

# Situs Inversus Partialis With Left Sided Gallbladder Incidental Finding During Laparoscopic Cholecystectomy

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## Abstract

Background: Situs Inversus Partialis is a congenital developmental anomaly wherein the abdominal organs (lower body) or thoracic organs (upper body) alone are reversed or mirrored to the opposite side of the body through the sagittal plane. In contrast, situs inversus partialis is less common than situs versus totalis in which both the thoracic and abdominal contents are reversed. Both anomalies have a genetic predisposition of autosomal recessive inheritance. Partial situs inversus is of clinical importance due to the technical and diagnostic difficulty. Pre-operative imaging sometimes fail to identify this anomaly, resulting in incidental finding at the time of laparoscopic cholecystectomy.

We report a case of incidental partial situs inversus with levocardia, cholelithiasis and chronic cholecystitis discovered incidentally during laparoscopic cholecystectomy.

Methods: A 21 – year old female was admitted with perioperative ultrasound confirmation of cholelithiasis and chronic cholecystitis. Trans -Thoracic ECHO (TTE) revealed no dextrocardia. Electrocardiogram (EKG) was unremarkable.

Results: Laparoscopic evaluation intraoperatively revealed situs inversus with the liver and gallbladder positioned on the left. The gallbladder was chronically thickened without acute inflammatory changes. Intraoperative cholangiogram was not performed. Laparoscopic identification of additional visceral transposition was not identified.

Conclusion: Situs inversus partialis can present operative technical difficulty during laparoscopic cholecystectomy. Careful identification and/or operative modification is warranted. Laparoscopic cholecystectomy can be performed safely in patients with situs inversus totalis or partialis. Attention to unfamiliar anatomic relationships is important in terms of dissection and safety.

## INTRODUCTION

Reported by Fabricius in the year 1600,[1] Situs inversus is a rare autosomal recessive condition. Its prevalence varies from 0.04% to 0.30%.[2] Situs inversus is divided into two types: situs inversus partialis, which involves the thoracic organs (dextrocardia) or abdominal viscera, the diagnosis of situs inversus can be based on physical examination, routine electrocardiogram, chest x-ray, abdominal ultrasonography and (contrast tomography) CT scan. Surgical therapy in patients with situs inversus is performed as in normal patients. Laparoscopic cholecystectomy is widely accepted as the treatment of choice for symptomatic cholelithiasis and in recent years has also been performed in patients with situs inversus partialis. The first known report on laparoscopic cholecystectomy in a patient with situs inversus totalis was in 1991 by Campos and Sipes.[3] However, the laparoscopic

treatment may have technical difficulties because of the mirror-image anatomy.

Severe acute cholecystitis requires caution and meticulous maneuvers during laparoscopic cholecystectomy. The anatomy in Calot's triangle [4] can be obscured secondary to fibrosis and adhesions. The risk of injury, mainly of the common bile duct, is increased. If situs inversus totalis or partialis (with left gallbladder) coexists, the technical difficulties are exacerbated. Furthermore, the increased possibility of other anatomic variations makes the operation further unfamiliar and increases the risk of complication.

Perioperative diagnosis using abdominal ultrasound, MRI (Magnetic resonance imaging) or CT (Computerized tomography) can be used to detect a left sided gallbladder.

Here we present a 21 year old female for laparoscopic cholecystectomy and incidental finding of situs inversus partialis.

## **CASE REPORT**

The patient is a 21- year-old female who presented to the emergency department with a one day history of dull epigastric pain, nausea and vomiting. Pain was localized in the epigastric region with migration to the left upper quadrant. The patient has a history of multiple ED visits for epigastric abdominal pain since pregnancy which was treated with antibiotics and/or narcotics. Per patient, she was advised at several emergency departments based on imaging that she had situs inversus with her gallbladder in the left upper quadrant. Past surgical and medical history was unremarkable. The patient was gravida 1, para 1. Previous imaging studies were not available to us.

Physical examination revealed stable vital signs. The patient was afebrile. The abdomen was non-distended without palpable masses. Mild tenderness to palpation was noted in the left subcostal region. Laboratory data on admission revealed a white cell count of 3.3, alkaline phosphatase (ALK PHOS) 192, SGOT 432, SGPT 241, Total bilirubin 1.9, Lipase 136. Sonographic Murphy sign was unremarkable. Radiology impression of the abdominal ultrasound revealed moderate distension with stones and deviated to the left (Figure 1). Gallbladder wall was mildly thickened measuring 0.4 cm. Common bile duct measured 0.6 cm in diameter. No intrahepatic biliary ductal dilatation was appreciated. Impression was not remarkable for liver malposition. Computed tomography (CT) was not performed on this admission. Two-dimensional transthoracic echocardiogram was performed which was interpreted as unremarkable.

### **Figure 1**

Perioperative abdominal ultrasound showing gallbladder displaced to the left  
Laparoscopic cholecystectomy was performed on this admission. The patient was placed in supine position followed by endotracheal intubation. 12 mm opti-view camera was placed sub-umbilical. The gallbladder and liver were visualized to the left (Figure 2). Three additional 5 mm trocars were placed in the left subcostal space. Modification of the surgical approach was not performed. The gallbladder was chronically thickened minimally without acute inflammatory changes. Blunt dissection of triangle of Calot (triangle of safety) was performed. The

cystic artery and cystic duct were clipped in standard fashion. The Gallbladder was retracted cephalad and dissected from the gallbladder fossa. The trocars were removed and the fascia re-approximated. The patient discourse was uneventful post-operatively and was discharged home on postoperative day 2.

### **Figure 2**

Laparoscopic view during Cholecystectomy. Gallbladder located in left flexure and to the left of the round ligament.

## **DISCUSSION**

Situs inversus partialis is a very rare condition and inherited as an autosomal recessive defect. The first human case of situs inversus was reported by Fabricius in 1600[1]. The first case of laparoscopic cholecystectomy in a patient with situs inversus was in 1991[3] To date, only 32 additional cases have been reported.[5] Situs inversus is a morphological anomaly of positioning of internal viscera where there is reversal of the visceral topography.[6] The normal development requires a 270 degree counter clockwise rotation that yields the normal anatomy of visceral structures. In situs inversus the 270 degree rotation occurs in the clockwise direction. Depending on the degree of malrotation situs inversus may be total, including abdominal and thoracic organ (situs inversus Totalis) or more rarely, partial (situs inversus partialis).[7]

As in our case, the incidental finding did not preclude operative modification despite the patient having preoperative ultrasound and transthoracic echo. There is no evidence to suggest that gallstones are more common in people with this condition. However, left upper quadrant pain may delay diagnosis. Perioperative knowledge of the gallbladder location is important due to anatomical malposition and to avoid injury to biliary ductal structures.

The incidence of cholelithiasis in situs inversus versus the general population is about the same. However, the presentation of patients of situs inversus having gallbladder stone disease is different as they have left upper quadrant pain causing delay in diagnosis. Seven to ten percent of patients experience right upper quadrant pain.[8]

The anatomical variation and mainly the contralateral disposition of the biliary tree demand an accurate dissection and exposure of the biliary structures to avoid iatrogenic injuries. The position of the surgeon and the orientation of the set-up has to be reversed. Technically, left-handed surgeons find it easier to perform laparoscopic

cholecystectomy in situs inversus,[9] as was the case in our operation. There was no modification of trocar placement, patient positioning or operative laterality. In our case, it was important that we identified the critical view of safety and dissect triangle of Calot. (Figure 3) (common hepatic duct medially, cystic duct inferiorly and the liver edge superiorly) prior to transection of any structures. Such patients may need intra-operative cholangiography (IOC) which we did not perform. We were prepared to convert to an operative cholecystectomy.

### Figure 3

Liver reflected to the left showing dissection of (Triangle of Calot- Dashed blue line CBD-(common bile duct), TOS- Triangle of Safety- area within solid red triangle, CA-(Cystic artery)

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