Laparoscopic cholecystectomy in Situs inversus totalis: a case report

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European Journal of Medical Case Reports
Volume 8(7):150–153
DOI: 10.24911/ejmcr.173-1718395147

ABSTRACT

Background: Situs inversus totalis (SIT) is a rare congenital condition characterized by the mirror-image reversal of the thoracic and abdominal organs. SIT presents significant challenges during surgical procedures that require anatomical familiarity and dexterity, such as laparoscopic cholecystectomy.

Case Presentation: A 73-year-old woman with SIT presented with a 2-day history of left-sided hypochondrial colicky abdominal pain aggravated by food intake and associated with nausea. Physical examination revealed a positive Murphy's sign in the left hypochondrium. Laboratory tests showed leukocytosis and elevated liver enzymes. Imaging (See Figures 1-4) confirmed acute cholecystitis with the gallbladder in the left upper quadrant. The patient was scheduled for laparoscopic cholecystectomy. Preoperative planning involved detailed imaging and coordination with the anesthesiology team. The surgical technique was adapted for SIT, including specific patient positioning and a mirror-image approach. The gallbladder was successfully removed, with careful dissection of the cystic duct and artery. Postoperative management included non-steroidal anti-inflammatory drugs, opioids, and monitoring. The patient's recovery was uneventful, and she was discharged on the third postoperative day with follow-up instructions. The care plan included pain management, regular monitoring, early mobilization, diet progression, and scheduled outpatient visits.

Conclusion: Laparoscopic cholecystectomy in patients with SIT requires careful preoperative planning, skilled surgical techniques, and effective team communication. Despite these challenges, successful outcomes are possible with meticulous attention to detail and adaptation to the reversed anatomy.

Keywords: Situs inversus totalis, laparoscopic cholecystectomy, reversed anatomy, acute cholecystitis, surgical technique adaptation.

Received: 30 July 2024 **Accepted:** 16 August 2024 **Type of Article:** CASE REPORT **Specialty:** General Surgery

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Introduction

Situs inversus totalis (SIT) is a congenital condition characterized by the mirror-image reversal of the thoracic and abdominal organs. This condition affects approximately 1 in 10,000 individuals and is often identified incidentally during imaging studies or surgical procedures [1,2]. While SIT does not usually affect the patient's health, it poses significant challenges during surgical interventions, particularly for procedures that require anatomical familiarity and dexterity, such as laparoscopic cholecystectomy.

Since its introduction in 1991, laparoscopic cholecystectomy has become the gold standard for treating cholelithiasis [3]. The procedure's minimally invasive nature offers numerous benefits, including reduced postoperative pain, shorter hospital stays, and faster recovery times. However, the reversed anatomy in patients with SIT can complicate the surgical approach, requiring adaptations in technique and instrumentation. We present a case of a patient with SIT who required laparoscopic cholecystectomy.

Case Presentation

A 73-year-old woman with SIT presented to the emergency department with a 2-day history of left-sided hypochondrial colicky abdominal pain, aggravated by food intake and associated with nausea. The patient's past medical history was unremarkable, with no previous abdominal surgeries or known comorbidities.

Upon physical examination, the patient exhibited a positive Murphy's sign in the left hypochondrium. Laboratory investigations revealed leukocytosis with a white blood cell count of 14,000/mm³ and elevated liver enzymes. Abdominal ultrasound (See Figure 1) and computed tomography (CT) scans (See Figures 2 and 3)

confirmed acute cholecystitis, with the gallbladder located in the left upper quadrant due to SIT.

The patient was scheduled for laparoscopic cholecystectomy. The surgical team, led by experienced laparoscopic surgeons, prepared for potential challenges due to the patient's reversed anatomy. Preoperative planning included detailed imaging studies and discussions with the anesthesiology team to ensure optimal patient positioning and access. A thorough preoperative assessment was conducted, including a comprehensive medical history review, detailed physical examination, complete blood count, liver function tests, coagulation profile, abdominal ultrasound (See Figure 1), chest X-ray(See Figure 4), contrast-enhanced CT scan (See Figures 2 and 3), and consultation with anesthesiology for preoperative planning and risk assessment.

The surgical technique adaptation for SIT included positioning the patient supine with a slight tilt to the right to enhance access to the left upper quadrant, adjusting port placement to accommodate the left-sided gallbladder (See Figure 5), selecting laparoscopic instruments designed for ambidextrous use, and using a mirror-image approach with the surgeon adapting to use the non-dominant hand for

Figure 1. *Abdominal ultrasound shows thickened gallbladder wall with a large stone at the neck of the gallbladder alongside vivid shadowing artifact.*

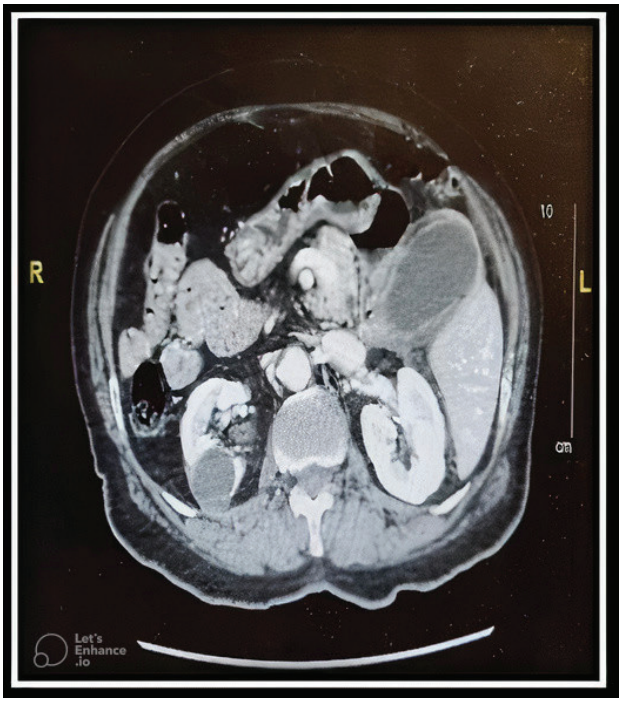

Figure 2. *A CT that shows the liver, gallbladder on the left side.*

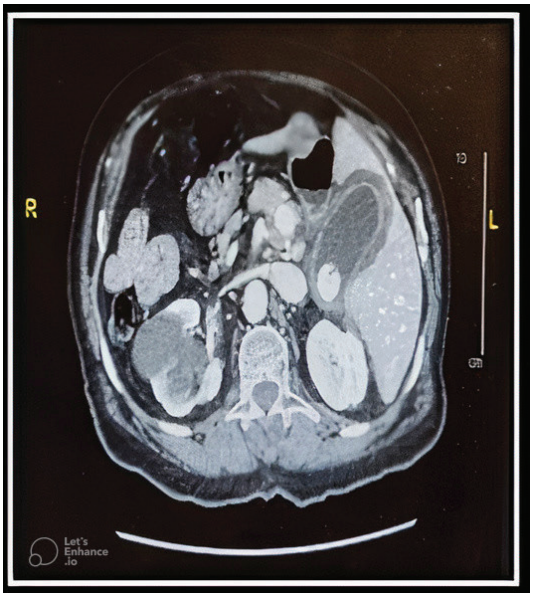

Figure 3. *CT clearly shows a stone at the neck of the gallbladder.*

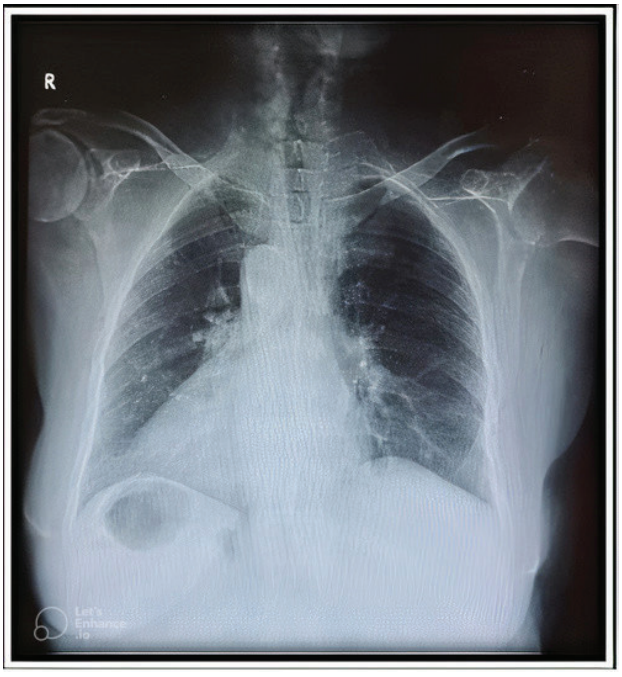

Figure 4. *A Chest X-ray important tool in diagnosing situs Inverses as the patients' heart is seen at the right side.*

dissection and clipping. Upon entering the abdomen, the anatomical variations typical of SIT were noted. The gallbladder was located on the left side, with a markedly enlarged cystic duct and an accessory cystic artery (See Figure 6). The surgical team employed a mirror-image approach, effectively adapting their technique to handle instruments with their non-dominant hand. Critical steps included identifying and carefully dissecting the cystic duct and artery and meticulous attention to hemostasis to avoid complications.

The patient was monitored in the recovery room for any immediate postoperative complications. Pain management included a combination of non-steroidal anti-inflammatory drugs (NSAIDs) and opioids. The patient's recovery was uneventful, and she was discharged on the third postoperative day with instructions for follow-up in the outpatient clinic. The postoperative care plan included pain management with a multimodal approach using NSAIDs and opioids, regular monitoring of vital signs, assessment of pain and the surgical site, early mobilization, a gradual progression from clear liquids to a regular diet as tolerated, and scheduled outpatient visits for wound assessment, monitoring for complications, and overall recovery evaluation.

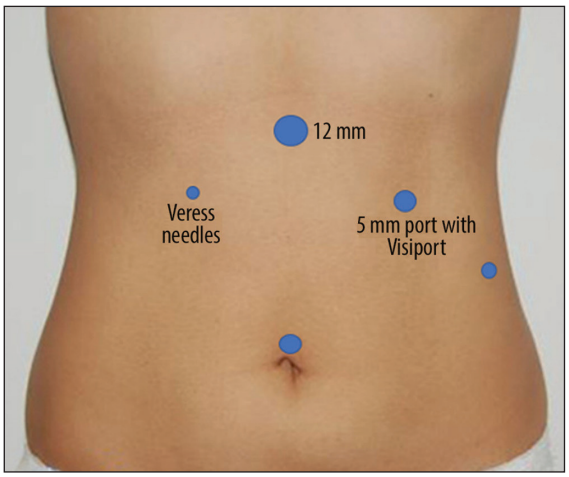

Figure 5. *Points where we place our ports while performing this rare procedure. A mirror image of the default port site in laparoscopic cholecystectomy [6].*

Discussion

Several studies and case reports have documented the challenges and outcomes of laparoscopic cholecystectomy in patients with SIT. Peeters and Devriendt [1] discussed human laterality disorders and emphasized recognizing anatomical variations in surgical planning. Blegen highlighted the difficulties of surgery in SIT, particularly the need for surgeons to adapt to the reversed anatomy [2]. Soper et al. [3] reviewed the evolution of laparoscopic cholecystectomy and its establishment as the gold standard for cholelithiasis treatment, noting the challenges posed by anatomical variations such as SIT.

A review of recent case series reveals that laparoscopic cholecystectomy in SIT patients is feasible but requires meticulous planning and skilled execution. Liu et al. [4] identified factors influencing the conversion of laparoscopic to open surgery, noting that unclear anatomy and technical difficulties were primary reasons for conversion. Fabricius and Blalock [5] provided a historical perspective on SIT and biliary tract diseases, emphasizing the importance of understanding anatomical variations in surgical practice.

Our case highlights several important considerations. Preoperative planning is crucial in identifying anatomical variations and potential challenges. Detailed imaging studies, including ultrasound (See Figure 1) and CT scans (See Figures 2 and 3), are essential for mapping the patient's anatomy and planning the surgical approach. The

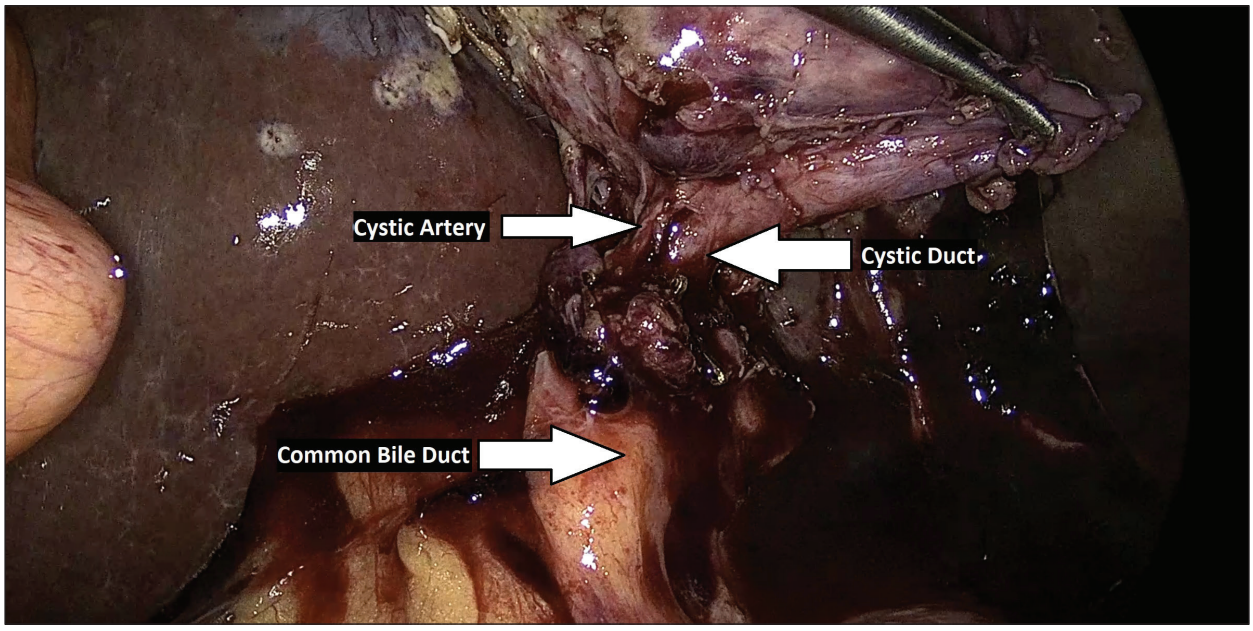

Figure 6. *An intraoperative still image showing the anatomy landmarks of the calot triangle*

surgical team must adapt their techniques to accommodate the reversed anatomy. This often involves a mirror-image approach, with the surgeon using their non-dominant hand for critical maneuvers. Familiarity with this technique and extensive experience in laparoscopic surgery are vital for a successful outcome. Communication and coordination among the surgical team, anesthesiologists, and nursing staff are paramount. This ensures that all team members are aware of the patient's condition and can anticipate and address potential complications.

Conclusion

Laparoscopic cholecystectomy in patients with SIT presents unique challenges that require careful preoperative planning, skilled surgical techniques, and effective team communication. Despite these challenges, successful outcomes can be achieved with meticulous attention to detail and adaptation to the reversed anatomy. This case report contributes to the growing literature on SIT and highlights the importance of continued research and education in managing this rare condition.

What is new

Performing laparoscopic cholecystectomy in situs inversus totalis requires meticulous planning and adaptation to reversed anatomy. Successful outcomes are achievable with skilled surgical techniques and careful team coordination. #Surgery #SitusInversus #AlJahraHospital.

List of Abbreviations

CT	Computed tomography
NSAIDs	Non-steroidal anti-inflammatory drugs
SIT	Situs inversus totalis

Acknowledgment

The authors extend their gratitude to the patient for consenting to the publication of this case report for educational purposes. Additionally, the authors acknowledge the support of the surgical team, nursing staff, and anesthesiology department at Al Jahra Hospital.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Consent for publication

Due permission was obtained from the patient of the patient to publish the case and the accompanying images.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

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Summary of the case

1	**Patient (gender, age)**	73 years, female
2	**Final diagnosis**	Cholecystitis in a patient with situs inverses totalis
3	**Symptoms**	Right upper quadrant pain, nausea, vomiting
4	**Medications**	Symptomatic treatment given
5	**Clinical procedure**	Cholecystectomy
6	**Specialty**	General Surgery