Duodenal web resection via hybrid natural orifice transluminal endoscopic surgery (NOTES)

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Abstract

Congenital duodenal atresia, stenosis, and webs are a common cause of proximal obstruction in the newborn period. A variety of surgical techniques have been described for the treatment of duodenal webs. Open and laparoscopic duodenotomy with web resection have been well described; endoscopic resection has also shown to have promising success. We describe a case of a 2-year-old male with a duodenal web, which was resected via an existing gastrostomy site utilizing a modified hybrid natural orifice transluminal endoscopic surgery (NOTES).

Key Words:
Duodenal web
Single incision
NOTES

Congenital duodenal obstruction accounts for 49% of all intestinal atresias [1]. Duodenal webs are caused by a partial duodenal luminal obstruction; the reported incidence ranges from 1 in 10,000 to 1 in 40,000 [2]. Although usually diagnosed in the early newborn period, duodenal webs have been reported later in infancy and even in adulthood [3–5]. Infants and toddlers will usually present with recurrent emesis, sometimes bilious, and the inability to tolerate food. Endoscopic resection for treatment of duodenal webs has been described with much success in the pediatric population [2,6,7]. We report a case of a male infant with a duodenal web treated with a hybrid natural orifice transluminal endoscopic surgery (NOTES).

1. Case report

The patient is a 2-year-old male with Down syndrome and congenital heart disease consisting of a complete AV canal, VSD, and hypoplastic right ventricle. From birth the patient had persistent nonbilious emesis and failure to thrive. After a negative work-up for malrotation and GERD, which included an upper gastrointestinal contrast study (UGI), he underwent a laparoscopic gastrostomy tube placement at 3-weeks of age. He subsequently underwent repair of his congenital heart disease. At 29-months of age he represented with recurrent emesis and inability to tolerate oral feeds above 1–2 oz or tube feeds above 50 cc/hr. His weight at the time of representation was 11.00 kg, placing him at the 1.8 percentile on the growth curve for his age. He underwent further work-up including a repeat UGI, which was suspicious for a duodenal web near the second portion of the duodenum (Fig. 1). On retrospective review the initial UGI did not reveal any evidence of a duodenal web. To confirm the diagnosis, the patient underwent an EGD, which did confirm a duodenal web proximal to the ampulla of Vater with an opening measuring 2 mm (Fig. 2).

An incisionless resection of the duodenal web via the existing gastrostomy site utilizing a hybrid NOTES procedure was discussed and planned. Initially the plan was to use the endoscope for visualization and the gastrostomy site for instrumentation; however, visualization was inadequate with the endoscope. The gastrostomy site was therefore dilated to 12 mm and an extra small Alexis™ wound protector was inserted. A 6.5 sterile orthopedic glove was secured over the wound protector allowing for inflation and access through the fingers for the laparoscope and 3 mm instruments (Fig. 3). A 70-degree laparoscope was utilized to achieve adequate visualization of the web. A 4-French Fogarty® catheter was used to cannulate the web. The balloon was inflated and retrograde traction was placed on the web, prolapsing it toward the stomach (Fig. 4A). This allowed for safe cauterization anteriorly and laterally on the web, away from the ampulla, with a 3 mm hook cautery. With continued cauterization the balloon was popped,

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http://dx.doi.org/10.1016/j.epsc.2015.01.002
leaving a larger opening in the web. This allowed use of a Ligasure\textsuperscript{TM} to further excise the web. At the completion of the resection bile reflux was appreciated, and the distal duodenal lumen was visualized (Fig. 4B). An intraoperative CXR was obtained ruling out any evidence of free air.

At the completion of the procedure the wound protector was removed and the gastrostomy tube was replaced. The patient did well postoperatively and was discharged home on postoperative day four. He subsequently has been decanulated from his gastrostomy tube and did required closure of his gastrocutaneous fistula. At his most recent follow up visit he is tolerating oral feeds and now weights 12.90 kg, placing him at the 3rd percentile on the growth curve.

2. Discussion

Congenital duodenal obstruction in an infant is an uncommon diagnosis, of which duodenal webs are an unusual cause. Most patients will present early in life, however there are reports of patients presenting later in infancy or in adulthood [3–5]. The symptoms often include persistent emesis that is non-bilious because of the preampulary location of the web.

Over the past decades treatment of duodenal webs in infants has progressed from open duodenoduodenostomy to laparoscopic resection with duodenoplasty, and most recently to endoscopic resection [1,8]. A few reports of endoscopic balloon dilation, resection with hot biopsy forceps, insulated-tip diathermic knife, and sphincterotome have been described in the pediatric population [2,6,7].

In our case, by utilizing the previous gastrostomy site, it allowed us to use a hybrid of techniques: single incision pediatric endoscopic surgery (SIPES) and the principles of natural orifice transluminal endoscopic surgery (NOTES). This approach is minimally invasive and unlike standard laparoscopic resection, it is performed without entering the abdominal cavity or creating a duodenotomy, which can lead to further complications [8,9].

This approach offers the advantages that the techniques and instruments utilized for resection are well known to the pediatric surgeon, therefore eliminating the need for a trained endoscopist. Like other endoscopic procedures described, the ampulla of Vater was not well visualized; however, injury can be avoided by not cauterizing the medial aspect of the web.

3. Conclusion

We conclude that duodenal web resection via hybrid NOTES performed utilizing an existing gastrostomy site is an effective and safe approach. This approach avoids a trans-peritoneal operation and a duodenotomy with the inherent complications, and eliminates the need for a trained endoscopist.

Conflict of interest

The authors have no conflict of interest to disclose.
References


