Case Letter

Duplicated gallbladder with acute cholecystitis: a case of unusual presentation and diagnostic challenges

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Anomalies in the gallbladder can lead to misidentifying anatomical structures, heightening the risk of complications in laparoscopic and open cholecystectomy procedures. Failure to recognize these variations increases the chances of iatrogenic bile duct injuries and other complications.[1,2] Therefore, preoperative evaluation of these malformations plays a crucial role in preventing potentially catastrophic intraoperative complications.[2] It is important to clarify that duplication of the gallbladder results from abnormal differentiation or an increased rate of cell division, particularly during the separation of the caudal bud of the hepatic diverticula into distinct buds. The timing of this primordial bifurcation influenced the extent of gallbladder duplication, with earlier occurrences leading to septated duplication. This involves the existence of an extra gallbladder alongside two separate cystic ducts. The exact incidence of gallbladder duplication is challenging to determine because the condition is only observed in symptomatic cases or as accidental finds during surgery.[3] Hence, recognizing gallbladder duplication in symptomatic patients significantly influences surgical planning, mitigating possible complications. This case involved a patient who presented with acute cholecystitis, and was subsequently diagnosed with gallbladder duplication during surgery.

CASE

A 41-year-old female patient presented to the emergency department with sudden and intense pain in the upper right abdomen that radiated to the right shoulder. The patient also reported symptoms of nausea, vomiting, and fever. She had previously been diagnosed with acute peptic ulcer disease and underwent surgery, but there were no signs of hemorrhage or perforation in the abdomen. Upon physical examination, the patient's abdominal region exhibited softness; however, tenderness was noted specifically in the epigastric and right upper quadrant regions. After a thorough evaluation of the symptoms, the patient was diagnosed with acute cholecystitis, and non-contrast computed tomography (CT) of the upper abdomen was performed due to clinical urgency. The evaluation of intra-abdominal solid organs and intestinal segments was suboptimal due to the non-administration of intravenous and oral contrast agents. CT revealed normal positioning and size of the liver, with a density of the liver parenchyma. Abdominal ultrasound revealed a duplicated gallbladder with stones and debris. Multiple hyperdense structures were observed in the gallbladder, the largest of which appeared to be a stone measuring approximately 1 cm in diameter. The liver and bile ducts looked fine. The pancreas and spleen were normal in size and position. The adrenal gland showed no issues. Both kidneys were in the right place and size, with no problems in their structure. There were no signs of kidney stones or blockages. No fluid or air was found in the abdomen. The bone structures within the examined area were normal. The bladder contours appeared smooth, and its filling was homogeneous. The internal genital organs matched the patient's age. The intestines and colon wall were normal in the examined area. The patient underwent open surgery as an emergency. The surgeon converted from laparoscopic to open cholecystectomy to avoid complications and ensure patient safety. During cholecystectomy, the presence of two gallbladders with corresponding cystic ducts was detected. Additionally, an anomaly involving the right hepatic duct was identified intraoperatively. Extraction

of the biliary stones with subsequent cholecystectomy of both gallbladders was successfully performed (Figure 1). The second accessory gallbladder was located close to the normal gallbladder. The separated smaller cystic duct was observed to be inserted into the bile duct approximately 0.5 cm proximal to the other cystic duct. Both cystic ducts were clearly identified during the surgery. The patient's postoperative recovery progressed without any notable complications, and she was discharged on the second day following the surgery, having fully recovered. The macroscopy and microscopy evaluation confirmed the presence of gallbladder duplication. Histopathological analysis did not reveal any signs of malignancy. No vascular anomalies were observed concerning the distribution of the cystic artery, its branching pattern, or its proximity to adjacent structures. After the surgery, the patient had a follow-up one month later, and she was fine with no issues.

DISCUSSION

The complexities of gallbladder duplications pose challenges for surgeons, necessitating interventions such as cholangiography, subtotal cholecystectomy, or open surgeries to mitigate bile duct injuries.[2,4] Although often asymptomatic, these duplications, when accompanied by conditions like cholecystitis, demand surgical planning based on specific types and subtypes.[5,6] This case highlighted the need for a septated double gallbladder with sub-Type B2 (Figure 2), emphasizing the need for refined classifications[5-8] due to associated complications and potential malignancy risks. The open conversion from laparoscopic surgery here was influenced by inflammation, anatomical complexities, and urgency, which are crucial factors in preventing intraoperative complications. It was reported that gallbladder duplication represented an anatomical biliary variation that could exhibit an association with malformations in the biliary ducts.[9] Similarly, in our case, it is important to note the presence of dual distinct ducts within this anomalous gallbladder (Figure 2). It has been reported that anatomic variations of this type are frequently linked to increased complication rates, particularly when not identified preoperatively.[8]

Surgery was not warranted in patients where duplicated gallbladders were incidentally discovered, and prophylactic cholecystectomy was not recommended for asymptomatic patients with gallbladder duplication. It was advised to remove both gallbladders during a single surgical procedure in symptomatic patients to prevent further impairments in the remaining gallbladder. It has been reported that in a significant proportion of cases involving duplicated gallbladders, laparoscopic cholecystectomy can be successfully performed for both gallbladders when certain conditions are recognized.[10] In this case, the surgeon opted for an open cholecystectomy. This choice may have been influenced by the intricacy of the case and patient's unique presentation. The presence of gallbladder duplication with double cystic ducts can pose intricate challenges for laparoscopic surgery, demanding precise identification and dissection of multiple anatomical structures.[11] The conversion to open surgery, as observed in this case, was warranted due to a spectrum of conditions, encompassing extensive inflammation, adhesions, anatomical variations, the

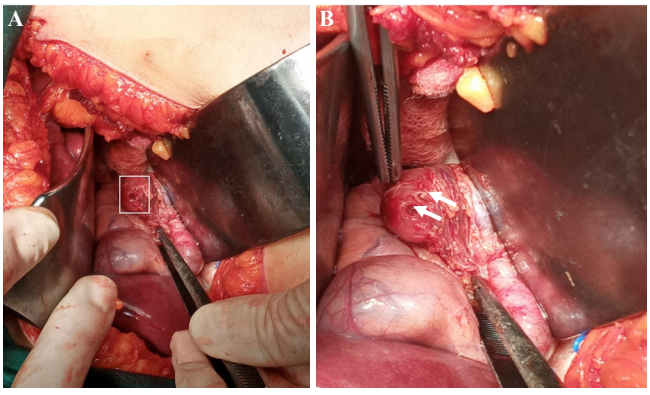

Figure 1. Surgical intervention in a patient with a double gallbladder with a septum and multiple cystic ducts. A: during cholecystectomy, the presence of two gallbladders along with their corresponding cystic ducts was detected. Successful extraction of the biliary stones was performed, followed by cholecystectomy of both gallbladders. Rectangle delineates double cystic ducts directing towards the gallbladders; B: in close proximity to the normal gallbladder, a second accessory gallbladder was observed. The smaller cystic duct was separated and inserted into the bile duct approximately 0.5 cm proximal to the other cystic duct. The surgical team was able to clearly identify both cystic ducts during the procedure. White arrows indicate cystic duct apertures of the normal and accessory gallbladders.

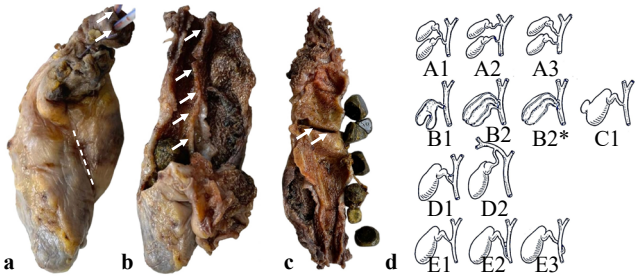

Figure 2. Anatomical variations observed during cholecystectomy in a patient with a double gallbladder. a: the separation between the two distinct gallbladders is depicted by the white dashed lines. The presence of two different cystic ducts is indicated by the white arrows; b: the gallbladder is characterized by the presence of a septum, and there are two cystic ducts; c: successful extraction of the biliary stones was performed, followed by cholecystectomy of both gallbladders. The septum is highlighted by white arrows; d: the classification of multiple gallbladders, as proposed by Harlaftis et al.[6] Type B2* was specifically described in the present case.

presence of retained stones, a history of extensive upper abdominal surgeries with adhesions, and the presence of other comorbid conditions, most notably, diabetes mellitus.[12] Furthermore, the urgency of the patient's clinical condition may have factored into the surgeon's decision, leading them to conclude that an open surgical approach was the most prudent and efficacious course of action. The distinct presentation and anatomical variances of each patient should be considered while deciding between an open and a laparoscopic cholecystectomy[11,13] (Supplementary Table 1).

Clinicians are required to consider these entities and anatomical variations when evaluating patients with biliary disease.[14] The presented case underscores the imperative of performing a comprehensive excision of both gallbladders during the primary surgical procedure. The accurate identification and assessment of vascular and biliary anatomical structures, including any associated anomalies, were emphasized to prevent intraoperative complications. The suspicion of various types of double gallbladders poses challenges in distinguishing them from other conditions such as empyema, torsion, biliary obstruction, or carcinoma. Therefore, it is imperative for surgeons and radiologists to possess a comprehensive understanding of this anatomical variation and apply a standardized terminology to delineate its various types.

CONCLUSIONS

Gallbladder duplication poses challenges in surgical planning due to the usual lack of symptoms, and meticulous categorization is needed for effective treatment. Surgical intervention, especially for symptomatic cases, prioritizes complete removal of both gallbladders to prevent additional issues. The selection between laparoscopic and open cholecystectomy relies on anatomical complexities, patient's manifestation, and urgency. Surgeons face difficulties in distinguishing this anomaly from other conditions, highlighting the importance of specific anomaly types and comprehensive medical knowledge for accurate diagnosis and treatment

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