Robotic transduodenal excision of duodenal duplication cyst: Case report and review

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Abstract
Duodenal duplication cysts are rare congenital anomalies that generally present with abdominal pain and vomiting or may have nonspecific symptoms. Surgical excision is the recommended treatment owing to possible complications, including malignancy. However, difficult locations like the periampullary region are problematic and major surgical procedures, for example, pancreaticoduodenectomy is necessary for total resection. These have a high complication rate resulting in a poor quality of life, especially in children and young adults. Here, we describe a case of duodenal duplication cyst managed by robotic (transduodenal) excision along with a brief review of the literature.

Keywords: Duplication, robotic, transduodenal

INTRODUCTION
Gastrointestinal (GI) duplications are congenital anomalies characterised by rarity and significant variation in presenting symptoms, signs, size and location. These may present as solid or cystic tumours, intussusception, perforation, obstruction or GI bleeding. About 2%–12% of digestive tract duplications are constituted by duodenal duplication with a prevalence of about <1/100,000 live births.[1] Duodenal duplications usually do not communicate with the intestinal lumen. Less than 30% of all cases are diagnosed in adults. Surgical resection is the preferred method of treatment for most GI duplications; however, for duodenal duplications cysts, surgical resection may be challenging because of the biliary and pancreatic ductal system in close proximity to these cysts. Although open exploration and resection has been the approach in most of the cases so far, few authors have reported the use of laparoscopy in the management of such cysts. Here, we describe a case of young female diagnosed with a duodenal duplication cyst who was managed by robotic transduodenal cyst excision and Roux-en-Y duodenojejunostomy.

CASE REPORT
A 26-year-old female presented with pain in the upper abdomen and vomiting for 3 days. There was no history of fever, jaundice, abdominal distension, hematemesis, melena or shortness of breath. On examination, her vitals were stable, with general and abdominal examinations being unremarkable. Contrast-enhanced computed tomography [Figure 1] and magnetic resonance cholangiopancreatography (MRCP) test reports (conducted prior to consulting us) suggested a cystic lesion in the duodenal wall, distal to ampulla with a duplication cyst, retained fluid in duodenal diverticulum.
or Type III choledochal cyst as differential diagnoses. The patient underwent upper GI endoscopy which revealed periampullary submucosal cystic swelling in the second part of the duodenum (D2), indicating choledochocele or duplication cyst as possible diagnoses. MRCP was repeated at our centre which established the diagnosis of duplication cyst measuring 3.2 cm × 3.7 cm × 5.2 cm in the D2. The patient was planned for surgical intervention. She underwent endoscopic retrograde cholangiopancreatography (ERCP) and common bile duct (CBD) stenting followed by robotic transduodenal duplication cyst excision and duodenojejunostomy after 2 days of ERCP.

**SURGICAL TECHNIQUE**

Initially, diagnostic laparoscopy was performed, followed by port placement (as shown in Figure 2a and docking of robotic arms. First, the gastrocolic ligament was opened, and the first and second parts of the duodenum were mobilised. This was followed by kocherisation. The first part of the duodenum (D1) was mobilised from the pancreas inferiorly [Figure 2b] and hepatoduodenal ligament superiorly. The D1 was transected at its junction with D2 using a stapler [Figure 2c]. Transected D2 was retracted up using the rubber band technique. After the initial mobilisation of medial portion of D2, the duodenum was opened on its anterior aspect, and the cyst came in view in its entirety [Figure 2d].

Posterior duodenal mucosa over the cyst was incised. The cyst was opened, and contents were suctioned off. Thereafter, the cyst was excised completely [Figure 3a] followed by the closure of the mucosa of the posterior wall with polydioxanone (PDS) 3–0 in a continuous fashion [Figure 3b]. CBD stent was removed, and two staplers were fired [Figure 3c] after taking stay sutures, thereby revising the transection margin and closing the doudenotomy. Duodenum (D2) was covered by approximating omentum to the peritoneum posteriorly [Figure 3d]. Loop of jejunum was brought up, and duodenojejunostomy was performed in end-to-side fashion using intracorporeal sutures with PDS 2–0 continuous sutures. Pneumoperitoneum was deflated after placing a drain in the subhepatic space.

Post-operatively, the patient had a normal recovery. Oral liquids were introduced on the post-operative day (POD) 2. The drain was removed on POD 5, and the patient was discharged on POD 6. Histopathology was consistent with duplication cyst of the duodenum. At 8 months of follow-up, the patient was doing fine.

**DISCUSSION**

Although considered to be more frequent in the paediatric age group, the incidence of duodenal duplication is significant in the adult age group as well. Chen et al.\(^2\) in
their meta-analysis of 47 cases reported between 1999 and 2009 found an incidence of 40.4%, 21.3% and 38.3% in the age group up to 10 years, 10–20 years and >20 years, respectively. Abdominal pain (80%) was the most common presenting complaint, and pancreatitis was the most common complication. Moreover, there are chances of neoplasia and intraoperative frozen sections of the lining epithelium and stripping of cyst mucosa have been suggested in a few reports.\(^2\)

Duodenal duplications may present as a diagnostic dilemma, with pancreatic pseudocyst being the most common misdiagnosis leading to incorrect management. Periampullary location of this entity poses a surgical challenge. Jadlowiec et al.\(^3\) reported open surgical exploration in a 59-year-old female wherein the gallbladder was removed, and a biliary Fogarty balloon catheter was inserted into the duodenum through the cystic duct to delineate the ampulla. This was followed by endoscopy. Duodenum was opened, cyst was excised and duodenojejunostomy was done after transecting the small bowel distal to ampulla. Due to complexity involved in surgery, few authors have even recommended a conservative approach towards isolated asymptotic cysts if in difficult locations.\(^4\) Complete surgical resection is the recommended treatment for duodenal duplications if their location allows it without endangering the biliopancreatic ducts. However, if important nearby structures are at risk, conservative surgical approaches, such as partial resection with mucosal stripping\(^5\) or internal marsupialization, have been proposed. Laparoscopic excision of the duodenal duplication cyst was reported by Anderson et al.\(^6\) in one of his three cases suggesting the feasibility of the procedure with smaller incisions and decreased blood loss.

In the present era, minimally invasive surgery is the gold standard for several procedures. Smaller incisions, decreased blood loss and a decrease in the surgical stress response and post-operative ileus result in enhanced recovery post-surgery. However, conventional laparoscopy has its limitations such as the restricted movement of instruments, difficult ergonomics, two-dimensional imaging and others. Robotic surgery, with the use of an articulated instrument, tremor filter and use of three-dimensional imaging tries to minimise the shortcomings of laparoscopy.

**CONCLUSION**

This report highlights the rare occurrence of a duodenal duplication cyst along with its management options. In patients presenting with abdominal symptoms with cystic structures in and around the duodenum, it should be considered as a differential diagnosis. Further, this report illustrates the feasibility of a minimally invasive approach to this condition in properly selected patients along with the application of robotics to overcome the shortcomings of conventional laparoscopy.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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