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Case Report

Pseudogallbladder Appearance on Ultrasonography After Cholecystectomy and Left Hemihepatectomy: A Postoperative Biliary Imaging Pitfall Clarified by MRCP

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ABSTRACT

Accurate identification of postoperative biliary anatomy following hepatobiliary surgery can be challenging because normal anatomical landmarks are altered. A 75-year-old woman who had undergone cholecystectomy and left hemihepatectomy four months earlier for intrahepatic bile duct stones presented with jaundice, generalized pruritus, epigastric pain, and cholestatic laboratory abnormalities, including elevated direct bilirubin levels. Ultrasonography demonstrated an elongated cystic structure in the gallbladder fossa containing echogenic intraluminal material suggestive of sludge and/or stones, mimicking the gallbladder on postoperative imaging. MRCP showed that the cystic structure in the gallbladder fossa was continuous with the biliary tree, consistent with a dilated postoperative biliary segment. A few stones were present within this structure, and additional stones were identified in the intrahepatic bile ducts and distal common bile duct. The patient subsequently underwent endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy, stone extraction, and biliary stent placement. Follow-up laboratory and MRCP findings showed interval improvement, although residual stones persisted. This case shows that ultrasonography may be misleading in patients with altered postoperative biliary anatomy. MRCP is valuable for demonstrating ductal continuity and for clarifying the true anatomical origin of a gallbladder-like postoperative biliary structure.

1. Introduction

Postoperative evaluation of the biliary system can be challenging because hepatobiliary surgery alters normal anatomical landmarks and may distort the expected relationships of the gallbladder fossa, bile ducts, and adjacent hepatic parenchyma. As a result, cystic or tubular structures identified on ultrasonography may be difficult to interpret, particularly in patients with a complex surgical history [1]. Although ultrasonography is the first-line imaging modality for biliary complaints because of its availability, real-time capability, and lack of ionizing radiation, interpretation may be limited when anatomy has been substantially altered [2].

In the postoperative setting, a cystic structure in the gallbladder fossa may represent a range of entities, including a true gallbladder remnant, cystic duct stump dilatation, a postoperative fluid collection or biloma, a dilated biliary duct, or even an adjacent bowel loop. Reliance on morphology alone may therefore lead to misinterpretation, especially when the structure contains internal echoes suggestive of sludge or stones [3]. In such cases, cross-sectional cholangiographic imaging is important because it can demonstrate ductal continuity and clarify the lesion's true anatomical origin [4]. The present case is unusual because the patient had undergone cholecystectomy and left hemihepatectomy in the same operation for intrahepatic bile duct stone disease, resulting in marked postoperative biliary distortion and displacement within the gallbladder fossa. Unlike routine post-cholecystectomy stump-related cases, this combined surgical history created a more complex postoperative anatomical configuration and a pseudogallbladder appearance on ultrasonography. Magnetic resonance cholangiopancreatography (MRCP) demonstrated that the suspicious structure represented a dilated postoperative biliary segment continuous with the biliary tree rather than a residual gallbladder-like structure. By presenting this case, we aim to emphasize a practical diagnostic pitfall in postoperative biliary imaging and the value of MRCP in resolving gallbladder-like appearances in surgically altered anatomy.

2. Case Presentation

A 75-year-old woman who had undergone cholecystectomy and left hemihepatectomy four months earlier for intrahepatic bile duct stones was referred to our institution for evaluation of postoperative biliary pathology. At presentation, she complained of jaundice, generalized pruritus, and epigastric pain. Physical examination revealed epigastric tenderness. Bilateral subcostal surgical scars consistent with prior open hepatobiliary surgery were present. The abdomen was otherwise soft, with no guarding or rebound tenderness, and bowel sounds were normal. Diffuse excoriations related to generalized pruritus were observed on the skin. Fever or other findings clearly suggestive of acute cholangitis were not documented.

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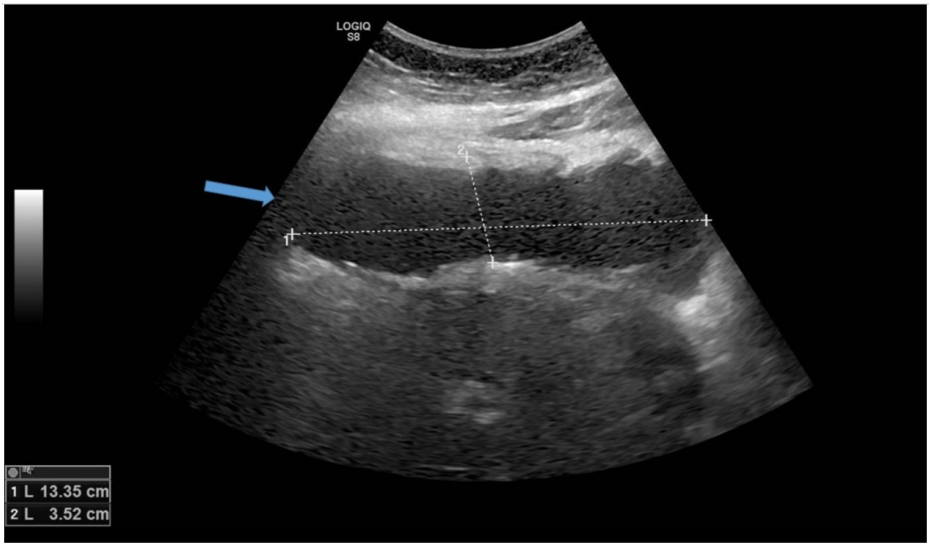

Figure 1: Transabdominal ultrasonography (longitudinal/oblique view) showing an elongated cystic structure in the gallbladder fossa (blue arrow), producing a gallbladder-like appearance despite prior cholecystectomy. The lesion was initially interpreted as a gallbladder-like structure because of its location and morphology.

Laboratory evaluation demonstrated cholestatic, inflammatory, and mild hematologic/renal abnormalities. Total bilirubin was 9.2 mg/dL, direct bilirubin 6.5 mg/dL, and indirect bilirubin 2.7 mg/dL. AST was 65 U/L, ALT 104 U/L, ALP 174 U/L, and GGT 104 U/L. Inflammatory markers were elevated, with a white blood cell count of $12.11 \times 10^9\ L^{-1}$ and C-reactive protein of 22 mg/L. Hemoglobin was 11.38 g/dL and hematocrit 37.20%. Blood urea nitrogen was 36 mg/dL, and urea was 77.04 mg/dL. Albumin was 3.9 g/dL, and INR was 1.81. These findings were consistent with postoperative biliary obstruction in the appropriate clinical and imaging context. Detailed operative notes, including the exact cystic duct ligation technique, the status of biliary reconstruction, and intraoperative cholangiographic findings, were not available in the accessible medical records **(Table 1)**.

Abdominal ultrasonography was performed in the fasting state using a routine transabdominal approach with a 1.5 – 5.0 MHz abdominal probe. At the time of the examination, the interpreting radiologist was not aware of the patient's prior operative history. Ultrasonography demonstrated an elongated cystic structure in the gallbladder fossa measuring approximately 133.5 × 35.2 mm **(Figure 1)**. The lesion contained echogenic intraluminal material suggestive of biliary sludge and/or stones, with multiple echogenic foci, the largest measuring approximately 6 mm **(Figure 2)**. The common bile duct was dilated, measuring 11.5 mm, and diffuse intrahepatic biliary dilatation was also observed. Because of its location and morphology, the structure was initially interpreted as a gallbladder-like lesion on sonography.

Magnetic resonance cholangiopancreatography (MRCP) was subsequently performed for further anatomical clarification. The examination included coronal TRUFI, axial T1-weighted fat-suppressed and non-fat-suppressed sequences, fat-suppressed T2-weighted TSE sequences, in-phase and opposed-phase imaging, and contrast-enhanced dynamic 3D VIBE imaging after intravenous administration of 15 mL gadoterate meglumine. MRCP confirmed the absence of the gallbladder and left hepatic lobe, consistent with prior surgery. In the gallbladder fossa, a 104 × 45 mm cystic-appearing structure was identified in continuity with the intrahepatic biliary system, consistent with a dilated postoperative biliary segment rather than a residual gallbladder-like structure **(Figure 3)**. A few hypointense filling defects compatible with stones, the largest measuring 9 mm, were present within this structure. In addition, 4 – 5 stones up to 15 mm were observed in the intrahepatic bile ducts, and 3 – 4 stones up to 5 mm were present in the distal common bile duct **(Figure 4)**. The difference in lesion dimensions and stone size between ultrasonography and MRCP was most likely due to differences in imaging planes, ultrasonography's limited acoustic window, and improved anatomical delineation on MRCP.

Following imaging evaluation, the patient underwent ERCP with sphincterotomy, stone extraction, and biliary stent placement. Detailed procedural parameters, including the exact number of stones, stent caliber, planned stent removal, and immediate cholangiographic endpoint, were not available in the accessible medical documentation. After the procedure, the patient's symptoms improved, and laboratory parameters returned to normal. Follow-up laboratory testing showed total bilirubin 2.5 mg/dL, direct bilirubin 2.0 mg/dL, indirect bilirubin 0.5 mg/dL, AST 44 U/L, ALT 80 U/L, ALP 140 U/L, GGT 66 U/L, white blood cell count $8.59 \times 10^9\ L^{-1}$, C-reactive protein 8.9 mg/L, hemoglobin 10.85 g/dL, hematocrit 34.94%, blood urea nitrogen 23 mg/dL, and urea 49.22 mg/dL, consistent with clinical and biochemical improvement after biliary decompression. A follow-up MRCP performed 15 days after ERCP demonstrated partial interval improvement compared with the prior examination. The biliary stent was visualized, the common bile duct was mildly dilated, and residual stones and sludge persisted within the cystic biliary structure in the gallbladder fossa, with a few residual stones in the distal common bile duct **(Figure 5)**. These findings indicated partial radiologic improvement rather than complete resolution. Because complete ductal clearance could not be confirmed, it could not be definitively determined whether the residual stones represented retained stones from the hepatolithiasis or recurrent stone formation during the postoperative interval. The chronological sequence of the patient's presentation, imaging work-up, treatment, and follow-up is summarized in **(Table 2)**.

To improve anatomical clarity, an annotated schematic illustration has been added **(Figure 6)**. The diagram provides an anatomical roadmap of the postoperative hepatobiliary anatomy after

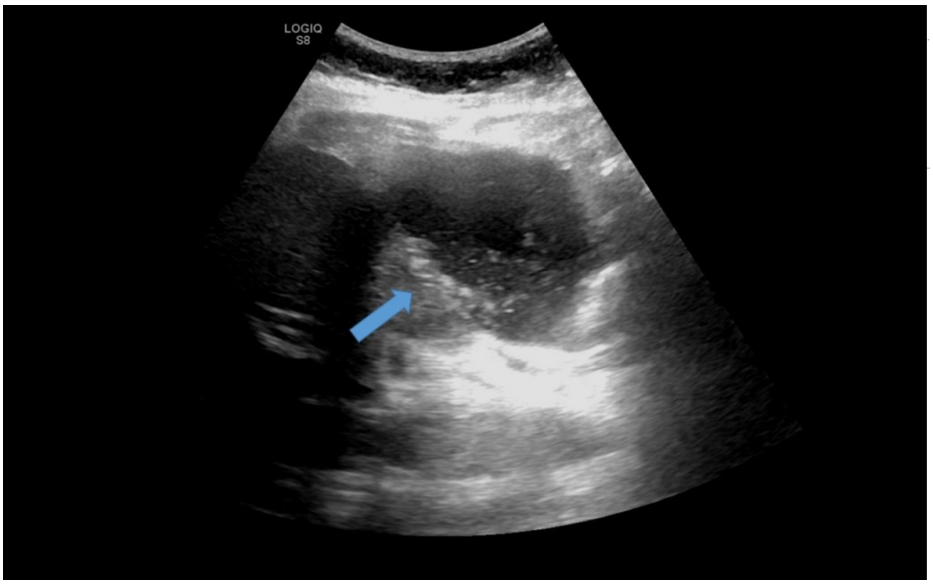

Figure 2: Transabdominal ultrasonography (focused view) demonstrates echogenic intraluminal material within the cystic structure in the gallbladder fossa (blue arrow), suggestive of biliary sludge and/or stones. These internal echoes contributed to the false sonographic impression of gallbladder pathology in the postoperative setting.

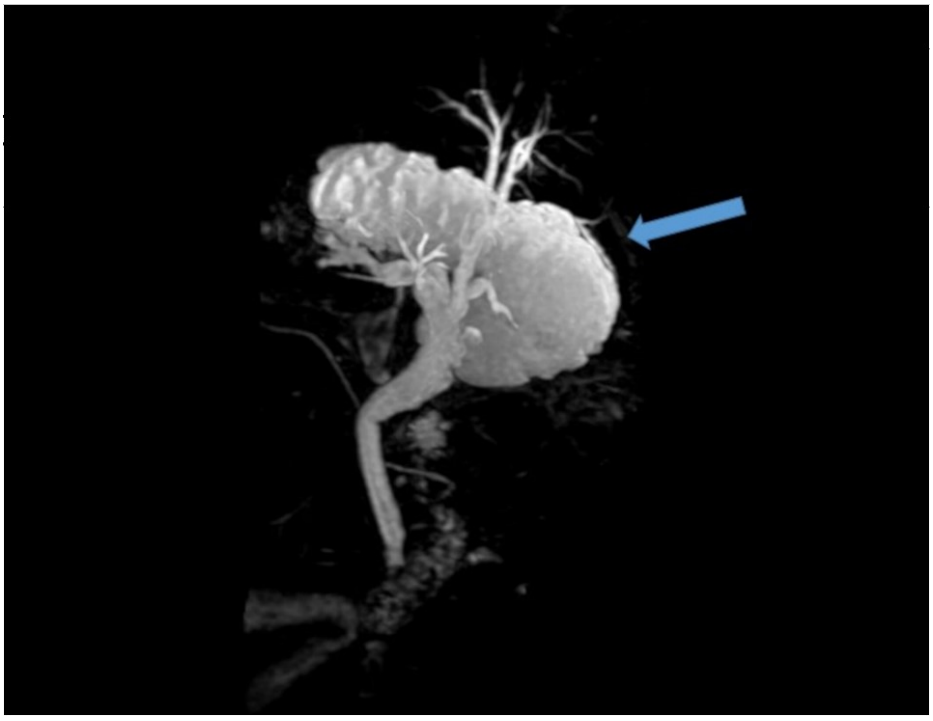

Figure 3: MRCP image (coronal thick-slab / coronal source image) demonstrating a cystic-appearing structure in the gallbladder fossa (blue arrow) that is continuous with the biliary tree. This continuity supports the interpretation of the lesion as a dilated postoperative biliary segment rather than a residual gallbladder-like structure.

cholecystectomy and left hemihepatectomy and demonstrates the continuity of the cystic-appearing structure with the biliary tree, helping to explain the pseudogallbladder appearance observed on ultrasonography.

3. Discussion

Postoperative biliary imaging may become particularly challenging when combined hepatobiliary procedures alter normal anatomical relationships. In the present case, the main diagnostic difficulty was not simply the presence of biliary stones, but the appearance of a gallbladder-like cystic structure in the gallbladder fossa despite prior cholecystectomy. This created a potential false impression of a residual gallbladder-like structure on ultrasonography. The case is therefore best understood as a postoperative anatomical interpretation challenge rather than as a routine example of post-cholecystectomy syndrome alone.

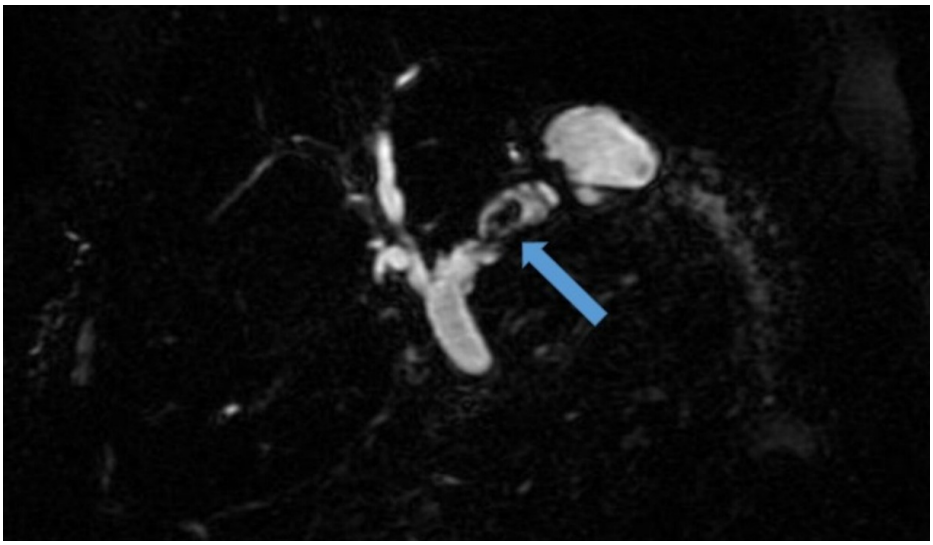

Figure 4: MRCP image (coronal source image / heavily T2-weighted image) showing calculi within the postoperative cystic biliary structure as well as additional stones in the intrahepatic bile ducts and the distal common bile duct. The blue arrow indicates one of the biliary stones, highlighting that the clinically relevant problem was persistent biliary stone disease rather than a true gallbladder lesion.

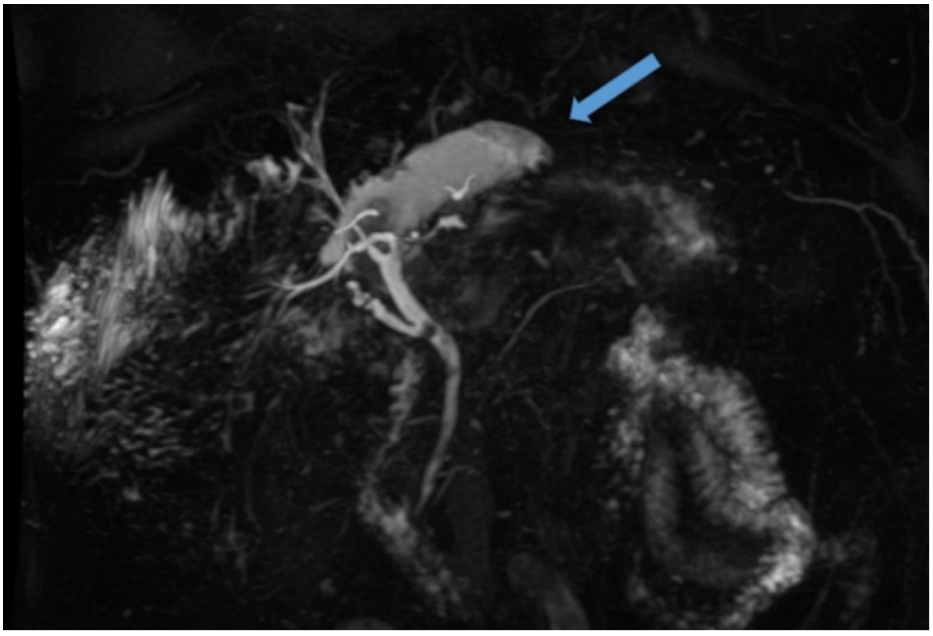

Figure 5: Follow-up MRCP performed 15 days after ERCP, showing partial interval improvement compared with the initial examination. The biliary stent is in place, the common bile duct is mildly dilated, and residual stones/sludge persist within the postoperative cystic biliary structure and distal common bile duct.

The unusual feature of this case was the coexistence of cholecystectomy and left hemihepatectomy in the same operation. Major hepatic resection may lead to postoperative remodeling of the remaining liver, altered orientation of the biliary tree, and displacement of dilated biliary structures into the gallbladder fossa [5]. In this setting, a dilated postoperative biliary segment may simulate the expected shape and location of the gallbladder on sonography, especially when intraluminal sludge or stones are present. Unlike routine stump-related post-cholecystectomy cases, the present case involved a more complex postsurgical anatomy in which biliary distortion after left hemihepatectomy likely contributed to the pseudogallbladder appearance.

The clinically relevant problem requiring treatment in this patient was biliary obstruction related to persistent stone disease rather than the mere presence of a gallbladder-like structure. MRCP demonstrated that the suspicious structure in the gallbladder fossa was continuous with the biliary tree and also showed stones within this structure, multiple intrahepatic stones, and additional distal common bile duct stones. However, the principal therapeutic issue was the overall biliary stone burden and associated obstruction, not the pseudogallbladder appearance itself. The postoperative episode described here was characterized by jaundice, cholestatic laboratory abnormalities, generalized pruritus, and epigastric pain/tenderness, without documented fever. This pattern indicates that clinically significant postoperative biliary obstruction may present without a

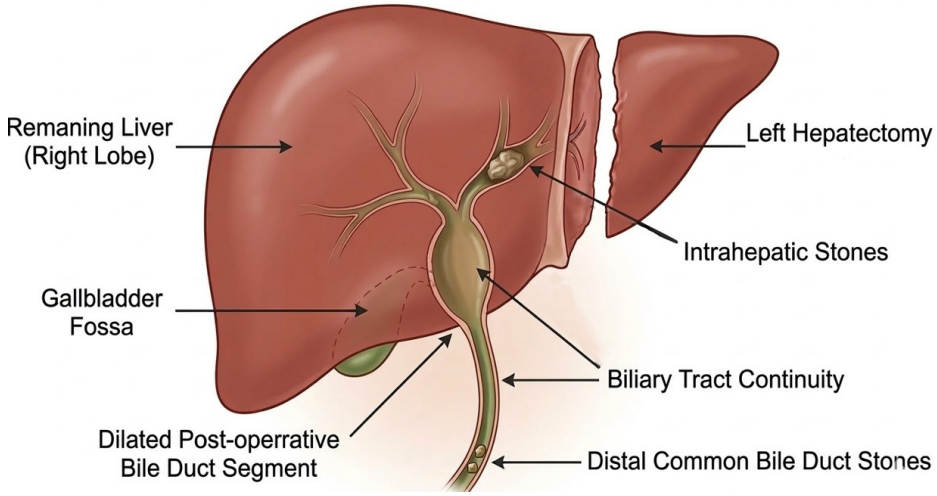

Figure 6: Schematic illustration of the postoperative biliary anatomy after cholecystectomy and left hemihepatectomy. The diagram shows the remaining right hepatic lobe, the left hepatectomy site, the gallbladder fossa, and a dilated postoperative bile duct segment that is continuous with the biliary tract, explaining the pseudogallbladder appearance on ultrasonography. Additional stones are illustrated within the intrahepatic bile ducts and the distal common bile duct.

Table 1: Laboratory findings at presentation and follow-up

Parameter	At presentation	Follow-up	Reference range
Total bilirubin	9.2 mg/dL	2.5 mg/dL	0.2–1.2 mg/dL
Direct bilirubin	6.5 mg/dL	2.0 mg/dL	0–0.5 mg/dL
Indirect bilirubin	2.7 mg/dL	0.5 mg/dL	0.2–0.7 mg/dL
AST	65 U/L	44 U/L	5–34 U/L
ALT	104 U/L	80 U/L	0–55 U/L
ALP	174 U/L	140 U/L	40–150 U/L
GGT	104 U/L	66 U/L	9–36 U/L
White blood cell count	12.11 $\times 10^9$/L	8.59 $\times 10^9$/L	4.6–10.2 $\times 10^9$/L
C-reactive protein	22 mg/L	8.9 mg/L	0–0.5 mg/L
Hemoglobin	11.38 g/dL	10.85 g/dL	12.2–16.2 g/dL
Hematocrit	37.20%	34.94%	36–47%
Blood urea nitrogen	36 mg/dL	23 mg/dL	8–23 mg/dL
Urea	77.04 mg/dL	49.22 mg/dL	17.1–49.2 mg/dL
Albumin	3.9 g/dL	—	3.2–4.6 g/dL
INR	1.81	—	0.8–1.2

AST, aspartate aminotransferase; ALT, alanine aminotransferase; ALP, alkaline phosphatase; GGT, gamma-glutamyl transferase; INR, international normalized ratio.

Table 2: Clinical timeline of the case

Time point	Event
Approximately 4 months before presentation	Cholecystectomy and left hemihepatectomy were performed for intrahepatic bile duct stones.
At presentation	The patient presented with jaundice, generalized pruritus, epigastric pain, and cholestatic laboratory abnormalities.
Initial imaging	Ultrasonography demonstrated a gallbladder-like cystic structure in the gallbladder fossa.
Further evaluation	MRCP demonstrated continuity of this structure with the biliary tree and additional stones within the cystic biliary structure, intrahepatic bile ducts, and distal common bile duct.
Treatment	ERCP with sphincterotomy, stone extraction, and biliary stent placement was performed.
Follow-up	Clinical, biochemical, and interval radiologic improvement was observed after biliary decompression, although residual stones persisted.

MRCP, Magnetic Resonance Cholangiopancreatography; ERCP, Endoscopic Retrograde Cholangiopancreatography.

classic acute cholangitis picture. Although alternative causes of obstruction in this setting include recurrent stone disease, postoperative biliary stricture, and papillary stenosis, the imaging and endoscopic findings in this case supported stone-related biliary obstruction as the most clinically actionable cause [6, 7].

An important teaching point of this case is how a postoperative biliary structure can be mistaken for the gallbladder on ultrasonography. Reliance on morphology and location alone may be misleading in surgically altered anatomy. Several practical steps may help avoid this pitfall: careful review of the surgical history before image interpretation, assessment for continuity with the biliary tree, evaluation for the absence of a typical gallbladder wall configuration, analysis of the structure's relationship to the portal triads and adjacent ducts, and dynamic scanning in multiple planes or with positional change when feasible. When uncertainty persists, MRCP provides a more reliable anatomical roadmap and can clarify whether a cystic structure in the gallbladder fossa represents a residual gallbladder-like postoperative structure, a cystic duct stump-related lesion, or a dilated postoperative biliary segment.

The respective roles of MRCP and ERCP should also be distinguished clearly. In this case, MRCP was primarily valuable for anatomical clarification: it demonstrated the absence of the gallbladder, showed continuity of the suspicious lesion with the

biliary system, and defined the distribution of associated stones. ERCP, by contrast, served as the therapeutic modality for biliary decompression and stone extraction [8]. Separating these diagnostic and therapeutic contributions is important to avoid the mistaken impression that the gallbladder-like structure itself was the direct cause of symptoms; rather, it represented the key imaging pitfall, whereas the symptomatic burden was more plausibly related to stone-associated biliary obstruction. Follow-up MRCP after ERCP demonstrated interval regression but persistent residual stones, further supporting the distinction between anatomical clarification and therapeutic management in this case.

This case, therefore, highlights a practical radiologic lesson in postoperative hepatobiliary imaging: a stone-containing cystic structure in the gallbladder fossa after cholecystectomy and left hemihepatectomy should not automatically be interpreted as a residual gallbladder. Demonstration of ductal continuity on MRCP is critical for correct anatomical identification and may help prevent diagnostic error and unnecessary surgical re-exploration.

4. Conclusion

This case highlights an important diagnostic pitfall in postoperative hepatobiliary imaging: a gallbladder-like cystic structure in the gallbladder fossa after cholecystectomy and hemihepatectomy may represent a dilated postoperative biliary segment rather than a residual gallbladder-like structure. Ultrasonography may be misleading when interpretation relies primarily on morphology in surgically altered anatomy. In such cases, MRCP is particularly valuable for demonstrating ductal continuity and clarifying the lesion's true anatomical origin. Accurate recognition of this postoperative pseudogallbladder appearance may help avoid diagnostic error and unnecessary surgical re-exploration, while directing attention to the actual treatable problem of stone-related biliary obstruction.

Conflicts of Interest

The authors declare no conflicts of interest.

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None.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Large Language Model

The authors declare that generative artificial intelligence (AI) tools were used during the preparation of this manuscript. ChatGPT (OpenAI) was used for language refinement, grammar checking, and improvement of manuscript clarity. In addition, a generative AI tool (Gemini, Google) was used to assist in creating a schematic illustration (Figure 6) of postoperative biliary anatomy. The figure was subsequently reviewed, edited, and verified by the authors to ensure anatomical and clinical accuracy. All content was critically evaluated by the authors, who take full responsibility for the integrity and accuracy of the manuscript. No third-party copyrighted material was used.

Authors Contributions

DD contributed to conceptualization, data curation, investigation, methodology, and writing of the original draft. EG was involved in the investigation and writing of the original draft. DD, EG, and KG contributed to the writing, reviewing, and editing of the manuscript. KG provided supervision. All authors have read and agreed to the published version of the manuscript.

Data Availability

All relevant data are included within the article. No additional datasets were generated or analyzed.

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