

# Strawberry Gallbladder: A Distinctive Type of Cholesterolosis, Case Report and Literature Review

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**Abstract:** Strawberry gallbladder is a benign medical condition that refers to the surface appearance of the gallbladder mucosa. It occurs due to precipitations of lipids and macrophages in the lamina propria of the gallbladder wall.

We report the case of a 44-year-old female patient who presented to the emergency department with few days history of biliary colic. Investigations showed elevated AST, ALT and hypercholesteremia. Ultrasound abdomen demonstrated a mild fatty liver and multiple GB polyps. Laparoscopic cholecystectomy was performed. Histopathologic features were consistent with diffuse cholesterolosis.

Strawberry gallbladder is a distinctive type of cholecystosis. It is caused by irreversible alteration in the anatomic and morphologic aspects of the gallbladder lining. This entity is usually identified after surgery. Symptomatic patients with cholesterolosis will benefit from cholecystectomy.

## 1. Introduction

Gallbladder diseases, including cholelithiasis and cholecystitis, are common conditions encountered in clinical practice. Nonetheless, some rare diseases of gallbladder wall like polyps, cholesterolosis and adenomyomatosis are less prevalent [1].

Strawberry gallbladder or diffuse cholesterolosis is a unique cholecystopathy characterized by a reddening and granular appearance of the gallbladder mucosa, resembling the surface of a strawberry [2]. Although its incidence remains unknown, it is estimated to present in approximately 10 % of cholecystectomies [3].

In our manuscript, we describe the case of a young female patient with symptomatic gallbladder polyps and relevant risk factors was discovered postoperatively to have a strawberry gallbladder.

## 2. Case Report

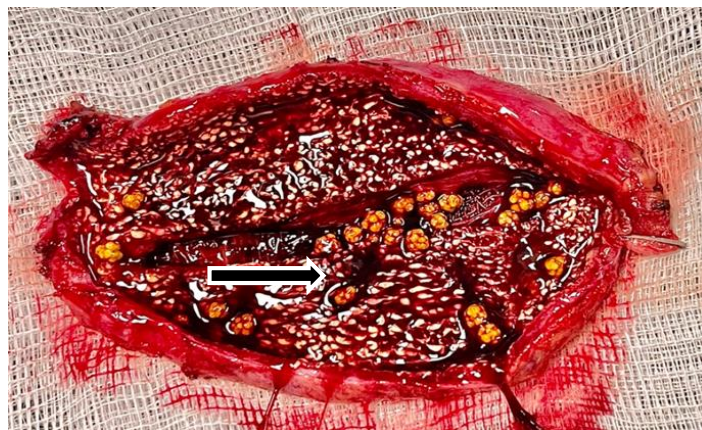
A 44-year-old female patient known to have dyslipidemia, presented to the emergency department complaining of right upper quadrant abdominal pain of 3 days duration. Pain was colicky in nature related to food associated with nausea and vomiting. History goes back to the last year when she experienced repeated bouts of biliary colic that was alleviated with paracetamol. Patient is a heavy smoker and moderate alcohol consumer.

Physical examination revealed normal vital signs, an overweight patient with RUQ tenderness and negative Murphy sign. Initial laboratory tests showed raised, cholesterol LDL, alanine transferase and gamma-glutamyl transferase levels. The ultrasonographic images demonstrated a distended gallbladder with thickened inner lining and multiple polyps (Figure 1). Patient was referred to hepatobiliary unit for further investigations and management. Tumor markers were unremarkable, and clinical history was not worrisome (no weight loss, no jaundice and absent family history of GB cancer). We decided to go for surgery since patient was symptomatic.

Intraoperatively, the gallbladder appeared slightly, inflamed with thickened wall. Laparoscopic cholecystectomy was performed and specimen was retrieved in an endobag. Gross image of the gallbladder showed diffuse, granular, and reddened dots on the surface containing cholesterol polyps resembling strawberry outline (Figure 2,3), while the histopathological assessment displayed an extensive mucosal hypertrophy and hyperplasia (Figure 4) and bulbous villi that contains aggregates of foamy lipid laden macrophages suggesting of cholesterolosis (Figure 5). The postoperative course was uneventful. Patient was advised for low fat diet and modification of life style as well as to follow up for her hypercholesteremia.



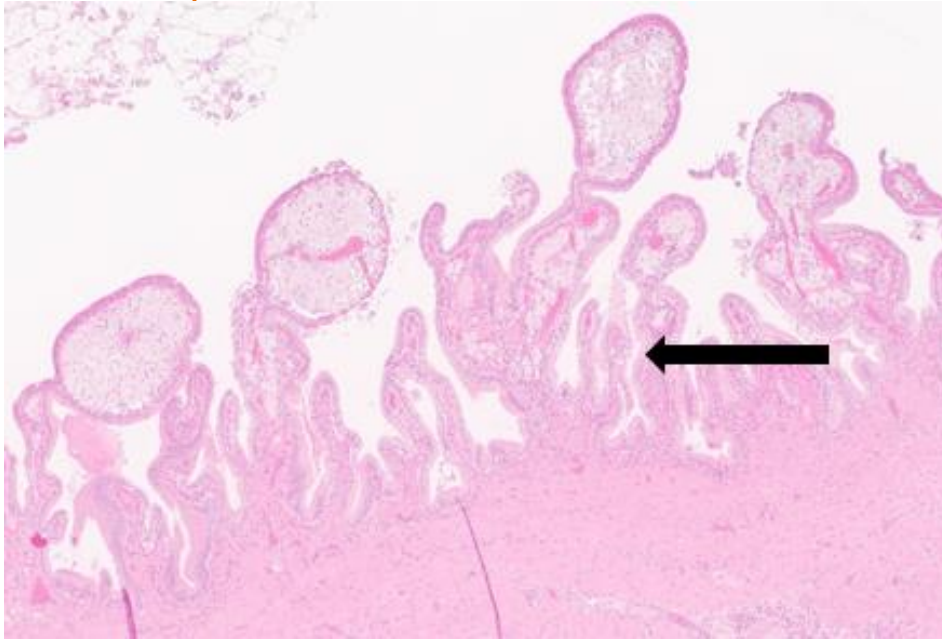
**Figure 1:** Ultrasound showing hyperplastic cholecystosis suggesting strawberry GB.



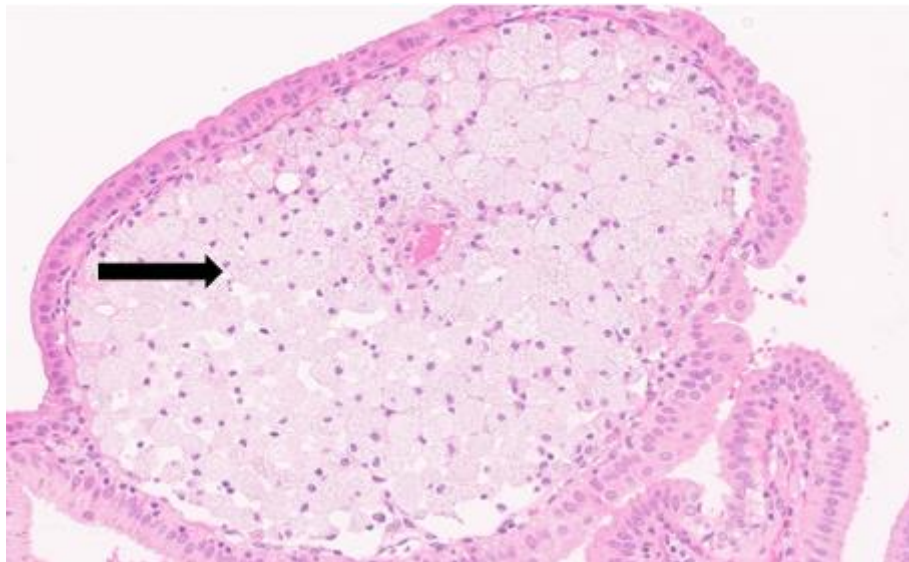
**Figure 2:** Gross image of gallbladder resembling strawberry outline with cholesterolosis.



**Figure 3:** Gross image of strawberry gallbladder after being preserved in formalin. Mucosa displays diffuse yellow streaks and dots.



**Figure 4:** Microscopic examination demonstrating diffuse alteration of gallbladder lining due to mucosal villous hyperplasia and hypertrophy. H&E, Objective 4x.



**Figure 5:** Histopathologic aspect revealing bulbous villi distended by foamy lipid laden macrophages representing cholesterosis. H&E, Objective 20x

### 3. Discussion

Cholesterosis is an idiopathic condition that is often diagnosed incidentally after cholecystectomy. Although the underlying pathophysiology is not fully understood, however it is believed to be linked to chronic inflammation of the gallbladder lining. Along with the accumulation of lipids and macrophages in the lamina propria can lead to focal, diffuse and polypoid proliferative changes. Diffuse cholesterosis is also called strawberry gallbladder [4].

Strawberry gallbladder is related to the typical stippled appearance of the mucosal surface on gross examination that resembles strawberry outline. It is usually noncancerous that affects females and obese patients mainly [5]. In addition, smoking and alcohol history could play a role in the pathogenesis of strawberry gallbladder [6].

Embryologically, biliary epithelium resembles the intestinal epithelium, which renders it capable of absorbing cholesterol from the bile. Gallbladders with normal function have the capacity to absorb esterified and non-esterified cholesterol from the bile [7]. The esterification process of cholesterol occurs in the endoplasmic reticulum which then creates lipid droplets which are released into the intercellular space. Eventually, they get phagocytosed by macrophages [8].

Several hypotheses exist to explain the accumulation of lipids such as cholesterol esters and triglycerides in cholesterolosis cases [9]. Possible causes include excessive cholesterol got absorbed from bloodstream directly, abnormal emptying of lipids from the gallbladder due to underlying mechanical factors and defects in cholesterol metabolism and excretion within the macrophages [10]. According to the literature, there is no exact pathogenetic pathway to this complex condition. Patients who suffer from cholesterolosis and cholesterol stones usually have supersaturated bile [11]. Some articles showed that high cholesterol increases the risk of cholesterolosis. In contrast, other studies have concluded that relationship between hypercholesterolemia and cholesterolosis is still inconsistent [11,12].

Hyperplastic cholecystosis manifests in variable clinical pictures, some patients may remain asymptomatic or might present with symptoms of biliary colic and others might exhibit acute cholecystitis and pancreatitis. Although cholesterolosis is linked to chronic cholecystitis, interestingly, Studies did not confirm any increase in the risk of gallbladder cancer [13].

Adenomyomatosis is another gallbladder rare disease that should be considered as a differential diagnosis with cholesterolosis. Compared to strawberry gallbladder, adenomyomatosis is characterized by the presence of hyperplasia and in-folding of the gallbladder lining which lead to the formation of Rokitansky-Aschoff sinuses [14]. While both conditions can present with a similar macroscopic appearance, the presence of these sinuses is the key distinguishing feature [15].

Preoperative radiological examination is often required to rule out other potential gallbladder pathologies including acute cholecystitis, and gallbladder carcinoma [16]. Although gross assessment of the gallbladder displays the presence of strawberry gallbladder, microscopic findings are necessary to confirm the diagnosis [17,18].

Definitive treatment of such cases is removal of the bladder only when indicated. Our patient symptoms were completely relieved after surgery. Follow up showed improvement of her laboratory. Findings after treatment with statins and modifications life style.

#### 4. Conclusion

Strawberry gallbladder is an idiopathic non-neoplastic condition occurs due to diffuse gallbladder wall cholesterolosis. Knowledge of this pathology and familiarity of its radiologic characteristics are important to establish proper diagnosis and provide appropriate management.

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