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(CASE REPORT)

Metastatic signet ring cell adenocarcinoma of the gallbladder: A rare case report

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Abstract

Background: Signet ring cell carcinoma (SRCC) of the gallbladder is an extremely rare and aggressive histological variant of adenocarcinoma, often associated with poor prognosis and early metastasis.

Case Presentation: A 52-year-old female presented with abdominal pain and loss of appetite for 20 days. Radiological investigations suggested calculous cholecystitis with features of pancreatitis and benign biliary stricture. Cholecystectomy specimen on histopathological examination revealed tumor cells with abundant intracytoplasmic mucin and peripheral nuclei consistent with signet ring morphology. The tumor infiltrated the muscularis propria, confirming metastatic signet ring cell adenocarcinoma of the gallbladder.

Conclusion: Gallbladder SRCC is a rare but highly aggressive malignancy. Early diagnosis remains difficult due to nonspecific clinical and radiological findings. Histopathological examination plays a crucial role in diagnosis, and reporting such rare cases is important for better understanding and management.

Keywords: Gallbladder Carcinoma; Signet Ring Cell Carcinoma; Metastasis; Adenocarcinoma; Post cholecystectomy; Rare tumor

1. Introduction

Gallbladder carcinoma is the most common malignancy of the biliary tract and represents a highly aggressive cancer with poor prognosis. The majority of cases are adenocarcinomas, while rare histological variants such as signet ring cell carcinoma are infrequently encountered but associated with a worse clinical outcome [1,2]. Signet ring cell carcinoma is characterized by tumor cells containing abundant intracellular mucin displacing the nucleus to the periphery. This variant is known for its aggressive clinical course, early dissemination, and poor prognosis [3]. Risk factors include cholelithiasis, chronic inflammation, porcelain gallbladder, and anomalous pancreaticobiliary junction [2,4]. Clinically, gallbladder carcinoma often presents with nonspecific symptoms such as right upper quadrant pain, anorexia, weight loss, and occasionally jaundice, leading to delayed diagnosis. Radiological investigations play a key role in initial evaluation. Ultrasonography is typically the first-line imaging modality, followed by contrast-enhanced CT or MRI for staging and assessment of local invasion. Magnetic resonance cholangiopancreatography (MRCP) and endoscopic retrograde cholangiopancreatography (ERCP) are useful in evaluating biliary obstruction and ductal involvement [1,5]. Definitive diagnosis is established by histopathological examination, which remains the gold standard. In certain cases, immunohistochemistry may aid in differentiating primary gallbladder carcinoma from metastatic lesions originating from other organs [3,6]. Overall, gallbladder carcinoma carries a poor prognosis due to late presentation and aggressive tumor biology. Early detection and accurate histopathological diagnosis are essential to guide appropriate management.

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2. Case Presentation

A 52-year-old female presented with complaints of dull aching pain in the right upper quadrant of the abdomen for a duration of 20 days. The pain was insidious in onset, non-radiating, and intermittently progressive in nature. It was associated with loss of appetite. There was no history of jaundice, vomiting, fever, or significant weight loss. There was no prior history of similar complaints or any known comorbid illnesses.

On general physical examination, the patient was conscious, oriented, and hemodynamically stable. No icterus, pallor, or lymphadenopathy was noted. Abdominal examination revealed mild tenderness in the right hypochondrium without any palpable mass or organomegaly.

Routine laboratory investigations were largely within normal limits, except for mild elevation in liver function parameters. Serum tumor markers were not significantly elevated (if available, can be added).

Radiological evaluation was performed for further assessment. Ultrasonography of the abdomen revealed features suggestive of calculous cholecystitis with mild hepatomegaly and a bulky pancreas, raising suspicion of associated pancreatitis. Subsequently, magnetic resonance cholangiopancreatography (MRCP) demonstrated cholelithiasis with mild dilatation of the proximal common bile duct and intrahepatic biliary radicles. A smooth narrowing of the mid and distal common bile duct was observed, suggestive of a benign stricture. The pancreatic head appeared bulky with surrounding fat stranding and minimal peripancreatic fluid, consistent with focal pancreatitis.

Further evaluation with endoscopic retrograde cholangiopancreatography (ERCP) confirmed distal common bile duct stricture, likely inflammatory in etiology, along with findings consistent with cholecystitis and pancreatitis.

Based on the clinical and radiological findings, a provisional diagnosis of calculous cholecystitis with associated pancreatitis and benign biliary stricture was made. The patient subsequently underwent cholecystectomy.

3. Surgical Intervention

The patient subsequently underwent cholecystectomy for symptomatic gallstone disease.

3.1. Histopathological Findings

3.1.1. Gross Examination

The cholecystectomy specimen measured approximately 6.5 × 3.0 × 1.2 cm. The external surface appeared congested. On cut section, the gallbladder wall was thickened, particularly at the fundus. The lumen contained two large brownish-black calculi. The mucosal surface was irregular and rough. A focal perforation measuring approximately 0.6 × 0.6 cm was identified at the fundus. An additional flap-like tissue fragment measuring 2.7 × 1.9 cm was also received.

3.1.2. Microscopic Examination

Histological examination reveals diffuse infiltration of the gallbladder wall by malignant epithelial cells arranged predominantly in poorly cohesive clusters, nests, and scattered single cells. The tumor cells are characterized by abundant intracytoplasmic mucin vacuoles displacing the nuclei eccentrically, imparting a classic signet ring cell morphology. The neoplastic cells exhibit marked cytological atypia, including nuclear pleomorphism, hyperchromatic, irregular nuclear contours, and occasional prominent nucleoli. Mitotic figures are infrequent but identifiable. Foci of rudimentary glandular differentiation are noted; however, the overall architecture remains predominantly poorly differentiated. The tumor infiltrates through the mucosa into the muscularis propria, with evidence of desmoplastic stromal reaction. No well-formed glandular structures are evident. The micromorphological features are consistent with a poorly differentiated adenocarcinoma with predominant signet ring cell differentiation, in keeping with metastatic involvement of the gallbladder.

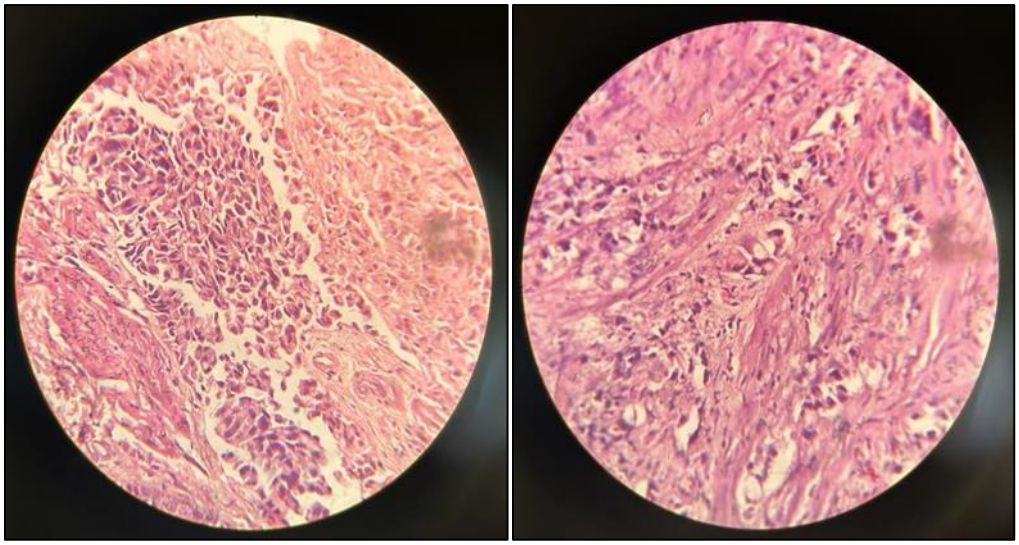

Figure 1 40x microscopic image of metastatic signet ring cell

3.1.3. Diagnosis

Metastatic signet ring cell adenocarcinoma of the gallbladder

4. Results and Discussion

Gallbladder carcinoma is the most common malignancy of the biliary tract and is characterized by an aggressive clinical course and poor prognosis. Adenocarcinoma constitutes many cases; however, rare histological variants such as signet ring cell carcinoma (SRCC) are exceedingly uncommon [1,5]. SRCC is defined by the presence of malignant cells containing abundant intracytoplasmic mucin that displaces the nucleus peripherally, producing the characteristic signet ring appearance [3].

SRCC most commonly arises in the stomach and may also be seen in the colon, breast, and pancreas. Its occurrence in the gallbladder is rare and often a diagnostic challenge, particularly in differentiating primary tumors from metastatic involvement [3,7]. In the present case, the diagnosis was established based on characteristic micromorphological features observed on microscopic examination.

Clinically and radiologically, gallbladder SRCC lacks specific distinguishing features and often mimics benign conditions such as cholecystitis, as seen in this case. The patient presented with nonspecific symptoms and imaging findings suggestive of calculous cholecystitis with pancreatitis and benign biliary stricture. Such overlapping features frequently lead to delayed or incidental diagnosis following cholecystectomy [5,8].

Histopathological examination remains the gold standard for diagnosis. The presence of poorly cohesive tumor cells with abundant mucin and signet ring morphology, along with infiltration of the gallbladder wall, is diagnostic. Immunohistochemistry may further aid in distinguishing primary gallbladder SRCC from metastasis, with markers such as CK7, CK20, and CDX2 playing an important role [3,6].

SRCC is associated with an aggressive biological behavior, characterized by diffuse infiltration, early lymphatic spread, and a high propensity for distant metastasis. Consequently, it carries a significantly poorer prognosis compared to conventional gallbladder adenocarcinoma [1,7].

Management of gallbladder SRCC is not well established due to its rarity. Surgical resection remains the treatment of choice in early-stage disease; however, most cases present at an advanced stage where curative surgery is not feasible. In such scenarios, systemic chemotherapy, typically with gemcitabine- and platinum-based regimens, is employed as palliative treatment. Despite therapy, overall survival remains limited [5,8].

The present case highlights the diagnostic challenge posed by this rare entity, where clinical and radiological findings were suggestive of benign pathology, and the malignancy was detected only on histopathological examination. This

underscores the importance of thorough pathological evaluation of all cholecystectomy specimens, even in apparently benign conditions.

5. Conclusion

Signet ring cell adenocarcinoma of the gallbladder is a rare and aggressive malignancy with nonspecific clinical presentation. Diagnosis is often incidental and relies on histopathological evaluation. Early detection and accurate identification of tumor origin are essential for appropriate management. More case reports and studies are needed to improve understanding and treatment outcomes.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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