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Hemorrhagic Cholecystitis With Cystic Artery Pseudoaneurysm Mimicking Gallbladder Cancer and Hepatic Metastases

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Abstract

Hemorrhagic cholecystitis is an uncommon but potentially life-threatening condition that can mimic malignancy on imaging studies. Cystic artery pseudoaneurysm is a rare associated finding that further complicates diagnosis. We report a case of a 78-year-old man presenting with right hypochondrial pain and fever. Initial imaging performed elsewhere was interpreted as gallbladder carcinoma with hepatic metastases. Repeat ultrasound, contrast-enhanced CT, and an MRI in our department demonstrated hemorrhagic cholecystitis, cystic artery pseudoaneurysm, and hepatic abscesses. Retrospective review of the prior CT confirmed that the pseudoaneurysm and hemorrhagic content had been misinterpreted as neoplastic. The patient underwent cholecystostomy and drainage of hepatic abscesses, with pathology excluding malignancy. This case highlights a rare presentation of hemorrhagic cholecystitis complicated by cystic artery pseudoaneurysm, mimicking gallbladder cancer. Careful multimodality imaging and correlation with clinical findings are essential to avoid diagnostic errors.

Categories: Radiology, General Surgery, Emergency Medicine
Keywords: abscess, ct imaging, cystic artery pseudoaneurysm, gallbladder carcinoma mimic, hemorrhagic cholecystitis

Introduction

Hemorrhagic cholecystitis is an uncommon and potentially life-threatening complication of acute cholecystitis characterized by intraluminal bleeding within the gallbladder. It is a rare entity, with most of the available literature consisting of case reports and small case series; in a retrospective cohort, 35 cases were identified among approximately 6,458 cholecystectomies [1].

It may occur spontaneously or in association with trauma, anticoagulation, vascular abnormalities, or severe inflammation. Severe transmural inflammation of the gallbladder can extend to adjacent vascular structures, causing inflammatory erosion and weakening of the cystic artery wall, which may lead to pseudoaneurysm formation and subsequent intraluminal hemorrhage. When complicated by a cystic artery pseudoaneurysm, the imaging diagnosis can be particularly challenging, as the combination of hemorrhagic intraluminal contents and vascular abnormalities may mimic gallbladder carcinoma, especially in elderly patients [2,3].

Furthermore, inflammatory hepatic lesions or hepatic abscesses contiguous with the gallbladder may demonstrate mass-like imaging features and can mimic hepatic metastases, particularly when associated with an irregular gallbladder mass. This combination of findings may therefore create a complex diagnostic mimic of advanced gallbladder malignancy.

Misinterpretation of these findings may have important therapeutic implications, potentially leading to inappropriate oncologic workup or biopsy rather than timely surgical or endovascular management [2]. This report illustrates an unusual case of hemorrhagic cholecystitis with cystic artery pseudoaneurysm and hepatic abscesses, initially misdiagnosed as gallbladder cancer with liver metastases, and underscores the importance of careful multimodality imaging review and correlation with clinical context.

Case Presentation

A 78-year-old male presented with a two-week history of right hypochondrial pain and fever, without jaundice. He was hemodynamically stable. The available medical records were reviewed for potential risk factors associated with hemorrhagic cholecystitis. There was no documented history of abdominal trauma, previous biliary intervention or hepatobiliary surgery, chronic liver disease, known malignancy, or coagulation disorder. The available records did not document anticoagulant or antiplatelet therapy or a previous history of cholecystitis. Laboratory tests revealed elevated C-reactive protein, leukocyte count, total bilirubin, and alkaline phosphatase levels (Table *1*).

Laboratory parameters	Patient value	Reference range
C-reactive protein	188 mg/L	<6 mg/L
Leukocyte count	15000 cells/µL	4000-10000 cells/µL
Hemoglobin	8.7 g/dL	13-17 g/dL
Platelets	350×10³/µL	150-450×10³/µL
AST	31 U/L	12-38 U/L
ALT	32 U/L	10-40 U/L
Total bilirubin	5.3 mg/dL	0.1-1 mg/dL
Alkaline phosphatase	317 U/L	25-100 U/L
Prothrombin time	90%	>70%
aPTT	27 s	25-35 s
Blood urea	0.74 g/L	0.06-0.36 g/L
Serum creatinine levels	8.5 mg/L	7-13 mg/L
Lipase	27 U/L	0-60 U/L

TABLE 1: The laboratory test results showing elevated C-reactive protein, leukocyte, total bilirubin, and alkaline phosphatase levels.

AST: aspartate aminotransferase; ALT: alanine aminotransferase; aPTT: activated partial thromboplastin time

An abdominal CT performed at an external facility had been interpreted as demonstrating gallbladder carcinoma with an impacted calculus and hepatic metastases. The patient was referred to our department for percutaneous biopsy of the presumed liver metastases. On arrival, an abdominal ultrasound revealed multiple hypoechoic intrahepatic collections consistent with abscesses. A repeat contrast-enhanced abdominal CT was performed (two weeks after the initial CT). The unenhanced phase demonstrated a distended gallbladder containing dense fluid (52 Hounsfield units {HU}) without enhancing soft tissue, suggesting hemorrhagic content (Figures *1*, *2*). In the arterial phase, a small (4 mm) saccular enhancing structure contiguous with a distal branch of the cystic artery was identified, consistent with a cystic artery pseudoaneurysm (Figures *3*, *4*). The enhancement persisted in the portal phase without change, favoring pseudoaneurysm rather than active extravasation (Figure *5*).

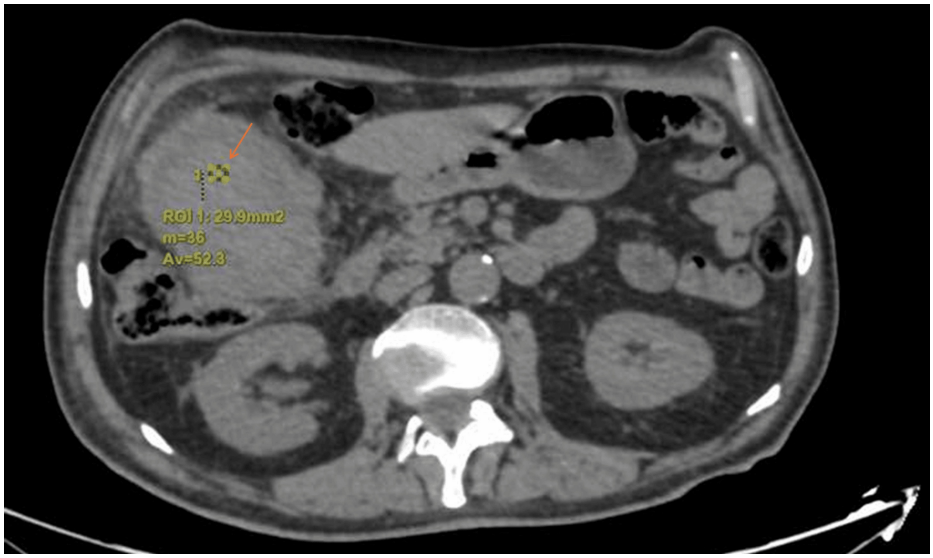


FIGURE 1: Axial unenhanced CT image demonstrating marked distension of the gallbladder with dense intraluminal material.

A region-of-interest (ROI) measurement confirms attenuation of 52 Hounsfield units, consistent with hemorrhagic content (arrow).



FIGURE 2: Axial portal venous phase CT image demonstrating absence of any enhancing intraluminal soft-tissue component within the gallbladder (arrow), supporting a diagnosis of hemorrhagic content rather than neoplasm.



FIGURE 3: Axial arterial-phase CT image demonstrating a small (4 mm) saccular enhancing structure within the gallbladder wall (arrow), consistent with a cystic artery pseudoaneurysm.

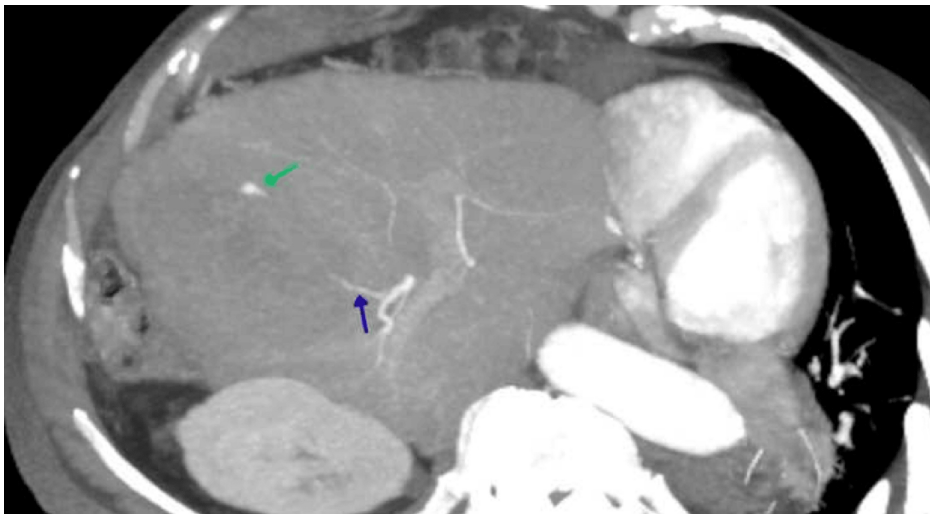


FIGURE 4: Axial arterial-phase CT image with MIP reconstruction demonstrating the cystic artery (blue arrow) and the saccular pseudoaneurysm arising from its distal branch (green arrow).

MIP: maximum intensity projection

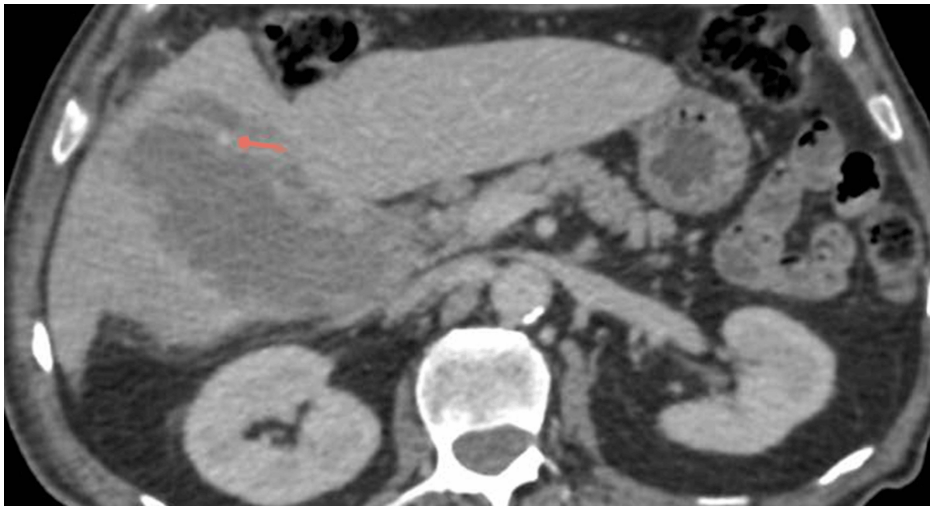


FIGURE 5: Axial portal venous phase CT showing a persistent, stable cystic artery pseudoaneurysm (arrow), without active extravasation.

The gallbladder wall was irregularly thickened and demonstrated multiple focal defects and ulcerations, with surrounding fat stranding indicative of inflammatory changes or evolving gangrene (Figure *6*). The intrahepatic lesions in segment V appeared as rounded collections with liquid content. They demonstrated a peripheral enhancing membrane on the portal phase and an outer hypodense rim that enhanced on delayed phase, producing a double-target sign strongly suggestive of hepatic abscesses (Figure *7*). A subtle tract was visualized extending between gallbladder wall ulcerations and the adjacent hepatic collections, suggesting direct extension of infection (Figure *8*). MRI confirmed these findings.



FIGURE 6: Axial portal venous phase CT image highlighting multiple focal defects and ulcerations of the thickened gallbladder wall (arrow), suggesting evolving gangrene.



FIGURE 7: Axial portal venous phase CT showing two hepatic abscesses with central fluid content, an enhancing internal membrane, and a surrounding hypodense rim (double-target sign, arrow).

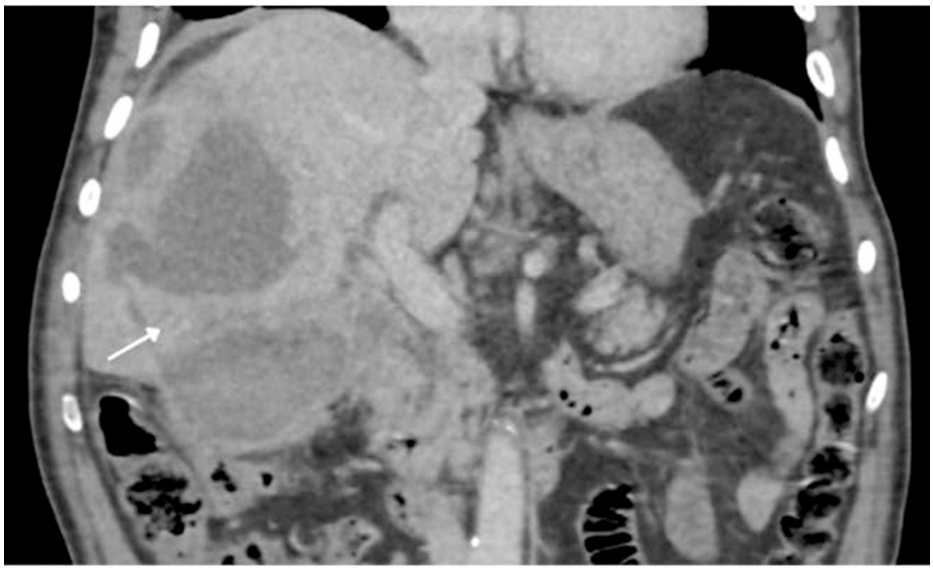


FIGURE 8: Coronal portal venous phase CT image demonstrating a subtle tract (arrow) extending from a focal defect in the gallbladder wall to the adjacent hepatic abscess, indicating direct spread of infection.

T1-weighted axial images showed high signal foci within the gallbladder lumen that did not suppress on fat-saturated sequences, consistent with hemorrhage (Figure *9*). Diffusion-weighted imaging demonstrated restricted diffusion within the gallbladder content, suggesting concurrent infection (Figure *10*). T2-weighted sequences confirmed irregular gallbladder wall thickening with multiple ulcerations (Figure *11*).

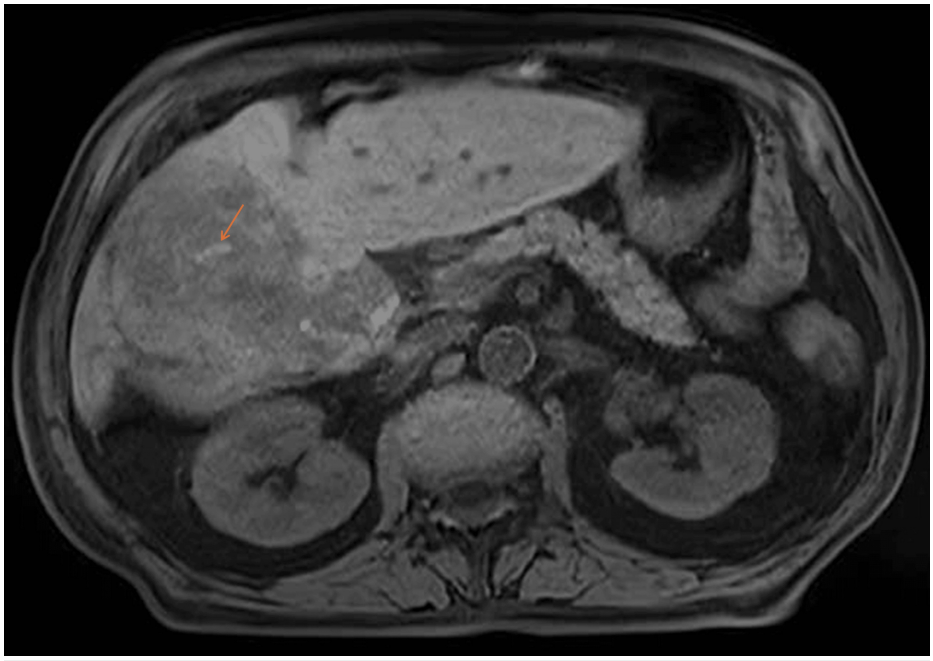


FIGURE 9: Axial T1-weighted fat-saturated MRI image demonstrating small hyperintense foci within the gallbladder lumen (arrow), consistent with intraluminal hemorrhage.

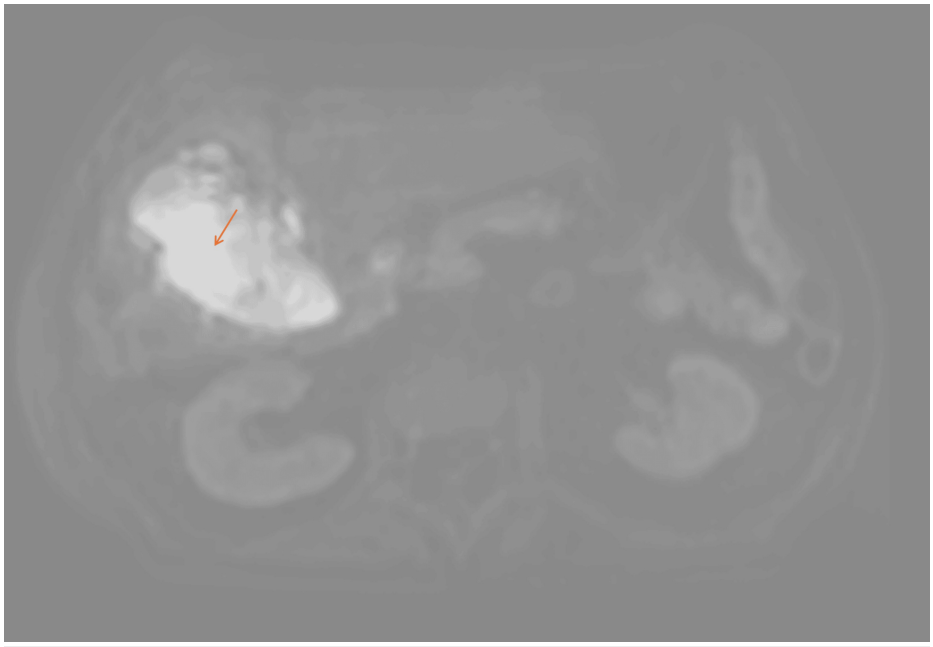


FIGURE 10: Axial diffusion-weighted MRI image demonstrating hyperintense signal within the gallbladder lumen (arrow), consistent with restricted diffusion indicative of purulent or hemorrhagic content.

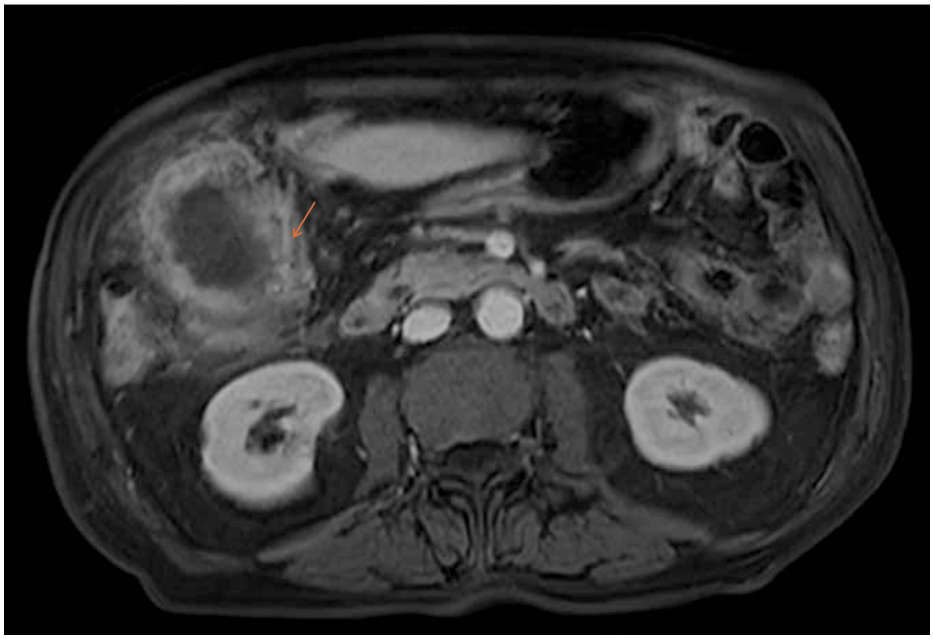


FIGURE 11: Axial T1-weighted fat-saturated portal-phase MRI image demonstrating a thickened, irregularly enhancing gallbladder wall (arrow) with adjacent pericholecystic fat stranding.

The cystic artery pseudoaneurysm was also visualized as a hyperintense structure on arterial-phase post-contrast T1-weighted fat-saturated images (Figure *12*). The hepatic lesions were hyperintense on T2-weighted images, showed restricted diffusion, and demonstrated peripheral rim enhancement with surrounding edema on delayed post-contrast sequences (Figure *13*).

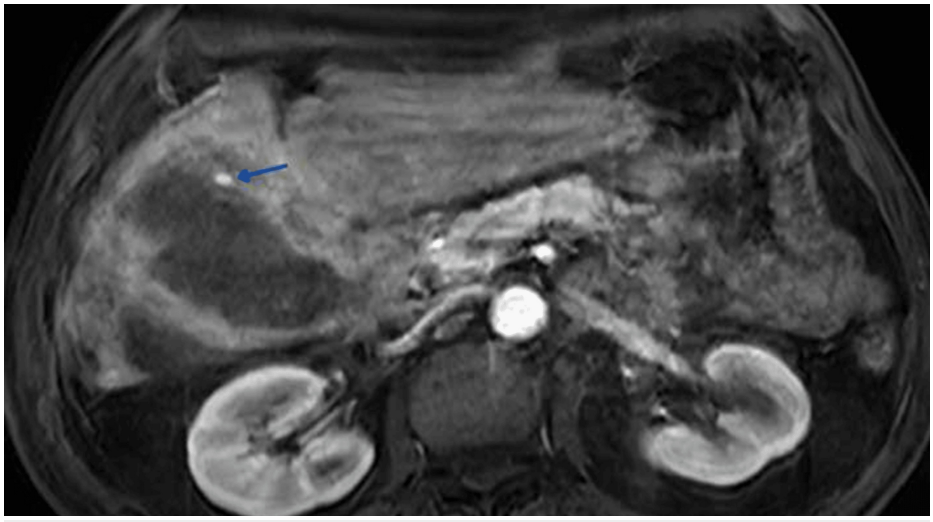


FIGURE 12: Axial T1-weighted fat-saturated arterial-phase MRI image demonstrating a hyperintense saccular structure (arrow) consistent with a cystic artery pseudoaneurysm.

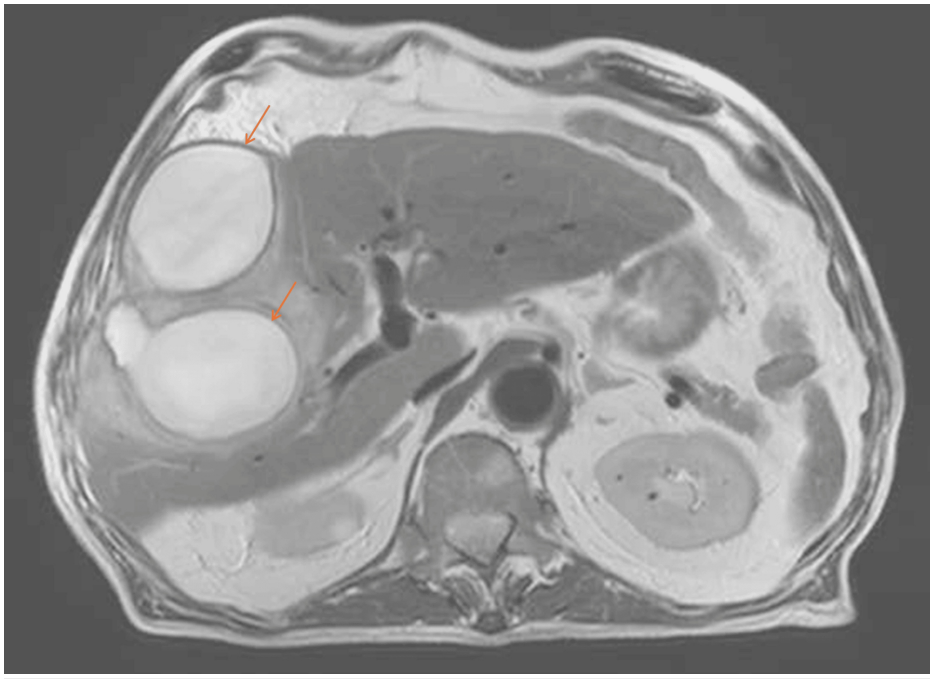


FIGURE 13: Axial T2-weighted non-fat-saturated MRI image demonstrating two hyperintense collections in segment V of the liver, with surrounding edema (arrows).

Upon completion of the imaging workup in our department, the initial external CT became available for review. Retrospective analysis confirmed a markedly distended gallbladder containing denser intraluminal material (62 HU), consistent with more recent hemorrhage (Figure *14*). A saccular enhancing structure contiguous with the cystic artery was also identified, measuring larger in diameter at that time (approximately 10 mm) (Figure *15*). The hepatic lesions appeared as heterodense collections with irregular margins, incomplete liquefaction, and smaller size compared to follow-up studies, consistent with the early pre-suppurative phase of abscess formation (Figure *16*). These findings correlated with the progression documented on subsequent imaging. Of note, the difference in the reported measurements may be related, at least in part, to differences in imaging acquisition, contrast timing, spatial resolution, and measurement plane between examinations.

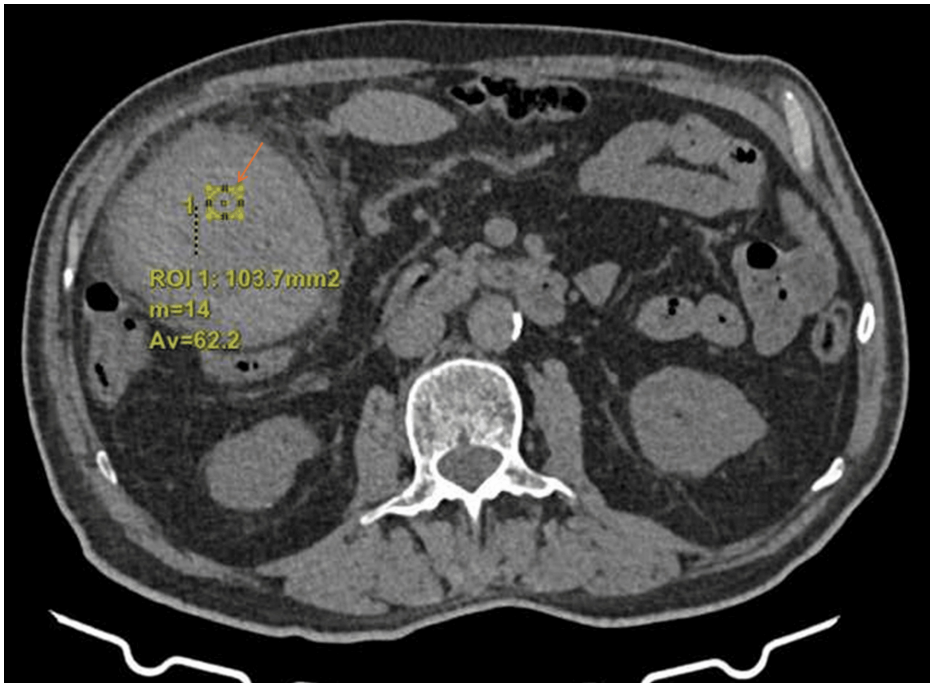


FIGURE 14: Axial unenhanced CT image from the initial external study demonstrating dense intraluminal material within the distended gallbladder.

A region-of-interest (ROI) measurement shows attenuation of 62 Hounsfield units (arrow), consistent with recent hemorrhage.

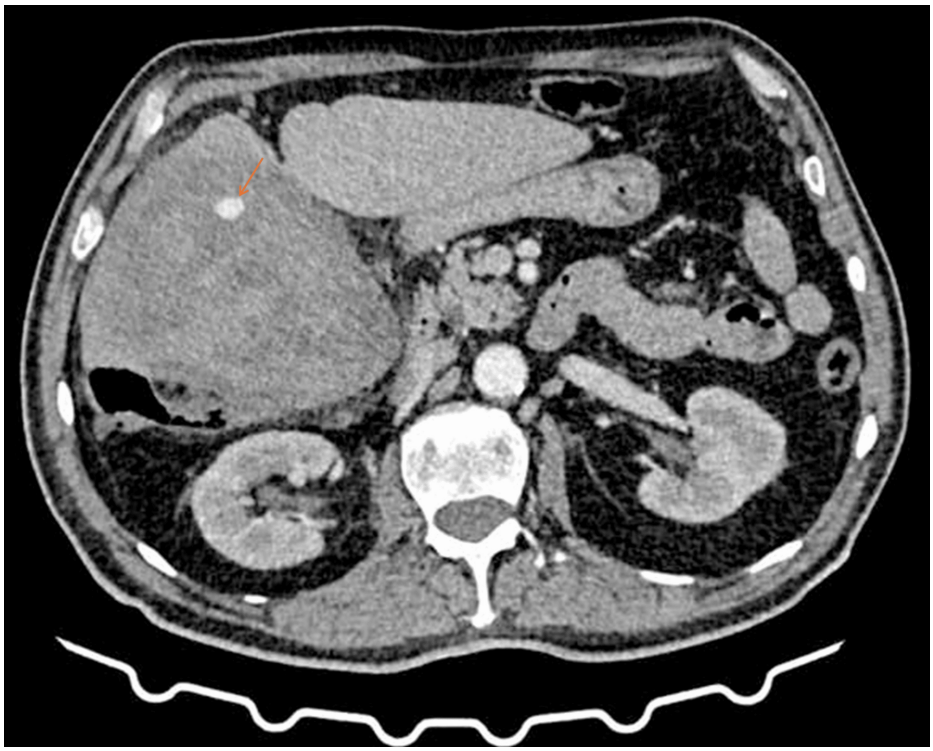


FIGURE 15: Axial arterial-phase CT image from the initial external study demonstrating a saccular enhancing pseudoaneurysm contiguous with the cystic artery, measuring approximately 10 mm in diameter (arrow).

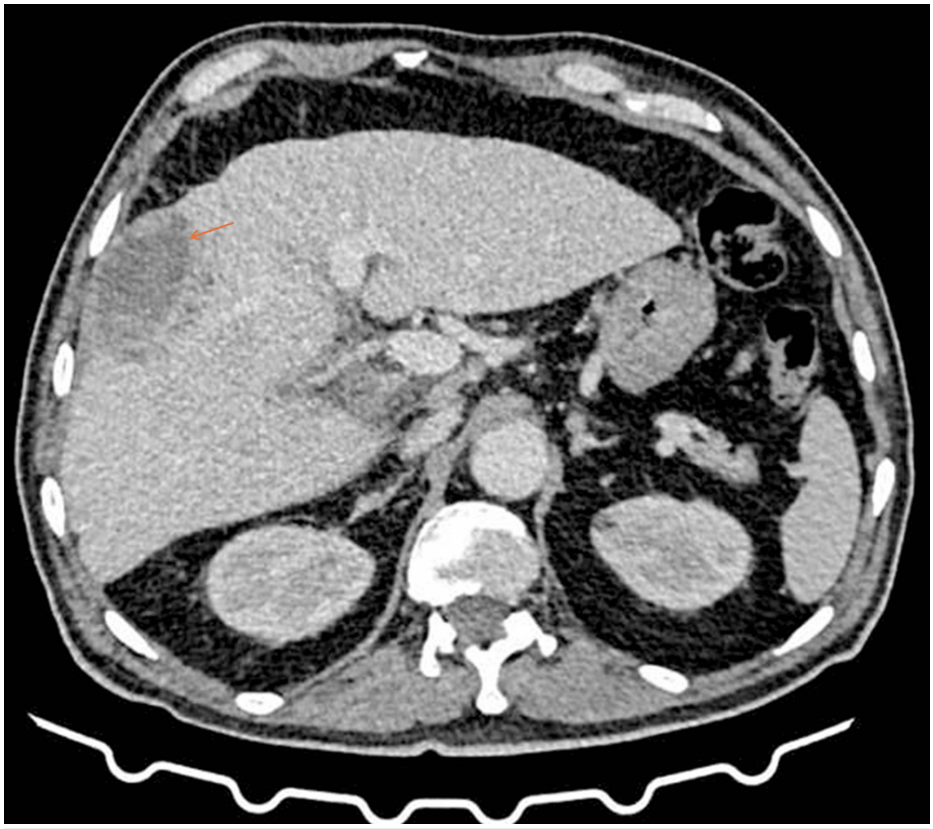


FIGURE 16: Axial portal venous phase CT showing hypodense lesions in hepatic segment V with irregular margins and incomplete liquefaction, consistent with early abscess formation (arrow).

The patient was referred to the general surgery department. Intraoperative findings included an inflammatory phlegmon encasing the gallbladder and pediculitis, precluding cholecystectomy. We placed a cholecystostomy drain to evacuate hemorrhagic and purulent material, and we drained the hepatic abscesses; cytobacteriological examination showed a neutrophil-rich inflammatory infiltrate, and culture grew *Escherichia coli* susceptible to commonly used antibiotics. Biopsy of the gallbladder wall revealed hemorrhagic and inflammatory changes without malignancy in the sampled tissue; no transarterial embolization or other specific intervention targeting the cystic artery pseudoaneurysm was performed.

Post-operative CT demonstrated decreased gallbladder distension with persistent wall irregularities and near-complete resolution of the hepatic abscesses, leaving only one residual collection measuring less than 3 cm (Figure *17*). The cystic artery pseudoaneurysm remained visible and stable in size without signs of active bleeding. The patient was managed with antibiotics (ceftriaxone 2 g intravenously once daily and metronidazole 500 mg intravenously three times daily, both for five days) and scheduled for elective cholecystectomy after clinical stabilization. The clinical course, including the main diagnostic findings, therapeutic interventions, and follow-up assessments, is summarized in the timeline presented in Table *2*.

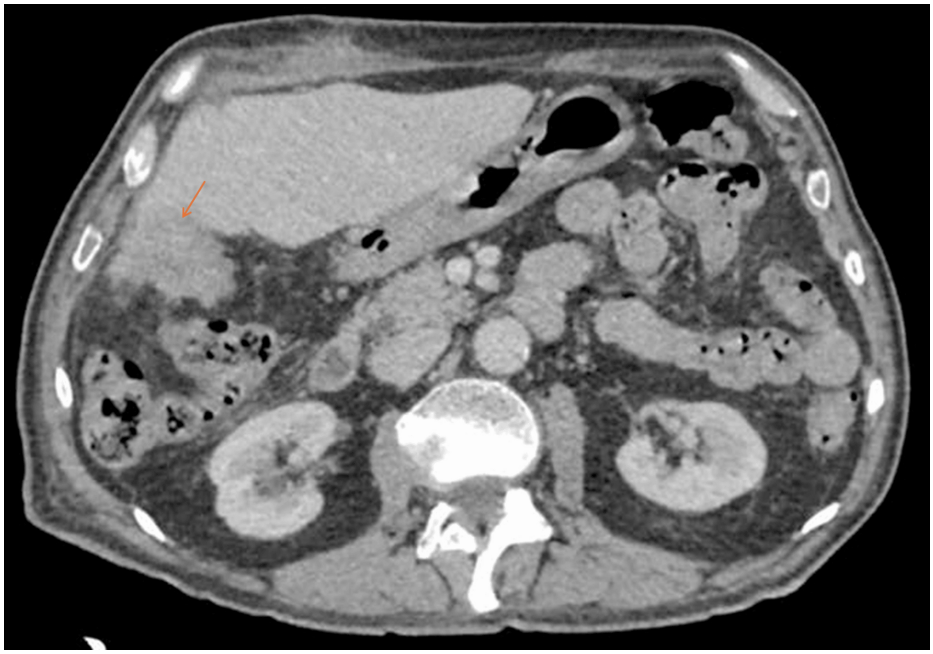


FIGURE 17: Axial portal venous phase CT image demonstrating markedly reduced distension of the gallbladder, persistent wall irregularities (arrow), and significant reduction of pericholecystic fat stranding following surgical drainage.

Time point	Investigation/management	Main findings
Initial presentation	External CT	Gallbladder lesion initially interpreted as gallbladder carcinoma with hepatic metastases.
Subsequent evaluation	CT	Hemorrhagic gallbladder contents with cystic artery pseudoaneurysm measuring approximately 4 mm; hepatic lesions.
Further evaluation	MRI	Hepatic lesions strongly suggestive of abscesses, with restricted diffusion.
Subsequent surgical management	Abscess drainage and partial cholecystectomy	Cytobacteriological examination showed a neutrophil-rich inflammatory infiltrate; culture grew Escherichia coli susceptible to commonly used antibiotics.
Antibiotic treatment	Broad-spectrum antibiotic therapy (ceftriaxone 2 g intravenously once daily for 5 days and metronidazole 500 mg intravenously three times daily for 5 days)	-
Post-operative follow-up	CT	Markedly reduced gallbladder volume; cystic artery pseudoaneurysm remained stable in size without documented interval enlargement.
Histopathology	Gallbladder wall biopsy	Hemorrhagic and inflammatory changes without malignancy in the sampled tissue.

TABLE 2: Timeline of clinical presentation, diagnostic findings, therapeutic interventions, and follow-up.

Discussion

Hemorrhagic cholecystitis is an uncommon, potentially life-threatening variant of acute cholecystitis characterized by intraluminal bleeding within the gallbladder due to mucosal ischemia, inflammation,

necrosis, or vascular erosion [2]. It can occur spontaneously or in the setting of anticoagulation, trauma, infection, or vascular abnormalities [2]. When complicated by cystic artery pseudoaneurysm, diagnosis can be particularly challenging [2,3].

Pseudoaneurysm of the cystic artery is rare and most often arises secondary to inflammation and erosion of the arterial wall [2]. On imaging, pseudoaneurysms typically appear as well-defined enhancing vascular structures on arterial-phase studies (Figures *3*-*5*, *12*, *15*) [2,4]. A critical diagnostic pitfall, as in this case, is the potential misinterpretation of a pseudoaneurysm as an impacted gallstone. Differentiation relies on careful review of unenhanced and multiphase CT images as follows: true calculi are generally visible on unenhanced scans, whereas pseudoaneurysms demonstrate contrast enhancement, most conspicuously during the arterial phase (Figures *1*, *14*) [2,4]. In this patient, failure to correlate unenhanced and arterial-phase images led to misclassification as a gallbladder calculus and contributed to the erroneous diagnosis of carcinoma [3].

Hemorrhagic content within the gallbladder lumen may appear hyperattenuating on unenhanced CT, potentially mimicking an enhancing neoplastic component (Figures *1*, *14*). The absence of enhancing mural nodules and the lack of persistent enhancement on delayed phases may favor hemorrhagic content over an enhancing neoplastic component (Figure *2*) [2,3]. In this case, the combination of dense luminal content and a cystic artery pseudoaneurysm was misinterpreted as malignancy.

The hepatic lesions demonstrated different imaging appearances between the initial and repeat studies, reflecting progression from an early to a more mature stage of abscess formation [5,6]. On the first CT performed externally, the lesions were heterogeneous, with irregular margins and incomplete internal liquefaction, compatible with an early or pre-suppurative stage (Figure *16*) [5,6]. The peripheral membrane was ill-defined, and the collections were not fully formed. In contrast, follow-up CT and MRI performed in our department demonstrated more typical imaging features of mature abscesses, including well-defined rounded collections with central fluid content, a clearly delineated enhancing internal membrane, and surrounding perilesional edema, producing the double-target sign (Figures *7*, *13*) [5]. Restricted diffusion on MRI further supported the presence of purulent content [5,6]. The interval change in appearance over two weeks illustrated the progressive maturation of hepatic abscesses.

This case underscores the importance of correlating clinical presentation, laboratory findings, and imaging across multiple phases and modalities. Systematic evaluation of unenhanced and contrast-enhanced CT images is critical to avoid diagnostic errors with significant therapeutic implications. Early recognition of hemorrhagic cholecystitis and associated cystic artery pseudoaneurysm is important because these conditions may result in severe hemorrhagic complications [2,4]. The management of cystic artery pseudoaneurysms depends on the clinical presentation, the severity of the underlying inflammatory process, and the patient's overall condition.

Transcatheter arterial embolization is generally the preferred initial approach to achieve hemostasis, particularly in patients with active bleeding or when emergency surgery carries substantial risk. Selective catheterization of the cystic artery followed by embolization, most commonly using microcoils, can effectively exclude the pseudoaneurysm from circulation while avoiding immediate dissection of severely inflamed tissues. However, embolization may not address the underlying gallbladder pathology, and subsequent cholecystectomy may therefore be required, depending on the patient's clinical condition. Endoscopic retrograde cholangiopancreatography may also be indicated when hemobilia causes biliary obstruction by blood clots [2].

Conclusions

Hemorrhagic cholecystitis complicated by a cystic artery pseudoaneurysm is a rare condition that can closely mimic gallbladder malignancy, particularly when associated with hepatic inflammatory lesions. Recognition of intraluminal hemorrhage, careful evaluation of the cystic artery on multiphasic CT, and identification of imaging features suggestive of hepatic abscesses are essential to avoid misdiagnosis. Correlation of CT and MRI findings with the clinical and laboratory context, together with retrospective review of prior imaging when available, can help establish the correct diagnosis and guide appropriate management.

Beyond its diagnostic value, identification of a cystic artery pseudoaneurysm has important therapeutic implications because of the potential risk of hemorrhagic complications. Management requires individualized assessment, with endovascular embolization or surgical intervention considered according to the patient's clinical condition and the severity of the underlying inflammatory process. When the pseudoaneurysm persists after initial treatment, vascular reassessment and appropriate imaging surveillance are important to evaluate its evolution and guide further management. Finally, although the available histopathological findings may support an inflammatory process, a gallbladder wall biopsy alone cannot definitively exclude malignancy when a complete cholecystectomy specimen is unavailable. This case highlights the importance of a multidisciplinary approach integrating radiological, clinical, surgical, and histopathological findings to guide diagnosis and management.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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