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A case report of laparoscopic cholecystectomy in situs inversus totalis: Technique and anatomical variation

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ABSTRACT

BACHGROUND: Since the first laparoscopic cholecystectomy report in situs inversus totalis in 1991, the safety of this procedure has still been questionable. A few surgeons were preferred to perform an open cholecystectomy due to technical difficulties as well as various anatomical varieties that can be faced during surgery.

CASE PRESENTATION: We report a case report of a 50 years old patient came with epigastric pain that radiated to her left shoulder, intermittent nausea, vomiting and bloating after some meals. She did not associate her symptoms with fatty food. She was a known case of situs inversus totalis and had a previous laparoscopic Nissen fundoplication that we performed 5 years ago. A laparoscopic cholecystectomy was performed by a left-handed surgeon, illustrating challenges, technique, and the advantages of left-handed surgeon over right-handed ones.

DISCUSSION: After the first discovery of situs inversus totalis by Fabricius in the 1600 the standard procedure for cholelithiasis was open surgery. The introduction of the first laparoscopic cholecystectomy in patients with situs inversus put surgeons in challenge for performing laparoscopic rather than open surgery for patients with situs inversus diagnosed with gallbladder disease. Only 67 cases used laparoscopic cholecystectomy in treating situs inversus patients with cholelithiasis. Although technical difficulties and expected anatomical variation are the main challenges in those patients, the current literature confirms the safety of laparoscopy in such cases.

CONCLUSION: Despite having all these difficulties, handling this type of operations can be safe and uneventful especially with experienced surgeon.

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1. Introduction

Situs Inversus Totalis is a term used to describe the transposition of all the organs of the body to the opposite side [1]. The incidence of situs inversus has been reported to vary widely between 1:5000–1:20,000 [2]. Although, Laparoscopic cholecystectomy is the standard procedure for most of cholelithiasis and it can be run without difficulties since it was first performed by Mouret in 1987 [3], but in case of situs inversus it can face technical challenges especially to right handed surgeons [4] and it is better to be handled by left-handed surgeon. There is no evidence for increased incidence of cholelithiasis in situs inversus totalis, on the other hand, associated variation and anomalies are expected to be more common in those patients. We present a case of laparoscopic cholecystectomy in situs inversus totalis with double cystic artery proceeded by left-handed surgeon.

2. Case presentation

A 50-year-old female came with 4 months of epigastric pain that radiated to her left shoulder, she experienced intermittent nausea, vomiting and bloating after some meals. She did not associate her symptoms with fatty foods. Her past medical history was known for situs inversus totalis and previous laparoscopic Nissen fundoplication that we performed 5 years ago. She received an abdominal ultrasound that showed a microlithiasic gall-bladder without biliary tree distention. Other finding on abdominal CT was 'acceptable' in light of the situs inversus totalis [Fig. 1]. CBC, blood chemistries, and liver function tests were all within normal limits.

3. Technique

Laparoscopic cholecystectomy was performed using 4-trocars. The left-handed surgeon stood on the patient's right side with the screen on the left side. A standard infraumbilical port was placed using the open technique (Hasson's method) and a Veress needle was inserted to inflate the abdominal cavity with CO₂, a 10 mm sub-xiphoid port was inserted, then two 5 mm ports were placed along the left midcostal line. Exploring the abdomen, the gallbladder was

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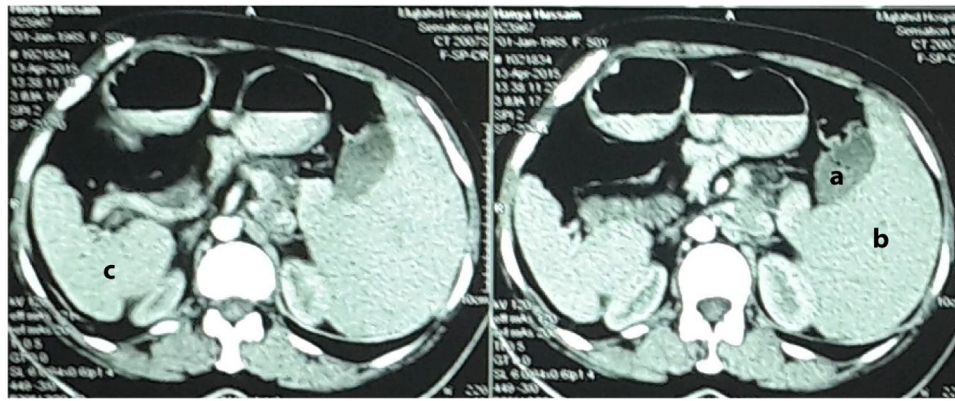


Fig. 1. Abdominal Computed Tomography (CT): (a): Gallbladder, (b): Liver, (c): Spleen.

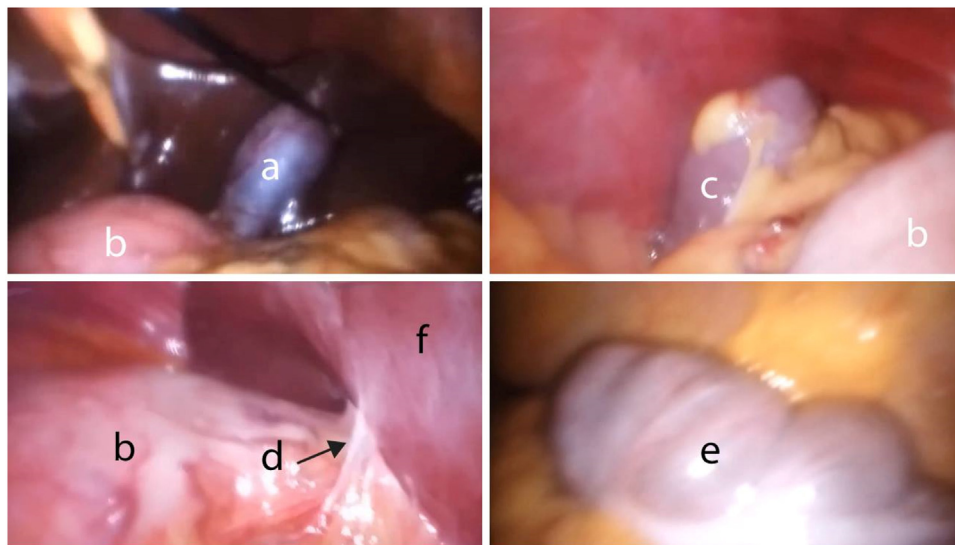


Fig. 2. (a): Gallbladder, (b): Stomach, (c): Spleen, (d): previous Nissen fundoplication, (e): Cecum, (f): Liver.

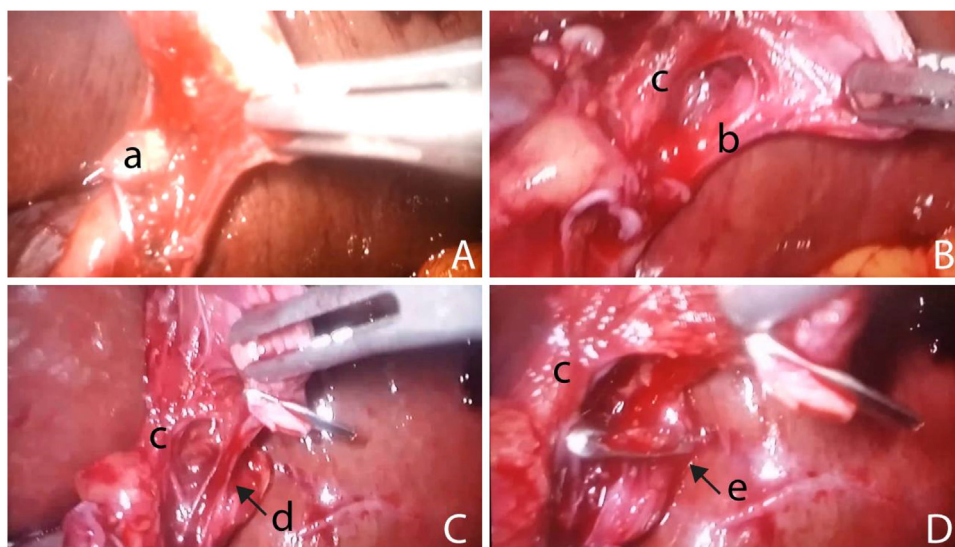


Fig. 3. (a): Calot's Node, (b): Cystic Duct, (c): Main Cystic Artery, (d): Additional Cystic Artery, (e): Additional Cystic Artery (clipped and cut).

distended with omental adhesions in addition to light adhesions at the previous surgical site [Fig. 2D]. The omental adhesions were dissected using the left hand. The cystic duct inferiorly and the main cystic artery in Calot's triangle were identified [Fig. 3B,C], the duct was endo-clipped and cut in the standard fashion. Here beside the main cystic artery, a thin accessory artery extending along the cystic duct but posterior to it was recognized [Fig. 3.D]. The two arteries endo-clipped and cut and the gallbladder was dissected from the liver bed, and removed from the subxiphoid port after first crushing. The total operating time was 60 min. The patient's post-operative recovery was uneventful. Pathological report revealed an acute cholecystitis. The patient discharged the day next to the surgery.

4. Discussion

After the first discovery of situs inversus totalis by Fabricius in the 1600 the standard procedure for cholelithiasis was open surgery. The introduction of the first laparoscopic cholecystectomy in patients with situs inversus was in 1991 by Camos and Sipes [5] after that, surgeons faced a challenge in performing laparoscopic rather than open surgery for patients with situs inversus diagnosed with gallbladder disease. Only 67 cases used laparoscopic cholecystectomy in treating situs inversus patients with cholelithiasis. Current literature informs the safety of the procedure in such cases [6].

Diagnosis of those patients can be difficult as not all patients came with symptoms in the upper left quadrant [2]. Although our patient is a well-known case of situs inversus totalis, the diagnosis of such phenomenon can be confirmed by further imaging such as ultrasonography, CT, and MRI.

Technique difficulties is the major challenge for surgeon as it takes times for the surgeon to cope with the mirror image anatomy to prevent iatrogenic injury which make the operation longer than the usual right cholecystectomy [7]. While most of right-handed surgeons preferred to dissect Calot's triangle using their right hands via the epigastric port, and employ their first assistants to retract on Hartmann's pouch, the left-handed surgeons could use their left hands in Calot's triangle dissection and their right hands in Hartmann's pouch retraction, they have clear advantage over the right-handed surgeons.

Associated anomalies with situs inversus totalis are expected to be more common, Vascular anomalies of the coeliac trunk and liver are very common in individuals with situs inversus [8]. The incidence of double cystic artery in the 'right-gallbladder patients' ranges from 2 to 25% [9] and this may cause unwilling hemorrhage and confusion and make the operation more challenging [10]. Only two cases reported extra cystic artery, one was "inferior" to the cystic duct as in Japanese case [10], and the other "posterior" as in Greek case [11]. Where possible the performance of an abdominal angiography could solve the problem as other investigators have also pointed out [10]. However, this is not always feasible, mainly due to the usual small diameter of the additional cystic artery that doesn't achieve the half of the diameter of the main cystic artery (about 2.1 mm for the additional artery/5.2 mm for the main cystic artery) [9], and therefore, in such cases meticulous dissection is the only way for a safe procedure.

5. Conclusion

Standard laparoscopic cholecystectomy can be applied safely on patients with situs inversus totalis especially if it performed

by left-handed surgeon. Technical difficulties such as mirror imaging anatomy and equipment preparations will extend the length of surgery. Anatomical variations are common in such patients and should be considered in every step through the operation to avoid iatrogenic injury.

Consent

A written consent was obtained from the patient for publication of this case report and any accompanying images.

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Ethical approval

Our manuscript is a case report not a research.

Author contributions

Author and coauthor shared the efforts of writing this manuscript and reviewing the literature. All authors read and approved the final manuscript. Mhd Belal Alsabek, was the left-handed surgeon under the supervision of Dr. Alaa Aldirani.

Competing interests

The authors declare that there is no competing of interests.

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