

# Flipped Anatomy, Same Pain: Rare Case of Acute Cholecystitis with Mucocele in Situs Inversus Totalis

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## ABSTRACT

Situs inversus totalis (SIT) is a rare congenital anomaly with an incidence of approximately 1 in 10,000 individuals. It is more prevalent in males than females, with a ratio of 1.5:1, and has no known racial predilection (1,2). While SIT is typically asymptomatic, it can pose diagnostic challenges in conditions such as cholecystitis and appendicitis due to the transposition of internal organs, leading to symptoms manifesting on the contralateral side.

This report presents the case of a 46-year-old female who presented to the emergency department with colicky pain localized to the left upper quadrant, accompanied by bilious vomiting and fever. Abdominal ultrasonography revealed situs inversus totalis with acute cholecystitis associated with mucocele. The patient underwent a laparoscopic cholecystectomy.

Laparoscopic cholecystectomy in patients with SIT presents technical challenges due to the mirror-image arrangement of abdominal structures. Surgeons must modify their standard approach by strategically planning the placement of trocars to facilitate a successful procedure.

**KEYWORDS:** Situs inversus totalis; Acute cholecystitis; cholelithiasis; Mucocele of gallbladder; laparoscopic Cholecystectomy.

## INTRODUCTION

Situs inversus totalis (SIT) is characterized by a complete mirror-image reversal of the thoracic and abdominal organs. In most cases, SIT remains asymptomatic and is often discovered incidentally during imaging studies conducted for unrelated medical issues (3).

When patients with SIT experience acute abdominal pain, diagnosing common conditions can be challenging due to the altered anatomical positioning of organs(4). For instance, Appendicitis may present with

pain in the left iliac fossa rather than the right, leading to a possible misdiagnosis of acute diverticulitis(5).

Similarly, cholecystitis may cause pain in the left upper quadrant instead of the right, which could be mistaken for gastritis(6,7). Because of these atypical presentations, physicians must maintain a high index of suspicion for SIT and confirm the diagnosis through appropriate radiological studies(8).

This article presents a case of a patient with SIT who was diagnosed with cholecystitis who underwent laparoscopic

cholecystectomy. The case highlights the surgical challenges posed by the complete transposition of abdominal organs and the technical adjustments required to perform the procedure successfully.

### CASE PRESENTATION

A 46-year-old female came to emergency department with complaints of abdominal pain, vomiting since 3 days. She had associated fever of one day. The pain was located in the epigastric and left upper quadrant areas, radiating to the back and was related to fatty food intake. Abdominal examination revealed a left sided “Murphy's sign”. She was investigated. X-ray chest revealed a dextrocardia, confirmed by a 2D echo. Complete blood count (CBC) revealed white blood cell count of 15000. Ultrasound abdomen revealed acute cholecystitis with mucocele of gallbladder with situs inversus. No further step to computed tomography (CT) scan was made because the diagnosis was established by ultrasound with correlation to the patient's symptoms.

A laparoscopic cholecystectomy was planned. The monitor was positioned above the patient's left shoulder. The patient was placed in supine position and the surgeon and camera assistant stood to the patient's right, with the second assistant to the left. The patient was positioned with 30 degrees of head up and 20 degrees of left sided tilt. A 10 mm trocar was inserted into the peritoneal cavity through the umbilicus using the veress method. Another 10 mm trocar was placed immediately inferior to the xiphoid process of the sternum. Two more subcostal 5 mm trocars were placed in the midclavicular and the left anterior axillary lines. Intraoperatively, we confirmed situs inversus. Fundus was grasped and retracted by the assistant using a grasper, which was inserted through the 5-mm trocar in the left anterior axillary line. Dissection started with separation of omental adhesions from the fundus of the gallbladder. Using his left hand through the epigastric port, the surgeon retracted the Hartmann's pouch to the right, and using his

right hand placed in the midclavicular port, he performed posterior dissection with a hook from the gallbladder neck to the liver bed.

After posterior dissection, using his right hand, the surgeon flipped the Hartmann's pouch to the left and using his left hand, the surgeon performed anterior dissection for the gallbladder neck to the liver bed. Ambidexterity skills were needed to perform this dissection as the surgeon was right handed. A stone was impacted in the neck of the gallbladder and gall bladder was distended with mucous. Posterior window was opened and the cystic artery and cystic duct were identified and clipped after achieving the critical view of safety. Clipping was also done through epigastric port. Gallbladder was detached from the liver and removed through the umbilicus in an endobag.

The postoperative period was uneventful, and the patient was discharged on the second postoperative day



Fig.1. Abdominal ultrasound showing cholecystitis with stone obstructing neck of gallbladder.

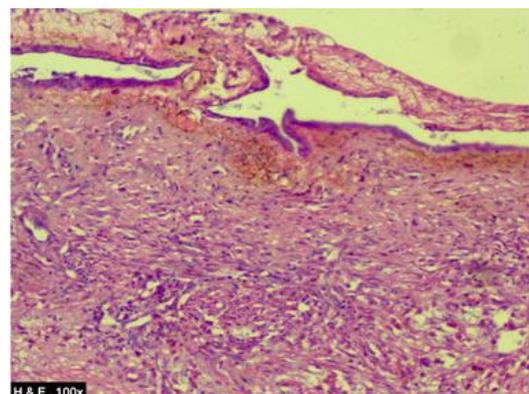


Fig.2. Gallbladder (H&E, 100x Magnification).

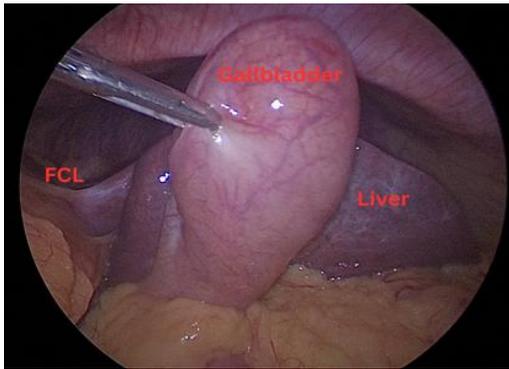


Fig.3. “Laparoscopic image showing distended gallbladder with Falciform ligament on right side of gallbladder”.

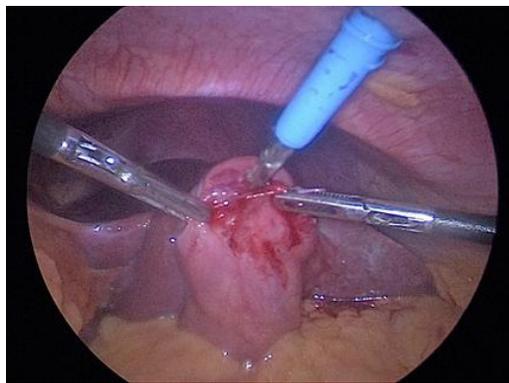


Fig.4. “Laparoscopic Cholecystectomy – Aspiration of Mucus from Gallbladder Mucocele”-decompressing the organ to facilitate safer dissection.

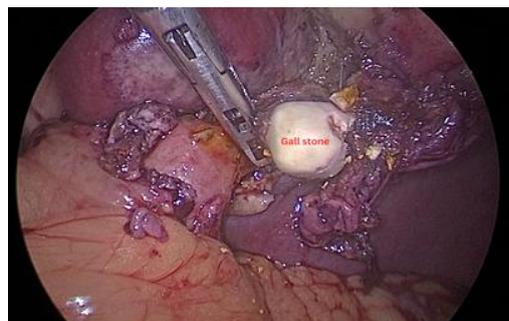


Fig.5. “Stone impacted in the neck of Gallbladder”.

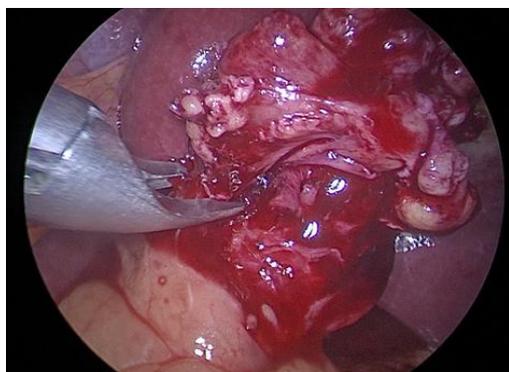


Fig.6. “Laparoscopic Cholecystectomy – Clipping of Cystic Artery and Cystic Duct”

## DISCUSSION

Situs inversus totalis is not associated with an increased incidence of gallbladder disease. However, it significantly complicates both the diagnosis and management of biliary conditions. In this case, the presentation of left-sided abdominal pain, fever, and vomiting, consistent with the clinical picture of cholecystitis, prompted further investigation and led to the diagnosis of the gallbladder mucocele with situs inversus totalis.

The diagnostic challenges in patients with situs inversus primarily arise from the altered anatomical orientation of the viscera. In patients with situs inversus, left-sided upper abdominal pain can easily be misinterpreted as being related to gastric, splenic, or colonic pathology, delaying the diagnosis of biliary disease. However, in some cases, patients with situs inversus may still experience right-sided abdominal pain due to incomplete transposition of visceral innervation. This phenomenon highlights the complexity of visceral pain perception in these patients, where typical assumptions about the side of the pain may not hold true. In this patient, diagnostic imaging-ultrasonography was essential in confirming the presence of gallbladder mucocele and situs inversus totalis.

Laparoscopic cholecystectomy has been widely accepted as the gold standard for the treatment of gallbladder pathologies, including mucocele(9).The challenge in performing this procedure in patients with situs inversus lies in the reversal of anatomy, which can disorient the surgeon and complicate the technical aspects of the surgery(10).Right-handed surgeons, in particular, may face difficulties in adapting to the reversed setup, as their non-dominant hand is required for critical tasks such as dissection and clip application. This is especially true during the skeletonization of Calot’s triangle, where precise dissection is required to avoid injury to the biliary tree. The interlocking of instruments, hyperflexion of the surgeon’s trunk make this procedure extremely challenging.

Despite the technical challenges, the literature supports the feasibility and safety of Laparoscopic cholecystectomy in patients with situs inversus (11). Several case reports have documented successful outcomes without the need for conversion to open surgery, and no significant increase in postoperative complications has been noted. In this case, the procedure was completed without intraoperative complications, and the patient had an uneventful postoperative recovery. The patient was discharged within 48 hours of surgery, consistent with the typical postoperative course for laparoscopic cholecystectomy. Conversion to open surgery should also remain an option if dissection becomes challenging.

## CONCLUSION

This case illustrates the importance of a thorough preoperative evaluation and meticulous surgical planning in patients with situs inversus totalis. Laparoscopic cholecystectomy, though technically demanding, remains the preferred treatment modality for gallbladder mucocele in these patients. Iatrogenic complications are prevented by meticulous planning of all ports in an ergonomic fashion and by dissecting above the level of the Rouviere's sulcus. The surgeon's ability to adapt to the reversed anatomy and employ careful dissection techniques is the key to minimizing the risk of complications and ensuring a successful outcome. In conclusion, laparoscopic cholecystectomy is feasible and should be preferred choice in patients with situs inversus totalis

### Declaration by Authors

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