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Laparoscopic cholecystectomy in situs inversus totalis: Presentation of a case and operative technique

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Abstract

Since Mouret first performed it in 1987, laparoscopic cholecystectomy has become the gold standard operative procedure for cholelithiasis.

Situs inversus totalis (SIT) is a congenital disorder in which the visceral organs are mirrored from their normal anatomical position. Diagnosis and management of cholelithiasis in patient with SIT poses a challenge due to the underlying anatomical variation.

Several cases have been reported in patients with situs inversus totalis.

Laparoscopic cholecystectomy in these patients is technically more demanding and needs reorientation of visual-motor skills to the left upper quadrant.

Keywords: Situs inversus totalis, cholelithiasis, laparoscopic cholecystectomy, gall bladder calculi, case report

Introduction

- Situs viscerum inversus (SVI) is a rare autosomal recessive condition in which the organs are transposed from their normal location to the opposite side of the body.
- It is found in one of every 5000 to 20,000 births [2].
- Situs inversus refers to spectrum of transposition of the body viscera, which can be complete (totalis) where both the thoracic and abdominal organs are reversed resulting in mirror image of the normal anatomical structures, or it may be partial (partialis) where either thoracic or abdominal organs are reversed [3]. Whereas the presence of an abnormally positioned organ known as situs ambiguus [4]. Dextrocardia refers to right sided heart which also can be found as different isolated entity [4].
- Retinal dysplasia, biliary atresia, congenital heart disease, and pancreatic fibrosis are some of the congenital anomalies that can be associated [3].
- If SIT is associated with bronchitis, chronic sinusitis, and deficient tracheobronchial cilia, this triad is known as Kartagener's Syndrome [3].
- Laparoscopic cholecystectomy in a patient with Situs Inversus was first described by Campos and Sipes in 1991, since then only a few surgeons have had the privilege of saying they have performed this unique and challenging surgery [5].
- The contralateral orientation of the viscera provides an opportunity to perform a familiar surgery in an unfamiliar environment and requires rethinking each manoeuvre of the operation from beginning to end.
- The contralateral anatomic variation of the biliary tree requires accurate dissection and exposure of biliary structures to avoid iatrogenic injury [6].
- We present a case of symptomatic gallbladder stone in a patient with situs inversus totalis requiring laparoscopic cholecystectomy (LC), discussing its feasibility and reviewing the surgical technique.

Case Report

- A 42 year old female presented to the hospital with 10 days of left upper abdominal pain which was colicky in nature, prominent after meals and associated with abdominal bloating, anorexia and weight loss.
- There was no history of vomiting, fever, constipation, burning micturition, jaundice.
- She had operative history of open appendectomy 25 years back and 3 caesarean section.

- Physical examination shows mild tenderness in epigastric region on palpation.
- Abdominal USG confirmed that gall bladder was distended and shows multiple calculi, largest measuring 8 mm in size along with situs inversus. Chest x-ray revealed situs inversus, with no evidence of bronchiectasis.
- Upper G.I. scopy suggestive of gastritis and situs inversus.
- C.E.C.T abdo-pelvis suggestive of situs inversus totalis and 7 mm size radio dense calculus in fundus of the gall bladder without changes of cholecystitis.
- Her liver function test was normal, so we planned for laparoscopic cholecystectomy and patient was operated for the same after taking fitness.
- Operation was performed without any intra-operative and post-operative complications.
- Histopathology report suggestive of chronic calculus cholecystitis.

Operative Technique

- Laparoscopic cholecystectomy was performed with the 4-trocar Technique, according to the American variable.
- The operative team and laparoscopic devices were located in the theatre as a mirror image configuration of normal laparoscopic cholecystectomy.
- The pneumoperitoneum (CO₂) was created by insertion of a veress needle through the supra-umbilical area with a pressure of 12 mmHg. Two 10-mm trocars were inserted into the abdominal cavity, one in the position of the veress needle for laparoscope and the other one in the subxiphoid location.
- A 5-mm trocar was inserted at left mid-clavicular line and second 5-mm trocar was inserted in left anterior axillary line under the view of laparoscope.
- At laparoscopic abdominal exploration, the entirely abdominal contents were indeed reversed.
- Adhesions were present beneath the past scar of caesarean section.
- Fundus of the gall bladder was grasped and retracted by the assistant using fundus holding forceps, which was inserted through the 5-mm trocar in the left anterior axillary line.
- Traction of the Hartmann's pouch was performed by left hand of the surgeon using a grasper inserted through the trocar located at left midclavicular line.
- Dissection of the Calot's triangle is one of the major problems for a right-handed surgeon in case of situs inversus totalis abnormality.
- Dissection of Calot's triangle was carried out with a posterior approach by using a forceps that was inserted through the trocar located in the midline.
- Meticulous dissection ensured complete freeing and definition of the course of both cystic duct and cystic artery.
- Dissection was performed above the plane of Rouviere's sulcus to avoid any injury.
- Both cystic duct and cystic arteries were clipped (double proximal, single distal 10-mm titanium clips) and then divided by hook scissors.
- After division of all peritoneal reflection on either side, the gall bladder was retrogradely separated from the liver bed by using electrocautery.

- It was then extracted through the 10-mm epigastric port.
- Adhesiolysis done. Fascial closure of large ports was sutured with absorbable material to prevent herniation.
- The postoperative period was uneventful, and the patient was discharged on the second day of postoperative period.



Fig 1: Operation Field Photograph Showing Ports Placement In Mirror Positions



Fig 2: Operation Field Photograph Showing Ports Placement In Mirror Positions



Fig 3: Dissection of Calot's Triangle of The Gall Bladder in Situs Inversus Totalis



Fig 4: Chest Radiography Showing Dextrocardia

Discussion

- Situs inversus totalis (SIT) is a rare autosomal recessive congenital anomaly, with a global prevalence of 0.01% [2, 7]. It is characterised by the transposition of both thoracic and abdominal viscera resulting in perfect mirror image of their normal anatomical position [7].
- It can be associated with various congenital anomalies, such as Kartagener's syndrome which comprises a triad of SIT, sinusitis and bronchiectasis, and Yoshikawa's syndrome that is characterised by the presence of SIT, bilateral renal dysplasia, pancreatic fibrosis and meconium ileus [8].
- Diagnosis of biliary colic in patient with SIT is challenging due to the underlying anatomical anomaly. They often have an unusual presentation in form of left upper quadrant or epigastric pain, leading to a delay in the diagnosis and management especially in those who are not known to have SIT, as in the reported case. However, there is no evidence suggest that patients with SIT are more susceptible to cholelithiasis [9].
- The first case of Laparoscopic cholecystectomy was successfully performed by Mouret in 1987, and since then it has become the gold standard approach [1].
- In 1991 Campos and Sipes performed the first successful laparoscopic cholecystectomy in patient with SIT [5].
- In the current literature, the most frequently adopted technique is the four port technique with placement of the laparoscopic equipment, positioning of the surgical team, and ports sites are a mirror image of the standards used in the usual cases [10, 11].
- The surgeon stands on the right side of the patient along with the camera assistant, and the first assistant stands on the left side. Left handed instruments are used to grasp Hartmann's pouch through the subxiphoid port, and the right hand is used for dissection through the left midclavicular subcostal ports [11, 12].
- In this case, the four port mirror image approach was used with 10 mm ports in epigastric and supra-umbilical sites. The surgeon alternated between right

and left hands for dissection. Clipping was one through epigastric port with left hand. The entire procedure took forty nine minutes.

- Modification of this technique have been reported in the literature, where the assistant retracts the gallbladder infundibulum while the surgeon perform the dissection through the epigastric port with the right hand [10]. Some authors adopted a complete mirror image approach by using the left hand for dissection through the subxiphoid port, which could be more suitable option for a left handed or ambidextrous surgeon [13]. Another alternative for the surgeon to be positioned between the patient's leg while the patient is in Lloyd-Davis position [14]. No technique has been considered yet as a standard for such cases. Surgeons should choose any suitable approach taking in account meticulous dissection and critical view achievement before clipping the cystic duct and artery. Intraoperative cholangiogram can be performed in such cases to visualise the anatomy and avoid iatrogenic injury [15]. Rungsakulkij *et al.* used fluorescent cholangiography by administration of indocyanine green to delineate the extra-hepatic biliary tree anatomy [11].

Conclusion

- SIT is a rare congenital anomaly with mirror image transposition of the viscera.
- This anatomical variation can influence the localisation of symptoms in patient with cholelithiasis leading to a delay in diagnosis and management.
- Laparoscopic cholecystectomy can be safely performed in these cases. However, it is considered technically challenging procedure and often requires alteration in the technique compared to the conventional laparoscopic cholecystectomy.

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Conflict of Interest

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