



## LAPAROSCOPIC CHOLECYSTECTOMY IN SITUS INVERSUS TOTALIS (SIT): CASE SERIES

### General Surgery

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### ABSTRACT

Laparoscopic cholecystectomy (LC) is the procedure of choice for symptomatic cholelithiasis. Situs inversus totalis is characterized by transposition of both thoracic and abdominal organs. It leads to different presentation, difficulty in diagnosis and modification in operative technique. We report four cases of symptomatic cholelithiasis that underwent laparoscopic cholecystectomy successfully.

### KEYWORDS

#### INTRODUCTION

Situs inversus totalis (SIT) is an uncommon entity. It was first reported by Fabricius in 1600 [1]. The incidence ranges from 1:5000 to 1:20000 [2]. It may be associated with Kartegener triad (bronchiectasis, sinusitis, and situs inversus) and cardiac anomalies. In the pre-laparoscopic era, 40 cases of open cholecystectomy are reported in situs inversus [3]. The difficulties during surgery were associated with different anatomy.

#### Case 1

A 48 years old male from West Bengal, India complained of recurrent episodes of pain in epigastrium since 6 months. He was a known case of SIT with no previous surgical history. He had received treatment for Multiple Myeloma in the past.

On examination, the apex beat was felt on the right 5th ICS. Abdominal examination showed no obvious findings. Ultrasonography of abdomen revealed liver and gall bladder on the left side of the abdomen and spleen on the right side. Gall bladder had single echogenic foci 17 mm in neck.

#### Case 2

A 45 years old female from Kerala, India complained of dyspepsia, pain in right upper quadrant since 4 months. She had no other medical or surgical history. She was suspected for symptomatic cholelithiasis, ultrasound abdomen showed left sided liver and gall bladder with multiple stones. She was diagnosed with SIT. No other anomalies were found.

#### Case 3

A 32 years old female from Punjab, India complained of left upper quadrant pain since 3 months for which ultrasound abdomen was done. It revealed transposition of organs along with echogenic foci of 8 mm and 12 mm in left sided gall bladder.

#### Case 4

A 29 years old female from New Delhi, India complained of pain in left upper quadrant area. She had no other complaints, no surgical or medical history. Ultrasound abdomen reported left sided liver and gall bladder with foci of 16 mm impacted in hartmann pouch.

Laparoscopic Cholecystectomy (LC) was planned for all the four cases. Theatre setup was arranged as mirror image of conventional LC. Video monitor was placed on the left side of head of the patient. Patient was positioned supine with head up and left up. Primary surgeon and

first assistant were standing on the right of patient while the second assistant on the left.

Four port technique was use (Fig 1): Camera port was placed in the supraumbilical (10mm) area, subxiphoid port (10mm) was placed in the epigastric area on the left of falciform ligament. Conventionally subxiphoid is controlled by right hand, but in SIT this port was controlled by left hand. Hartmann pouch was retracted outwards and clips were applied using this port. Subcostal port (5mm) was placed in the left mid clavicular line, normally this port is held by left hand however, in SIT this port was controlled by right hand. This port was used for calots dissection, hook diathermy, and suction. Fourth port (5mm) was inserted in the left anterior axillary line at level of umbilicus. This port was used for fundus retraction.

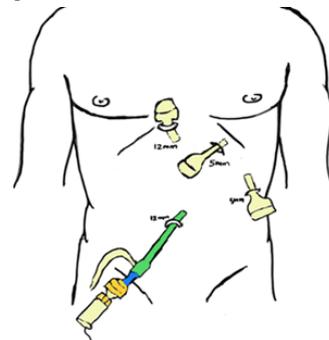


Fig. 1 Port position in situs inversus

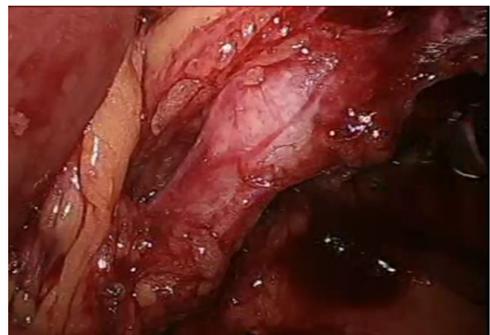


Fig 2. Intra operative view of calots triangle after dissection

Calots triangle was dissected by right hand and Hartmann pouch retracted by left hand. Conventionally posterior fold dissection requires crossing of instruments but in patients with situs inversus, anterior fold dissection requires crossing. Also, cystic artery in patients with SIT lies posteriorly because of the clockwise rotation; that was clipped by left hand. Gall bladder was taken out from the epigastric port. Rest of the procedure was similar to non-SIT patients.

All 4 patients tolerated the procedure well and started orally on post-operative day (POD)-0. Patients were discharged on POD-1. Histopathology showed no evidence of dysplasia or malignancy. All 4 patients on follow up at 1 year were asymptomatic.

S no	Age (years)	Sex	Clinical presentation	Findings
1	45	Male	Epigastric pain since 6 months	Single echogenic foci 17 mm in gall bladder neck
2	51	Female	dyspepsia, pain in right upper quadrant since 4 months	Multiple gall bladder stones
3	32	Female	Left upper quadrant pain since 3 months	Echogenic foci of 8 mm and 12 mm in left sided gall bladder
4	29	Female	Left upper quadrant pain since 3 months	Echogenic foci of 16 mm impacted in Hartmann pouch.

## DISCUSSION

Situs inversus is an autosomal recessive inherited, morphological anomaly of positioning of internal viscera, that occurs by around 2nd week of embryonic life. Reversal may be either of thoracic or abdominal viscera (situs inversus partialis) or both (situs inversus totalis). Normally, 270 degree counterclockwise rotation yields the normal anatomy. In situs inversus totalis, the 270 degree rotation occurs in the clockwise direction [4]. Situs inversus itself is not a pathological condition; but, it may be associated with cardiorespiratory, hepatopancreaticobiliary, gastrointestinal, neurological, orthopedic and urological anomalies, some of which may be life-threatening as in our study one of the cases had multiple myeloma. There is no evidence for increased incidence of cholelithiasis in SIT [5].

Laparoscopic surgery was first performed by Mauret in 1987. The first case report of LC in SIT was published in 1991 by Campos and Sipes [6]. Three port laparoscopic cholecystectomy for left handed surgeon was introduced using 12mm subumbilical, 10mm epigastric, and 5mm left subcostal port in 2008 [7]. Four port mirror image of conventional LC was introduced in 2010 [8]. It has been reported that laparoscopy in biliary pancreatitis is feasible in SIT as well. Successful laparoscopic exploration of common bile duct for choledocholithiasis in a patient with situs inversus totalis has also been reported [9].

Most patients present with left-sided upper abdominal pain. However, about 10% of patients with left-sided cholelithiasis present with right-sided abdominal pain as one of the four patients in our study. 1/3 of the patients with situs inversus and symptomatic gall stones may present with epigastric pain [10]. This phenomenon has been observed for both visceral biliary pain and somatic pain in cases of cholecystitis. In our study, 2 cases presented with left upper quadrant pain, 1 each with right upper quadrant, and epigastric pain. Complications of cholelithiasis are similar to that of general population. Patients may present with biliary pancreatitis and cholangitis.

Pre-operative work up includes Liver Function Test, Ultrasound abdomen, Computed tomography (CT) angiography to rule out vascular anatomical variations preoperatively [11]. Patients with situs inversus that are scheduled for LC should be assessed pre-operatively for any potentially serious cardiac or respiratory abnormalities. There is no evidence to suggest that there is an increased risk of bile duct injuries in patients with situs inversus totalis. In patients with situs inversus partialis, there is an increased possibility of associated biliary tract and vascular anomalies and such patients may need intraoperative cholangiography and a low threshold for conversion to open surgery [1]. However, others still feel it is safer to perform LC in these patients.

Challenges encountered are unusual orientation while operating on a left-sided gall bladder which requires mental adaptability and manual dexterity to cope with difficult intra-operative situations like pyocoele

leading to dense adhesions in Calots triangle or impacted stone at the Hartmann pouch leading to difficulty in holding and retracting the gall bladder. Different orientation and ergonomic challenges may also result in an increased operative time.

A 30 degree scope is better. However, the ergonomics of a right-handed surgeon standing on the right side of the patient demand that either he crosses hands so as to allow the right hand to operate through the epigastric port or uses the assistant to retract the Hartmann's pouch from the left side. The epigastric port can be used to retract the neck with the left hand and operate with the right hand through the lateral subcostal port. Another variation can be that the surgeon stands at the foot end, in between the legs of the patient while the patient is in a Lloyd-Davis position. In one of our cases we had placed a large mirror on the right hand side of the patient to check whether the technique can become easy or not. However, we found that the mirror didn't help us during dissection and during application of clip. Left handed surgeon may find it easier to operate in situs inversus [12].

## CONCLUSION

Laparoscopic cholecystectomy is feasible for patients with symptomatic cholelithiasis associated with situs inversus. Standing on the right side of the patient is more convenient when compared to standing between the legs. Care should be taken while planning of port placement. Associated vascular and biliary anomalies should be ruled out pre-operatively. It requires a high degree of visio-spatial coordination and patience for right handed dissection in a mirror image anatomy.

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