

# Left-Sided Gallbladder: Uncommon Presentation and Laparoscopic Approach

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Sinistroposition, or left-sided placement of the gallbladder, is a rare congenital anomaly with a prevalence of about 0.3%. These gallbladders, through multiple proposed developmental aberrations, are situated beneath segment III or IV (or both, as in this case) of the liver, and

can lead to diagnostic difficulty. We present a case of atypical presentation of acute cholecystitis from a left-sided gallbladder and the modified laparoscopic technique used for its safe removal.

## INTRODUCTION

In an era in which laparoscopic cholecystectomy has become the gold standard for treatment of acute cholecystitis, knowledge of developmental anomalies of the gallbladder and biliary system is essential in order to avoid intraoperative injury to bile ducts (Suhocki & Meyers, 1999).

The embryologic origin of the gallbladder is from the hepatic diverticulum, an out-pouching of the primitive foregut (Ando, 2010). During this early development, a number of malformations may occur: double gallbladder, bilobed (septate) gallbladder, diverticulum of the gallbladder, or gallbladder agenesis (Gross, 1936). Anomalous positions have also been described: intrahepatic gallbladder, left-sided gallbladder, retrodisplacement (at the postero-inferior surface of the liver) of the gallbladder, transverse position of the gallbladder, and floating gallbladder.

This study reports a case of intrahepatic left-sided gallbladder, in an atypical presentation of acute cholecystitis, and describes the modified laparoscopic technique used during cholecystectomy.

## CASE REPORT

A 22-year-old man with a medical history of hypothyroidism and a reducible umbilical hernia presented to the emergency department with a 12-hour history of unrelenting, cramping pain concentrated first in the epigastrium and later migrating to the back, midchest, and entire abdomen. Subjective fever, chills, nausea, and cold sweats accompanied the pain. The patient denied emesis, change in bowel movements, or change in urinary habits.

Physical exam revealed a soft abdomen with tenderness over the epigastrium and left upper quadrant. Laboratory values were within normal limits. A computed tomography (CT) scan was obtained in the face of nonspecific findings, with results suspicious for acute cholecystitis—mildly distended gallbladder with prominent wall, lack of pericholecystic fluid/stranding, and no radio-opaque gallstones (Figure 1). The gallbladder was distended and was seen coursing obliquely toward the left. Porta hepatis and Calot's triangle were both normally located. Abdominal ultrasound revealed a left-

sided gallbladder, gallstones, mild wall thickening, distension, and a sonographic Murphy's sign (Figure 2).

The patient underwent laparoscopic cholecystectomy. The initial look revealed the gallbladder oriented obliquely, taking off from the right of the midline and coursing toward the left side. The falciform ligament was situated normally, with the gallbladder running below and across it to the liver segments III and IV. Further dissection at the Calot's triangle revealed that the cystic duct was taking off anterolateral to the common bile duct and the cystic artery was located posterior to the cystic duct, with almost anteriorly oriented perpendicular takeoff from the portal structures. Further distally, the gallbladder was partially intrahepatic, reaching up to the liver margin (Figure 3).

Decompression of the gallbladder allowed us to grasp the distended and inflamed gallbladder. In order to improve access to the gallbladder's unusual location, additional 5-mm ports were added in the left lower quadrant and right lower quadrant (lumbar region). From this vantage point, the cystic duct and artery were both dissected and ligated, and the gallbladder was removed.

## DISCUSSION

Hochstetter first described an anomalous, left-sided gallbladder in 1886, and a multicenter series of laparoscopic cholecystectomies shows a prevalence of 0.3% (Hochstetter, 1886; Idu, Jakimowicz, Iuppa, & Cuschieri, 1996). While about 149 cases of left-sided gallbladder have been reported in the past, only a handful of these cases has been diseased (Dhulkotia, Kumar, Kabra, & Shukla, 2002).

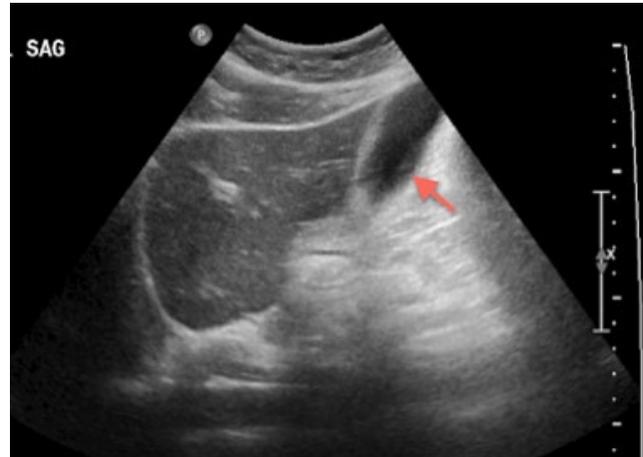
Several theories exist about the etiology of left-sided gallbladder. Cases such as this one show a cystic duct anterolateral to the common bile duct, an anatomically normal configuration. The resulting left-sided gallbladder may have occurred from hepatic diverticulum after normal development, and subsequent migration toward the left lobe instead of rightward (Gross, 1936). This theory would be consistent with our case, as it results in normal orientation of the cystic duct and artery. Another explanation is the com-



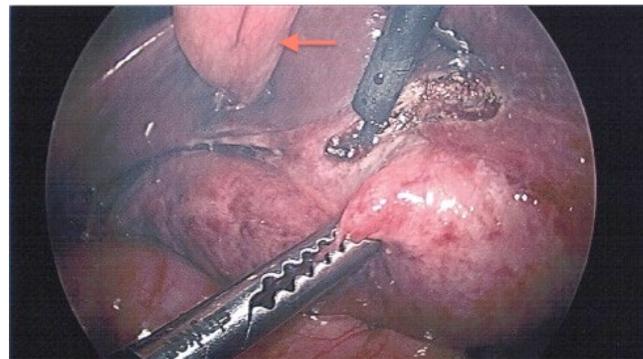
**Figure 1** | CT showing gallbladder (red arrow) traveling obliquely toward the left.

plete agenesis of the normal gallbladder, in conjunction with the development of a second gallbladder from the left hepatic duct (Gross, 1936). Finally, a Japanese study has found that suspected left-sided gallbladders were in their normal anatomic location, and that the anomalies were actually in right-sided falciform ligaments (Nagai, Kubota, & Kawasaki, 1997).

Several therapeutic implications exist for this anatomic variation, as they are associated with anomalies in the intrahepatic portal vein, cystic duct, and accessory liver (Hsu, Chen, & Huang, 2007; Ikoma, Tamaka, & Hamada, 1992). For example, left-sided gallbladders have been reported with a cystic duct entering the left hepatic duct, making surgery potentially more hazardous (Gross, 1936). Clinically, the presentation of cholecystitis in a left-sided gallbladder (as above, with epigastric and left upper-quadrant pain) may be confused with cardiac or pancreatic pathologies. A laparoscopic approach to cholecystectomy has been successful, with several proposed modifications to surgical technique. One approach used a traditional right-side port placement, with a window created in the falciform ligament to access the left side (Hopper, Ryder, Swarnkar, & Stephenson, 2003). Anterograde dissection—a “dome down” approach via laparoscopy—has also been proposed (dissecting from the fundus), as is traditionally done with open cholecystectomy (Schiffino, Mouro, Levard, & Dubois, 1993). Finally, the placement of left-sided ports, as performed in our case, may provide better access (Zografos, 2009). Additionally, intraoperative cholangiography may aid in the visualization and confirmation of biliary architecture prior to dissection (Corbajo, Martin del Omo, & Blanco, 1999). Open cholecystectomy should always be kept in mind as an option, but with careful use of procedural and imaging techniques as described, a surgeon encountering this diagnosis will have a better chance of avoiding open surgery and common bile-duct injury.



**Figure 2** | Ultrasound study showing gallbladder tip (red arrow) associated with left lobe of liver.



**Figure 3** | Dissection of gallbladder with intrahepatic portion inside left lobe; falciform ligament (red arrow).

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