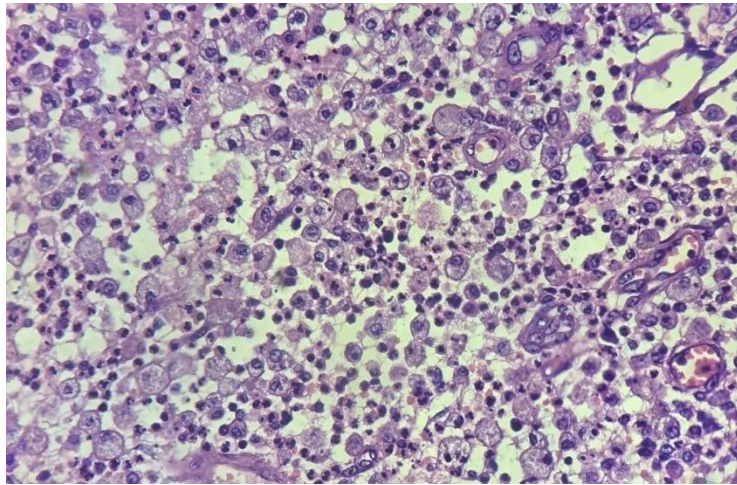
[Fig-4]: Showing cut open cholecystectomy specimen with thickened wall, loss of mucosal rugosity and cavity filled with friable material (arrow) and showing irregular growth at periphery (arrow head). [Adenocarcinoma carcinoma gall bladder]



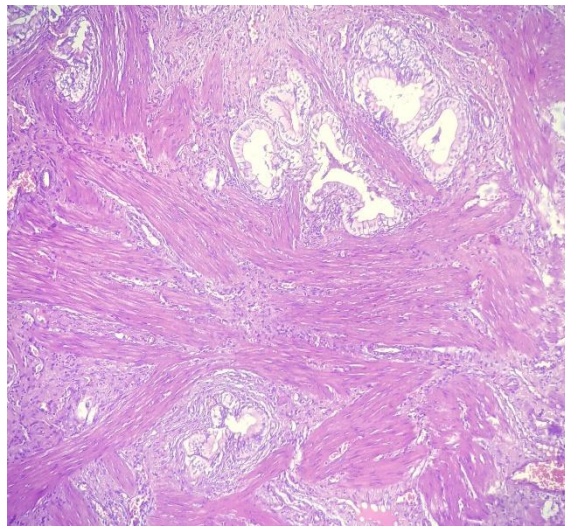
[Fig-5]: Showing cut open cholecystectomy specimen with thickened wall, loss of mucosal rugosity and cavity filled with friable material and showing irregular growth at periphery (arrow). [Adenosquamous carcinoma gall bladder]



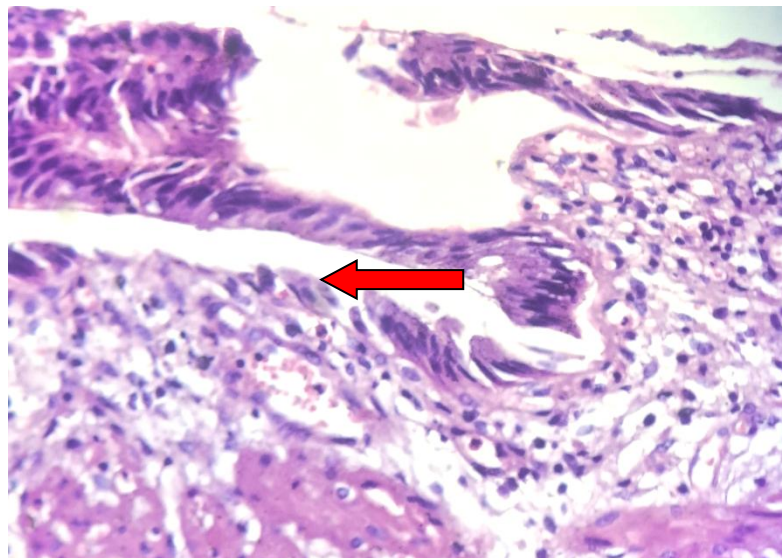
[Fig-6]: Collection of foamy macrophages in lamina propria (H&E, 10X). [Cholesterosis]



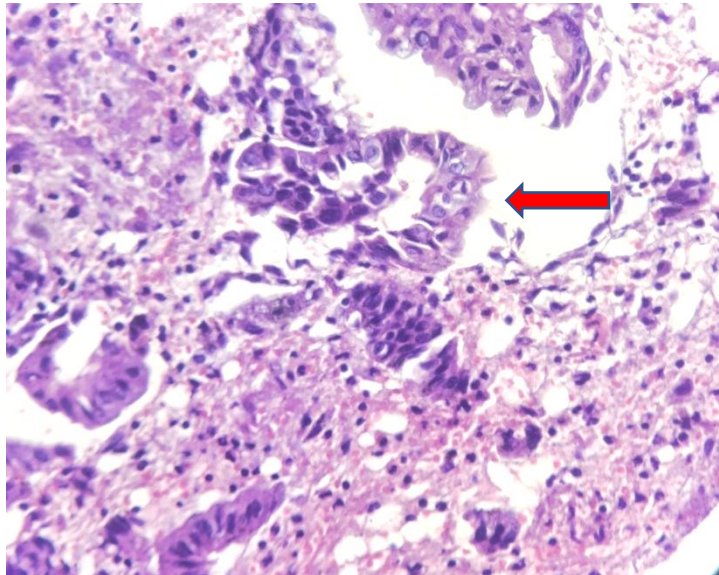
[Fig-7]: Shows collection of foamy histiocytes and multinucleate giant cells (H&E,10X) [Xanthogranulomatous cholecystitis]



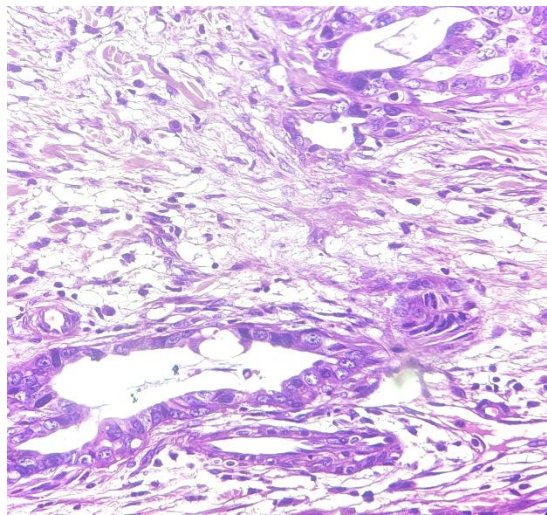
[Fig-8]: Shows cystically dilated biliary glands with surrounding smooth muscles (H&E, 10X). [Adenomyomatous hyperplasia of gall bladder]



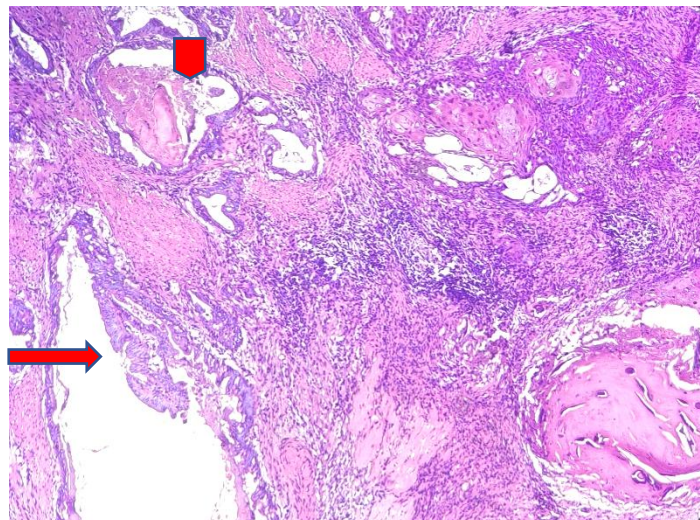
[Fig-9] Showing low grade dysplasia, with penicillate shape hyperchromatic nucleus (H&E, 40X).



[Fig -10] Showing high grade dysplasia, with rounded nuclei showing loss of polarity and nucleoli at places (H&E, 40X)



[Fig -11] Showing angulated glands lined by polygonal tumor cells with enlarged nuclei showing vesicular chromatin, prominent nucleoli lying in peri-muscular connective tissue (H&E, 40X). [Moderately differentiated Adenocarcinoma of Gall bladder]



[Fig-12]: Showing well differentiated glands lined by columnar epithelium with minimal cytological atypia (arrow) and with squamous component having cells arranged in sheets (arrow head) with keratinization at place (H&E, 10X). [Adenosquamous carcinoma of Gall bladder]

In this study out of total 90 neoplastic cases, 87 cases were found adenocarcinomas and remaining three cases were having adenosquamous carcinoma.

DISCUSSION:

Sedentary life style, high calorie diet and increase prevalence of obesity has led to increase risk of gall bladder diseases. Gall bladder is the most commonly received specimen in histopathology lab [5]. Cholelithiasis is the most common biliary tract pathology accounting for approximately 10-15%. The gall bladder stones are associated with several mucosal changes like, inflammation, cholesterosis and hyperplasia, and increased the risk of gall bladder and hepatobiliary cancers. Gall bladder cancers accounts 80% of biliary tract malignancy and have poor prognosis as they are diagnosed at an advanced stage [1, 5]. In the present study, female predominance was observed accounting 81.5% of cases which was comparable to the study conducted by Pant S et al, Almas T et al, Mustaq M et al [5, 8, 9]. Elevated estrogens levels in females increase cholesterol excretion in the bile leading to its supersaturation, and hence a 2-3 times higher risk of gallstones in reproductive aged females. In pregnancy gallbladder evacuation function also suffers which further increase the risk of gallstone diseases, especially in multiparous females [10].

In this study, majority of patients were in age group of 31-40 years followed by 21-30 years which is comparable with the study conducted by Pant S et al [5] and found dis-concordant with the study conducted by Almas et al, Beena et al in which maximum patients were in 4th and 5th decade of life respectively [8, 11]. In this study 2150 cases had mixed/pure cholesterol stones of variables sizes while only 220 cases had pigment stones [Fig-1] and found comparable with the study conducted by Pant S et al and Jayanthi V et al [5, 12]. Pigment stones are more common in South India, where as symptomatic gall stones are twenty times more common in North India with predominance of mixed/pure cholesterol stones [12].

In this study, non-neoplastic lesions were more common accounting 97.3% cases than neoplastic cases consisting only 2.7% cases which is comparable to study conducted by Pandav AB et al, Shah H et al and Damor NT et al [3, 4, 13].

In this study, the chronic cholecystitis with cholelithiasis is the most common non-neoplastic lesions accounting 73.3% cases which is comparable to study conducted by Joshi N et al, Pant S et al, Almas T et al, Beena D et al and Kotasthane VD et al. [1, 5, 8, 11, 14] and found dis-concordant with the study conducted by Pandav AB et al, Damor et al and Murmu et al as they identified acute cholecystitis the most common histopathological findings [3, 13, 15]. The chronic cholecystitis on microscopy shows thickened wall, chronic inflammatory infiltrate and mucosal changes like pyloric and intestinal metaplasia which occasionally culminates into dysplasia or malignancy. Acute on chronic cholecystitis with cholelithiasis was seen in 7 % of cases.

The cholesterosis is asymptomatic, non-inflammatory condition with no malignant potential, and is caused due to accumulation of cholesterol ester and triglycerides in gall bladder mucosa and yellow streaks are seen on mucosal wall [3, 5] [Fig-2, 6, 7]. In this study the cholesterosis was seen in 4.5% cases which is comparable to the study conducted by Joshi N et al, Mondal B et al and Beena D et al as they observed cholesterosis in 10.47%, 2.92% and 2.50% cases respectively [1, 11, 16], while in the study conducted by Pant S et al. and Almas T et al it was observed in 23.55% and 32.80% cases respectively [1, 5]. Therefore, the prevalence of cholesterosis was lower in this study as compare to Pant S et al and Almas T et al.

In the xanthogranulomatous cholecystitis (XGC) the clinical and radiological findings can mimic gall bladder carcinoma and on microscopy shows foamy histiocytes, fibrosis and chronic active inflammation in the gall bladder wall and is usually associated with gall stones [17]. In this study it was observed in 3.8% cases which was in concordance with the study conducted by Pant S et al, Joshi N et al as they found in 5.39% and 2.48% cases respectively [1, 5]. While Almas T et al and Mondal B et al reported 1.13% and 1.65% cases of XGC in their study respectively [8, 16].

Other non-neoplastic conditions include mucocele of gall bladder seen in 0.2% cases and adenomyomatous hyperplasia seen in 5.4% cases respectively [6, 11] [Fig-8].

In the present study the metaplasia and dysplasia were observed in 2.5% and 0.3% cases respectively. Both metaplasia and dysplasia findings were lower in comparison to the study conducted by Mondal B et al and Mukhopadhyaya et al as they observed metaplasia in 4.70% and 69.25% cases, dysplasia in 2.16% and 5.0% cases respectively [16, 18] [Fig- 9, 10]. The variation in the incidence of metaplasia and dysplasia can be attributed to ethnic and geographical differences as well due to variations in method of extensive gall bladder grossing had been done [5, 18].

In this study neoplastic lesions were more commonly seen in individuals over 5th decade of life, similar findings were seen in study conducted by Pandav AB et al [3].

The gall bladder carcinoma (GBC) is the most common malignancy of the biliary tract accounting 85-95% cases. Gall stone disease, gall bladder polyps, porcelain gall bladder, primary sclerosing cholangitis, exposure to carcinogens and obesity are some of the attributed risk factors [1, 5, 19, 20, 21]. Adenocarcinomas with varying degree of differentiation is most common histological malignancy of gall bladder with less common type including adeno-squamous carcinoma, lymphoma,

melanoma and sarcoma [3]. Most of the GBC are diagnosed late due to non-specific symptoms; general symptoms include nausea, vomiting and jaundice [19]. In this study neoplastic cases accounts 2.7% of cases. Out of 90 neoplastic cases, 87 cases were adenocarcinomas and only 03 cases were of adeno-squamous carcinoma which is similar to study conducted by Pant s et al, Damor et al, Mohan et al, Kumbhakar et al as they found 1.05%, 2%, 1.09% and 1.25% cases respectively [5,13,22,23] [Fig-4,5, 11,12]. Out of 90 cases, 28(31%) cases were incidentally diagnosed on routine histopathological examination and were missed on radiological investigations. Jha V et al and Shi SP et al had rendered diagnosis of incidental GBC in 41% and 50% cases respectively [24, 25].

CONCLUSION:

The present study highlights the wide range of gall bladder lesions on histopathology with non-neoplastic being more common than neoplastic. Chronic cholecystitis with cholelithiasis is the most common non-neoplastic findings. Mixed/pure cholesterol stones were more common than pigmented ones. Routine cholecystectomy for gall stones revealed, in some cases, subclinical malignancies that go undetected in pre-operative imaging. Early and accurate diagnosis of these malignancies is required to reduce morbidity and mortality and histopathological examination remains the gold standard for identifying pre-malignant and malignant lesions, especially when undetected by imaging modalities.

Limitation of Study:

Extensive gall bladder sampling needs to be done in all cholecystectomy specimens to identify small focus of metaplasia and dysplasia.

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