

Technical and Ergonomic Considerations: Two Surgeon's Techniques for Lap Cholecystectomy in Situs-Inversus For a Right-Handed Surgeon

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Abstract

Laparoscopic cholecystectomy can be technically challenging in patients with situs inversus totalis (SIT). A 39-year male presented with left hypochondriac pain. His cardiac workup showed dextrocardia, and ultrasonography showed a gall bladder on the left side. We used the four-port technique where anterior dissection was carried out by the dominant right hand of the primary surgeon, and the infundibulum was retracted by the first assistant from the mid-clavicular port. The first assistant carries out the posterior dissection through a midclavicular port, whereas the primary surgeon does retraction. To conclude, this two-surgeon technique decreases the ergonomic difficulty faced by right-handed surgeons while performing laparoscopic cholecystectomy.

Keywords: Situs inversus totalis; Dextro-cardia; Laparoscopy; Cholecystectomy

Introduction

Situs inversus totalis is a rare congenital anomaly with an estimated incidence of 1 per 5000-20,000 live births [1-3]. Anatomically, gall bladder is located in the left hypochondrium, posing a diagnostic challenge to clinically suspect symptomatic gall stone disease. Laparoscopic surgery in these patients poses technical challenges, especially for right-handed surgeons, like dissecting calot's triangle with the non-dominated hand and chances of crossing the arms [1,2]. Another concerning issue in these patients is associated with vascular anomalies, which are common in patients with situs-inversus [4-7]. Despite these concerns, laparoscopic cholecystectomy is the treatment of choice and can be performed safely even in acute cholecystitis patients with situs-inversus [8-11]. In this review, we discussed the technical and ergonomic considerations for safe cholecystectomy in patients with situs-inversus.

Case Report

A 39-year gentleman complained of pain in the left hypochondrium for one month. Ultrasonography revealed a spleen in the right hypochondriac region and gallbladder in the left hypochondriac region, and stones were identified in the gall bladder. Based on ultrasonography findings, diagnosis of symptomatic gall stones was made. His laboratory parameters, ECG, and echocardiography were normal, and he was planned for laparoscopic cholecystectomy. We started the procedure by adjusting the theatre equipment on the left side, mirroring the right side. The primary surgeon and first assistant stood on the patient's

right side and the second assistant on the left side. Four ports were used-the; two 10 mm ports were placed in the subxiphoid towards the left and other supra umbilically, respectively. Two 5mm ports were placed in the left hypochondriac region in the left midclavicular line and left anterior axillary line at the level of the umbilicus. An open technique created Pneumoperitoneum by the surgeon standing on the patient's left side. The abdomen was inspected, and a gall bladder was found on the left side.

Technical Aspects

The second assistant standing on the left retracted the fundus of the gall bladder to prevent a crossover of the arms of the operating surgeon fundus of the gall bladder was retracted by the first assistant. By using the Maryland dissecting forceps calot's triangle was dissected, the anterior fibrofatty layer was dissected by the primary surgeon [Figure-1(G)], and posterior dissection was carried out by the first assistant to prevent cross over of the arms [Figure-1 (H)]. Once calot's triangle was dissected, and a critical view of safety was achieved, the cystic artery and the cystic duct were clipped and divided. The gall bladder was dissected from the liver surface using hook diathermy by the first assistant, and traction was given by the primary surgeon [Figure-2]. The gall bladder was delivered from the epigastric port, closed ports using non-absorbable sutures.

The total operating time was 60 minutes, and the postoperative patient was discharged the next day following surgery. Postoperatively no complications were noted to date.

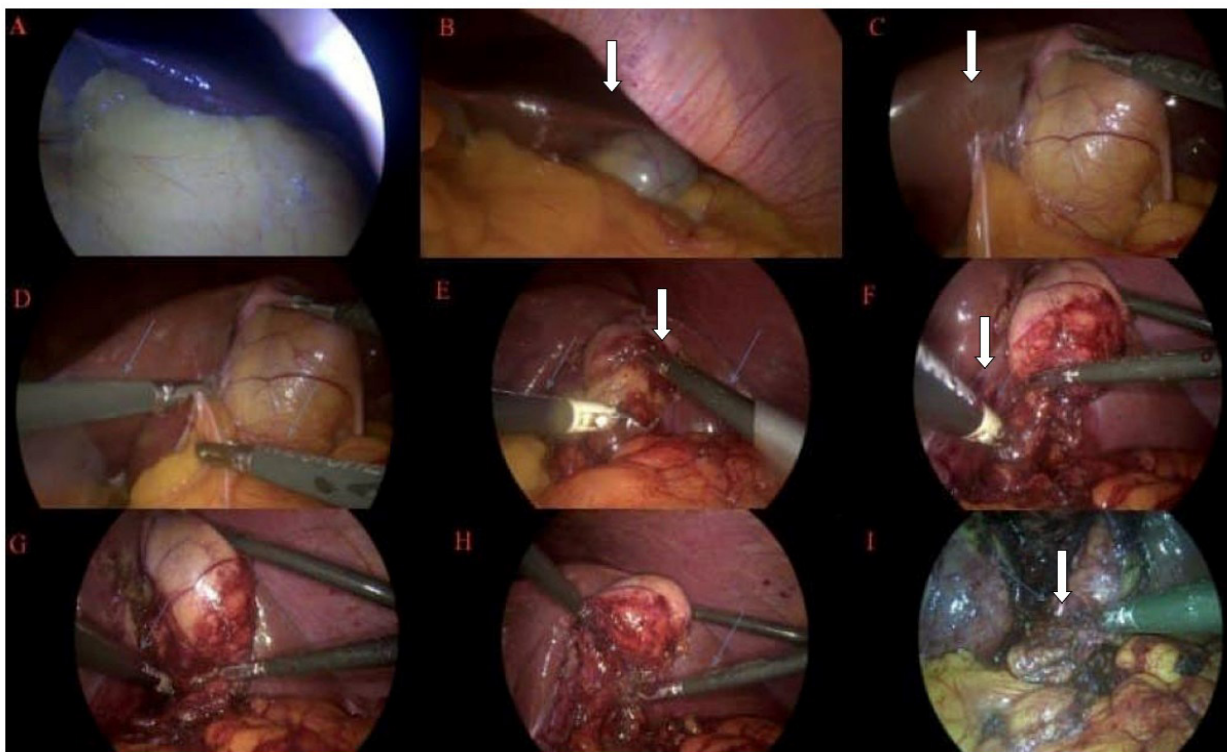


Figure-1: A, B, and C: Left-sided location of the liver and gall bladder; D, E, F, G: Right hand of the primary surgeon using Maryland for separating adhesions while retraction by the assistant, H: posterior dissection is being done by the right hand of the assistant surgeon using Maryland dissecting forceps, I: arrow showing cystic duct

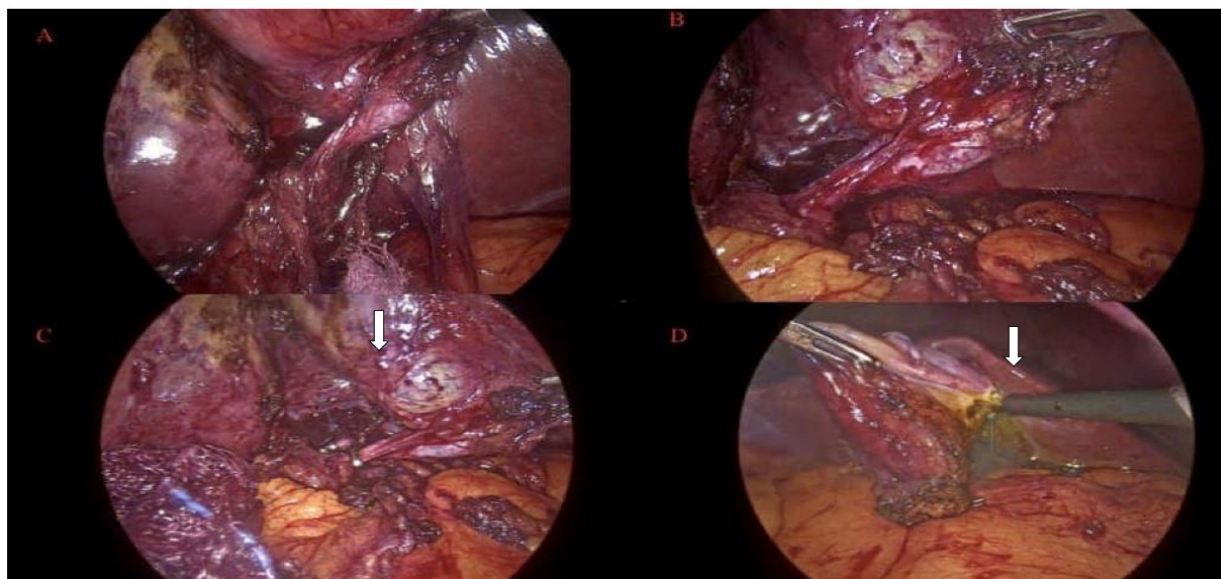


Figure-2: A and B: Image show the acritical view of safety; C: Clipping of the cystic duct and cystic artery; D: Separating gall bladder from the liver bed by the first assistant using hook diathermy

Discussion

The right-handed surgeon might experience technical difficulties while performing the laparoscopic cholecystectomy in situs inversus totalis patients. The difficulty might be due to a) difficult adhesiolysis with the non-dominant hand, b) constant mental orientation of the anatomy c) crossover of the hands while dissecting the calot's triangle [12-16]. Dissection of the calot's triangle would be easier for a left-handed surgeon than a right-handed surgeon [17-20]. Many techniques are described to decrease the difficulty, like the four-port technique, the French position of the operating

surgeon, frequent changes in instruments between two arms, retracting infundibulum through the sub-xiphoid port, and port relocation [21-26]. These techniques, even though useful, could not prevent crossover of the arms leading to an abnormal posture for the surgeon. To avoid difficult dissection, two surgeon's techniques can be followed, where the primary and the first assistant use the dominant right hand [6,25,27,28]. However, the problem with this technique is it requires good coordination among the operating surgeons, preventing abnormal posture for the operating surgeon [29]. In this technique, the primary surgeon dissects the

calot's triangle with his dominant hand while the infundibulum is retracted by the first assistant and the fundus by the third assistant [30-32]. The first assistant carries out posterior dissection while the operating surgeon retracts the infundibulum. Dissection by the left hand from the sub-xiphoid port makes the instrument lose its perpendicular and narrow angles, making dissection difficult [32]. However, this problem can be overcome by doing anterior dissection alone from the dominant right hand of the right-handed surgeon and posterior dissection by the first assistant through the mid-clavicular port [33]. Advantages of this technique include using the dominant hand by the surgeons, preventing abnormal postures when the surgeon is standing to the patient's left, and simplifying the procedure ergonomically. Bile duct injuries following laparoscopic cholecystectomy have been rarely reported and can be prevented using similar techniques described when the gall bladder is on the right side [34,35].

Conclusion

To conclude, laparoscopic cholecystectomy is the gold standard even when situs inversus is present. Two surgeon techniques can decrease the ergonomic difficulties faced by the right-handed surgeon. However, to standardize these techniques prospective study might be required, because of the rarity of situs inversus this might not be possible.

Authorship Criteria

Venu bhargav Malpuri – Concept and design, drafting, critical review, guarantor

Krishna Ramavath - Concept and design, drafting, critical review

Pranay singh Palle - Concept and design, drafting, critical review

Kishore Abuji - Concept and design, drafting, critical review

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