



MIRROR'S HIDDEN DEPTHS- LAPAROSCOPIC CHOLECYSTECTOMY IN SITUS INVERSUS TOTALIS

General Surgery

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ABSTRACT

Situs inversus totalis is a rare congenital abnormality characterised by a mirror-image transposition of both abdominal and thoracic organs. This anatomical disposition of organs not only influences the localisation of symptoms and signs arising from a diseased organ but also imposes special demands on the diagnostic and surgical skills of the surgeon. We present a case of a 28-year-old female patient diagnosed as chronic calculous cholecystitis with situs inversus totalis. Elective laparoscopic cholecystectomy was performed safely, and the patient was discharged on postoperative day two with no significant postoperative complications.

KEYWORDS

chronic calculous cholecystitis, situs inversus totalis, laparoscopic cholecystectomy

INTRODUCTION:

Laterality is established early in development and is governed by multiple genes; any failure in this process can lead to a wide variety of disorders, one extreme of which is situs inversus totalis. Situs inversus totalis affects less than 0.01% of the population, occurring in approximately 1 out of every 10,000 to 20,000 live births [1]. The presence of situs inversus totalis complicates the diagnosis of commonly encountered diseases, leading to delays in diagnosis and treatment.

The occurrence of cholelithiasis and cholecystitis in patients with situs inversus totalis is comparable to that observed in the general population. It is imperative to recognize that a detailed preoperative evaluation with radiological investigations, such as computed tomography and magnetic resonance imaging, is required to ascertain the anatomy of the hepatobiliary system for performing laparoscopic cholecystectomy. Surgery performed by a highly skilled surgeon, with appropriate adaptations in trocar placement and positioning of the operating team, is likely to reduce complications, the duration of surgery, morbidity, and length of postoperative stay [2].

This case report details the setup and technique employed by a right-handed surgeon to safely perform laparoscopic cholecystectomy in a patient with situs inversus totalis. Due to the potential for anatomical variations leading to surgical complications, special emphasis was placed on conducting anatomical checkpoints, such as establishing the critical view of safety.

CASE REPORT:

A 28-year-old female patient presented to the surgical outpatient department with complaints of recurrent upper left abdominal pain and nausea for the past two years. The symptoms had exacerbated over the past two weeks, leading her to seek medical attention from our surgical team. She also has a history of hypertension and hypothyroidism which is well controlled with medications.

On physical examination, her apex beat was found to be on the right side. Abdominal examination revealed no fever or jaundice. Upper left abdominal tenderness was present, no guarding. Laboratory investigations showed normal complete blood count, renal function tests, liver function tests, serum amylase and lipase levels. Upper gastrointestinal endoscopy showed normal mucosa.

Chest X Ray showed the presence of dextrocardia. (Figure 1)

Ultrasound of the abdomen visualized the gallbladder in the left hypochondriac region with multiple echogenic shadows, the largest measuring 14 mm within the lumen. Contrast enhanced computed tomography revealed the presence of situs inversus totalis, no dilatation of intra or extra hepatic biliary ducts were noted.

The patient was then scheduled for an elective laparoscopic

cholecystectomy after a preoperative evaluation by the anaesthesiologist, cardiologist and physician which deemed the patient low risk for the proposed procedure.



Figure 1: Chest X Ray showing dextrocardia

The operating room equipment and team was set up as a mirror image of routine laparoscopic cholecystectomy according to the American variable. Under general anaesthesia and strict aseptic precautions, parts were painted and draped. The right-handed operating surgeon stood to the right side of the patient, to his left was the scrub nurse and to his right the camera assistant. Pneumoperitoneum was created by open method through the umbilicus with a pressure of 14mmHg using a 10mm camera port. A 10mm working port was inserted in the subxiphoid position. Another 5 mm working port was introduced at the left mid-clavicular line under vision of the laparoscope.

Inspection of the abdomen confirmed the diagnosis of situs inversus totalis. Liver and gall bladder were situated to the left of the falciform ligament. (Figure 2)



Figure 2: Liver and gall bladder situated to left of falciform ligament. Blue arrow- Gall bladder

Cardiac pulsations were seen over the right side. Caecum and appendix were situated on the left side. Dense omental adhesions were observed over the gall bladder and Calot's triangle. Gall bladder wall was found to be thickened. Owing to which a 4th port of 5mm was introduced in the left anterior axillary line for retraction of the gall bladder fundus by an assistant who stood to the left side of the patient. (Figure 3)



Figure 3: Addition of 4th port in the anterior axillary line for gall bladder retraction.

Following which the Calot's triangle was delineated above the Rouviere's sulcus and Critical View of Safety achieved. (Figure 4)

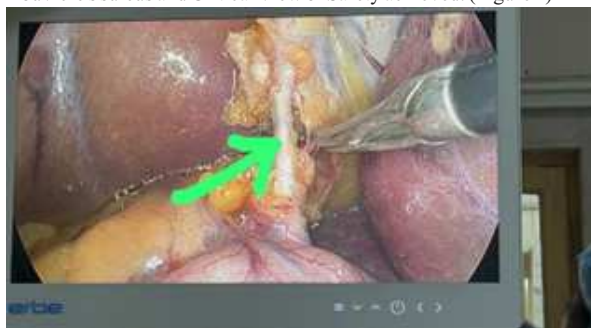


Figure 4: Critical view of Safety. Green arrow- Cystic duct

The cystic duct was clipped using a clip applicator introduced through the 10mm epigastric port, cut using laparoscopic scissors. The cystic artery was cauterized. The gall bladder was then dissected off its fossa using hook diathermy and was delivered through the epigastric port. Adequate haemostasis was ensured and port sites were closed. Patient was discharged on post operative day two. No post operative complications were noted during follow up in the out patient department till date. Histopathological examination confirmed the diagnosis of chronic calculous cholecystitis.

DISCUSSION:

Aristotle was the first to observe situs inversus in animals. Küchenmeister coined the term situs viscerum transversus after thorough physical examination of four living patients [1]. The condition was classified according to the variation from this normal arrangement (situs solitus) expressed either as random eccentric location of organs called situs ambiguus or complete reversal of normal organ position called situs inversus. The inheritance patterns have been found to be autosomal dominant, recessive, and X-linked inheritance. Genetic studies have led to the identification of a gene on the X chromosome responsible for some cases of situs inversus [3].

Situs inversus is often associated with a myriad of conditions such as asplenia or polysplenia, which warrant suspicion of wandering spleen. Cardiac malpositions in this condition are usually associated with complex congenital abnormalities and pulmonary malformations. Cases with associated microgastria, primary ciliary dyskinesia and biliary atresia have also been reported [4]. Adequate preoperative investigations to rule out these associated conditions are vital to ensure safe surgery.

According to the literature, there are no reports indicating an increased predisposition to cholelithiasis among patients with situs inversus. Laparoscopic cholecystectomy was first performed by Campos and Sipes in 1991 and has since emerged as the treatment of choice [5].

Numerous adaptations of the positions of the operating team members and the number and sites of trocar placement have been described. The most frequently adopted technique is the four-port technique, where the placement of the laparoscopic equipment, positioning of the surgical team, and port sites are a mirror image of the standards used in 6 of 7 typical cases. Commonly described sites for port insertion include a 10-mm camera port at the umbilicus, a 5-mm port inserted at the epigastrium, and two 5-mm ports inserted along the left subcostal line. The primary surgeon performs the dissection with his dominant right hand via the epigastric port, while the assistant surgeon retracts the fundus of the gallbladder via left subcostal port. Another technique described involves the surgeon positioning between the patient's legs while the patient is in the Lloyd-Davis position, known as the French technique. This approach allows ergonomic movements of right-handed instruments. Advances in technique include single-port laparoscopic cholecystectomy, which offers easier dissection with the right hand and better cosmetic results but may require more expertise due to the limited space available. The handedness of the surgeon has been reported to influence operation duration. Some authors believe that left-handed surgeons may have shorter operating times [6]. Robotic surgeries have also been reported but are still not widely practiced.

No technique has yet been considered standard for such cases, which may be due to the lack of substantial literature to reach a consensus. Surgeons should choose a suitable approach tailored to their patient and personal preference. Striving for meticulous dissection and achieving the critical view of safety before clipping the cystic duct and cystic artery helps prevent inadvertent complications. Intraoperative cholangiography can be used as an adjunct technique in cases where visualizing and delineating the biliary tree anatomy is complicated, to avoid iatrogenic injuries to the biliary tree [7].

CONCLUSION:

The surgical treatment of similar cases requires detailed preoperative evaluation as supposed by the surgical team to develop a dependable surgical plan, specialized variations and careful disquisition, as changes in anatomical disposition of organs not only impact the localization of symptoms and signs arising from a pathological organ but also imposes special demands on the surgeon.

It is also crucial to exclude other serious congenital malformations that might be associated with situs inversus totalis especially congenital heart disease, renal anomalies, biliary malformations like atresia and aberrant bile vasculature before embarking on the surgery.

It may thus be concluded that a laparoscopic cholecystectomy in a patient with situs inversus totalis is feasible and may be recommended as the procedure of choice. The surgery can be performed safely, as well as with precision, by an experienced right-handed surgeon with meticulous preoperative planning and intraoperative adaptations, resulting in operating times comparable to conventional cases.

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