

Acute Cholecystitis in a Case of Situs Inversus Totalis: A Clinical Analysis and Review of the Literature

José Emiliano González Flores¹, Dr. Hiram Efraín Lozano Cervantes², Daniela Fernanda Estrada Mercado³, Daniel Fernando Narváez Hernández⁴, Brenda Lorena Castro Ortega⁵, María José Sanchez Ruiz⁶, Alfonso Sandoval Polito⁷, Jorge Noceda Crispin⁸, Abigail Bernal Chacha⁹, Luis Miguel Canal de Velasco¹⁰

¹Instituto Tecnológico y de Estudios Superiores de Monterrey ITESM Campus Ciudad de México Orcid: 0009-0003-9178-0195
Agave 42, Jardines de Coyoacán, CP 04890

²Cirugía General. Hospital de Especialidades "Dr. Belisario Domínguez"

^{3,7,8,9}Instituto Tecnológico y de Estudios Superiores de Monterrey ITESM Campus Ciudad de México

⁴Hospital General Dr. Rubén Leñero, Ciudad de México Orcid: 0009-0009-5485-6369

⁵Instituto Politécnico Nacional Escuela Superior de Medicina

⁶Hospital de Especialidades "Dr. Belisario Domínguez"

¹⁰Universidad Panamericana

ABSTRACT

Situs inversus is a rare congenital condition in which the thoracic and abdominal organs are located in a mirror image of their normal position. This anomaly affects approximately 1 in 10,000 people and can occur completely (situs inversus totalis) or partial (situs inversus incompletus). The condition may be discovered incidentally during radiological or surgical studies. Acute cholecystitis is a diagnostic challenge in patients with situs inversus totalis. A review of a clinical case of a patient with acute cholecystitis and situs inversus totalis will be carried out, with timely diagnosis and treatment of acute and incidental cholecystitis for situs inversus totalis.

KEYWORDS: Situs inversus totalis, Acute cholecystitis, Laparoscopic cholecystectomy.

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INTRODUCTION

Situs inversus totalis (SIT) is a congenital anomaly of autosomal recessive inheritance that is due to a disturbance during the third week of embryological development in which the right-left axes of the embryo are established, which corresponds to the gastrulation stage. The genetic alteration is believed to be located in fibroblast growth factor 8, the Lefty 1 gene and PITX2. It is rare and is characterized by transposition of the thoracic and abdominal organs in a "mirror" position or also called mirror image, without gender predominance and which may be associated with transposition of cardiac abnormalities, renal dysplasia and biliary atresia (1). Charles W. Mayo reported in 1949 an incidence of 1 in 20,000 patients admitted to general surgery hospitalization, of which half needed surgery and another 7 had bile duct diseases (2). Anatomically we find Situs Solitus where the normal position of the thoracic and abdominal organs is demonstrated; In SIT there is a mirror transposition

of the thoracic and abdominal organs involving the heart to the right (3); Situs inversus partialis (SIP) is a rarer and more severe condition in which the transposition usually spares the thoracic organs, while the abdominal viscera may or may not be inverted (4). The diagnosis is a real question because it is incidental and is not among the first options in the differential diagnosis. In the face of an acute abdominal condition with atypical symptoms, the role of the image plays an important role because it shows us the behavior to follow.

The gallbladder is located in sinistroposition in the left upper quadrant, to the left of the round ligament, in which the cystic duct retains its normal position, crossing in front of the common bile duct, from right to left. Cholecystitis by definition is a clinical entity in which there is inflammation of the gallbladder wall that is usually manifested by abdominal pain, tenderness in the right upper quadrant (5) being one of the most frequent causes of acute abdominal pain (3 to 10%). In the context of cholecystitis, we use the

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Tokyo criteria (6) where we find three categories: local signs of inflammation where we intentionally look for Murphy's sign and pain, any mass or tenderness in the right upper quadrant; Systemic signs of inflammation: presence of fever or increased CRP and white blood cells; Imaging findings: characteristic images of acute cholecystitis. We establish a diagnostic suspicion with a positive characteristic from group one with a positive one from group two. For the definitive diagnosis it is with a positive characteristic of the three groups. Emergency laparoscopic cholecystectomy with mirror insertion is the treatment of choice (6), being necessary to perform intraoperative cholangiography in these patients or conversion to open surgery in selected cases.

The majority of cases of patients who have SIT are asymptomatic and are diagnosed incidentally either by imaging studies or intraoperatively, while, when there is an acute event of cholecystitis, patients will present pain in the left hypochondrium and even signs of cholangitis or pancreatitis, the ultrasound will reveal the presence of stones in the gallbladder that is located in a "mirror" to the normal position which is in the upper right quadrant and where the spleen is located, transposition of the liver to the left side. The chest x-ray will show dextrocardia and the presence of the gastric bubble on the right side of the patient. The computed tomography will show the transposition of viscera in a "mirror" image. Regarding the technique of placing laparoscopy ports, different studies have reported the use of 0° and 30° cameras, with preference given to 30° cameras. The camera angle does not play as much of a determining role as does the surgeon's comfort with the position of the trocars. The American technique (7), with the surgeon on the patient's right improves postoperative outcomes, where the monitor is placed on the patient's left side and the ports are placed in a "mirror" of conventional laparoscopic cholecystectomy; the umbilical telescope port (10 mm), three working ports (all 5 mm) in the subxiphoid regions, left midclavicular line and right anterior axillary line. However, the surgeon must accommodate the configuration of the trocars, respecting the principle of laparoscopic triangulation, according to his or her preferences and abilities.

CASE REPRESENTATION

A 65-year-old female with no significant personal pathological history, who began suffering two days prior to her admission to the emergency area with intense colic-like abdominal pain in the hypogastrium with irradiation to the left hypochondrium, continuous, after ingesting cholecystokinetic foods, accompanied of nausea and vomiting of gastro-alimentary content on 6 occasions. An evaluation was carried out by General Surgery, with the following vital signs HR: 118bpm RR: 20rpm, SatO₂: 93%, T: 36.3°C T/A: 131/83mmHg, on physical examination algica facie, globose abdomen at the expense of adipose panniculus, hypoactive peristalsis present, with pain on superficial palpation in the hypogastrium and left hypochondrium, with

signs of peritoneal irritation. Laboratories: Leukocytes 16,000, Neutrophils 87%, Hemoglobin 14 g/dl, Hematocrit 46%, Platelets 401,000, Urea Nitrogen in blood 18 mg/dl, Urea 30 mg/dl, Creatinine 1.1 mg/dl, Glucose 83 mg/dl, Bilirubin total 1.9 mg/dl, Direct bilirubin 1.2 mg/dl, Indirect bilirubin: 0.7 mg/dl, Alanine aminotransferase 80 mg/dl, Aspartate aminotransferase 103 mg/dl, Alkaline phosphatase 180 mg/dl.

Complementary imaging studies were performed: chest x-ray with the presence of dextrocardia (**Figure 1**), CT of the abdomen in simple phase and contrast (**figure 2A and 2B**) with the following findings: 1) Cardiac apex is observed on the right, 2) Liver located in the left hypochondrium, dimensions preserved, its contour is regularly defined, homogeneous density, 3) Intra- and extrahepatic bile duct without signs of dilation. Homogeneous gallbladder, measures 79 x 27 x 32 mm, its wall is thin with 8 mm thickness, 4) Stomach is located to the right of the midline, 5) Pancreas is observed to be of normal shape and size, the head is located in the left hemiabdomen and the tail in the right hemiabdomen in relation to the splenic hilum, its parenchyma is homogeneous, without evidence of focal or diffuse lesions, 6) Spleen is located in the right hypochondrium, with preserved density and size, measuring 86 mm in its long axis, 7) Intestinal loops with adequate distension, the ileocecal valve is observed in the left lower quadrant. The cecum and ascending colon are located on the left flank, the transverse colon is observed without alterations with adequate location. The path of the descending colon is observed on the right flank with redundant sigmoid and straight rectum without alterations, 8) Kidneys in corresponding fossa, with regular, defined edges, homogeneous density. Both ureters of course and diameter are preserved, with no evidence of calcifications, 9) Upon passing contrast medium, adequate reinforcement of the vascular structures is observed, the aorta artery is observed to the right of the midline with adequate bifurcation into iliac arteries, the Confluence of the iliac veins and the inferior vena cava is located to the left of the midline.

Ultrasound of the liver and bile ducts is performed where the Liver is visualized in the left hypochondrium with preserved morphology, regular borders defined with homogeneous echogenicity, the intrahepatic bile duct of correct caliber and trajectory, the extrahepatic bile duct shows a 4 mm common bile duct and a 9.3 mm portal, gallbladder measuring 85 x 27 x 34 mm, inside heterogeneous due to the presence of a defined hyperechoic image measuring 22 mm with posterior acoustic shadow, the thickened wall measuring 8.8 mm and presence of free fluid (**figure 3**), it is concluded Vesicular lithiasis with situs inversus totalis.

Medical management is provided with supportive measures that include fasting, fluid therapy and medications, and laparoscopic mirror cholecystectomy is performed (**figure 4**). Cholecystectomy was performed without presenting any complications during the operation, with findings of an 8 x 4 cm gallbladder with multiple stones inside,

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wall edema, 4 mm cystic duct, 2 mm systemic artery and situs inversus totalis. Subsequently progressing with adequate post-surgical evolution, with hospital discharge.



Figure 1: chest x-ray with presence of dextrocardia.



Figure 2A: abdominopelvic CT showing SIT.

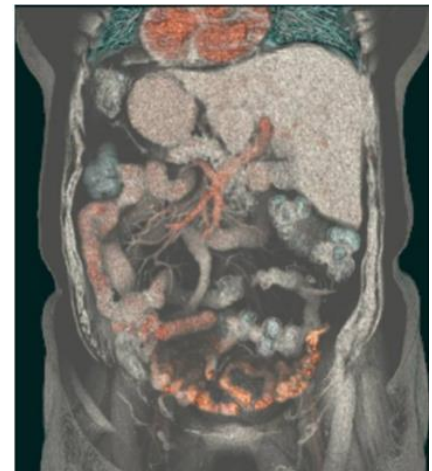


Figure 2B: abdominopelvic CT with enhancement of abdominal viscera.



Figure 4: liver is observed to the left of the round ligament.

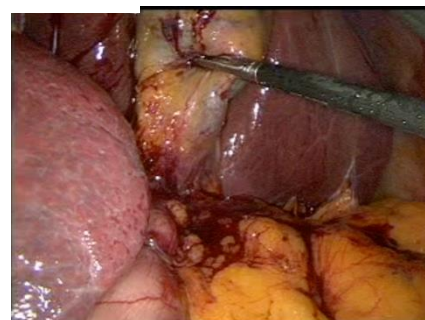


Figure 2: gallbladder on the left side with dissection of Calot's triangle in a situs inversus.

DISCUSSION

The first report of laparoscopic cholecystectomy in SIT was published in 1991, since then the cases that have been reported with the combination do not exceed 100 cases (7). In Mexico, the first case with this duality was published in 2020. Curiously, in Chile and Ecuador they were also during the year 2020 (2).

The case presentation was an acute abdomen with atypical symptoms with intense colicky abdominal pain in the hypogastrium with irradiation to the left hypochondrium, with postprandial emesis that is associated with cholecystokinetic foods with gastrointestinal content, with hypoactive peristalsis, pain on superficial palpation. in the hypogastrium and left hypochondrium and with data of peritoneal irritation. Laboratory tests showed increased transaminase activity with leukocytosis. A suspicious diagnosis is established due to the presence of two items (leukocytosis and imaging findings characteristic of cholecystitis) of the Tokyo criteria, because the location of the symptoms occurred in the left upper quadrant (LSC) with severity criteria. Grade II due to the palpable painful mass in the CSI. A chest x-ray was performed with the presence of dextrocardia, a plain and contrasted CT scan of the abdomen

spleen in the right hypochondrium, and ileocecal valve in the left lower quadrant. An ultrasound of the liver and bile duct was performed, reporting a thickened wall of 8.8 mm with perivascular fluid and the presence of gallstones with Situs Inversus Totalis.

Situs Inversus Totalis (SIT) is a rare anomaly characterized by the complete reversal of the arrangement of the thoracic and abdominal organs in relation to their normal anatomical position (4). This alteration can significantly complicate the diagnosis of abdominal pathologies due to the unusual arrangement of the organs. In the present case, the patient presented abdominal pain with atypical symptoms in the context of SIT, which adds an additional layer of difficulty in both diagnosis and therapeutic management. There is no evidence that SIT predisposes to gallstones (8), but it leads to an acute abdomen that is difficult to diagnose where high suspicion is needed. Patients with SIT are usually asymptomatic, since the structures and physiology of vital organs are not altered.

The gallbladder within the context of a SIT is located to the left of the round ligament, with the cystic duct in a normal position, crossing in front of the common bile duct, from right to left. In patients with SIT the gallbladder is

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in the intrahepatic left upper quadrant. Generally, patients do not present alterations in the bile ducts, veins or arteries, which contrasts with the anatomy of partial situs inversus, since it is common to find abnormalities in the bile ducts and vessels, which can lead to conversion to open surgery or subjecting the patient to intraoperative cholangiography (9). According to Enciu O, et al. suggest that the surgeon's experience influences whether the laparoscopic procedure is sufficient, and that the percentage of bile duct injury decreases with a learning curve of approximately 40 laparoscopic cholecystectomies (2). The training and skills of the surgeon influence because at least two-thirds are right-handed; It is imperative for both the surgeon and his assistants to modify the surgical technique to maintain safety and carry out the procedure, from placing the trocars in opposite directions to avoiding crossing the hands to retract the Hartmann's bag for the dissection of the triangle. of Calot, which is more convenient for the retraction of the Hartmann pouch to be performed by the assistant to allow the surgeon to operate in a more simplified manner (10).

Currently, laparoscopic cholecystectomy with placement of the "mirror" posts is the treatment of choice in patients with gallstones. The presence of SIT introduces considerable challenges in the clinical diagnosis and in the surgical approach due to the anatomical distortion, in the context of cholecystitis, the cornerstone to avoid bile duct injury is Strasberg's critical view of safety seen modified during laparoscopic cholecystectomy in SIT because it is observed through Calot's triangle from lateral to medial, contrary to what is described in the literature, it demands a clear dissection and exposure to avoid iatrogenic injuries (2). All current reports consider that SIT is not a contraindication to performing the laparoscopic approach and is considered safe. The surgical time varies between 45 to 200 minutes in different reports. Currently, the need to convert laparoscopic cholecystectomy to open surgery in SIT has not been reported (7), it is thought to be due to the precautions surgeons take when dealing with these patients. Almost all patients can be safely discharged within the first 48 hours after surgery (10,11).

CONCLUSIONS

The duality in the clinical presentation, where we have an acute abdomen in conjunction with an anatomical transposition, entails challenges for the surgeon from the beginning: making a diagnosis with atypical symptoms and signs, formulating the clinical suspicion, establishing the diagnosis, interpretation of the imaging studies, planning and surgical skill. The presence of SIT does not contraindicate the performance of laparoscopic cholecystectomy, and this is considered a safe method, which requires greater experience, the surgeon's skill in forming visuospatial images, and motor skill.

PATIENT CONSENT

The consent for publication was obtained from the patient.

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DATA AVAILABILITY

No data was used for the research described in the article.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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