Utility of Indocyanine Green (ICG) Fluorescence for a Patient with True Left-Sided Gallbladder Undergoing Laparoscopic Cholecystectomy

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Introduction

- True left-sided gallbladder (sinistroposition) is rare (0.013–1.1%).[1-4] Defined as a gallbladder located to the left of the ligamentum teres and falciform ligament under segment III.
- Two variants: associated with situs inversus or left of an aberrantly located right-sided round ligament. [5]
- Embryologic theories include abnormal hepatic diverticulum attachment or ectopic gallbladder development.[6-7]
- Recognition is important as left-sided gallbladder increases risk of biliary and vascular anomalies and bile duct injury during laparoscopic cholecystectomy. ICG can be utilized to aid in safer dissection.

Case Presentation

- 56-year-old man with HTN, HLD, morbid obesity, insulin-dependent T2DM, ESRD on hemodialysis, HFrEF, PVD, CAD s/p CABG, legal blindness, and wheelchair dependence undergoing evaluation for kidney transplant.
- Presented with 3 months of severe intermittent RUQ pain radiating to right flank. LFTs were normal. Imaging: hepatomegaly, fatty liver, cholelithiasis without cholecystitis, and gallbladder EF 17% (biliary dyskinesia).
- CT showed left-sided gallbladder with a large portal vein branch closely adherent to the posterior gallbladder surface. Figure 1.

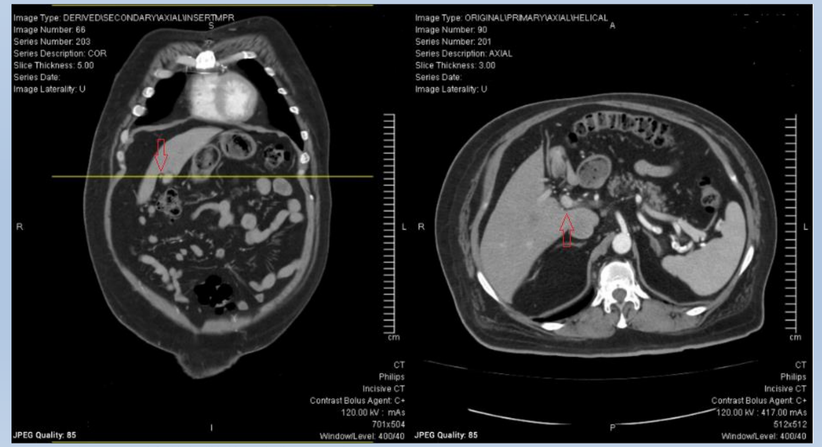

Figure 1. CT demonstrating left-sided gallbladder and adherent portal vein.

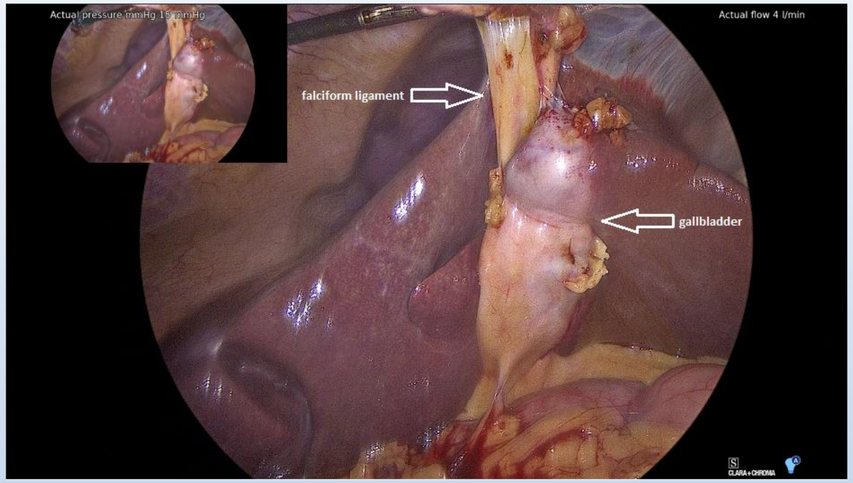

Figure 2. Intraoperative view: gallbladder adherent to falciform ligament.

Operative Details

- Ports modified for left-sided gallbladder; not always possible to plan for this preemptively as left-sided gallbladder is often an intraoperative finding.
- Gallbladder under segments II–III and adherent to falciform ligament. Figure 2.
- After dissection of Calot's triangle, two tubular structures identified; ICG fluorescence used to confirm cystic duct and CBD anatomy. Figure 3.
- Large portal vein branch adherent to gallbladder required stapled transection. Laparoscopic ultrasound confirmed biliary and portal venous integrity. Patient discharged same day.
- Histopathology revealed chronic cholecystitis.

Discussion

- True left-sided gallbladder is rare and often not diagnosed preoperatively.
- Symptoms may still be right-sided.
- Left-sided gallbladder increases bile duct injury risk (4.4–7.3%). Variations include abnormal cystic duct insertion, accessory ducts, and aberrant arterial anatomy.[10]
- ICG fluorescence cholangiography provides immediate biliary visualization and can guide safe dissection when anatomy is unclear.
- Consider adjusted port placement, surgeon positioning, and intraoperative imaging (ICG, ultrasound) when encountering left-sided gallbladder.

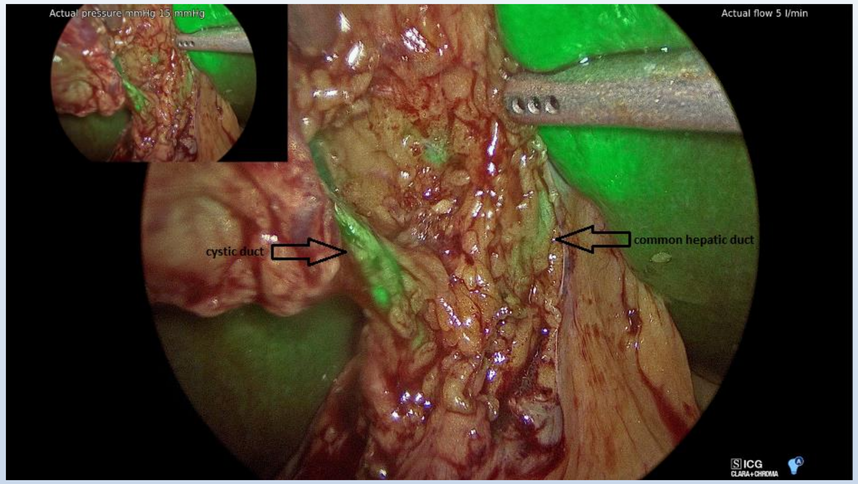

Figure 3. ICG fluorescence cholangiography identifying cystic duct and CBD.

Conclusion

- The finding of a left sided gallbladder, whether discovered pre- or intraoperatively, should prompt suspicion for biliary and vascular anomalies.
- In our case, the patient presented with RUQ pain with biliary dyskinesia and CT imaging showed a left sided gallbladder. Intraoperatively, the biliary and vascular anatomy was confirmed with the assistance of ICG fluorescence, which provides a powerful tool to help elucidate aberrant anatomy to proceed with safe dissection.

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