Endoscopic Management of a Double Duodenal Web: A Case Report of a Rare Alimentary Anomaly

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ABSTRACT: Duodenal webs are a rare clinical entity with the presentation of a double duodenal web being exceedingly uncommon. Management of duodenal webs traditionally involves duodenal web excision with duodenoduodenostomy, which is usually performed via a laparoscopic or an open approach. We report the case of a 6-month-old child who presented with progressively worsening bilious emesis with imaging findings concerning for a duodenal web. Endoscopic evaluation was performed that identified 2 webs in the fourth portion of the duodenum. These were managed completely endoscopically with balloon dilation. Although surgery is the mainstay of treatment of duodenal webs, this patient was successfully managed by endoscopic intervention without the need for open or laparoscopic excision, which has not been previously described for double duodenal webs. This work demonstrates the safety and efficacy of endoscopic management for infants with this anomaly.

KEYWORDS: Duodenal web, double duodenal web, endoscopic web dilation, pediatric endoscopy, case report

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Introduction

Duodenal web results from an incomplete recanalization of the small bowel between 6 and 8 weeks of gestation,[1] with incidence reported between 1 in 10 000 and 1 in 40 000 live births.[2] Webs are most often localized in the second portion of the duodenum occurring in approximately 85% to 90% of cases.[1,3] The clinical presentation usually includes poor tolerance of oral feeds, post prandial non-bilious or bilious emesis depending on the level of obstruction, and failure to appropriately gain weight.[4] Surgery, including longitudinal duodenotomy with web excision and transverse closure of the duodenum, is the mainstay of treatment.

Case Presentation

A 6-month-old, otherwise healthy female who was born at full term, presented to our emergency department with a 1-month history of worsening episodes of projectile, bilious emesis. When the episodes first began, the patient would have about 1 episode a week. The patient was seen as an outpatient by her pediatrician, who recommended ranitidine for management of suspected gastroesophageal reflux. However, the episodes of emesis continued—becoming more frequent and increasingly bilious. At the time of presentation, the patient had about 3 episodes of emesis a day. She was feeding regularly with intake of about 4 ounces of breast milk every 3 hours along with some solid foods. The infant had 2 normal bowel movements a week at baseline.

Initial work-up in the emergency department included routine serum laboratory tests, which demonstrated no abnormalities. On physical examination, the patient was lethargic and fussy, but was not dehydrated. The patient's abdominal exam and vital signs were within normal limits. A nasogastric tube was placed at bedside with approximately 50 mL of bilious output. An abdominal X-ray showed significant gastric distension. Due to concerns for malrotation, the patient underwent an urgent upper gastrointestinal study with oral contrast immediately after evaluation, which demonstrated no suggestion of gastric outlet obstruction or volvulus. However, the duodenum appeared distended with contrast refluxing back into the stomach (Figure 1a). There was also delay of contrast transit with notable beaking in the third portion of the duodenum (Figure 1b). The imaging, although suggestive of a duodenal web, was not confirmatory as the typical classic radiological signs such as "double bubble," "halo," and "windsock" signs were not seen. Although clinical suspicion was highest for a duodenal web, alternative diagnoses such as annular pancreas or a partially obstructing duplication cyst were also considered. The findings were discussed with the patient's family and they were offered an exploration with an esophagogastroduodenoscopy (EGD) versus surgical exploration. The parents chose to proceed with an EGD with possible dilation of the duodenal web. The esophagus was easily intubated with a neonatal endoscope and then advanced into the stomach where a significant amount of bilious fluid was encountered. The gastric mucosa was normal in appearance. We then traversed the pylorus to enter the duodenum. The endoscope was easily advanced until the proximal aspect of the fourth portion of the duodenum, where an area of luminal narrowing that measured approximately 1 cm in diameter was found, suggestive of a duodenal web (Figure 2a). After discussion with the patient's family, the area of stenosis was dilated serially 12 times, from 6 mm (18 Fr) to 18 mm (54 Fr). Each increment was held for approximately 30 seconds (Figure 2b). Next, we used biopsy forceps to excise tissue from around the

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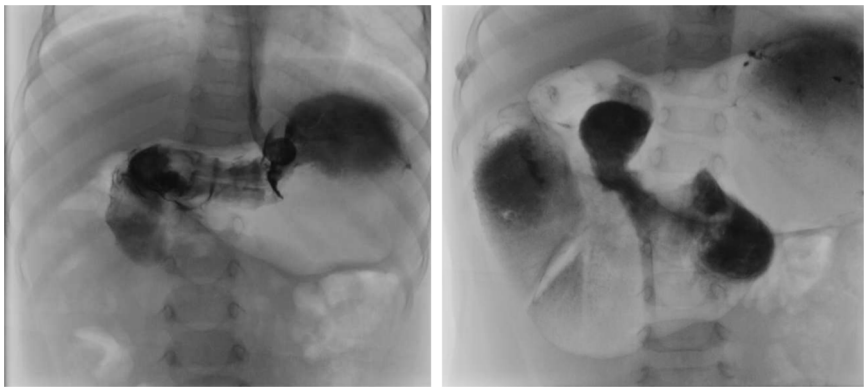


Figure 1. Upper gastrointestinal study revealing a dilated duodenum with contrast refluxing back into the stomach (a) and beaking of contrast in the third portion of the duodenum (b).

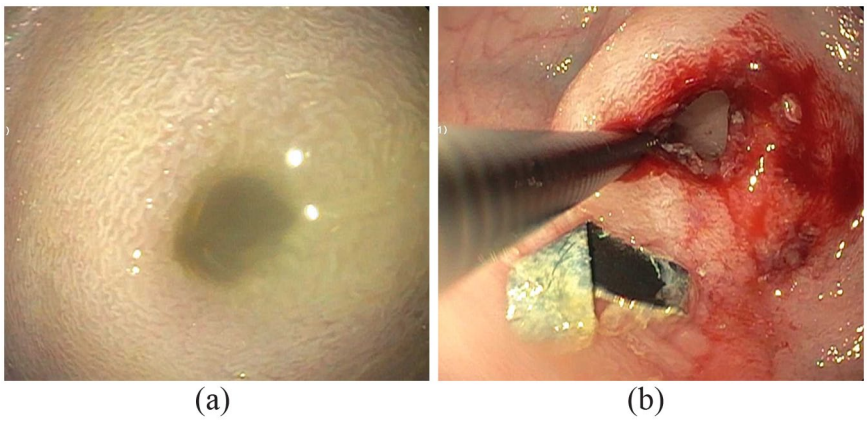


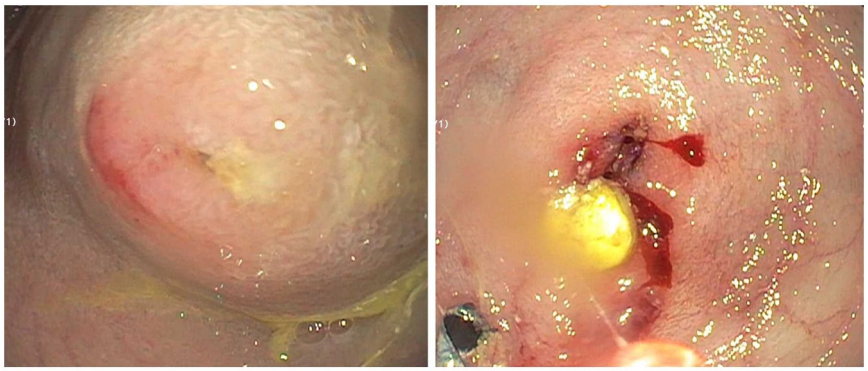
Figure 2. Pre-dilation image of the first duodenal web found in the proximal fourth portion of the duodenum (a) followed by post-dilation (b).

ring of stenosis. After the dilation, the endoscope easily traversed this area of stenosis. The remainder of the duodenum was examined. Interestingly, the patient had an additional pinpoint duodenal web in the distal fourth portion of the duodenum as well. It measured approximately 5 mm in diameter (Figure 3a). This area of stenosis was dilated serially 10 times, from 6 mm (18-Fr) to 15 mm (45-Fr; Figure 3b). Biopsy forceps were once again utilized to excise tissue from around the ring of stenosis. Upon completion, the endoscope easily passed into the jejunum. The endoscope was withdrawn back to the pylorus and advanced again to the level of the proximal jejunum to confirm that there were no additional areas of obstruction. The patient was extubated without difficulty, and she was transferred to the recovery unit in stable condition. A post-procedure abdominal radiograph demonstrated no evidence of pneumoperitoneum. The patient's postoperative course was uneventful, and she tolerated oral feeds with breast milk on postoperative day (POD) 0. The patient was discharged on POD 1. At follow-up at 18 months, the patient was continuing to gain weight appropriately.

Discussion

Although multiple case reports of patients with a duodenal web in the setting of a concomitant obstructive disease such as malrotation[2] or duodenal stenosis[5] have been noted, these are typically managed with surgery. There is a growing body of literature that suggests that these areas of stenosis can be managed safely and effectively with endoscopic dilation.[6-9] Compared to these previous works, our case, to our knowledge, is the first in the literature to describe a double duodenal web managed entirely by a endoscopic intervention without surgery, the use of electrocautery, or the need for repeat endoscopic dilations. Historically, surgery is the cornerstone of therapy for symptomatic duodenal webs. However, this approach allowed for the amelioration of this patient's disease without the need for laparotomy or laparoscopy in contrast to the management of most duodenal webs.

Typical management often includes diagnostic laparoscopy or open laparotomy with duodenoduodenostomy or duodenotomy with excision of the duodenal web.[10,11] Complications of these more invasive methods can include anastomotic leak and stenosis with open procedures, resulting in longer hospitalization, patient recovery time, and greater resource utilization.[12] Endoscopic management in our patient's case avoided the morbidity and complication profile associated with surgical resection of duodenal webs. However, there are limitations in performing a successful endoscopic recanalization of a duodenal web using this technique. The size of the child is



(a) (b)

Figure 3. Pre- (a) and post-dilation (b) images of the second duodenal web found in the distal fourth portion of the duodenum.

important to consideration as children under 5 kg will likely be precluded from endoscopic management due to inability for a child of that size to tolerate an adult endoscope.[13] A completely occlusive web would not be amenable to an endoscopic intervention alone due to the inability to pass a guidewire and safely navigate the balloon into position.

Anatomical considerations are also a concern, where duodenal webs located more distally or near the ligament of Treitz may create challenges to safely navigate the scope into position. Additionally, the use of biopsy forceps or endoscopic sphincterotome with electrocautery increases the risk of duodenal perforation or treatment failure, particularly in patients who have failed initial endoscopic management and require repeat dilations.[9] Still, in carefully selected patients this may be an ideal adjunct for addressing excess tissue not addressed during dilation and endoscopic management may lead to a decreased risk of adhesive small bowel obstructions in the future.[9,14] Furthermore, endoscopic management precludes the risk of anastomotic leaks associated with bowel resection and anastomosis.[14] To our knowledge, this is the first report of multiple duodenal webs in an infant treated by a solely endoscopic approach. Duodenal webs may be rare; however, future studies to evaluate the safety and efficacy of endoscopic management of duodenal webs compared to laparoscopic and open web excision may be considered if feasible.

Conclusion

This case represents a rare presentation of a double duodenal web. A high level of suspicion is important to identify patients appropriate for initial endoscopy instead of diagnostic laparoscopy. Careful review of salient imaging and clinical presentation will assist in identifying these patients given that patients who initially or inconsistently tolerate feeds are more likely to have a duodenal web instead of an atresia. Lastly, surgery remains a mainstay of treatment for intestinal obstructions, and an inability to address the obstruction endoscopically may require conversion to laparoscopy or laparotomy if necessary. This report demonstrates the safety and effectiveness of rare presentation of a double duodenal web managed endoscopically.

Declarations

Ethics Approval and Consent to Participate

This report was deemed exempt from review by the University of Miami Institutional Review Board. This report does not contain any personal information that could lead to the identification of the patient.

Consent for Publication

Informed consent to publish the patient's case and medical images was obtained by the patient's legal guardian. This report does not contain any personal information that could lead to the identification of the patient.

Author Contributions

Andrew Sundin: Conceptualization; Data curation; Formal analysis; Visualization; Writing—original draft. **Carlos T. Huerta:** Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing—review & editing. **Jennifer Nguyen:** Conceptualization; Data curation; Formal analysis; Project administration; Writing—original draft; Writing—review & editing. **Ann-Christina Brady:** Conceptualization; Data curation; Methodology; Supervision; Writing—review & editing. **Anthony R. Hogan:** Conceptualization; Data curation; Methodology; Supervision; Writing—review & editing. **Eduardo A. Perez:** Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing—review & editing.

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