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HISTOPATHOLOGICAL STUDY OF GALL BLADDER MUCOSA WITH CHOLELITHIASIS

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Abstract

Introduction: - Gall Bladder is a viscous and hollow organ, located obliquely in the gall bladder fossa on the quadrate lobe of the liver. There are three parts of the gallbladder- the neck, the body, and the fundus. Histologically, the wall of the gall bladder is composed mucosa, muscularis externa, and adventitia or serosa. There is no submucosa or muscularis mucosae in the gallbladder wall. **Aim & Objective: -** To study of histopathological changes in the gallbladder mucosa of cholelithiasis. **Material & Methods: -** The current study was conducted in the anatomy department collaboration with the department of pathology and surgery, School of Medical Sciences & Research, Sharda University & Noida International Institute of Medical Sciences, Noida International University. A total of 140 specimens were selected from gallbladder after cholecystectomy. **Results:** - On gross examination was observed that outer gallbladder surface was congested in 100 specimens (71%), wall thickness was increased in 44 (31%) and mucosal abnormalities in 101 (72%). In microscopic finding maximum number of specimens had Chronic Cholecystitis132 (94%), followed by Rokitansky Aschoff sinuses 60 (42%), Muscular Hypertrophy 40 (28%), Epithelial Hyperplasia 15 (10%) Muscular gland metaplasia 10 (7%) and Intestinal Metaplasia 2 (1.4%). **Conclusion: -** In the present study it was concluded that Gallbladder disorders more prevalent in female. Chronic cholecystitis was the most frequent histological variation in the gallbladder mucosa associated with cholelithiasis, followed by rokitansky aschoff sinuses, muscular hyperplasia, epithelial hyperplasia, and intestinal metaplasia.

Keywords: Gall Stones, Gall Bladder, Cholecystitis, Cholecystectomy.

INTRODUCTION

Gall Bladder is a viscous and hollow organ, located obliquely in the gall bladder fossa on the quadrate lobe of the liver at the level of the cystic notch. The gall bladder extends from the inferior border of the liver to the porta hepatis. There are three parts to the gallbladder- the neck, the body, and the fundus. Neck continues as a cystic duct. Histologically, the wall of the gall bladder is composed mucosa, muscularis externa, and adventitia or serosa. There is no submucosa or muscularis mucosae in the gallbladder wall.[1] The innermost layer-mucosa has lining epithelium composed up of a single layer of tall columnar cells and basal cells. The lamina propria consists of loose connective tissue, some lymphatic tissue, blood vessels, venules, and arteriole.

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The gallbladder wall has temporary mucosal folds when it is not distended with bile, but these folds disappear when the gallbladder gets distended. The arrangement and size of the mucosal folds are irregular. Diverticula or crypts, which frequently form deep hollows in the mucosa, are located between the mucosal folds. The diverticula or crypts in the lamina propria resemble tubular glands when seen in cross section. However, there are no glands in the gall-bladder proper, except in the neck region of the organ.[2] The second layer is denoted as the fibro-muscular layer due to muscular and it has a major number of elastic fibers combined with smooth muscle fibers which are arranged in an oblique, longitudinal, and circular manner. Bile is released by this layer. Outer layer is serosa covers the entire unattached fundus, inferior surface and sides of gallbladder. Where the gallbladder is attached to superior surface of liver, this connective tissue layer is the adventitia.[3] Fair, obese, fertile women in their forty to fifty are considered to be at greater risk to suffer from cholelithiasis.[4] Various histopathologic alterations in the gall bladder mucosa are caused by gallstone disease. Cholelithiasis is regulated by the gall bladder mucus, which promotes the formation of stones. Gallstones are created by a mixture of lipids, calcium, and mucus.[5] Due to an increase in fatty and high calorie diets as well as alcohol usage, cholecystitis and cholelithiasis appear to be becoming more common during the past few decades.

Gallstones with symptoms are 20 times more common in North India than in South India and natures of gallstones are mostly of the mixed or cholesterol, whereas pigment stones are prevalent in South India.[6]

The aim of current study was to examine the histopathological changes in specimens of gall bladder due to gallstones.

Materials and Methods: - The current study was conducted in the Department of anatomy in collaboration with the department of pathology and surgery, School of Medical Sciences & Research, Sharda University & Noida International Institute of Medical Sciences, Noida International University, Greater Noida. A total of 140 specimens with a histological diagnosis of chronic calculus cholecystitis received by the Department of Pathology were selected from gallbladders after cholecystectomy.

Inclusion Criteria: -

- Both male and female patients between 18-60 years of age group of Cholecystitis with gallbladder stone.

Exclusion criteria: -

- Cholecystectomy cases without gallstone specimens were not taken.

Based on morphology, the physical features of the stones, such as cholesterol, pigment, or mixed, were found. White and yellow stones have been shown to be cholesterol stones. Pigment stones were classified as black and dark brown stones. Mixed stones were classified as green or brownish yellow stones. The specimens of the gall bladder were collected and preserved in 10% formalin & gallbladder outer surface, wall thickness and

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mucosa were observed for gross examination. The specimen was also examined under a microscope in details using by histology techniques.

Statistical Analysis- Data were analyzed using statistical software.

Results and Observations: - The current study examined the histopathological changes in the gallbladder of patients with gallstones. A total of 140 cholecystectomy specimens were collected by the Department of Surgery and Pathology, School of Medical Sciences and Research, Sharda University, Greater Noida. 114 cases (81.42%) from females, and 26 cases (18.57%) from males. The majority of the gallbladders (68 instances, or 48.5%) had cholesterol stones, followed by pigment stones in 51 gallbladders (36.4%) and 21 gallbladders (15%) with mixed gallstones. (**Table-1**)

Table 1: Showing types of gallstones in cholecystectomy specimen

Type of Stone	No of Specimens	Percentage
Cholesterol	68	48.50%
Pigmented	51	36.40%
Mixed	21	15%

Table 2: Showing macroscopic changes of cholecystectomy specimen

Parameters	Features	No of Specimens	Percentage (%)
Serosa	Normal	37	26.40%
	Congested	100	71.40%
Wall	Normal	92	65.70%
	Thicken	44	31.40%
Mucosa	Normal	36	26.70%
	Partially Lost	77	55%
	Completely lost	24	17.10%

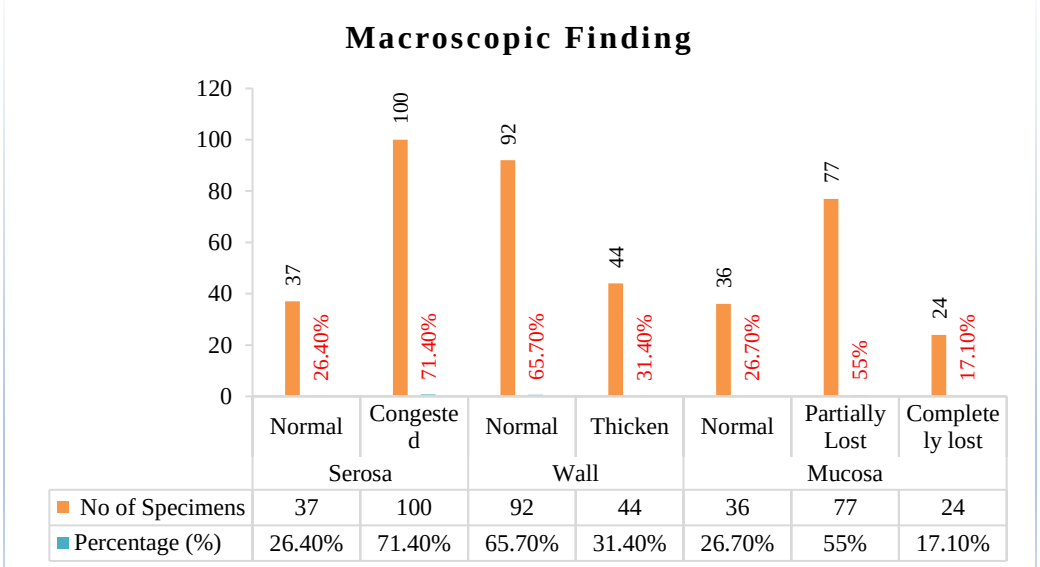

Figure 1: Bar diagram showing macroscopic finding of cholecystectomy gall bladder

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Above Table no 2 and Figure no-1 is showing that Gallbladder serosa was found to be normal in 37 (26.4%) of the cases, but congested in 100(71.40%) of the cases. Gallbladder wall was found to be normal (< 3 mm) in 92(65.70%) of the cases, thicken (> 3 mm) in 44(31.40%) of the cases. Gallbladder mucosal changes was found to be normal in 36(26.70%) of the cases, partially lost in 77(55%) of the cases, and completely lost in 24(17.10%) of the cases in this study.

Table 3: showing mucosal changes of cholecystectomy specimen

Parameters (Mucosal changes)	No of Cases	Percentage (%)
Normal Epithilium	13	9
Mucosal Gland Metaplasia	10	7.1
Rokitansky Aschoff Sinuses	60	42
Epithelial Hyperplasia	15	10
Muscular Hypertrophy	40	28
Chronic Cholecystitis	132	94
Acute Cholecystitis	7	5
Intestinal Metaplasia	2	1.4

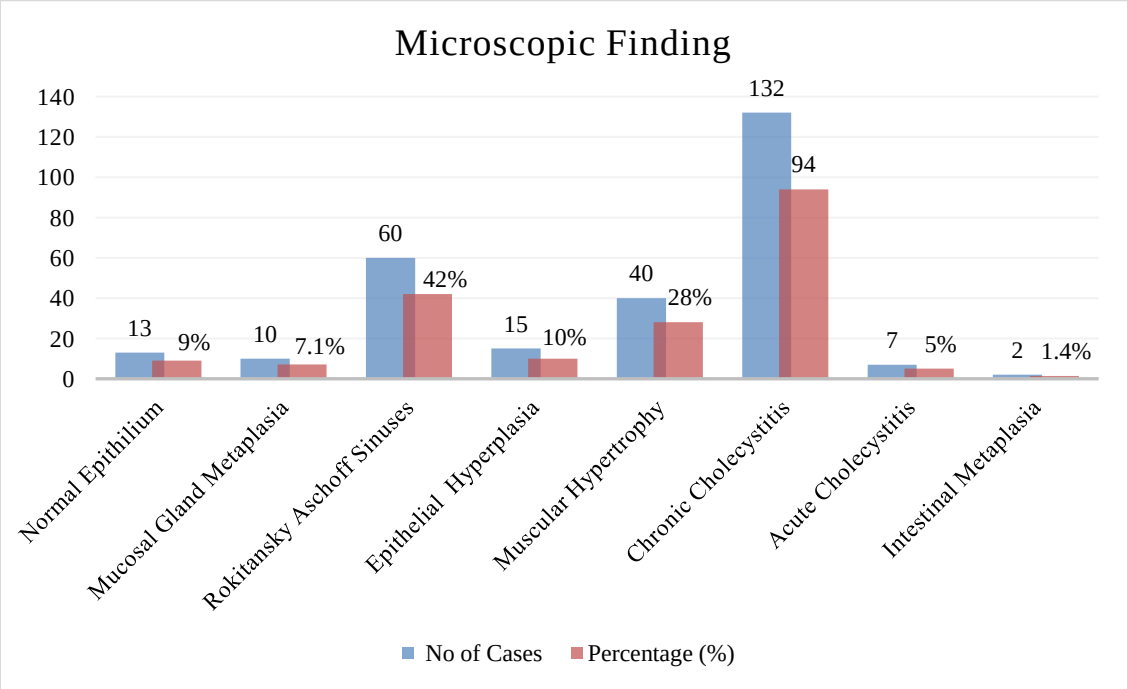

Figure 2: Column chart showing mucosal changes in gallbladder

Table no-3 and Figure no-2 Showing the frequency of alterations varies according on the variety of gallstone found in gallbladder. Normal Epithelium was observed in 13 cholelithiasis specimen (9%). Mucosal Gland Metaplasia was seen in 10 specimens (7%), Rokitansky Aschoff Sinuses in 60 specimens (42%), Epithelial Hyperplasia in 15 specimens (10%), Muscular Hypertrophy in 40 specimens (28), Chronic Cholecystitis in 132 specimens (94), AcutCholecystitis in 7 specimens (5%) and Intestinal Metaplasia in 2 specimens (1.4%).

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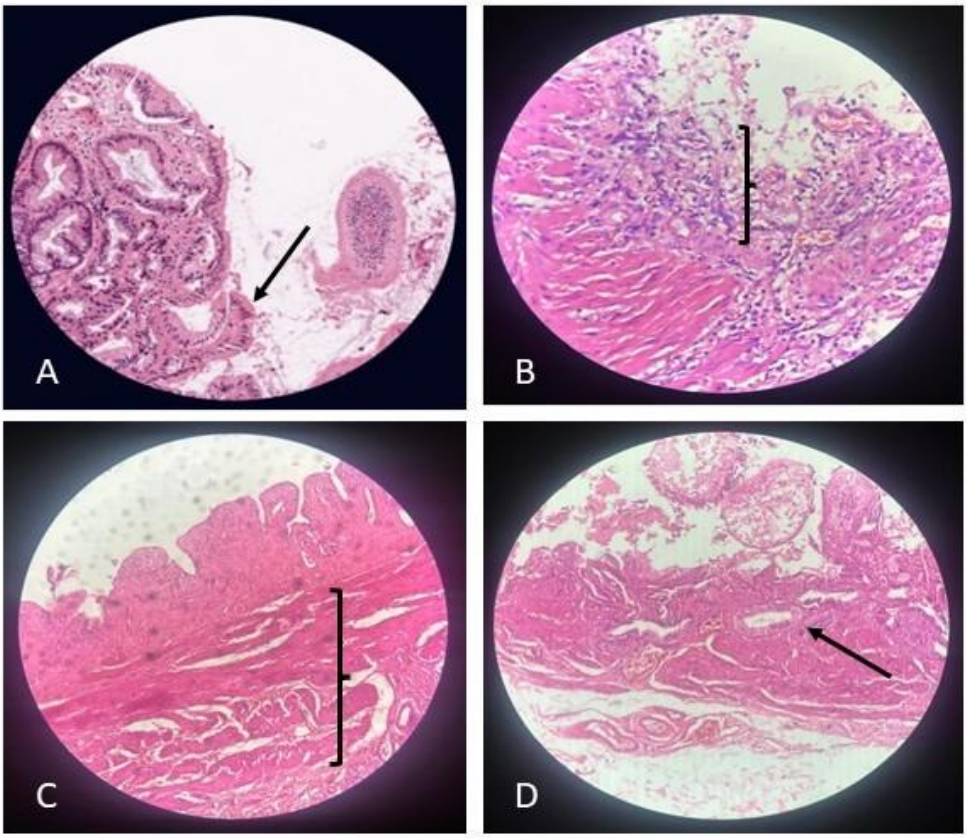

Figure 3: A-D showing A- Chronic Cholecystitis [H&E 40X], B- Acute Cholecystitis [H&E 40X], C- Muscular Hypertrophy [H&E 40X], D- Rokitansky Aschoff Sinuses [H&E 40X]

DISCUSSION

Table 4: Comparision of Histological study of gallbladder specimens with the previous study

Authours	Histological lesions	No of Cases	Percentages (%)
Baig et al. (2002) [7]	Chronic cholecystitis	24	60%
	Adenomatous hyperplasia	5	8%
Khanna et al. (2006) [8]	Normal epithelium	13	9%
	Epithelial hyperplasia	83	59%
	Antral metaplasia	23	16.50%
	Intestinal metaplasia	22	15.50%
	Epithelial ulceration	26	19%
Baidya et al. (2012) [9]	Epithelial metaplasia	183	46.20%
	Intestinal metaplasia	112	28.20%
	Dysplasia	5	1.30%
Tadashi et al. (2013) [10]	Normal epithilium	11	2.00%
	Chronic cholecystitis	508	94%

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	Rokitansky Aschoff sinus	351	65%
	Acute Cholecystitis	8	1.50%
Giri et al. (2016) [11]	Normal epithelium	79	15%
	Epithelial hyperplasia	195	37%
	Intestinal metaplasia	181	34%
Singh et al. (2019) [12]	Chronic cholecystitis	79	79%
	Acute cholecystitis	2	2%
	Intestinal metaplasia	1	1%
Ahadi M et al. (2020) [13]	Chronic cholecystitis	462	76%
	Acute cholecystitis	135	22%
Dabral M et al. (2023) [6]	Chronic cholecystitis	709	93%
	Acute cholecystitis	20	2.60%
	Intestinal metaplasia	8	1.10%
Mishra S et al. (2023) [14]	Chronic cholecystitis	140	70%
	Rokitansky-Aschoff sinuses	80	40%
	Acute cholecystitis	30	15%
Fatma et al. (2024) [15]	Chronic cholecystitis	122	38%
	Acute cholecystitis	22	6.9%
Present Study	Chronic cholecystitis	132	94%
	Acute cholecystitis	7	5%
	Rokitansky-Aschoff Sinuses	60	42%
	Mucosal Gland Metaplasia	10	7.1%
	Muscular Hypertrophy	40	28%
	Epithelial hyperplasia	15	10%
	Intestinal metaplasia	2	1.40%

Khanna et al. [8] reported thicker gallbladder walls in 57.5% of the cases and the most frequent finding, found in 83 specimens (59%) was epithelial hyperplasia, which was followed by antral metaplasia in 23 specimens (16.5%), intestinal metaplasia in 22 specimens (15.5%), epithelial ulceration in 26 specimens (19%) and normal epithelium in 13 specimens (9%).

In present study histological findings, mucosal alterations in the form of chronic cholecystitis 132 cases (94%) are more prevalent. Similar results have been reported by previous authors (Mohan et al and Baig et al.) who found that gallstone patients had a higher prevalence of chronic cholecystitis. [4,15,7]

Baidya et al. [9] In their study gallbladder serosal surface was found to be congested in 116 patients (28%), and normal in 280 patients (72%). In 215 patients (54.3%), the gallbladder wall thickness was normal, while in 181 patients (45.7%), it was thicker. In 270 specimens (68.4%), the mucosa was normal in 55 (13.8%) and in 11 specimens (2.7%), it was slightly nodular.

Histologically, they observed 183 patients (46.2%) had epithelial hyperplasia, 112 patients (28.0%) had intestinal metaplasia, 5 patients (1.3%) had dysplasia. In our study 37 (26.4%) had normal gallbladder serosa, 100 (71.40%) congested gallbladder serosa. In 44 cases (31.40%), the gallbladder wall was thicker, while in 92 cases (65.70%), it was normal. 36 patients (26.70%) had normal gallbladder mucosal alterations, 77 cases (55%) had partial loss, and 24 cases (17.10%) had completely loss.

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Tadashi et al. [10] Examined 540 specimens from cholecystectomy. According to their findings, the most frequent finding was 508 cases (94.1%) in chronic Cholecystitis similar to our finding, 351 cases (65%) in Rokitansky Aschoff sinus, 8 cases (1.50%) in Acute Cholecystitis & 11 cases (2.0%) in Normal epithilium. There was no evidence of intestinal metaplasia but it is present in our study.

Giri et al. [11] Examined on 526 cholecystectomy specimens with cholelithiasis. According to their findings, by gross examination, 340 specimens (64.64%) had a normal gallbladder serosal surface, while 186 specimens (35.36%) had a congested gallbladder. In 230 instances, the gallbladder wall thickness was normal (43.72%) similar to our studies.

The mucosa was partially nodular in 26 specimens (4.56%) and normal in 322 specimens (61.40%). Histologic study shown that 79 specimens (15.01%) had normal epithelium, 195 specimens (37.07%) had epithelial hyperplasia, 181 specimens (34.41%) had intestinal metaplasia similar to our study, 100 (71.40%) had congested gallbladder serosa, while 37 (26.4%) had normal gallbladder serosa.

The gallbladder wall was thicker in 44 cases (31.40%) and normal in 92 cases (65.70%). A total of 24 instances (17.10%) had completely loss, 77 cases (55%) had partial loss, and 36 patients (26.70%) had normal gallbladder mucosal changes. The histological findings, chronic cholecystitis, which shows as mucosal changes in 132 cases (94%) is more common.

Singh et al. [12] In 56% of the cases, the gallbladder's average wall thickness was normal, while in 44% of the cases, it was thickened. The wall of gallbladder thickness was normal in 65.70% of the cases but thickened in 31.40% of the cases in present study, So our finding is similar to his study.

Nasar A et al. [1] The most frequent histological findings were intestinal metaplasia in 54 specimens (51.9%), epithelial hyperplasia in 65 specimens (62.5%), antral metaplasia in 76 specimens (73.1%), and hemorrhage and congestion in 77 specimens (74%) similar to our study.

Eleven specimens (10.6%) had normal epithelium which is almost similar to findings of present study, in total, there were 132 (94%) cases of chronic cholecystitis, 60 (42%) cases of Rokitansky Aschoff sinus, and 7 (5%) cases of acute cholecystitis. Fifteen (10%) had epithelial hyperplasia, 40 (28%) had muscular hypertrophy, and two (1.4%) had intestinal metaplasia.

Aslam et al. [5] There were 664 cholecystectomy specimens examined. They found that the most frequent lesion was chronic Cholecystitis in 559(84%) and acute Cholecystitis in 95 (14%) cases which is similar to our study.

Ahadi M et al. [13] They found that the gallbladder diseases were more common in women than men and the most frequent histological finding in the gallbladder diseases of the cholecystectomy specimens was chronic Cholecystitis 462 (76.74%) with cholesterol stones and acute Cholecystitis 135 (22.42%) which is similar to our study.

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Dabral M et al. [6] Chronic cholecystitis was the most common histopathological diagnosis in 709 cases (93.28%), acute cholecystitis in 20 cases (2.6%) and intestinal metaplasia in 8 cases (1.13%). In our study also similar 7 (5%) cases of acute cholecystitis and 132 (94%) cases of chronic cholecystitis were reported.

Mishra S et al. [14] The findings of histopathology the most common changes were found in 140 instances (70%) of chronic cholecystitis, 30 cases (15%) of acute cholecystitis, and 80 cases (40%) with Rokitansky-Aschoff sinuses similar to our study, Acute cholecystitis occurred in 7 (5%), Rokitansky Aschoff sinuses for 60 (42%), and chronic cholecystitis for 132 (94%).

CONCLUSION

In our study it was concluded that Gallbladder disorders were more prevalent in female. Chronic cholecystitis is the most frequent histological variation in the gallbladder mucosa associated with cholelithiasis, followed by Rokitansky Aschoff sinuses, muscular hyperplasia, epithelial hyperplasia, and intestinal metaplasia.

Early identification and intervention in patients with gallstones could prevent these pathological changes and lower the risk of malignancy need for careful histopathological evaluation of resected gallbladder. This study will help in recognizing the potential complication of gallstones at a histological level with implications for clinical management and Prognosis.

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