

A GIANT TYPE I CHOLEDOCHAL CYST: PRESENTATION, PITFALLS OF IT'S LAPAROSCOPIC EXCISION AND THE ROLE OF ICG

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ABSTRACT

Type I Choledochal cysts (CDCs) are congenital fusiform cystic dilatations of the extrahepatic biliary tree. A giant CDC has a diameter of more than 10 cm. Incidence is more common in female children. However; their occurrence in adult counterparts is also known. Clinical examination, Liver function tests, Ultrasonography (USG) and Magnetic resonance cholangiopancreatography (MRCP) help in making a definitive diagnosis. Use of Indocyanine green dye (ICG) aided fluorescent imaging helps in better delineation of biliary and vascular anatomy during laparoscopic approach. We present a case of 17-year-old female with Type I Giant CDC managed with laparoscopic complete cyst excision and hepatico-duodenostomy using ICG intraoperatively for better delineation of the anatomy. A brief case report with review of literature is presented.

KEYWORDS : Type I Choledochal cysts, Giant choledochal cysts, Indocyanine green (ICG), Fluorescence, Hepatico-duodenostomy, Laparoscopic

INTRODUCTION

Type I Choledochal cysts (CDCs) are congenital fusiform cystic dilatations of the extrahepatic biliary tree as described by Todani in 1977. A giant CDC is defined as a cyst larger than diameter of 10 cm. Most of the type I choledochal cysts are associated with Abnormal pancreaticobiliary duct junction (APBDJ) (1). Ultrasonography (USG) and Magnetic resonance cholangiopancreatography (MRCP) help in making a definitive diagnosis. Though they present clinically with non-specific abdominal symptoms like dull aching pain and lump in abdomen, definitive surgery is always recommended to prevent the associated complications. Farello et al performed the first laparoscopic choledochal cyst excision with hepaticojejunostomy in 1995(2).

Application of ICG in hepatobiliary surgery has revolutionized the safe practice of calot's dissection. As per a study by Boni et al the sensitivity of ICG detecting the cystic artery and CBD was found to be 100% (3).

CASE REPORT

A 17-year-old female had presented to our surgical outpatient department with complaints of lump and vague pain in her right upper abdomen since childhood. Patient had no other complaints or comorbidities. Her past and family histories were unremarkable. Clinical examination revealed a lump in the right hypochondrium extending 8cm below the costal margin with no tenderness. It couldn't be differentiated from the liver clinically (Fig. 1).

Cell counts and biochemical tests were unremarkable. USG of the abdomen was suggestive of dilated intrahepatic and extrahepatic biliary system with a giant cystic dilatation of the CBD and the Right hepatic duct (RHD). Gall bladder (GB) was compressed by the cyst and showed no evidence of cholelithiasis.

Contrast enhanced CT scan (CECT) of the abdomen was suggestive of Cystic dilatation of the entire CBD measuring 16x 10 cm. MRCP revealed a gross fusiform cystic dilatation of the CBD, measuring 10cm in diameter and 17cm long, extending from the confluence of the Hepatic ducts superiorly and superior border of the L4 vertebra inferiorly(till the head of pancreas).The cyst was causing mass effect over the right and left hepatic ducts, which lead to the upstream dilatation of the intrahepatic biliary radicles(IHBRD). RHA was found abutting the cyst on the superomedial side and GDA was seen in close proximity to the anterior wall of the cyst. The MPD was normal in caliber(1.8mm) . MRCP couldn't reveal any APBDJ associated.

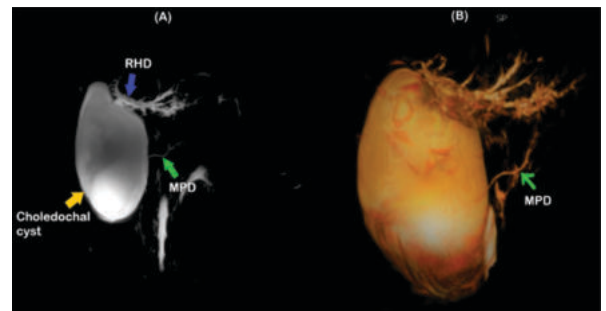


Fig.1

(A). MRCP image of the cyst showing the cyst (yellow arrow), MPD (green arrow) and the RHD (blue arrow) and (B) 3d reconstruction with MPD displaced anteriorly

As the patient had an episode of cholangitis during the course of hospital stay, we did not go ahead with Endoscopic retrograde cholangiopancreatography (ERCP) in this patient to avoid the risk of acute pancreatitis or cholangitis.

The Procedure

A diagnostic laparoscopy was performed to visualize a giant cystic lesion in the right hypochondrium and no intraabdominal adhesions were seen. A 5mm working port was then inserted in the epigastric region, on the right side of the falciform ligament after a stab incision. Another 5 mm port was inserted in the right iliac fossa in the anterior axillary line under vision and the liver was retracted holding the GB. A final 5mm working port was inserted in the right iliac fossa in the midclavicular line under vision.

The camera was changed to the fluorescence mode and green fluorescence of the ICG was seen in the liver and the cyst. The peri-choledochal fascia was dissected from the anterior surface and the cyst wall was identified. Around 800cc of the bile was aspirated from the cyst with an aspiration needle to improve the visualization as the cyst collapsed after aspiration.

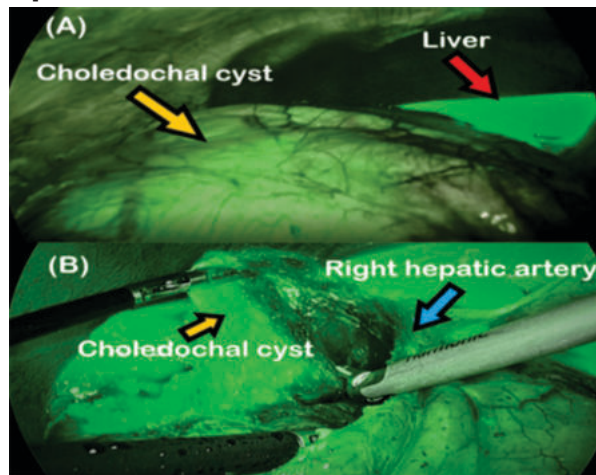


Fig.2

(A) and (B), ICG fluorescent images demonstrating the giant CDC (yellow arrow), liver (red arrow) and right hepatic artery (RHA) (blue arrow).

The dissection proceeded from left to right side, by carefully preserving the RHA and the GDA. ICG fluorescence helped in identifying these structures closely associated with the cyst. The head of the pancreas and the C loop of the duodenum were carefully preserved by a steady inferior traction. The cyst was transected just above the normal stump of the CBD and the stump was ligated with absorbable suture material. An on table choledochoscopy was performed with a 5mm telescope after opening the cyst wall to visualize the openings of the Right and left hepatic ducts with active bile flow. The cyst was transected superiorly by just leaving a stump of CHD.

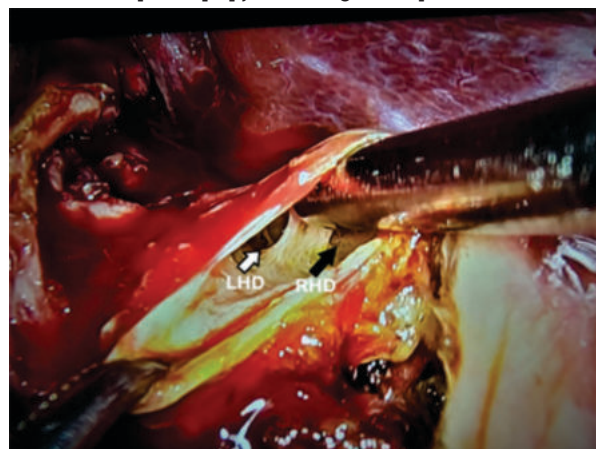


Fig.3

Intraoperative demonstrating the opening of Left hepatic duct (white arrow) and the Right hepatic duct (black arrow)

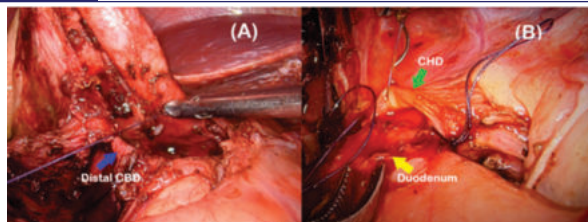


Fig.4

(a). Normal stump of the Distal CBD ligated below the CDC (blue arrow) (b). Anastomosis between the duodenum (yellow arrow) and the stump of the CHD (green arrow)

End to side anastomosis between the anterior surface of first part of the duodenum and the stump of the CHD was performed in four layers with polyglactin 4-0 sutures in an interrupted fashion. A cholecystectomy was performed finally. The resected cyst and the gall bladder were removed in an endobag via the 10mm port site after placing a 16F Ryle's tube drain in the subhepatic space. Thorough hemostasis was achieved throughout the procedure with the harmonic device. Clear fluids were started on post-operative day 3 followed by solid foods on day 5. Post-operative status was unremarkable. Patient required a single dose of epidural top up analgesia on post op day 1. Patient was discharged on day 5 after surgery.

Histopathological examination of the cyst revealed no evidence of any malignant change.

DISCUSSION

CDCs are benign biliary disorders of the first decade of life, however they are also encountered in the adult counter parts (4). They occur more frequently in the Asian population (1 in 13,000) and 80% of them are constituted by type I CDCs. They have a higher female preponderance. Early classifications by Alonso Lej in 1959 considered only the extrahepatic involvement of the biliary tree, Todani revised the classification in 1977 considering the intrahepatic biliary involvement (5). Babbit proposed the hypothesis of pathogenesis of choledochal cysts and Abnormal pancreaticobiliary duct junction (APBDJ). As reported by Choi et al largest CDC documented was 23cm long and 20 cm in diameter; however, it was managed by an open laparotomy (6). Liem et al documented a case series of 74 patients with CDCs managed laparoscopically (7). They usually present clinically with a vague pain in right upper abdomen with a lump; however, the classical triad of pain, lump and jaundice is rarely seen. Early diagnosis and treatment are advised to prevent complications like recurrent cholangitis, pancreatitis, choledocholithiasis and cholangiocarcinoma.

Diagnosis is based on clinical examination, Biochemical investigations, USG, CECT and MRCP. ERCP is an ideal modality of investigation to delineate the anatomy of the pancreaticobiliary tree; however, use is limited due to the possible complications like cholangitis and pancreatitis.

Complete Excision of the cyst and a biliary-enteric anastomosis (hepaticojejunostomy or hepaticoduodenostomy) is the recommended management for type I, II and IVA cysts which can be performed by open or laparoscopic techniques. Hepatic duodenostomy is preferred to the conventional Roux-en-Y hepaticojejunostomy as the former is more physiological anastomosis, had less operative duration, easy to construct, and provides an opportunity to future endoscopic intervention (if needed) as per a study by Liam et al. As per a study by Lu et al, the operative time by Laparoscopic technique was like open approach as the learning curve improved. The mean post-operative hospital stay was found to be less in patients operated by laparoscopic technique (4.7 days) compared to open approach (8.4 days) in the same study. Less Intraoperative blood loss, enhanced

accuracy of dissection due to magnification, early post op recovery, better cosmesis and least post op pain and ventral hernias are other advantages of laparoscopic technique (8).

The percentage of the complications encountered during dissection of giant CDC as per a case series on 28 patients by Diao et al were as follows: inflammatory adhesions (8/28, 28.6%), occult perforation (3/28, 10.7%) at posterior cyst wall aggravated the adhesion with portal vein and hepatic artery, large interface between intra-pancreatic segment of CDC and pancreas requiring wide and deep dissection, in-growth of pancreatic tissue into the cyst wall obscured the border between common bile duct and pancreas (4/28, 14.3%)(5).

Indocyanine green (ICG) dye is being used in hepatobiliary surgeries since a long time. ICG demonstrates blood vessels due to its green fluorescence when the tissues are illuminated with light of wavelength of 750–800 nm, corresponding to the excitation wavelength of the dye. Pertaining to its clearance via the biliary system in unaltered form, it was first used in laparoscopic cholecystectomies to identify the cystic artery, CBD by the NIR fluorescence and thus preventing their inadvertent injury. We applied the same principle to our case. As the Cyst was found to be closely associated RHA and the GDA, it was vital part of the surgery to recognize them and avoid their iatrogenic trauma. Hence, application of ICG aided real time fluorescent imaging will help in management of giant CDCs by laparoscopic approach and prevents the complications of open surgery.

CONCLUSION

Complete choledochal cyst excision with a biliary enteric anastomosis is the most preferred management of giant type I choledochal cysts. Application of Indocyanine green aided NIR fluorescent imaging will help in managing even giant CDCs by laparoscopic approach by easy recognition of vital structures like the RHA, GDA and CHD on table and help in prevention of their inadvertent trauma during surgery. Application of ICG in many laparoscopic surgeries is a well-known fact; however, application of the same for excision of giant CDC as in this case is not known in English literature.

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