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**Laparoscopic partial cystectomy with mucosal stripping of extraluminal duodenal duplication cysts: A case report**

Byun J *et al*. Laparoscopic management of extraluminal DDC

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**Abstract**

Duodenal duplication cysts are rare congenital anomalies. Duodenal duplication in the differential diagnosis should be considered for patients who present with abdominal symptoms with cystic structures neighboring the duodenum. Here, we present a case of a duodenal duplication cyst treated with partial cystectomy with mucosal stripping performed in a laparoscopic procedure for an 8-year-old girl. Laparoscopic surgery can be considered as a treatment option for duodenal duplication cysts especially in extraluminal situations.

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**Key words**: Duodenal duplication cyst; Laparoscopic surgery; Partial cystectomy; Extraluminal situation; Children

**Core tip:** In duodenal duplication cysts, endoscopic approach has limitations in extraluminal situations. And since endoscopic internal derivation cannot remove the mucosal layer where malignancy mainly occurs, we propose that laparoscopic surgery can be considered as a treatment option for duodenal duplication cysts especially in extraluminal situations.

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**INTRODUCTION**

Duodenal duplication cysts are rare congenital anomalies, which can appear during the neonatal period or later in life depending on the degree of the gastric outlet obstruction[1]. Classical treatment for duodenal duplication cysts is total resection, but in cases requiring pancreaticoduodenectomy, less invasive approaches have been proposed[2-4]. Herein, we describe the laparoscopic technique for partial resection of duodenal duplication cysts performed in children.

**CASE REPORT**

An 8-year-old girl had suffered from intermittent abdominal pain, nausea and vomiting for 2 mo. The patient had no other underlying diseases. The abdomen was flat and no definite mass was palpable. The laboratory studies were normal. The patient did not have jaundice and had normal serum bilirubin level. The tumor markers were not checked before the surgery. Abdominal ultrasonography (US) showed 6 cm × 5 cm sized lobulated retroperitoneal cystic mass, septated between the duodenum and the pancreas. Upper gastrointestinal series (UGIS) revealed a luminal narrowing of the 2nd portion of the duodenum. (Figure 1A) Abdominal computed tomography (CT) and biliary pancreas magnetic resonance imaging (MRI) showed a multiseptated cystic mass suspected of originating from the uncinate process of the pancreas. Extra-compression from this lesion seemed to be causing the narrowing of the duodenal lumen (Figure 1B and C). Retroperitoneal lymphangioma of the pancreas was primarily suspected along with other differential diagnoses including solid and papillary epithelial neoplasms, pancreatoblastomas, unusual cystadenomas and pseudocysts of the pancreas.

Laparoscopic exploration was performed. The patient was placed in the supine position under general anesthesia and an optical umbilical port was placed under direct vision followed by 3 additional ports (Figure 2). A snake retractor (Snowden Pencer, United States) was inserted through port site 3 for liver retraction. After performing a laparoscopic Kocher maneuver, a multi-lobulated cystic mass was identified on the 2nd portion of the duodenum. The cystic mass was originated from the mesenteric border of the duodenum and adhered to the uncinate process of the pancreas (Figure 3A). Followed by adhesiolysis between the cyst and the pancreas, clear demarcation of the cystic surface was identified(Figure 3B). An arterial branch supplying the mass originating from the gastroduodenal artery was ligated with 5 mm hemoclip and divided (Figure 3C). The proximal border of the mass was easily dissected from duodenum with endo-bovie, but the distal border was directly attached to duodenal wall forming a common wall. Harmonic Scalpel (Ethicon Endo-Surgery, OH, United States) was used to resect the mass from the duodenum and the remnant mucosa was cauterized with endo-bovie. The lesion formed a common wall with the duodenum, without communication or fistula. No intra-operative complications were encountered.

The patient was discharged on postoperative day 9 without any complications. Upon histopathological review, a compatible duodenal wall with partially denuded epithelium was consistent with duodenal duplication (Figure 4).

**DISCUSSION**

Patients with duodenal duplication cysts present with recurrent nausea, vomiting, abdominal mass, abdominal distension, pancreatitis, or gastrointestinal bleeding[4,5]. Duodenal duplication can be diagnosed with various imaging modalities. The ‘‘double-layered wall’’ of the duodenum in US findings, CT, and endoscopic ultrasound (EUS) are used to reach a diagnosis of duodenal duplication[6-8]. In this case, the patient had complained of recurrent nausea and vomiting. However, in the US findings, the ‘‘double-layered wall’’ was not significant, and the lesion seemed to originate from the pancreas in the CT and MRI images. Moreover, the lesion showed multiseptations, which turned out to be the folding patterns of the cyst wall upon surgical exploration and made it difficult to distinguish from other pancreatic tumors including pancreatic lymphangioma.

The ideal treatment for duodenal duplication cysts is complete surgical resection if their location allows it without endangering the biliopancreatic ducts[4]. However, in cases of duodenal duplication cysts involving important nearby structures, for example, the pancreas or biliary ducts, major surgical procedures like pancreaticoduodenectomy may be required for total resection. Since this major procedure has a high complication rate resulting in poor quality of life especially in children, less invasive approaches, for instance partial resection or internal marsupialization, have been proposed[2-4]. We have performed partial cystectomies with mucosal stripping without a duodenotomy using laparoscopic devices. Even though, in children, a small abdominal cavity and relatively small organs have given limitations for laparoscopic approaches, compared with conventional open surgery, laparoscopic surgery is less invasive and has more cosmetic advantages if there are well experienced surgeons with the proper equipment.

Endoscopic therapy for duodenal duplication has been suggested recently for minimal invasive treatment. However, endoscopic approach has limitations in extraluminal cysts. And since endoscopic internal derivation cannot remove the mucosal layer where malignancy mainly occurs, we propose that laparoscopic surgery would be a safer method especially for extraluminal situated cases[2,9,10].

In summary, although duodenal duplication cysts are very rare, they should be considered in the differential diagnosis of a patient who presents with abdominal symptoms with cystic structures neighboring the duodenum. Laparoscopic partial cystectomy with mucosal stripping can be considered as a treatment option for duodenal duplication cysts even in children.

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**Figure 1 Images for pre-operative diagnosis.** A: Upper gastrointestinal series demonstrates luminal narrowing and displacement of the duodenum by the mass (arrow); B, C: Coronal reconstruction computer tomography image and coronal thick-slab T2-weighted image show a multiloculated cystic mass (black arrow heads) between the head of the pancreas and duodenum. The mass seems to originate from the uncinate process of the pancreas and the 2nd and 3rd portions of the duodenum are inferolaterally displaced and compressed by the mass (white arrow head).

**Figure 2** **Laparoscopic port insertion site**. 1: 12 mm optical umbilical port; 2, 4: 5 mm main working port; 3: 5 mm port for liver retraction.

**Figure** 3 **Laparoscopic procedures and intra-operative findings**. A: Laparoscopic intraoperative findings of duodenal duplication cyst after the Kocher's maneuver. Duplication cyst (white arrow head) and mesenteric side of posterior wall of duodenum (black arrow head); B: Demarcation of the mass surface after adhesiolysis. An arterial branch from gastroduodenal artery supporting the mass is also noticed; C: Resection line with Harmonic Scapel (white line).

**Figure 4 Pathologic findings of resected specimen showing duodenal wall with partially denuded epithelium (hematoxylin eosin staining,** **× 12.5).** The mucosal lining (black arrow), smooth muscle coat (black arrowhead), and glands (white arrowhead) are noticed.