



A Case Report on True Left-Sided Gallbladder and Review of Literature

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Abstract

Background: The symptoms of a true Left-Sided Gallbladder (LSG), an uncommon finding, may resemble those of a gallbladder in a normal location. Additionally, it might be overlooked by preoperative imaging tests like endoscopic ultrasound, Computed Tomography (CT), or Magnetic Resonance Imaging (MRI). A true left-sided gallbladder poses a surgical challenge, and laparoscopic cholecystectomy may require modification of the surgical procedure.

Case Report: In this case report, we show a real case of a gallbladder on the left side that caused symptoms on the right side of the abdomen. The gallbladder's location on the left side of the abdomen was not visible on an abdominal ultrasound. The aberrant architecture is typically found unintentionally during surgery because the majority of patients with symptomatic gallstones do not require additional cross-sectional imaging (CT or MRI), as in our case report.

Discussion: True LSG is an uncommon anomaly that can exhibit right-sided symptoms similar to a gallbladder in its normal position. It could go undetected in prior imaging tests and be found only during surgery. For the safe removal of the gallbladder, it might be necessary to modify the laparoscopic ports, adjust the patient's posture or the surgeon's position, or switch to an open cholecystectomy.

Conclusion: For a left-sided gallbladder, the traditional laparoscopic cholecystectomy procedure is possible. However, changes to the surgical procedure may be required for the safe dissection of the gallbladder if the anatomy is unclear.

Keywords: Laparoscopic; Cholecystectomy; Anatomy

Introduction

One of the most frequent surgical treatments is a cholecystectomy. Biliary colic, cholecystitis, gallstone pancreatitis, and risk factors for gallbladder cancer (polyp >10 mm, porcelain gallbladder, etc.) were among the reasons for gallbladder operation. The majority of times, the gallbladder is removed laparoscopically through four tiny incisions, though open surgery is still a possibility for more challenging procedures. Accordingly, the chance of conversion to an open procedure is between 1 and 5%. Day-case surgery is becoming more common. The rare discovery of a left-sided gallbladder is frequently made by accident during a laparoscopic cholecystectomy. The gallbladder is positioned against the liver's left lobe due to a genetic anomaly. Gallbladders are known as "false" left-sided gallbladders in cases where a right-sided round ligament is present. The term "true left-sided gallbladder" refers to a left-sided gallbladder that does not have a right-sided round ligament. These are incredibly uncommon [1]. The gallbladder ordinarily sits in the gallbladder fossa between liver segments IV and V and emerges through the hepatic diverticulum. There are a few uncommon ectopic sites, such as transverse, intrahepatic, retrodisplaced, and left-sided. Gallbladder presentation on the left side often takes place *in situs inversus*. Yet, up to 0.3% of people have transposition of only the gallbladder [2,3]. The biliary system, portal vein anomalies, and segment IV atrophies are among the abnormalities connected to gallbladder transposition [4-7]. The ability to recognize any anatomical variations is a surgical skill that is essential to successfully completing any surgical procedure. Anatomical variation may present some operative challenges with an increased risk of morbidity [8]. We present a case report of a 65-year-old woman visited the outpatient clinic complaining of right upper quadrant pain attacks that had persisted for two to three months.

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Case Presentation

A 65-year-old woman visited the outpatient clinic complaining of right upper quadrant pain attacks that had persisted for two to three months. Anorexia and nausea were also present with the numerous episodes of normal biliary colic. Her daily meals were typically consumed before the discomfort began. She was a nonsmoker who drank infrequently. Although she had undergone an open appendectomy and was taking oral omeprazole for gastroesophageal reflux in her medical history, there were no other major conditions or surgical comorbidities. She had no serious medical conditions. There was no clinical evidence of jaundice, dark urine, pale stools, or pruritus. He was afebrile and had normal vital signs upon evaluation. He experienced modest epigastric tenderness and central obesity (a BMI of 38), but there was no sign of peritonism. Her abdomen was soft and non-tender, and a clinical examination revealed little of note. Blood test findings showed that her liver function tests were all within normal limits. An abdominal ultrasound revealed a thin-walled gallbladder with numerous small calculi. However, neither CBD dilatation nor pericholecystic fluid were present. There were no remarks that suggested the gallbladder's orthotopic position should be changed. Although the liver was big, it had a typical echo texture and no focal lesions. Her spleen measured 140 mm, which was at the higher end of the normal range. The patient was scheduled for a day-case elective laparoscopic cholecystectomy after a clinical evaluation. Routine ports were placed at the umbilicus (10 mm), epigastrium (10 mm), right mid-axillary (5 mm), and mid-clavicular (5 mm) lines after general anesthesia and preventative antibiotics. The gallbladder was not present where it usually would have been during the laparoscopic exploration. During surgery, the gallbladder was discovered in the midline against the left lobe of the liver between segments III and IV, to the left of the falciform tendon, along with an enlarged smooth liver. The gallbladder was found suspended at segment three of the liver's medial portion. It was somewhat intrahepatic in the fundus. The cystic artery was located anterior to the cystic duct, which was narrow and traced a path to the common hepatic duct. The rest of the abdominal viscera appeared to be in a normal posture, and the heart's diaphragmatic pulse was on the left side of the body. The process had to be modified in order to be carried out successfully and safely as a result of the findings made during the procedure. Due to obstruction by the falciform, it was challenging to access the gallbladder through the epigastric port; as a result, a second port was added at Palmer's point in the left upper quadrant, allowing for simpler access and dissection. To reveal the Calot's triangle and prevent liver tears, the gallbladder was retracted towards the left shoulder beneath the falciform rather than the right shoulder tip. The fundus of the gallbladder retracted toward the left shoulder. After that, the distal gallbladder was separated from the cystic plate and proceeded along the gallbladder wall in the direction of the cystic artery and duct. The cystic artery and duct were found during a difficult, time-consuming dissection, which was followed by a critical view of safety. It was isolated, trimmed, and separated to release the short cystic artery. A relatively tiny cystic duct prevented an intraoperative cholangiogram from being successful after the cystic duct was clipped. After that, the cystic duct was separated and snipped. Segment 3's gallbladder underwent antegrade dissection. Through Port 1, the gallbladder was removed after being put in a retrieval bag. The rest of the surgical procedure was carried out as usual without any complications because there were no other anatomical abnormalities discovered during the operation. The patient recovered postoperatively without incident,

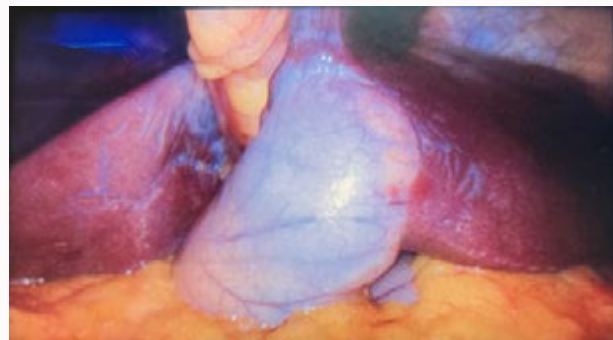


Figure 1: True-LSG.

and she was safely sent home (Figure 1). The patient's recovery from surgery went without incident. The drain, which was removed the day after surgery, did not contain any bile-stained fluid. Days 1 and 2 after surgery, liver function tests revealed nothing noteworthy. On day 2, the patient was released after tolerating a typical meal and being pain-free. Two weeks later, during his outpatient assessment, he was well and showed no signs of clinical concern.

Discussion

A comprehensive search of medical databases, including PubMed, Embase, and the Cochrane Library, was conducted using the keywords "case report, laparoscopic, cholecystectomy, Anatomy". The research was restricted to studies published only through 2023. The inclusion criteria for the studies were: (1) those that examined the left-sided gallbladder; (2) those that reported both perioperative outcomes and long-term survival; and (3) those that were written in English. Furthermore, the data from these studies were carefully analyzed and evaluated to assess the efficacy and safety of laparoscopic cholecystectomy. The results of the analysis were then compared to other available treatments to determine the optimal management strategy. The findings of this research will provide valuable insight into the benefits and risks and help clinicians make informed decisions when treating patients. Hochstetter et al. [8] originally reported a tiny series of LSGB in 1886, and the current description is a gallbladder connected to the undersurface of segment 3 without situs inversus viscerum. There are two ways that an abnormal gallbladder can form beneath the left lobe of the liver. The gallbladder initially forms from a hepatic diverticulum in its usual location, then it migrates to the left of the falciform tendon and becomes affixed to the left liver's underside. This migration explains how the cystic duct enters the hepatic duct on the right side, as reported in this study and the majority of others. Second, a right-sided normal gallbladder may not form along with the development of a left-sided gallbladder directly from the left hepatic duct. In this location on the left side, the cystic duct joins the common duct. Third, Nagai and coworkers [9] discovered the anomaly associated with a right-sided falciform ligament in 3 of 1,621 patients (0.2%) at Operation 7, and another 15 instances of this association have been reported. This association has been used to explain some left-sided gallbladders. The proposed reason is that both the right- and left-sided umbilical ligaments are present during early fetal growth to a size of 6 mm. When an embryo is 7 mm in size, the right side typically atrophies and the left side takes over. In 0.1% to 0.7% of cases, the right ligament takes over when the left ligament atrophies [10-19]. The gallbladder looks abnormally located beneath the left lobe of the liver in these patients because it is

Table 1: Results.

References	Location	Reported number of patients	Clinical presentation	Diagnosis made pre-op?	Surgical treatment (cholecystectomy)
Rozsos I et al. [4]	Hungary	1	True-LSG	Right sided abdominal pain	1 open
Idu M et al. [5]	UK	5	True-LSG	Right sided abdominal pain	4 Laparoscopy 1 Converted
Nagai M. et al. [8]	Japan	3	False-LSG	Right sided abdominal pain	1 open 2--
Reddy PK et al. [3]	India	1	True-LSG	Right sided abdominal pain	1 Laparoscopic: Modified Left subcostal port Lithotomy position
Sadhu S et al. [24]	India	1	True-LSG	Right sided abdominal pain	1 Laparoscopic: Modified Left upper quadrant port and right subcostal port
Wong LS et al. [25]	UK	1	True-LSG	Right sided abdominal pain	Open with biliary lesion
Abe T et al. [26]	Japan	1	True-LSG	Incidental during liver cancer	Open
Zografos GC et al. [27]	Greece	1	True-LSG	Right sided abdominal pain	Laparoscopic. Modified 10-mm trocar between umbilicus and xiphoid left midclavicular and left anterior axillary
Bender EA et al. [28]	USA	1	True-LSG + Duplication of common bile duct	Right sided abdominal pain	Laparoscopic
Colovic R et al. [29]	Serbia	2	True-LSG	1 asymptomatic/1 right sided abdominal pain	Open
Dhulkotia A et al. [30]	India	1	True-LSG	Right sided abdominal pain	Open
Qureshi I et al. [31]	USA	1	True-LSG	Right sided abdominal pain	1 Laparoscopic: Modified Left upper quadrant port
McGowan JM et al. [32]	USA	1	True-LSG	Right sided abdominal pain	1 Laparoscopic
Strong RW et al. [33]	USA	1	True-LSG	Association with giardia lamblia infection	Open
Makni A et al. [34]	Tunisia	1	True-LSG	Right sided abdominal pain	1 Laparoscopic
Kawai R et al. [35]	Japan	1	True-LSG	Right sided abdominal pain	1 Laparoscopic
Moo-Young TA et al. [36]	USA	1	True-LSG	Right sided abdominal pain	1 laparoscopic CBD injury because of anomalous left sided common hepatic duct
Jung HS et al. [37]	South Korea	1	True-LSG	Right sided abdominal pain	1 Laparoscopic
Matsumura N et al. [38]	Japan	1	True-LSG	Right sided abdominal pain	1 Laparoscopic + lap CBD exploration
Si-Youn R et al. [39]	South Korea	3	True-LSG	Omphalocele with herniated liver	---
Kanazumi N. et al. [40]	Japan	2	True-LSG	Right sided abdominal pain	2 Laparoscopic
Noritomi T et al. [41]	Japan	1	True-LSG	Right sided abdominal pain, Associated with hypoplasia of the left lobe of the liver	1 open
Fujita N. et al. [42]	Japan	1	False-LSG	Right sided pain, right sided round ligament	1 Open
Shimizu T et al. [43]	Japan	1	True-LSG	Living donor transplant Association with portal vein anomalous branching	1 Open
Alharthi S et al. [44]	South Africa	1	True-LSG	Right sided abdominal pain	1 Laparoscopic
Hwang S. et al. [45]	China	3	True-LSG	Living donor transplant Biliary, arterial, and portal venous anomalies	3 Open
Gui D et al. [46]	Italy	1	True-LSG	Right sided pain	1 Laparoscopic
Asonuma K. et al. [7]	Japan	3	True-LSG	Living donor transplant Portal venous anomaly	3 Open
Donthi et al. [47]	USA	2	1 situs viscreum inversus	Right sided abdominal pain	1 Laparoscopic: modified Left anterior axillary and left midclavicular ports
Chrungoo et al. [48]	India	2	---	Right sided abdominal pain	Laparoscopic
Iskandar et al. [49]	USA	1	True-LSG	Right sided abdominal pain	1 Laparoscopic
Nastos et al. [50]	Greece	2	---		2 Laparoscopic: Modified Subxiphoid trocar introduced to the left of the round ligament, right midclavicular and anterior axillary passed under the round ligament
Our study Coco Leanza S	Italy	1	True-LSG	Right sided abdominal pain	1 Laparoscopic
Velimezis et al. [51]	Germany	7	True-LSG	Right sided abdominal pain	5 Laparoscopic 2 Conversion open
Saafan et al. [52]	Quatar	1	True-LSG	Right sided abdominal pain	1 Laparoscopic

True-LSG: True-Left Side Gallbladder; Right-LSD: Right ligament- Left Side Gallbladder

located in the normal location but to the left of a right-sided falciform ligament. Contrast this abnormality with a real left-sided gallbladder that is medial to a healthy falciform ligament. A prevalence of 0.04% to 0.3% is recorded for left-sided gallbladders without situs inversus [4,5]. Preoperative ultrasonography, the most common imaging modality for symptomatic gallstone disease, usually misses LSGB. Just 2.7% of ultrasound-detected LSGB cases had a positive predictive value [20]. As the majority of patients with symptomatic gallstones do not need further cross-sectional imaging (CT or MRI), the aberrant architecture is typically discovered unanticipatedly during surgery, as we have shown. According to reports, several anomalies of the portal vein and bile duct are closely related to a true left-sided gallbladder. The detection of this congenital biliary anomaly has several therapeutic implications, particularly in situations of hepatic resection. The left-sided gallbladder may be associated with anomalies of the intrahepatic portal vein (trifurcation type), the cystic duct, or an accessory liver [19,21,22]. Similar conditions to those that affect their normally located peers, such as cholelithiasis, polyps, and empyema, can affect abnormal gallbladders. When performing procedures, it is necessary to be aware of the anomaly. It is obvious that knowledge of the anomaly is essential for effective therapy. When an LSGB is discovered during surgery, the attending surgeon has three options: (1) performing the procedure laparoscopically with the addition of extra ports or falciform ligament maneuvers; (2) consulting a skilled general or hepatobiliary surgeon who may be able to offer intraoperative assistance; or (3) postponing the procedure in order to obtain additional imaging to clarify the biliary anatomy. Open surgery should be taken into consideration, though, in case of difficulties. It may be easier to complete the procedure if you adopt the French position, which is what we did for our patient.

Several changes to the laparoscopic procedure have been proposed by some authors, particularly to the positioning of the port and the operating surgeon's standing position. Cholangiography should be done intraoperatively. It presents a significant challenge for surgeons when the T-LSG is discovered during surgery. According to studies, patients with T-LSG who underwent LC had a 4.4 percent incidence of common bile duct injury [20]. According to Schiffino et al. [23] 1993 report on the first laparoscopic cholecystectomy for a left-sided gallbladder, the anterograde approach should be used in this situation to safely prevent harm to the hepatic pedicle and improve anatomical visibility. Compared to 27 reports from other countries, 15 Japanese reports of an abnormal gallbladder located beneath the left liver are known. Table 1 provides a summary of a more thorough literature review of patients who underwent surgery and had left-sided gallbladders without situs inversus [24-52].

Conclusion

The true Left Side Gallbladder (LSG) is an uncommon anomaly that is only occasionally identified during surgery. The safe removal of LSG *via* the laparoscopic method depends on accurate anatomical recognition and careful dissection over the gallbladder border. However, for the safe identification of vascular and biliary structures and the removal of the gallbladder, modifications to the method may be necessary. Classical ports and the typical patient position can still be used. To prevent bile duct injuries, there should be a strong propensity to switch to open surgery in cases of challenging anatomy and an inability to safely dissect the gallbladder using a laparoscopic approach.

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