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CASE REPORT

Porcelain Gallbladder Undetected by Preoperative Imaging Findings: A Case Report and Literature Review

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ABSTRACT

Porcelain gallbladder is a rare condition, defined as calcification of the gallbladder wall. Its etiology is still not well established, but a relationship with gallstones of up to 95% is suggested, which causes an obstructive effect that triggers an inflammatory process with subsequent irritation and fibrosis of the gallbladder wall, either focal (affecting only the muscle layer) or transmural. It often has an asymptomatic course but may present as a case of chronic cholecystitis. It is a relevant pathology because a relationship with gallbladder cancer of up to 6% has been demonstrated, and in this regard, the role of prophylactic cholecystectomy is still debated. This article presents the case of a 51-year-old woman who consulted for abdominal pain in the right hypochondrium. An ultrasound was performed, diagnosing cholelithiasis with cholecystitis and a gallbladder with a thickened wall and mobile stones inside. A laparoscopic cholecystectomy was performed, with samples taken for pathology, and malignancy was ruled out.

Keywords: Abdominal pain, cholecystectomy, diagnosis, gallbladder, gallbladder neoplasms, treatment

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INTRODUCTION

Porcelain gallbladder is a rare condition characterized by calcification of the gallbladder wall, resulting in a bluish coloration due to calcium deposition, typically associated with chronic inflammation.[1] This finding is usually incidental, with a prevalence ranging from 0.06% to 0.8% in cholecystectomy specimens. In 90–95% of cases, it is associated with gallstones, which constitute a significant risk factor.[2]

It predominantly affects women, with a female-to-male ratio of approximately 5:1, and has a higher prevalence in the sixth decade of life.[3] Around 18% of cases are asymptomatic; when symptoms occur, they resemble chronic cholecystitis, including abdominal pain, anorexia, nausea, vomiting, fever, and jaundice.[4,5] Diagnosis is typically made through imaging studies such as abdominal radiography, ultrasound, or computed tomography, with gallbladder wall calcification being the most consistent finding.[1,4]

Although rare, porcelain gallbladder is significantly associated with gallbladder cancer, particularly adenocarcinoma, occurring in 2–3% of cases.[5] Selective mucosal calcification, in particular, has been linked to malignancy rates of up to 7%.

Preoperative diagnosis is important for surgical planning and to reduce complications such as bleeding, perforation, or conversion to open surgery. Imaging—such as ultrasound, CT, or MRI—can help assess the extent of calcification, detect chronic inflammation, identify adhesions, and rule out malignancy. This information is essential for anticipating technical challenges, selecting the surgical approach, and optimizing perioperative care.[6]

The following case describes an incidental intraoperative finding of porcelain gallbladder, undetected by preoperative imaging. Given its unusual presentation and clinical relevance, we aim to highlight its features and the challenges it presents in surgical management.[7,8]

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CASE REPORT

A 51-year-old woman with no relevant past medical history presented to the emergency department with an eight-month history of intermittent right upper quadrant pain, exacerbated by fatty meals. The pain was self-limiting and occasionally accompanied by nausea and bilious vomiting.

On admission, the patient was in good general condition: alert, oriented, afebrile, hydrated, with stable vital signs, and without respiratory distress. Physical examination revealed no scleral icterus or cardiopulmonary abnormalities. The abdomen was soft, tender in the right upper quadrant, without peritoneal signs, palpable masses, or organomegaly.

Laboratory tests showed mild leukocytosis; liver function tests were normal. Abdominal ultrasound revealed a normal-sized liver and a gallbladder with thickened walls (5 mm), mobile gallstones, and no biliary dilation. The common bile duct measured 2.9 mm. Pancreas, kidneys, and spleen were normal. The diagnosis was cholelithiasis with signs of cholecystitis.

The patient was admitted and underwent laparoscopic cholecystectomy. Intraoperatively, a porcelain gallbladder was identified. Resection of the gallbladder and cystic lymph node was performed. Histopathological examination revealed low-grade dysplasia of the gallbladder wall, without adenocarcinoma or high-grade dysplasia. The cystic lymph node was negative for malignancy (Figs. 1,2).

DISCUSSION

Porcelain gallbladder is a rare condition defined by the calcification of the gallbladder wall, giving it a bluish and hardened appearance resembling "porcelain".[9]

This entity primarily affects individuals over 60 years old and is associated with gallstones in up to 95% of cases.[2]

Its etiology remains unclear, but various theories have been proposed regarding its development. Chronic inflammation of the gallbladder has been identified as a potential cause, leading to hemorrhage and scarring of the gallbladder wall.

Additionally, the accumulation of gallstones, obstruction of the cystic duct, and subsequent bile stasis may irritate the gallbladder wall due to the precipitation of calcium carbonate in the mucosa.

Calcification patterns are classified based on their extent: complete intramural calcification, which affects the entire wall thickness, and selective mucosal calcification, which only affects the muscular layer of the gallbladder wall. Patients with a complete calcification pattern may have a lower risk of developing malignancy.[2,7,10]

Many cases are diagnosed incidentally during abdominal imaging studies. On an abdominal X-ray, intramural calcification may appear as a rounded opacity in the right upper quadrant, though focal calcifications might not be visible.[5]

It is essential to identify undiagnosed cases of porcelain gallbladder through diagnostic imaging in order to antici-

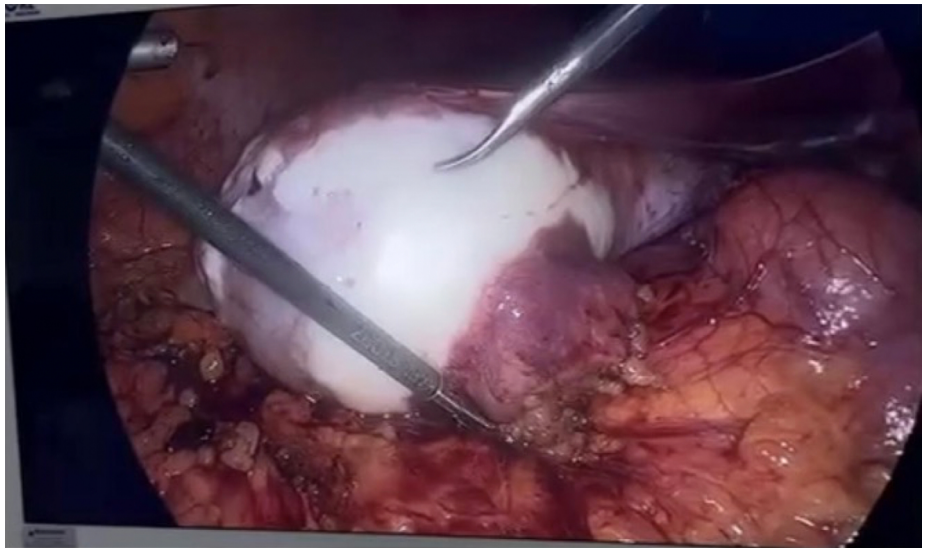

Figure 1. Intraoperative laparoscopic view of a porcelain gallbladder. The gallbladder wall appears whitish, calcified, and glossy, characteristic of this condition, during dissection of Calot's triangle

Figure 2. Laparoscopic view of a porcelain gallbladder from an inferior angle. Note the diffuse calcification and thickening of the wall, with a smooth, porcelain-like surface

pate surgical complexity.[11–14] Calcification of the gallbladder wall can complicate dissection during cholecystectomy and increase the risk of bleeding or bile duct injury. Moreover, preoperative imaging is key to assessing oncologic risk, reducing complication rates, and avoiding unplanned intraoperative decisions.[15,16]

Ultrasound findings may reveal different patterns: a hyperechoic crescent structure with posterior acoustic shadowing; a biconvex curvilinear echogenic structure with acoustic shadowing; or irregular clusters of echoes with posterior acoustic shadowing. These findings are crucial in ruling out differential diagnoses such as a gallbladder filled with gallstones (which would present with the "wall-echo-shadow" sign) and emphysematous cholecystitis (characterized by "ring-down artifacts" due to trapped gas movement). However, ultrasound does not always allow for a definitive diagnosis of porcelain gallbladder due to its limited ability to distinguish between large gallstones, wall thickening, or mural calcification.[11]

Taylor et al.[15] described three ultrasound patterns that may hinder diagnosis:

1. **Semilunar pattern:** A posterior acoustic shadow that can mimic a single large gallstone.
2. **Curvilinear pattern:** A continuous echogenic band that may be confused with thickened wall, intraluminal gas, or vascular calcification.
3. **Irregular clumps:** Discontinuous echogenic foci that can be mistaken for chronic cholecystitis, adenomyomatosis, or calcified polyps.

Because of these challenges, it is recommended to supplement ultrasound with contrast-enhanced abdominal computed tomography in patients with high clinical suspicion—namely, those with chronic cholelithiasis, atypical biliary symptoms, or incidental findings on abdominal X ray or ultrasound.[16,17]

The clinical relevance of this condition lies in its high risk of associated gallbladder malignancy. Previously, its incidence was believed to range from 12% to 62%. However, recent studies suggest a much lower incidence.[3] A 2012 study by Schnelldorfer et al.[9] found that patients with gallbladder calcification have a 6% risk of developing malignancy compared to 1% in those without this condition. Since many patients are asymptomatic, diagnoses are often delayed, contributing to a poor 5-year survival rate of only 19%.

Prophylactic cholecystectomy is not routinely recommended, but it remains a controversial topic.[1,5] Most sources agree that patients should be assessed individually; prophylactic cholecystectomy is recommended in symptomatic patients, patients with radiographic findings suggestive of malignancy such as a gallbladder mass, focal wall thickening, or local invasion; patients with clinical signs highly suggestive of gallbladder cancer (jaundice, Courvoisier signs, or unexplained weight loss); or young patients with low surgical risk. It is not usually indicated in asymptomat-

ic patients without the findings described above, given the low probability of developing cancer.[12,17,18]

Conservative management may be reasonable when cancer risk factors or suggestive signs are unclear, or in patients with a high surgical risk.[10]

This approach is generally recommended for incidental findings when surgical risks outweigh cancer development risks. Serial ultrasound evaluations of the gallbladder may support this decision.[1]

Additionally, in patients without clear biliary symptoms, no history of chronic cholelithiasis, or no findings on initial imaging, a conservative strategy is recommended. If nonspecific ultrasound findings are present in asymptomatic patients, a follow-up ultrasound can be performed in 3–6 months to assess for any changes.[12,17]

Histopathological examination of the porcelain gallbladder is crucial. If malignancy is detected, extended or radical cholecystectomy (wedge resection of the liver and gallbladder bed, followed by lymphadenectomy) is the treatment of choice.[6]

Surgical management poses challenges due to the gallbladder's calcified wall, adhesions in the pericholecystic region and hepatic bed, as well as tissue friability, increasing the risk of bleeding and conversion to open surgery (5–25%).[1]

Despite these difficulties, laparoscopic cholecystectomy remains the preferred approach.[8,14]

CONCLUSION

In conclusion, porcelain gallbladder is a pathology with a low prevalence, and its diagnosis is usually incidental. Its association with malignancy development remains a condition of clinical interest. Laparoscopic cholecystectomy is the treatment of choice in symptomatic patients or those with findings suggestive of malignancy. The use of various diagnostic tools is necessary to clarify the actual cancer risk in these patients.

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from the patient for publication of the clinical details and images.

Resources

We reviewed relevant literature on porcelain gallbladder, its diagnosis and management, using PubMed and Google Scholar. The diagnosis was mainly based on abdominal ultrasound findings. Laparoscopic cholecystectomy was done following the standard surgical protocols. The manuscript was prepared using Microsoft Word following the journal's formatting guidelines.

Disclosures

Ethics Committee Approval: This is a single case report, and therefore ethics committee approval was not required in accordance with institutional policies.

Informed Consent: Written informed consent was obtained from the patient for publication of the clinical details and images.

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