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Case Report

Sinistroposition: A case report on incidental finding of left sided gall bladder on laparoscopic cholecystectomy

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ABSTRACT

Introduction and importance: Left-sided gall bladder, a rare biliary abnormality with an incidence of 0.04–0.3%, is characterized by the presence of the gall bladder to the left of the ligamentum teres. However, they are often missed during pre-operative imaging and often encountered intraoperatively, thus challenging the surgical intervention for the surgeons.

Case presentation: We herein present a 40-year-old male presented with colicky right hypochondriac pain and epigastric discomfort, diagnosed incidentally during laparoscopic cholecystectomy as a left-sided sided gall bladder without situs inversus, which was missed during pre-operative ultrasonography and was treated without any complications with conventional four-port technique without changes in the trocar placement.

Clinical discussion: Gall bladder is normally found in the gall bladder fossa to the right of the ligamentum teres in the plane of the von Rex-Cantlie line; however, left-sided gall bladder is found to the left of the ligamentum teres and is frequently associated with inversus of the abdominal structures and associated vessels. They are frequently overlooked during preoperative diagnostic imaging, ultrasound for colicky discomfort, and encountered during intraoperative operations, confounding the treating surgeon's anatomic expertise. Intra-operative cholangiography is sometimes used as an adjunct, and operations can be accomplished with or without modifications in trocar position.

Conclusion: Despite preoperative imaging, biliary abnormalities can be discovered accidently during laparoscopic cholecystectomy. Thus, diligent recognition of structures and related anomalies by the treating surgeon has a high value in the best possible outcome for the patient, and left-sided gall bladder can be done with minimum difficulty even without interposition of trocar placement.

1. Introduction

Among the several congenital anatomic variation including, agenesis, duplication, wandering gallbladder, multi-septate and ectopic gall bladder encountered accidently during laparoscopic cholecystectomy, left sided gallbladder is an unusual anatomic anomaly of extrahepatic biliary tree with the prevalence of 0.1%–0.7% [1] and left sided (sinistroposition) gall bladder without situs inversus is even rarer with prevalence of 0.04%–0.3% [2]. Based on three distinct specimens, Hochstetter initially described this anatomical variation finding in 1886 [1,3].

LSGB is characterized by the findings of gall bladder to the left side of the round ligament or ligamentum teres in contrast, normally, gall bladder dwell on the gall bladder fossa, inferior to the liver between hepatic segments IVb and V, along the von Rex-Cantlie line [1,3]. Despite pre-operative ultrasonography being the diagnostic modality of biliary colicky pain, they often missed this clinical entity and often discovered incidentally challenging the surgical aspect while

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performing laparoscopic cholecystectomy [1,4–6]. In this case report, we presented an adult male diagnosed incidentally during laparoscopic cholecystectomy as having a left-sided gall bladder without situs inversus.

This case is reported in accordance with SCARE 2020 guidelines [7].

2. Case presentation

A 40-year-old well-built male with no known comorbidities presented in our general surgery outpatient care with a complaint of pain in the right hypochondriac and epigastric regions for two to three months. The pain was insidious on onset, dull aching, intermittent in nature, occasionally radiating to the right scapular tip with no diurnal variation associated with nausea and vomiting (non-projectile, non-bilious, non-bile stained). He graded 6/10 on the Wong-Baker facial grimace scale. He denied any history of fever, weight loss, yellowish discoloration of sclera and body, changes in bowel and bladder habits, cough, chest pain, or shortness of breath, while his past medical and surgical history was unremarkable. He denied any similar family history, as well as any significant family and allergic history. He denied on taking smoking, alcohol, and recreational drug use. His vital signs were within normal limits upon assessment.

Systemic examinations (respiratory, cardiovascular, central nervous system, and musculoskeletal system) revealed no abnormalities. However, abdominal examination showed a soft, symmetric abdomen with no local rise in temperature and mild tenderness in the right hypochondriac region. The Murphy sign was negative, and there was no guarding or rigidity. Organomegaly and renal angle tenderness were not evident.

Routine baseline laboratory investigation and serology for HIV–I and II, HBsAg and Anti-HCV, as well as serum amylase and lipase, were within normal limits. The chest radiograph (X-ray postero-anterior view of the chest) was normal. Ultrasonography of the abdomen and pelvis reveals a distended gall bladder with multiple stones and a thick-walled gall bladder. The common bile duct (CBD) and intrahepatic biliary radicles (IHBR) were both normal, with no pericholecystic fluid and inflammatory changes.

After thorough discussion with the patient, laparoscopic cholecystectomy was planned and performed using the standard four-port technique under general anesthesia. Following general anesthesia, dressing and draping were done in aseptic conditions. Pneumoperitoneum was created by the open method using standard insufflation at an intra-abdominal pressure of 12 mm of Hg followed by placement of the other 3 trocars under vision. Subsequently, the gall bladder was absent in its normal position and was found on the undersurface of the liver medial to the falciform ligament (i.e., a left-sided gall bladder) without any other displacement of visceral structure to the opposite site (Fig. 1). According to the treating surgeon, intraoperative cholangiography was not performed. The falciform ligament was cut, held with a grasper inserted through the fourth port, and pushed towards the right side to obtain a better retraction of the gall bladder. An experienced consultant general and gastrointestinal surgeon in a tertiary care center conducted the procedure. The gall bladder was distended with a thickened wall and multiple calculi. Histopathological examination showed the features suggestive of chronic cholecystitis consistent with gallstones without any evidence of mitosis or nuclear atypia.

The postoperative period was uneventful and the patient was discharged on the second postoperative day with antibiotics (cephalosporin group), analgesics (NSAIDS) and proton pump inhibitors for 7 days. The patient's follow-up after 7 and 30 days was unremarkable.

3. Discussion

Normally, the gallbladder is located in the hepatic segments IV and V gallbladder fossa inferior to the liver on the plane known as the von Rex-Cantlie line, which divides the liver into left and right lobes [3].

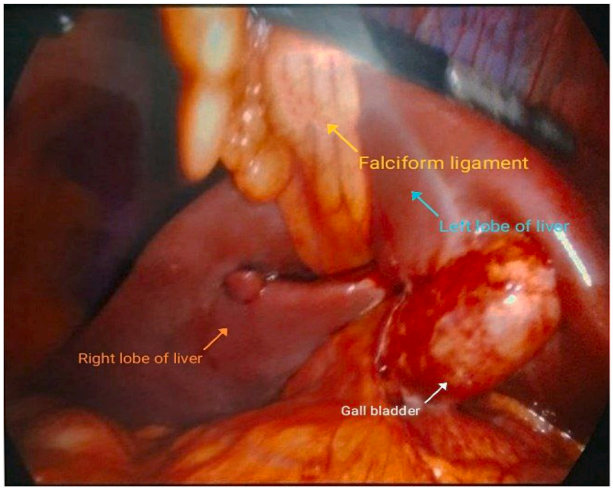

Fig. 1. Intra-operative image showing the presence of the distended gall bladder medial to the falciform/ligamentum teres under the left lobe of the liver.

However, the anatomy of the gall bladder has been reported with several congenital variants such as intrahepatic, left-sided, transverse, and retro-displaced [1]. Left-sided gall bladder is characterized by the presence of the gall bladder to the left of the ligamentum teres hepatis [8].

Left sided gall bladder is classified as [3].

Classification	Comments
LSGB with situs inversus	Major internal organs are congenitally mirrored or reversed (situs inversus) from their native locations (situs solitus).
True LSGB	Most common type; the gall bladder is situated under the surface of segments III (or II) of the left liver lobe, to the left of the ligamentum teres and falciform ligament but absence of situs inversus
Right LSGB	Gall bladder positioned to the left of right-sided falciform ligament that is not in its typical location at segment IVb but absence of situs inversus.

Our patient was diagnosed intraoperatively with a left-sided gall bladder with ligamentum teres to the right under the segment third of the left liver lobe without situs inversus (i.e., a true left-sided gall bladder).

LSGB without the situs inversus is a rare variant that constitutes an incidence of 0.04%–0.1% (Nguyen 2015), after it was first reported in 1886 by Hochsetter [1,3]. Segment IV atrophy, biliary system aberrations, and portal vein abnormalities are among the concomitant anomalies with a left-sided gallbladder [8]. As per Beck, gallbladder malposition can occur without situs inversus [9]: i) Medioposition (medially displaced gall bladder, lying on the quadrate lobe's underside and on the right side of the round ligament) and ii) Sinistroposition (gallbladder positioned under the left lobe, often segment III, and to the left of the ligamentum teres). Our patient belongs to type II.

The liver and gallbladder are both produced by the hepatic diverticulum, an extension of the foregut's endodermal lining into the surrounding mesoderm during the 4th week of embryonic life. The bile duct is formed by the narrowing of the hepatic diverticulum-foregut junction. The gallbladder and cystic duct are then produced as an extension of the bile duct, which in turn splits the bile duct into the hepatic and common bile ducts [10]. Albeit uncommon, there have been several theories put forward on the embryological mechanism of the left sided gallbladder [3,8,11].

- First, the ectopic gallbladder, which had a proper outlet for its cystic duct, very likely developed from the hepatic diverticulum as a normal embryologic bud, but it migrated to a position underneath the left lobe rather than taking up its regular spot under the right lobe.

- ➢ Another explanation for a gallbladder on the left side is that a second gallbladder independently developed from the left hepatic duct while the usual structure on the right side failed to form.
- ➢ Thirdly, the gallbladder may adhere to the growing left lobe of the liver and be transported over to the left side of the round ligament when it emerges from the hepatic diverticulum.
- ➢ Fourthly, it can be the product of the liver's quadrate lobe failure to develop.
- ➢ Lastly, the ligamentum teres deviated to the right, placing the gallbladder on the left side of that as well.

Because visceral nerve fibers do not transpose with the gallbladder, gallbladders with sinistroposition are truly left-sided, but when they become symptomatic, they most often present with right-sided symptoms, making preoperative identification a herculean task [2].

Despite using ultrasonography (USG) as an initial modality of choice for biliary pathology, recent studies have shown that conventional USG invariably misses the detection of LGB pathology in individuals with gallstone disease [4,6]. Our patient also presented with right-sided pain and failed to be diagnosed on preoperative USG. As we have documented, the atypical anatomy is typically discovered unanticipatedly during surgery for gall bladder pathology, since the majority of patients with symptomatic gallstones do not require alternative cross-sectional imaging technology (CT or MRI), which have a superior detection rate for LSGB [4].

Varied aberrant anatomic anomalies are associated with LSGB and are concurrently coupled with operative biliary injury during laparoscopic cholecystectomy (4.4% in comparison to 0.3% for ideal positioned gall bladder) [12,13]. Alternative modalities, such as mirror imaging of the laparoscopic set-up, alteration of patient position (left--side-up position), initial approach to the GB fundus, and intra-operative cholangiography (for better visualization and thus avoiding damage to the biliary tract), have been reported in the literature to reduce intra-operative hepatobiliary injury and provide a safe laparoscopic cholecystectomy [13–15]. Regardless of the modalities, if the laparoscopic procedure fails, open surgery may be performed as a final option [13].

In our patient, LSG was successfully removed using the conventional approach (four port technique) of laparoscopic cholecystectomy, which was aided by withdrawing the gallbladder to the right side beneath the falciform ligament without the use of IOC. Our findings are in accordance with earlier studies of safe laparoscopic removal of LSG using conventional ports and the laparoscopic cholecystectomy procedure without any damage to adjacent structures.

4. Conclusions

Sinistroposition (Left-sided) gall bladder without situs inversus viscerum is a rare anatomical variation of the extra-hepatic biliary tree which is often missed during pre-operative radiographic imaging and detected incidentally during laparoscopic cholecystectomy in patients with symptomatic cholelithiasis. Therefore, the diligent recognition by the surgeons of the anatomical peculiarities in the biliary tree is recommended. For such conditions, trocar placement changes are an option; however, management without trocar placement changes (classical techniques) can be performed with minimal difficulty.

5. Patient perspective

The patient expressed his gratitude for the diagnosis and treatment of his illness.

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Ethical approval

Not needed for the given article.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Authors Contributions

Sujan Bohara and Samikshya Karki contributed in study conception, drafting, revision of manuscript and manuscript submission. Pawan Singh Bhat, Binit Upadhaya Regmi, Swastika Sedhai and Suman Paudel involved in editing the draft and revision of the content of manuscript. Sushil Bahadur Rawal, Srijan Malla contributed in complete supervision, critical appraisal of the manuscript and performed the surgery. All authors have approved the final article for submission.

Research registration

N/A.

Gurantor

Dr. Srijan Malla.

Declaration of competing interest

No any conflict of interest to declare by the authors.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2022.104547.

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