

# A Rare Case of Laparoscopic Cholecystectomy in Situs Inversus Totalis: Case Report

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**Abstract:** *Situs inversus totalis (SIT), a rare congenital anomaly where visceral organs are mirrored, complicates the diagnosis and management of cholelithiasis due to atypical anatomy. This case report describes a 48 - year - old female with SIT who presented with epigastric and left upper quadrant pain for two months. Clinical and radiographic evaluation confirmed cholelithiasis, prompting an elective laparoscopic cholecystectomy. Surgeons employed an inverted laparoscopic approach, adapting port placement to mirror standard positioning, achieving an uneventful recovery. This case underscores the feasibility of laparoscopic cholecystectomy in SIT with careful technical adjustments, despite diagnostic challenges posed by anatomical variations.*

**Keywords:** Situs Inversus Totalis, Cholelithiasis, Laparoscopic, Cholecystectomy

## 1. Introduction

Situs inversus (SI) is a rare congenital disorder inherited in an autosomal recessive manner [1]. The incidence of situs inversus totalis (SIT) ranges from 1: 10, 000 to 1: 20, 000 [2]. Situs inversus refers to the spectrum of transposition of the body viscera, which can be complete (totalis) with both thoracic and abdominal organs reversed, resulting in a mirror image of the normal anatomical structures, or it may be partial (partialis) where either the thoracic or abdominal organs are transposed [3]. However, the existence of an abnormally positioned organ known as situs ambiguous [4]. Situs inversus (SI) is associated with various congenital anomalies including congenital heart diseases, renal dysplasia, and biliary atresia [3]. In patients with SIT, diagnosing and treating symptomatic gallbladder stones might be challenging. Although minimally invasive surgery is the best approach, it still poses a technical difficulty due to anatomical variability. Herein, we are presenting a case of symptomatic cholelithiasis in a patient with Situs Inversus Totalis who underwent laparoscopic cholecystectomy (LC), discussing the surgical feasibility and reviewing surgical techniques. This case highlights the importance of tailored surgical strategies in managing cholelithiasis in SIT, a condition that challenges conventional approaches.

## 2. Case Report

### Patient Information:

A 48 - year - old female presented to the hospital in surgery OPD at Lal Bahadur Shastri Hospital, East Delhi with complaints of epigastric and left upper quadrant pain for 2 months, which was on and off in nature, dull in character, radiating to the back, associated with intermittent nausea and vomiting, dyspepsia, and aggravated by fatty meals, with no other associated symptoms. She did not have any comorbidities and any previous surgical history.

### Clinical Findings:

After verbal consent and with a female attendant present, the patient was examined. On per abdominal examination, she presented with a soft abdomen, mild tenderness in the epigastric and left hypochondrium region and no organomegaly was noted. She had no history of fever and jaundice.

### Radiological Findings:

Chest X - ray revealed dextrocardia (Fig 3).

An abdominal ultrasound revealed the following findings (Fig 5):

- 1) Gall Bladder (GB) is overdistended. GB wall thickness measures 3.5mm. Multiple calculi are seen in GB lumen, with largest of size 12mm. Mild Sludge is also noted in its lumen. Common Bile Duct is normal.
- 2) Situs Inversus is seen with liver, gall bladder on left side and spleen on the right side of abdominal region.
- 3) Rest of the ultrasound findings are within normal limit.

The patient underwent abdominal magnetic resonance cholangiopancreatography (MRCP), which indicated cholelithiasis, with no evidence of dilated bile duct (Fig 6). Considering the presence of dextrocardia and situs inversus, the patient underwent preoperative cardiac and respiratory function tests. 2 - D echocardiography showed dextrocardia and no significant structural or functional abnormalities. Pulmonary functions showed no apparent lesions.

### Laboratory Findings -

Lab investigation including complete blood count, renal function test, liver function test, PT/INR and blood glucose level were all within the normal limits. ECG showed marked right axis deviation, global negativity in lead I and global positivity in aVR, absent R wave progression in precordial leads (Fig 4), which was accepted in PAC. There were no signs of elevation of amylase and lipase in blood, which ruled out the diagnosis of acute pancreatitis.

### Therapeutic Intervention -

After PAC clearance and informed consent, patient was prepared for laparoscopic cholecystectomy as the patient had clear indications for surgery and no contraindications were noted. Under general anesthesia, Laparoscopic cholecystectomy was done.

The arrangement of operating room equipment was modified to reflect a Mirror Image of the standard Laparoscopic Cholecystectomy (Fig 2). The monitor was positioned on the patient's left side. The camera assistant and the surgeon were on patient's right side while first assistant was on patient's left side. With strict aseptic precautions, the abdomen was scrubbed and draped. The first infraumbilical 10 mm blunt trocar was introduced after creating a pneumoperitoneum using the veress needle technique. Three 5 mm trocars were inserted, about 1 finger away from xiphisternum which was utilized for the left hand of the surgeon, at the left midclavicular line 2 cm inferior to the costal margin which was utilized as working port for the right hand of the surgeon and at left anterior axillary line 5 cm away from the costal margin which was utilized for retraction of gallbladder fundus by second assistant, respectively (Fig 1). Exploration of the abdominal cavity established the diagnosis of situs inversus totalis with the liver and the gall bladder on the left side, spleen right side (Fig 7). The Gall Bladder was identified which was overdistended and Pyocele of Gall Bladder was noted. Dense adhesions were also noted with omentum adhered to Gall Bladder, Liver margin and Bowel wall (Fig 8). The Calot's triangle was identified which consisted of short cystic duct and cystic artery and common bile duct were in normal caliber. Cystic artery and cystic duct were ligated and cut after adhesiolysis and calot's dissection (Fig 9, 10). The gallbladder was dissected from its peritoneal attachments and extracted from the liver bed using monopolar cautery and was retrieved through epigastric port in an Endoscopic bag (Fig 11). The operative time was recorded as 75 minutes, which is more than for the traditional laparoscopic cholecystectomy. It can be ascribed to the change in the technique needed to adapt to the mirror image anatomy.

### Follow Up -

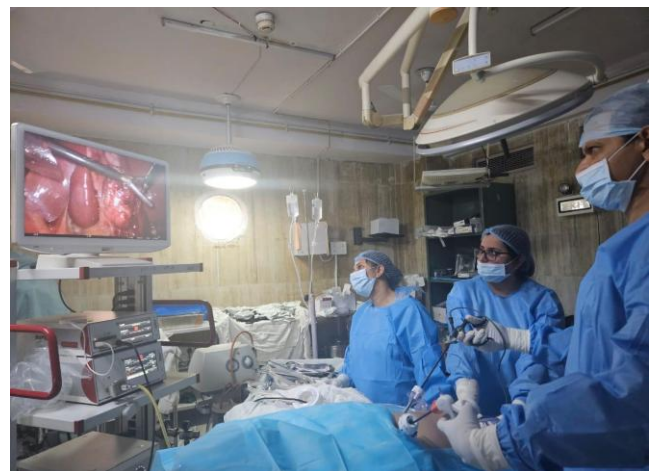
The patient was discharged from the hospital without any post operative complication on day 2.

Histopathological examination of the gallbladder confirmed the presence of gallstones with features of chronic cholecystitis. No postoperative complications were observed on her follow up in the outpatient department.



**Figure 1: Port Placement**

- A- Epigastric Port
- B- Infraumbilical Port
- C- Left Mid Clavicular Port
- D- Left Anterior Axillary Port



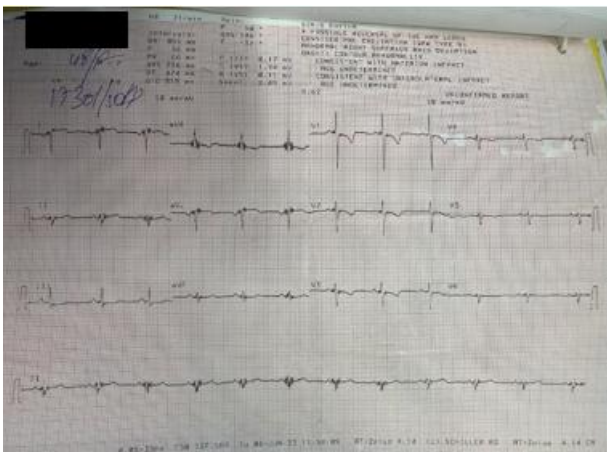
**Figure 2: Operating Room arrangement adjusted to mirror image of routine laparoscopic cholecystectomy.**

The monitor was placed on left side of the patient. The surgeon with the camera assistant were on right side of the patient and the first assistant was on left side of the patient.



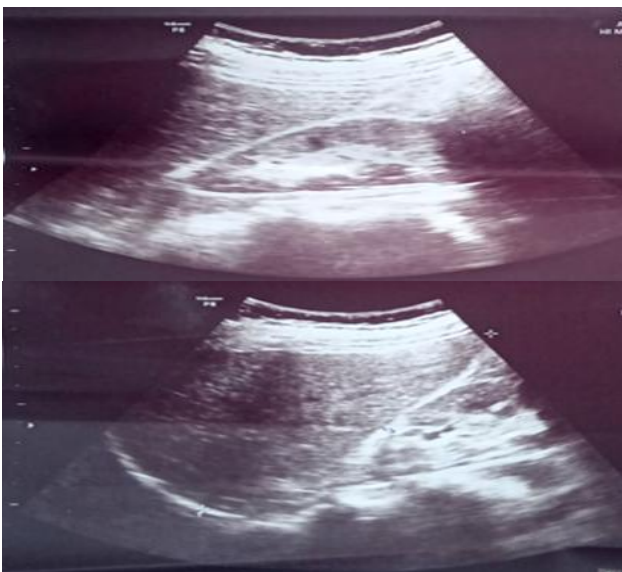


**Figure 3:** Chest X - Ray showing dextrocardia

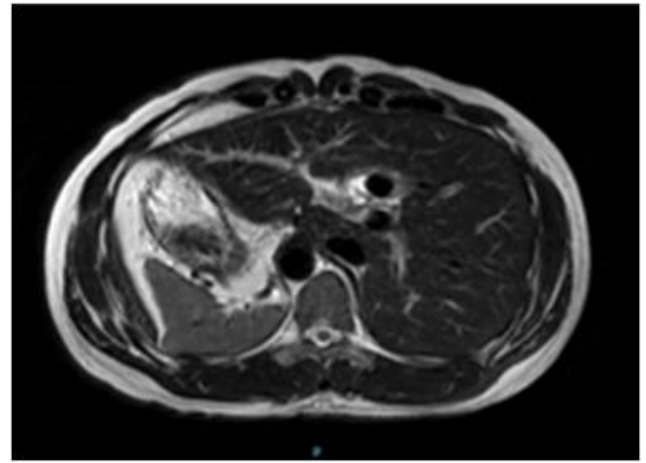


**Figure 4:** ECG showing

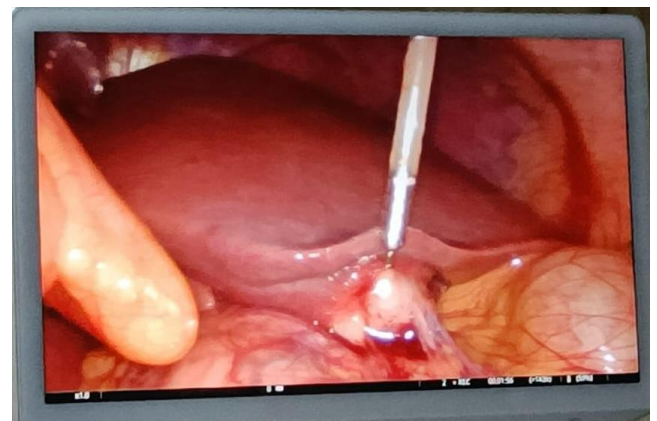
- Marked right axis deviation
- Global negativity in lead I and global positivity in aVR
- Absent R wave progression in precordial leads



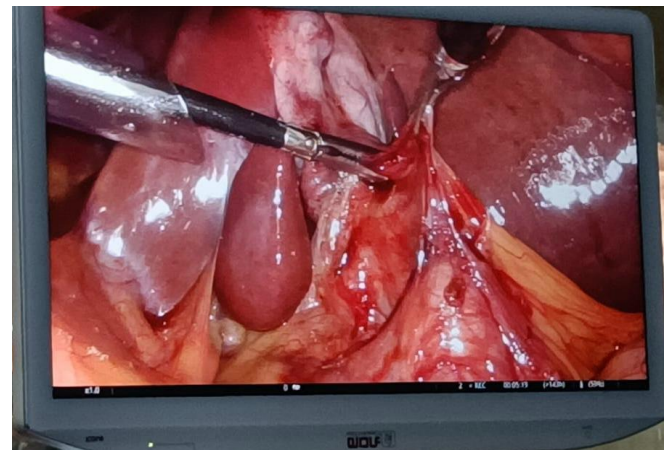
**Figure 5:** USG findings showing liver on the left side and gall bladder on the left side, confirming the diagnosis of SIT.



**Figure 6:** MRCP confirming SIT features



**Figure 7:** Intra Op visualization of Gall Bladder on left side showing dense adhesions.



**Figure 8:** Features of acute cholecystitis visualized with dense adhesions present. Omentum adhered to gall bladder and bowel wall.



**Figure 9:** Clipping the cystic duct.



**Figure 10:** Clipped cystic duct.



**Figure 11:** Extracted Gall Bladder showing multiple gall stones.

### 3. Discussion

Situs inversus totalis (SIT) is a rare congenital condition inherited in an autosomal recessive pattern, with an estimated global prevalence of approximately 0.01%. [1, 5]. It is characterized by the thoracic and abdominal viscera being transposed, creating an exact mirror image of their normal anatomical locations [5]. SI is typically related to congenital cardiac disease in 3–9% of SIT cases, and almost 80% in situs ambiguous [6].

A patient with SI is typically diagnosed accidentally when using conventional imaging techniques, such as ultrasound (USG) or plain film X - rays, and or using advanced imaging modalities like computed tomography (CT) or magnetic resonant imaging (MRI) performed for other medical conditions [6]. Cholelithiasis in patient of SIT is difficult to diagnose because of the underlying anatomical defect. Symptoms, typically epigastric or left upper quadrant pain, present atypically, leads to diagnostic and therapeutic delay, especially in patients unfamiliar with SIT [7], as in our reported case. Nevertheless, there is no evidence to indicate that individuals with SIT are more prone to cholelithiasis. [8].

Prior to the advent of laparoscopic procedures, the standard treatment for cholelithiasis was open cholecystectomy [9]. Since Mouret performed the first successful laparoscopic cholecystectomy in 1987, the procedure has gained widespread recognition as the gold standard for gallbladder removal [10]. In 1991, Campos and Sipes [11] successfully performed a laparoscopic cholecystectomy on a 39 - year - old woman with SIT.

We employed a four - port approach on our patient, making sure that the surgical team's positioning, the laparoscopic equipment placement, and the port sites are identical to the standard norms used in the usual cases [12, 13]. The surgical team's positioning involved placing the first assistant on the patient's left side, while the surgeon and camera assistant were stationed on the right. Hartmann's pouch was grasped using left - handed instruments through the epigastric port, while dissection was performed with the right hand via the left midclavicular subcostal ports. [13, 14].

For the right - handed surgeon, the most challenging aspect was performing the dissection and ligation of the cystic duct and artery using their non - dominant left hand. During the dissection, the surgeon adopted a technique that ensured comfort and control, using the right hand for dissection while applying surgical tension with the left. This technique facilitated directing most of the dissection toward the midline, where our anatomical checkpoints were crucial. The dissection was meticulously maintained over Rouvière's sulcus to ensure precision and enhance surgical safety. Before clipping, Strasburg's 'critical view of safety' was ensured from both the medial and lateral views of Calot's triangle to ensure optimal visualization and safety. In order to ensure safety during LC in SIT, repeated examination and cross - checking of anatomy was essential [15].

### 4. Conclusion

As of yet, there is no standard treatment for cholelithiasis in SIT patients. Laparoscopic cholecystectomy can be performed safely in these circumstances. [7]. Laparoscopic cholecystectomy proves safe and effective for cholelithiasis in SIT with meticulous planning, suggesting its adaptability for other anatomical anomalies.

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