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Successful Treatment of Recurrent Pyloric Stenosis Using Balloon Dilation

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Abstract: Infantile hypertrophic pyloric stenosis is a common surgical disease in infants, with an incidence of 2 to 5 cases per 1000 live births. It often presents with nonbilious projectile vomiting after feeding and a mid-epigastric mass in infants between the third and eighth weeks of life. Ramstedt pyloromyotomy remains the gold standard of treatment. Postoperative emesis is common; however, further evaluation for incomplete pyloromyotomy and recurrent pyloric stenosis should be conducted with prolonged, or new-onset postoperative emesis. While repeat pyloromyotomy is the standard of care for infants presenting with incomplete pyloric stenosis, treatment for the rare development of recurrent pyloric stenosis is not clearly outlined. Here, we report a successful balloon dilation procedure in an 8-week-old female with recurrent pyloric stenosis three and a half weeks after the initial laparoscopic pyloromyotomy.

Key Words: balloon dilation, infantile hypertrophic pyloric stenosis, recurrent stenosis

INTRODUCTION

Infantile hypertrophic pyloric stenosis is a common surgical disease with an incidence of 2–5 cases per 1000 live births. Currently, pyloromyotomy is the gold standard of treatment. While postoperative emesis is common, prolonged or recurrent emesis requires evaluation for incomplete pyloromyotomy and recurrent pyloric stenosis. In both situations, repeat pyloromyotomy is the usual therapy. There have been a few case reports of balloon dilation as an alternate option, with mixed results (1–4). We report a case of an 8-week-old with recurrent pyloric stenosis treated successfully with balloon dilation.

CASE REPORT

A 4-week-old full-term female presented with a 2-day history of nonbilious projectile vomiting after every feeding, lack of stools, and 380 g weight loss (10%), without response to switching from formula to Pedialyte. Vital signs remained stable, and no mass was palpable on examination. Pyloric ultrasound was consistent with pyloric stenosis, showing an elongated pyloric channel measuring 18–19 mm with muscular wall thickening measuring 5–6 mm. She underwent an uncomplicated laparoscopic pyloromyotomy and was discharged the following day. She did well without emesis and gained weight for the next 3 weeks. Approximately 3 weeks after surgery, she developed recurrent symptoms, with 3 days of nonbilious vomiting leading to dehydration requiring readmission. The physical examination was unremarkable except for signs of dehydration. Upper gastrointestinal series (Fig. 1) showed gastric distention and minimal passage of contrast into the duodenal bulb, consistent with recurrent pyloric stenosis. Pediatric surgery requested an esophagogastroduodenoscopy for further evaluation and balloon dilation, as it was felt to be less invasive. Her esophagogastroduodenoscopy demonstrated mild esophagitis and a very tight pylorus (Fig. 2). Initially, the GIF XP190N endoscope (outer diameter 5.4 mm, channel diameter 2.2 mm) was unable to traverse the pylorus. The endoscope was switched to the GIF H190 (outer diameter 9.2 mm, channel diameter 2.8 mm) to allow passage of the 2.5 mm balloons for pyloric dilation, which was performed using 8 mm, 10 mm, 12 mm, and 15 mm balloons (balloon length 5.5 cm) sequentially through the endoscope (Fig. 3). Each size was inflated for 30 seconds, with the 15-mm balloon used twice. After dilation, the pylorus was easily traversed with the GIF H190 endoscope. There was minimal bleeding and no mucosal tear. Biopsies demonstrated neutrophilic infiltration of the esophagus without eosinophils, consistent with acute esophagitis and normal stomach. She did well immediately after the endoscopy, without emesis, and was successfully discharged the next day. After discharge, she had appropriate weight gain and no further emesis.

DISCUSSION

Pyloromyotomy remains the gold standard for the treatment of infantile hypertrophic pyloric stenosis. Postoperative complications include incomplete pyloromyotomy or recurrent pyloric stenosis. An incomplete pyloromyotomy occurs with a reported incidence of around 4%. However, recurrent pyloric stenosis is extremely rare (5,6). As a result, the pathophysiology is not well understood, with some authors arguing it results from an ongoing process driving pyloric hypertrophy continuing after initial pyloromyotomy (5,6). Criteria for recurrent pyloric stenosis are defined by complete resolution of symptoms for at least 3 weeks, subsequent weight gain postsurgery, and evidence of restenosis with imaging or operative confirmation (3). We present a case of an 8-week-old female diagnosed at 4 weeks of age with pyloric stenosis, who responded well to pyloromyotomy with normal feeding and weight gain, until three and a half weeks after surgery when she was readmitted with persistent vomiting. Upper gastrointestinal showed gastric outlet obstruction and upper endoscopy stenosis of the pylorus, indicating a recurrence of pyloric stenosis. Based on diagnostic criteria found within the literature, this presentation is consistent with recurrent pyloric stenosis rather than incomplete pyloromyotomy.

Currently, repeat pyloromyotomy remains the preferred treatment option for recurrent pyloric stenosis (3,5). However, balloon dilation is an alternate option, although frequently discouraged due to unreliable results, a perceived need for multiple dilations, and concern for possible complications such as perforation and bleeding, especially with severe stenoses (4–8). Previous reports have shown variable results, leading most clinicians to recommend repeat

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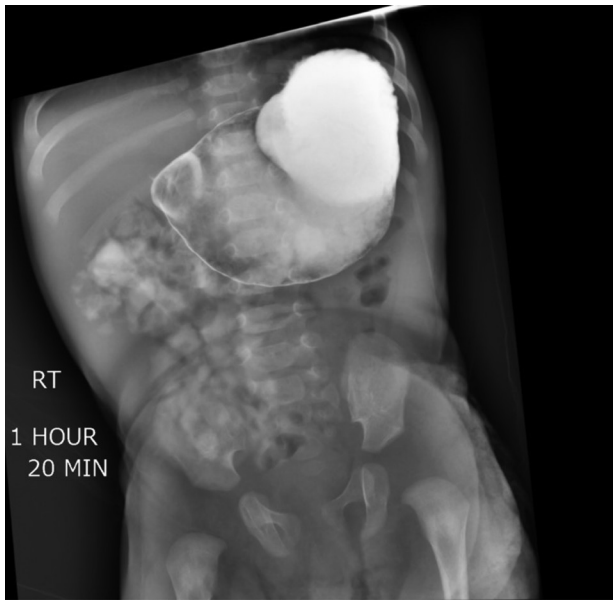

FIGURE 1. Fluoroscopy upper gastrointestinal (GI) series with small bowel. This fluoroscopy upper GI series with small bowel demonstrates severe gastric outlet with delayed passing of contents into the small bowel

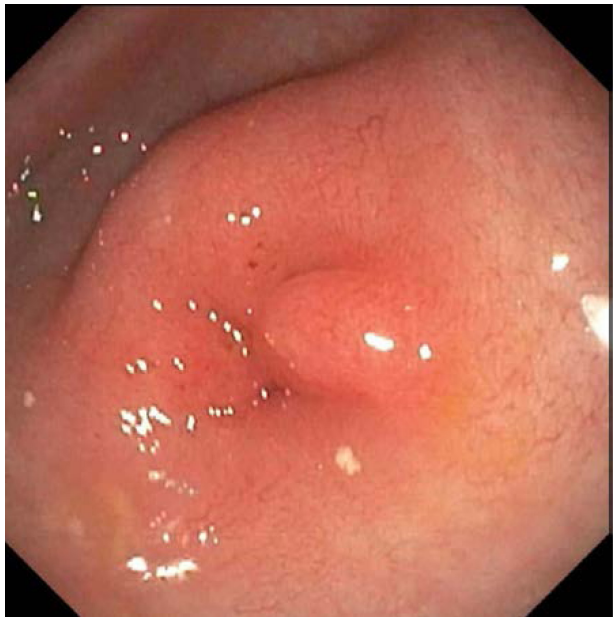

FIGURE 2. Pre-dilation esophagogastroduodenoscopy. This esophagogastroduodenoscopy shows an incredibly tight pylorus with significant occlusion of the lumen

pyloromyotomy for recurrent pyloric stenosis. In our case, surgery was requested for an upper endoscopy and balloon dilation to evaluate for other possible causes such as eosinophilic gastropathy. Their perception was that it was less invasive with fewer potential sequelae such as bleeding, perforation, adhesions, and wound infection.

It is likely that the failures of balloon dilation noted within the literature are from unstandardized protocols and using different-sized balloons. Heymans, et al (1) reported 2 cases of recurrent pyloric stenosis, both responding to fluoroscopic balloon dilation with a 15-mm

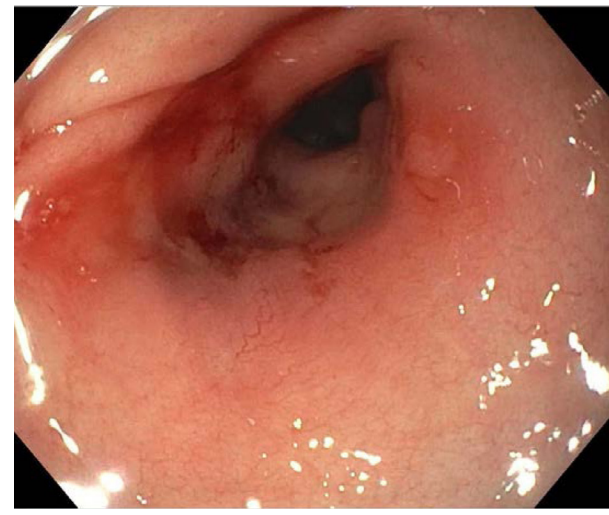

FIGURE 3. Post-balloon dilation esophagogastroduodenoscopy. This esophagogastroduodenoscopy image shows an open lumen after balloon dilation

balloon. Nasr et al (2) reported 2 cases of recurrent pyloric stenosis using balloon dilation, where only 1 case was successful. The first, unsuccessful, case used a 10-mm balloon, while the second, successful, attempt used a 15-mm balloon. Khoshoo et al (3)described 3 cases of endoscopic balloon dilatation in infants with incomplete pyloromyotomy for hypertrophic pyloric stenosis. The first infant failed dilation of 12 mm but subsequently responded to dilation of 15 mm, without complications. The next 2 cases responded to a dilation of 12 mm. The authors felt that the first case failed initial dilation due to the balloon length being inadequate based on pyloric length, as the unsuccessful dilation was performed with a 3 cm balloon, while the successful dilation used an 8 cm balloon. However, it seems more likely that balloon size was the more important factor. Ostlie et al (8) reported that a pyloromyotomy length of 2 cm is effective in preventing incomplete pyloromyotomy, suggesting a 3 cm balloon should have been effective. Prior unsuccessful reports have often not attempted a 15 mm size (2,3). We performed one procedure, dilating to 15 mm in a single setting. Reviewing prior cases, it was felt that dilating to 15 mm was necessary to ensure success; no prior cases dilating to 15 mm in one setting reported complications, and the pylorus could be evaluated for complications after each size dilator.

Our report, coupled with prior case reports, suggests that using a 15-mm pyloric balloon most often results in a successful approach. We propose that this is safe, noninvasive, and cost-effective and could be the therapy of choice in recurrent pyloric stenosis.

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