LAPAROSCOPIC MANAGEMENT OF CHOLEDOCHAL CYST: A CASE SERIES

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ABSTRACT

Background: Choledochal cysts are rare congenital anomaly, characterized by cystic dilation of the biliary tract. The disorder is primarily a pediatric disease, however can be detected in adults too. Laparoscopic complete excision of choledochal cyst with reconstruction of biliary tract is the treatment of choice. Laparoscopic hepato-duodenostomy is one of the mentioned procedures in the literature; however, laparoscopic Roux-en-Y hepatico-jejunostomy has gained wide acceptance.

Methods: From March 2016 to March 2018, we received 4 patients from our gastro-enterology department. Three of these patients were females and one was male with type-1 choledochal cyst. One of the patients was under taken for laparoscopic excision of the cyst with hepatico-duodenostomy and rest three were treated by laparoscopic excision of the cyst with Roux-en-Y hepatico-jejunostomy. We evaluated all the cases with reference to their age, sex, clinical symptoms, Todani Classification, Anomalous pancreaticobiliary duct union, operative time, complications and hospital stay. The evaluation was done by clinical history, Ultrasound, Computed Tomography Scan and magnetic resonance cholangiopancreatography.

Conclusion: Laparoscopic management of choledochal cyst is gaining popularity, as it offers all the advantages of minimal access surgery to the patient. However it should be done by the most experienced laparoscopic surgeon.

INTRODUCTION

Choledochal cyst (CC) is a rare congenital cystic dilation of the biliary tract. This disorder was first described by Vater and Ezler in 1723 [1]. Commonly a pediatric disease however can be detected in adults too. Choledochal cysts are more prevalent among Asian females and are commonly associated with anomalous pancreaticobiliary duct union (APBDU) [2, 3]. Although there are various classifications, the most common type (78%) is fusiform dilatation of the extra-hepatic bile ducts (Todani Type 1) [4]. The symptoms vary in pediatric and adult age group; the most common symptom is right upper quadrant pain, which sometimes can be accompanied by jaundice and an abdominal mass [5]. Choledochal cyst is a benign condition associated with serious complications which could include malignant transformation, cholangitis, pancreatitis, choledolithiasis and even the perforation of the cyst [6]. The fear of malignant transformation of the cyst makes them early birds for surgery. The current imaging modalities have facilitated the diagnosis at any time from antenatal to adult life. The cysto-enterostomy used to be the surgical method of choice in the olden days. However, it was associated with recurrence of symptoms and malignancy in the retained cyst. The current surgical management lies in primary cyst excision with Roux-en-Y bilio-enteric drainage done either by open or laparoscopic approach. It is beyond doubt that laparoscopic approach is recommended as the standard treatment. Laparoscopic excision of the cyst with Roux-en-Y hepatico-jejunostomy is a preferred treatment both in pediatric and adult age group. It is safe, efficacious and offers all the benefits of minimally invasive procedure to the patient [7]. It is important to understand that the surgical expertise is a big concern in performing this advanced procedure. However, to the best of our knowledge, there has been no publication addressing the learning curve of laparoscopic cyst excision in children or adults. Laparoscopic surgeon proficient in intra-corporeal suturing and stapling with good background experience of laparoscopic gastrointestinal surgery should contemplate such procedures.

MATERIAL AND METHODS

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From March 2016 to March 2018, four patients underwent laparoscopic choledochal cyst excision with bilio-enteric reconstruction. Patient 1 underwent laparoscopic choledochal cyst excision with hepatico-duodenostomy and patients 2, 3 underwent laparoscopic cyst excision with antecolic Roux-en–Y hepatico-jejunostomy. Patient 4 underwent complete cyst excision with retrocolic Roux-en–Y hepatico-jejunostomy. All these patients were referred from department of gastro-enterology to our department. These patients were evaluated for demographic profile, preoperative assessment, Todani classification, Anomalous pancreaticobiliary duct union, surgical management with reference to operative time, intra-operative and post-operative complications, conversion to open procedure, and hospital stay. All surgeries were performed by single surgeon, who had experience of more than a decade in minimal invasive surgery. The current case series was performed in the department of surgery and all the co-authors contributed to this series as the assistants to the operating surgeon and in framing up the manuscript.

Case Description

Patient 1

Patient 1 was a 40 years old female, referred from gastroenterology department with history of pain in epigastrium, radiating to back. She had no associated co-morbidity such as hypertension, Diabetes mellitus and hypothyroidism. There was no history of cholangitis. However, she had history of mild jaundice 1 year back. Her vitals were normal on examination and abdomen did not reveal any lump. Her Liver function test was reportedly normal. Ultra sonography showed type 1 choledochal cyst without any intra-hepatic biliary dilatation and MRCP confirmed it and did not reveal any abnormal pancreaticobiliary duct union. The patient was worked up for surgery. We performed laparoscopic total excision of the cyst with hepatico-duodenostomy on her. The mean operative time was about 240 minutes. There was no untoward incident or complication reported in this patient during surgery and in the post-operative period. We did not have excessive bleeding, any injury to the hepatic artery, portal vein or post-operative biliary leak. Orals were offered on third post operative day. Mean blood loss was about 100 ml and patient was discharged on the 4th post operative day.

Patient 2

She was a 25 years old unmarried female, referred from gastroenterology department again with history of pain in epigastrium, radiating to back for a period of 6 months. She had almost same presentation as patient 1 with no associated co-morbidities. However she did not have any previous history of jaundice. Ultra sonography showed type 1 choledochal cyst and MRCP confirmed it to be Type 1c choledochal cyst with intra hepatic dilatation. There was no abnormal pancreatico-biliary duct union present. This patient was under taken for laparoscopic total excision of the cyst with ante-colic Roux-en-Y hepatico-jejunostomy. The mean operative time was about 300 minutes. There was no major intra-operative complication noted and post-operative period remain uneventful. Oral intake was started at 4th post operative day. Patient was discharged on 6th post operative day. Total blood loss was 110 ml during the surgery.

Patient 3

He was a young male, 20 year old, with history of pain in the epigastrium from two months. There was no history of cholangitis, hypertension, diabetes mellitus or hypothyroidism. Liver function test was reported normal. This patient was advised ultra sonography by a local physician which picked up the type 1 choledochal cyst. MRCP was performed on him, which also showed Type 1a choledochal cyst with no intra-hepatic dilatation. CECT was performed which revealed normal hepatic parenchyma. There was no abnormal pancreatico-biliary duct union noted. The patient was worked up for surgery. Laparoscopic excision of whole cyst with ant-colic Roux-en-Y hepatico-jejunostomy was performed in this patient. The mean operative time was about 280 minutes. There was no major intra-operative complication and post-operative period was uneventful. Oral started at 4th post operative day. Patient was discharged on 6th post operative day. Total blood loss was 130 ml during the surgery.

Patient 4

She was a 30 year old married female, reported our OPD with Ultra sonography documented Type 1 choledochal cyst. The patient had a clinical presentation of pain only in the epigastrium, radiating to back. No history of jaundice, pancreatitis, cholangolithiasis noted on her. Her bilirubin, alkaline phosphates and liver enzymes were mildly raised. MRCP showed Type 1a choledochal cyst with normal intra hepatic biliary radicals. No abnormal pancreaticobiliary duct union was present. She was worked up for surgery and we did laparoscopic excision of the cyst with retro-colic Roux-en-Y hepatico-jejunostomy. The mean operative time was about 330 minutes. There was no major intra-operative complication. Post operative period was also uneventful except that patient developed port site infection which was managed by dressings. Orals started at 4th post operative day. Patient discharged on 6th post operative day. Total blood loss was 120 ml during the surgery.

Operative technique

After a thorough preoperative work up, the patients were planned for surgery. All the patients were operated under general anesthesia and the position of the patient on the operating table was the same as for laparoscopic cholecystectomy. A nasogastric tube was inserted to decompress the stomach, and a Foley catheter was inserted. We used a four-port technique. A 10 mm optical port made in the umbilicus for the camera. Two additional trocars 5 mm each inserted in the right hypochondrium and right flank were made exactly as for laparoscopic cholecystectomy. Epigastric port was made a little towards the left side, few centimeters below and to the left of abdomen from its conventional site. It was 12 mm working and stapling port in patient 2, 3, 4 except in patient 1 where a 10 mm port was only used. The right flank port was used for the retraction of gall bladder and also aided in dissection and anastomosis. This trocar was also used to insert a closed drain at a site of hepatico-jejunostomy in patient 2, 3, 4 and hepatico-duodenostomy in patient. The dissection was carried as per laparoscopic cholecystectomy. The calot’s triangle was opened precisely and the junction of cystic duct with the common hepatic duct was defined. The clips were applied to the cystic duct but was not cut with an idea to aid in
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We performed hepatico-duodenostomy. Duodenum was kocherized and mobilized to carry up to the cut end of common hepatic duct. A stay suture was used between the cut end of common hepatic duct and duodenum. A 1 cm duodunostomy was performed and anastomosis was done by using 3-0 vicryl. The posterior layer of the anastomosis was performed in an interrupted fashion and the anterior layer too was done in an interrupted fashion. A hitch stitch was used on the right of the anastomosis between the duodenum and the liver. A 32 size wide bore drain was placed beneath the anastomosis and exteriorized through the right port. The postoperative course was uneventful in all the cases and was discharged safely from the hospital with an advice to follow up in OPD at 1, 3 and 6 weeks, 6 months and 1 year.

Operative images patient 1 (hepatico-duodenostomy)

A 1 cm jejunosotomy was done by using harmonics. Posterior layer was sutured between posterior half of common hepatic duct and posterior cut margin of jejunal Roux limb by using 3-0 vicryl. The anterior layer was accomplished in a continuous suture fashion. The care was taken to make it a water tight anastomosis. A Hitch stitch was used to hitch the Roux limb with liver to avoid a dragging tension on the anastomosis. A 32 wide bore drain was placed beneath the anastomosis and exteriorized through the right flank port. However, in patient 1,
Fig 3 Choledochal cyst marked by arrow

Fig 4 Lifting of choledochal cyst from portal vein

Fig 5 The lower Tapering end of choledochal cyst being cut

Fig 6 The cut end of common hepatic duct

Fig 7 Duodenostomy marked by arrow

Fig 8 The completed Hepatico-duodenostomy

Fig 9 Specimen of Gall bladder and choledochal cyst

Operative images patients 2, 3 and 4 (roux-en-y hepatico-jejunostomy)

Fig 1 CECT showing Type 1 choledochal cyst
Fig 2 MRCP showing Type 1 choledochal cyst

Fig 3 Choledochal cyst marked by arrow

Fig 4 Transfixation of tapering end of Choledochal cyst

Fig 5 Transsection of choledochal cyst proximally

Fig 6 The cut end of common hepatic duct

Fig 7 Transection of jejunum by stapler

Fig 8 Jejuno-Jejunostomy anastomosis

Fig 9 The complete hepatico-jejunostomy
Choledochal cyst is predominantly seen in a pediatric age group, however it can present in adults too. The presentation in children is little different than in adults. Abdominal lump and perforation of the cyst are commonly seen in the pediatric age group. They can present with cholelithiasis, choledocholithiasis, pancreatitis, cholangitis, gastric outlet obstruction, cholangiocarcinoma and others. As per Alonso Lej Todani Classification there are five types of choledochal cyst and type 1 is commonest seen in around 90% of patients. Due to all these problems and complications mentioned above and the fear of cancer in the cyst, it has become mandatory to excise the cyst in toto and reconstruct the biliary pathway by biliary-enteric anastomosis. Over the period of time, open surgical methods have been rapidly invaded by laparoscopic techniques. Laparoscopic choledochal cyst excision and Roux-en-Y hepatico–jejunostomy in children is widely accepted and several studies have described the advantages of laparoscopic surgery [11]. Liem et al and Nguyen Thanh et al reported laparoscopic choledochal cyst excision and the reconstruction of the biliary tract system as a safe and effective method in a large number of choledochal cyst patients [12]. It is important to understand and mention that such procedures be carried out by the most experienced laparoscopic surgeon in an institutional centre. In this regard Diao et al [13] has impressed that a definite learning curve for the procedure is required.

DISCUSSION

Choledochal cyst is not an uncommon surgical entity; however it is commonly distributed throughout south Asian countries [8, 9,10]. The exact etiology is not known but a strong association between choledochal cyst with anomalous pancreatic biliary duct junction is an established fact. The reflux of pancreatic juice in to the CBD results in weakness and rupture of the cyst wall. Choledochal cyst is predominantly seen in a pediatric age group, however it can present in adults too. The presentation in children is little different than in adults. Abdominal lump and perforation of the cyst are commonly seen in the pediatric age group. They can present with cholelithiasis, choledocholithiasis, pancreatitis, cholangitis, gastric outlet obstruction, cholangiocarcinoma and others. As per Alonso Lej Todani Classification there are five types of choledochal cyst and type 1 is commonest seen in around 90% of patients. Due to all these problems and complications mentioned above and the fear of cancer in the cyst, it has become mandatory to excise the cyst in toto and reconstruct the biliary pathway by biliary-enteric anastomosis. Over the period of time, open surgical methods have been rapidly invaded by laparoscopic techniques. Laparoscopic choledochal cyst excision and Roux-en-Y hepatico–jejunostomy in children is widely accepted and several studies have described the advantages of laparoscopic surgery [11]. Liem et al and Nguyen Thanh et al reported laparoscopic choledochal cyst excision and the reconstruction of the biliary tract system as a safe and effective method in a large number of choledochal cyst patients [12]. It is important to understand and mention that such procedures be carried out by the most experienced laparoscopic surgeon in an institutional centre. In this regard Diao et al [13] has impressed that a definite learning curve for the procedure is required.

We feel it safe to mention that the procedure should be carried out by an experienced surgeon who is proficient in intra-corporeal suturing and stapling and has definite experience in laparoscopic intestinal surgeries. No differences in operative time were observed between the open and laparoscopic surgery groups. The abdominal cavity in pediatric patients is very small compared to that in adults which makes free use of laparoscopic instruments difficult. Laparoscopic surgery makes the hepatico-jejunostomy anastomosis more easy, but in the hands of an experienced surgeon. We feel that, it is difficult in open technique too. Here we present a series of 4 patients with favorable outcome and no conversion to open surgery. All of our patients had type 1 choledochal cyst with normal hepatic parenchyma. One of our patients was a male and rest three were females. None of them had cholangitis, pancreatitis, or CBD stone. In one of our patients laparoscopic excision of the cyst was followed by hepatico-duodenostomy and in others hepatico-jejunostomy was performed. We did not record any major intra-operative or post-operative complications in our series like duodenal injury, portal vein injury, hepatic artery injury and biliary leak. Ono et al [14] reported liver dysfunction, dilatation of the intra-hepatic bile ducts, recurrent abdominal pain and biliary tract malignancy as long term complication after choledochal cyst excision after hepatico-jejunostomy. We conclude from this short case series that laparoscopic excision of the cyst with hepatico-jejunostomy is an advantageous approach for handling this surgical disorder. It not only avoids a huge laparotomy but also helps in magnifying the operative view which helps in dissecting the whole choledochal cyst and in anastomosis too. It is a safe and feasible method with an excellent cosmetic outcome, in addition to early oral intake, early ambulation, less post operative pain and shorter hospital stay and avoiding late sequel of laparotomy like adhesion obstruction and incisional hernia. A word of caution is that...
such procedures should be permitted to be handled by the most experienced laparoscopic surgeon.

**Abbreviation**

MRCP : Magnetic Resonance Cholangiopancreaticography  
CECT : Contrast Enhanced Computed Tomography  
OPD : Out Patient Department  
LFT : Liver Function Test  
CBD : Common Bile Duct

**References**


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