

Case Series

Gallbladder to the left side of the falciform ligament in absence of Situs Inversus “Sinistroposition” – Case series of 2 patients with this anomaly who underwent mini-laparoscopic cholecystectomy

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ABSTRACT

INTRODUCTION: Gallbladders located to the left of falciform ligament, without situs inversus, are denominated sinistroposition or true left-sided gallbladders; it is considered a rare anatomic anomaly with a prevalence in between 0.1% and 0.7%. Left-sided gallbladder usually occur as a component of situs inversus.

PRESENTATION OF CASES: We report a case series of two patients of true left-sided gallbladder that were found at our institution from 2015 to 2017; the anatomic anomalies were discovered during the performance of mini-laparoscopic cholecystectomy due to acute cholecystitis with cholelithiasis in both cases. Both patients underwent a successful surgery and there were no postsurgical complications.

DISCUSSION: The reported prevalence of left-sided gallbladder is between 0.1% and 0.7%, thus considered a rare anatomic finding. Currently, with advances in diagnostic imaging modalities, the report of left-sided gallbladder has increased nowadays. It may be a more common anomaly than previously thought.

CONCLUSION: True left-sided gallbladder can be an incidental finding; it is in part due to the fact that radiographic images do not typically detect this anomaly, therefore surgeons must be aware of this condition because it is associated with anomalies in the intrahepatic portal vein and biliary tree.

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1. Introduction

True left-sided gallbladder is a rare anatomic anomaly. This finding must be differentiated from a persistent right umbilical vein, being this anatomic anomaly a right-sided round ligament [1].

Laparoscopic cholecystectomy in patients with left-sided gallbladder can be performed safely, although lesions of the bile duct are not unusual [2], given the association of these cases with anomalies of the biliary tree and the intrahepatic portal vein [3].

First described in 1886 by Hochstetter, the location of the gallbladder between liver segments III and IV or in segment III, remains a rare anomaly [4]. In this condition, the gallbladder is located to the left side of the falciform ligament, without involvement with situs inversus or hypoplasia of segment IV, nor abnormal location of the round ligament on the right side, which is called true sinistroposition.

This type of gallbladder is located below the left hepatic lobe, between segments III and IV, or on segment III, to the left side of the falciform ligament [5].

Despite preoperative imaging studies, they not always detect this anomaly [6] and incidental discovery within surgical time may be more common than previously thought [7], so the surgeon in charge must have considered this type of incidental anomalies when performing the surgical approach.

Hereafter we report a case series of two patients with left-sided gallbladder encountered in our private health-care institution from 2015 to 2017. This case series is present in a retrospective design.

This manuscript has been reported in line with the PROCESS guidelines [8].

Ethical approval of this study is exempt at our institution.

We obtained signed patient consent forms for the publication of this article.

2. Case 1

23 year-old female Hispanic patient, with no concomitant pathology of importance, no important past medical history, with

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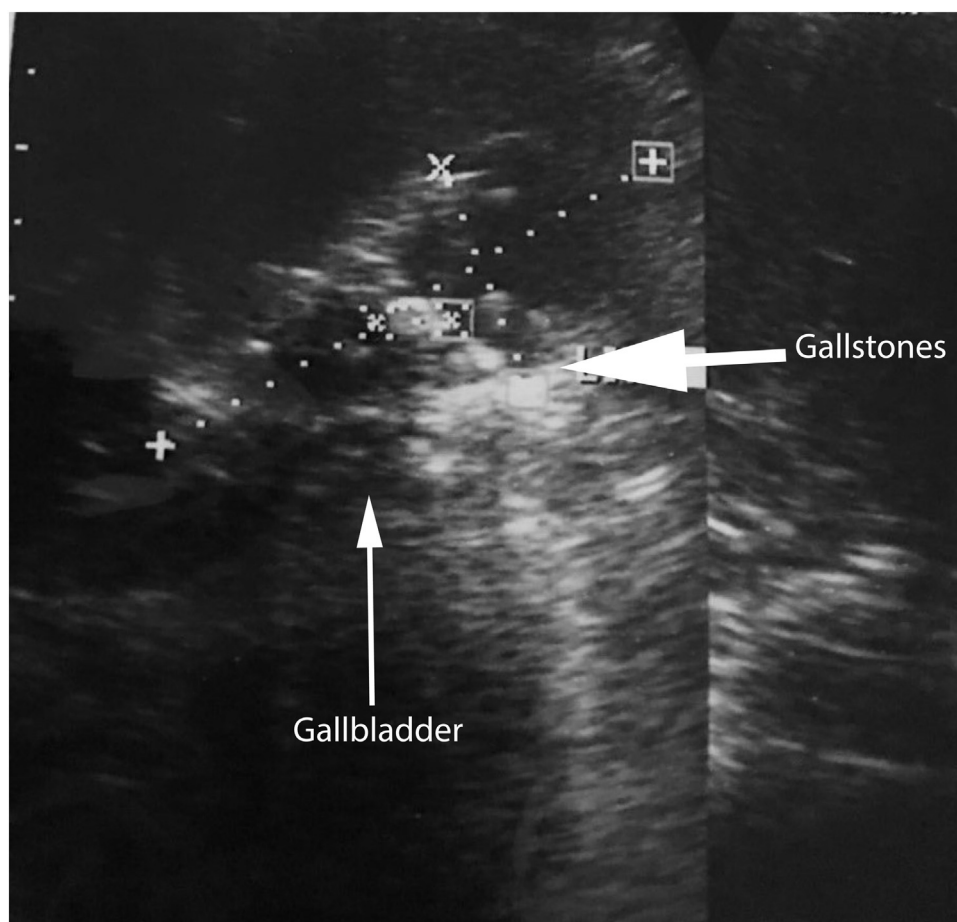


Fig. 1. Ultrasound of patient 1 revealing gallstones but not the left-sided gallbladder later found intraoperatively.

a body mass index of 35.9 kg/m^2 (class 2 obesity), with chronic pain in the right hypochondrium walked into the Emergency room. Laboratory tests were within normal ranges. Hepatic and bile duct ultrasound was performed, in which chronic exacerbated cholelithiasis was reported, with the presence of multiple stones and an important inflammatory process, without further anomalies (Fig. 1).

Conventional mini-laparoscopic cholecystectomy was performed by an experienced surgeon, we used 4 ports, one of 12 mm and 3 of 3 mm, however, when visualizing the infrahepatic space, the anomaly of sinistroposition was noticed, so that 2 of the 3 mm ports, which lay on the right side were relocated on the left side, remaining as follows: 1–12 mm umbilical port, 1–3 mm infraxifoid port, 1–3 mm left subcostal mid-clavicular line port, 1–3 mm left subcostal (anterior axillary line) port; with this port positioning, good visualization was obtained for the performance of the surgery (Fig. 2).

The gallbladder was found in sinistroposition, it was adhered to the round ligament, the vesicular bed was located towards the hepatic segment III, the triangle of Calot lay below the gallbladder. The wall of the gallbladder was thickened and fibrous in appearance. Therefore, the first thing that was done was the separation of the gallbladder from the hepatic bed and the round ligament. The duct and the cystic artery were identified, it was observed that the artery was anterior to the cystic duct, reaching towards the vesicular fundus.

After identification of the critical vision of safety, the artery was first ligated and then the cystic duct in the infundibulocystic junction was ligated with intracorporeal knots with 1-g vicryl material. The gallbladder was separated from the hepatic bed in a cysto-

functional manner with electrocautery and surgery was completed without difficulties. The pathological analysis did not reveal any abnormalities (Fig. 3).

According to the treating surgeon, intraoperative cholangiography was not performed.

The surgical time was 120 min, 60 min longer than the average surgical time for a usual cholecystectomy in our institution. 106 liters of CO_2 were spent. The anesthetic technique used was mixed subdural block without complications. The patient was managed without surgical eventualities for 3 days postoperatively and discharged from hospital for improvement. So far, 2 years after surgery, the patient is asymptomatic.

The patient case was classified as Grade II, based on the Clavien-Dindo classification [9], due to the use of intravenous antibiotic postoperative regimen.

3. Case 2

71-year-old female Hispanic patient with no concomitant pathology of importance, no important medical history, with a body mass index of 32.4 kg/m^2 (class 1 obesity), with chronic pain in the right hypochondrium walked into the Emergency room. Ultrasound of the liver and bile ducts was performed, in which chronic exacerbated cholelithiasis was reported. In this ultrasound, the gallbladder was visualized in a normal position.

Mini-laparoscopic cholecystectomy was performed by an experienced surgeon. We used 4 ports, one 12 mm port and 3 ports of 3 mm, to perform cholecystectomy in a usual way; however, when visualizing the infrahepatic space, the anomaly was noticed intra-surgically, so that two of the right-side ports were relocated

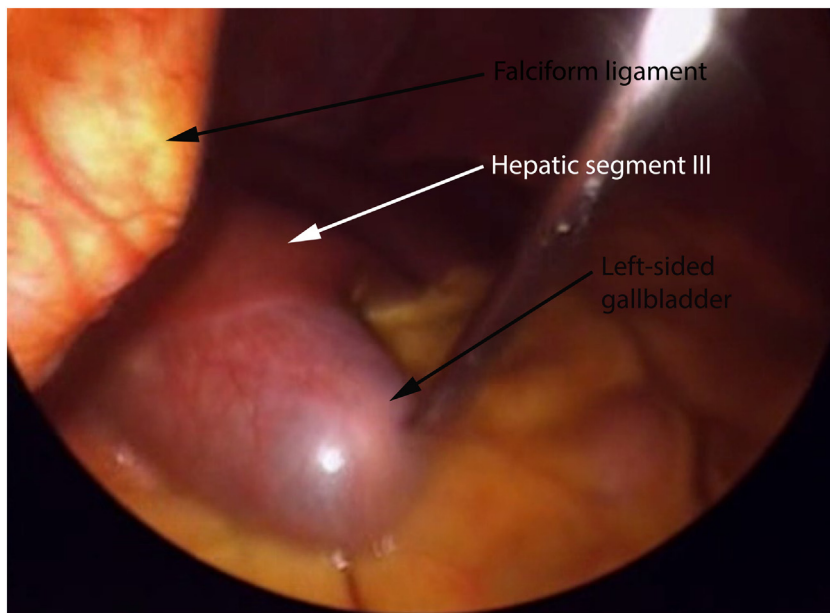


Fig. 2. Intraoperative imaging reveals a left-sided gallbladder in case 1.

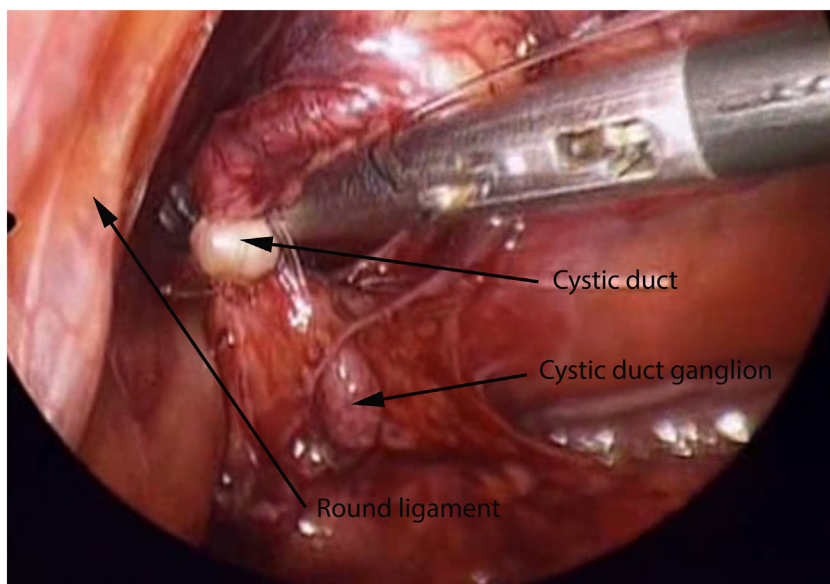


Fig. 3. Mini-laparoscopic cholecystectomy being performed in a left-sided gallbladder in case 1.

from the right side of the patient to the left side. In this patient the ports were relocated as follows: 1–12 mm the umbilical port, 13 mm infraxifoid port, 13 mm left subcostal mid-clavicular line port, 1–3 mm left subcostal anterior axillary line port (Fig. 4). The gallbladder was found in sinistroposition, located towards hepatic segment III. The wall of the gallbladder was thickened. The separation of the gallbladder from the liver bed was performed. After that, the duct and the cystic artery were identified, it was observed that the artery was anterior to the cystic duct, also reaching the vesicular fundus.

After identification of the critical vision of safety, the artery was first ligated and then the cystic duct in the infundibulocystic junction was ligated with intracorporeal knots with 1-g vicryl material. The gallbladder was separated from the hepatic bed cystofunctionally with electrocautery, completing the surgery without difficulties. The pathological report revealed no anomalies (Fig. 5).

According to the treating surgeon, intraoperative cholangiography was not performed.

The surgical time was 140 min. 160 liters of CO₂ were spent. The anesthetic technique used was mixed subdural block without complications. The patient was managed without surgical eventualities for 3 days postoperatively and discharged from our service for improvement. So far, 8 months after surgery, there are no postoperative complications in this patient.

The patient case was classified as Grade II, based on the Clavien-Dindo classification [9], due to the use of intravenous antibiotic postoperative regimen (Fig. 6).

4. Discussion

The reported prevalence of left-sided gallbladder is between 0.1% and 0.7%, with 154 cases reported to date [1,4,5,7,10,11],

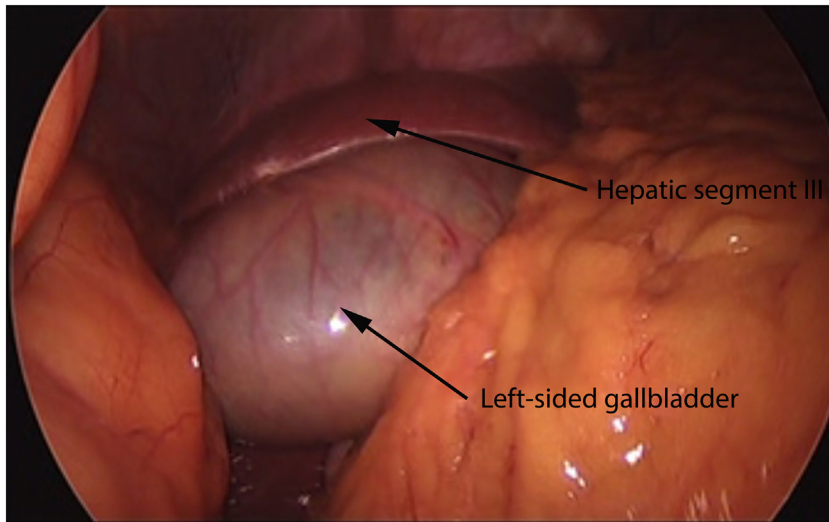


Fig. 4. Intraoperative imaging in case 2 reveals a left-sided gallbladder with an inflammatory process.

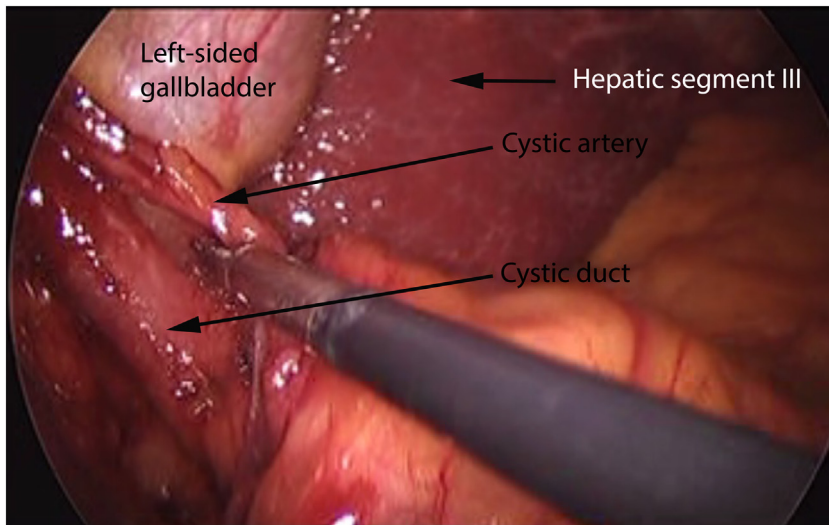


Fig. 5. Mini-laparoscopic cholecystectomy being performed in a left-sided gallbladder in case 2.

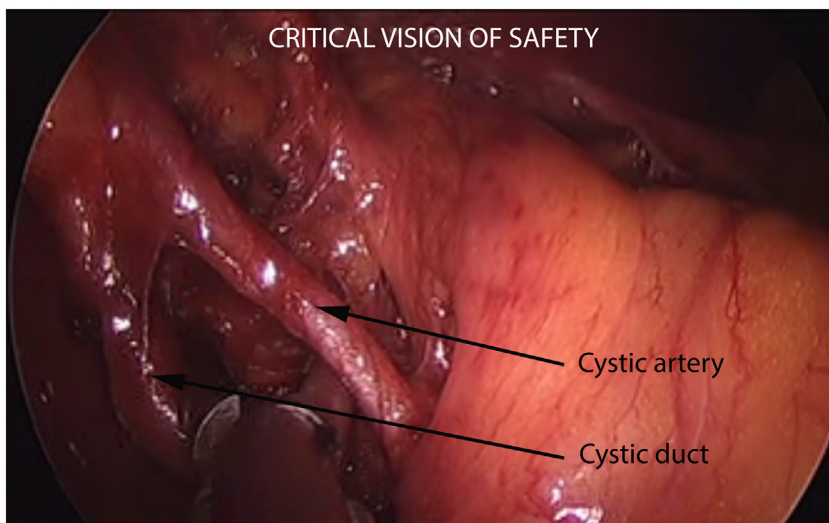


Fig. 6. Critical view of safety in a left sided-gallbladder in case 2.

however, it may be a more common anomaly than previously thought, due to cases not reported [12]; although, the etiology of this anomaly remains unknown.

Currently, with advances in diagnostic imaging modalities, such as US, CT, MRI and angiography, the report of left-sided gallbladder has increased [13]. This anomaly should be suspected when in ultrasonography, tomography and/or angiography there is not a clear image of the hepatic segment IV [5].

In these two patients, the clinical picture presented with acute and intense pain (as it is the case of most patients who are decided to undergo surgery in our institution) in the right hypochondrium; the abnormal position of the gallbladder was an incidental finding during surgery in both cases. Recent studies suggest that routine ultrasonography in a patient with a sinistroposition usually fails to perform the diagnosis in most cases [14], as it was in these 2 cases presented.

It should be recalled that both the duct and the cystic artery may have a longer length than usual, which may facilitate dissection. This should be done carefully and the critical vision of safety should be established, with the option of using intraoperative cholangiography to clarify the anatomy and minimize the risk of complications.

The ligation and division of the duct and the cystic artery should be close to the gallbladder. The surgeon must do everything possible to identify key anatomical reference points and also have the option of performing laparoscopic cholecystectomy through the antegrade route, in order to avoid injuries to the hepatic hilum.

Many techniques have been described for this laparoscopic cholecystectomy, such as the traditional multiport or monoport [4]. Reports of cases of patients with gallbladder located in the left hepatic lobe or in situs inversus have shown that laparoscopic multi-port [15] and single-port approach are safe and effective in groups of experienced surgeons [4].

Given the suspicion of this anomaly, it is important to perform imaging tests, such as computerized axial tomography or magnetic resonance imaging preoperatively to obtain a prior and accurate diagnosis, and thus plan a surgery. In case of doubt, it is recommended a conversion to open surgery, abort the intervention to complete more extensive preoperative studies or, even, transfer of the patient to an experienced center in performing minimally invasive techniques and, thus, avoid the bile duct injury or other catastrophic complications for the patient in advanced laparoscopic surgery.

5. Conclusion

Sinistroposition is an unusual anatomical variant, but the general surgeon is not exempt from knowing it and/or finding it. Patients who present with typical pain in the right hypochondrium, and preoperative images commonly do not identify it, the diagnosis is made in an intraoperative manner, and therefore, a meticulous attention to the anatomical peculiarities in the biliary tree is recommended. There are options to change the location of trocars, to perform intraoperative cholangiography, to convert laparoscopic surgery to open surgery, to abort the procedure, to complete more extensive preoperative studies of the patient or even to transfer the patient to a center with experience in advanced laparoscopic surgery.

To date, many cases have not been reported in the literature, with an incidence of 0.1%–0.7%.

Adequate anatomical identification of the reference points is the key to and will allow most of these procedures to be carried out satisfactorily.

Conflict of interest

We, all the authors, have no potential conflict of interest.

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Ethical approval

Ethical approval of this study is exempt at our institution.

Consent

Patients' consent were obtained in both patients presented in this manuscript, the forms were signed by the patients, and these forms are IJS Publishing Group Ltd. Patient consent form.

Author contribution

Mendoza-Calderón, Sotelo and Dávila-Arriaga conceived of the study and participated in its coordination.

Mendoza-Calderón, Sotelo and Dávila-Arriaga contributed to the acquisition of clinical data, its analysis and interpretation and to the preparation of images and manuscript.

Mendoza-Calderón and Sotelo contributed to the refinement of this case series.

All authors have approved the final article.

Registration of research studies

researchregistry4182.

Guarantor

Carlos Mendoza-Calderón, MD, FACS.
José William Sotelo, MD.

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