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# Pyloric Dilation

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## Abstract

Benign pyloric stenosis and gastric outlet obstruction are most commonly caused by peptic ulcer disease. Endoscopic balloon dilation of benign gastric outlet obstruction is a safe, successful, cost-effective, long-lasting alternative to surgery and should be the first-line therapy. Patients with recurrent or intractable symptoms of gastric outlet obstruction, despite multiple attempts at endoscopic dilation, should be considered for surgical intervention.

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Peptic ulcer disease is the major cause of benign gastroduodenal obstruction or gastric outlet obstruction in the adult population. Endoscopic therapy of gastrointestinal strictures has become the first line of therapy in the majority of patients thanks to the advances in endoscopic techniques and the introduction of ‘through-the-scope’ balloon-dilating catheters [1]. Success rates of 80 and 100% have been achieved without complications. Nevertheless, potential complications such as bleeding and perforation should not be ignored [2, 3]. Endoscopic balloon dilation (EBD) has been widely used for peptic ulcer disease; it is also useful for caustic-induced gastric outlet obstruction [4], for postsurgical stenosis [5] and for strictures related to Crohn’s disease [6, 7]. These cases usually require more dilations than ulcer-related strictures [4].

## Procedural Aspects

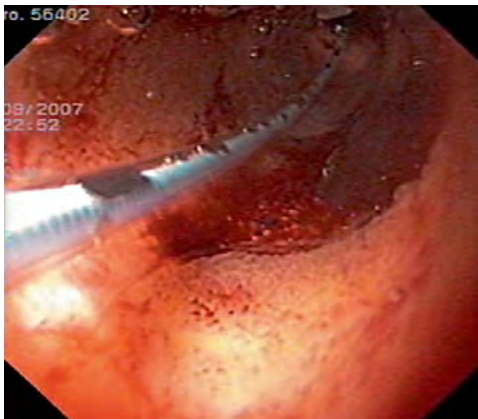
The patient is asked to fast for at least 8–12 h prior to the procedure. In case of severe outlet obstruction, the patient’s diet should be restricted to liquids at least 24 h before the procedure [1]. Upper endoscopy under conscious sedation is recommended. The stomach and pyloric channel should be carefully examined for the presence of ulcer disease, and biopsy specimens are needed for the study of *Helicobacter pylori* infection. If active ulceration is seen in the pylorus or in the duodenal bulb and always if *H. pylori* is present, we indicate a medical treatment with PPI and antibiotics prior to dilation. The degree of the pyloric stenosis can be assessed by measuring its luminal diameter in reference to the outer diameter of the endoscope and by the ability to advance the endoscope through the stricture into the distal duodenum. This may help to choose the initial size of the dilator to be used. Slim (5.9 mm outer diameter) and super-slim (4.9 mm) endoscopes (Olympus GIF-XP160 and GIF N180 respectively) are extremely useful to go



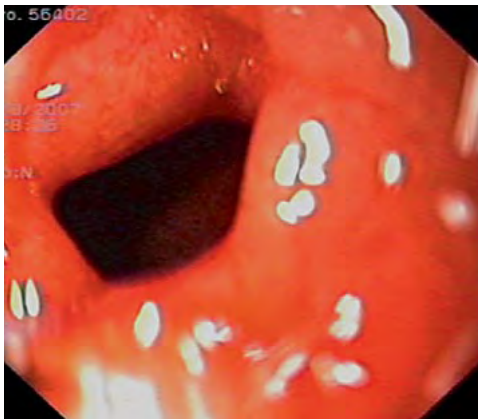
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**Fig. 1.** Endoscopic view with a slim endoscope with the guidewire introduced into the distal part of the duodenum.

**Fig. 2.** Endoscopic view of pyloric stenosis.

**Fig. 3.** Endoscopic view of an inflated through-the-scope balloon catheter properly positioned in a pyloric stricture.

**Fig. 4.** Endoscopic view of pyloric stenosis immediately after successful dilation.

**Fig. 5.** Endoscopic view of a duodenal perforation immediately after pyloric dilation.



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through the stricture, allowing the endoscopist to study the length of the stricture, to examine the duodenum and also to introduce easily the guidewire into the distal part of the duodenum (fig. 1). The most commonly balloon dilators used are the controlled radial expansion wire-guided balloon dilators (Boston Scientific Corp., Natick, Mass., USA). These balloons have a

flexible tip that minimizes the risk of perforation and they are able to deliver three distinct pressure-controlled diameters with a high degree of radial vector force at any given pressure.

Apply silicone spray to the balloon and gently rub over the entire balloon surface to ensure uniform coverage. Advance the balloon catheter into the scope using short, 2- to 3-cm movements. A guidewire is used to advance the balloon, enhancing its placement. It is possible to use a common guidewire and place it under endoscopic guidance with a slim or super-slim endoscope. Another option is to use a wire-guided balloon dilator. Once the balloon is positioned across the stricture, it is inflated with either sterile water or sterile saline by using a pressure gun, up to the pressure recommended by the manufacturer to achieve the desired diameter. This procedure is usually performed under direct endoscopic visualization (fig. 2–4), although in some cases it can also be performed under fluoroscopic guidance [6]. In this case, sterile saline mixed with a contrast agent is used. The balloon diameter should be selected by the clinical condition of the patient and by the endoscopic appearance of the stricture. The procedure is repeated in 1–2 weeks, until outlet obstruction symptoms disappear.

Studies about gastric outlet obstruction of peptic origin show a response from as low as 16% [8] to as high 88% [9], with disappearance of all the associated lesions, as reflux esophagitis and gastric ulcers [9]. Recent reports suggest that endoscopic therapy combined with *H. pylori* eradication can provide sustained relief in such patients [10–12] and there have been reports of resolution of gastric outlet obstruction after eradication of the infection [1]. In corrosive induced pyloric stenosis, intralesional steroid injections combined with EBD can be an effective treatment [13]. Cost comparisons suggest that the surgical approach to gastric outlet obstruction, with vagotomy and pyloroplasty, is approximately 10-fold higher compared with endoscopic treatment [14].

### **Limitations and Complications**

EBD for benign pyloric stenosis is usually effective and offers symptom relief in the majority of patients, however treatment failure occurs in a small group of patients [1]. Perng et al. [15] prospectively studied 42 patients with benign gastric outlet obstruction who underwent EBD in order to identify factors that predict failure of endoscopic therapy. The only statistically significant prognostic factor was the need for more than two courses of balloon dilation in order to achieve symptom relief [15]. In another study, duration of endoscopic treatment (<1 vs. >1 year) and number of dilatations (<3 vs. >3) were statistically significant prognostic factors that predicted the need for surgery [16]. Complications of EBD include perforation and bleeding. Perforation complicates the procedure in 0–12% of patients [4, 6, 9]. The incidence of perforation seems to be related to the diameter of the balloon used, increasing after 16 mm dilation [6, 12]. 15 mm may be the optimal size for dilation of a strictured gastric outlet [17].

### **Postprocedure Care**

Following dilation, as after every endoscopic dilation of the GI tract, we recommend to explore endoscopically the dilated stenosis in order to see the lesion and diagnose possible complications, such as bleeding or perforation (fig. 5). If bleeding is present, we will try to see clearly the lesion and will treat endoscopically if possible. If perforation is present, its management depends

on the size of the hole. If it is small it could be possible to close the hole with hemoclips [18] and in some cases with the combined use of hemoclips and endoloops [19]. If the perforation is too big it is better to go to surgery.

After the procedure the patient is monitored for signs and symptoms of perforation and bleeding. Afterwards the patients are allowed to take clear liquids and the diet is advanced to a regular diet as tolerated. In case of active *H. pylori* infection, appropriate antimicrobial and acid-suppressive therapy should be administered [1]. If dilation fails, symptoms frequently recur, or perforation occurs, surgery can be performed without compromising patient outcomes [17].

## Tricks

These include the following: (1) The use a slim endoscope to: (i) see the whole stenosis, (ii) pass to the second part of the duodenum, and (iii) easily pass the guidewire. (2) If *H. pylori* infection is present, previous treatment of the infection is highly recommended. (3) Do not use dilators >16 mm in order to avoid the risk of perforation. (4) Finally, explore endoscopically the treated stenosis immediately after finishing the dilation in order to diagnose without delay possible complications.

## References

- 1 Yusuf TE, Brugge WR: Endoscopic therapy of benign pyloric stenosis and gastric outlet obstruction. *Curr Opin Gastroenterol* 2006;22:570–573.
- 2 Griffin SM, Chung SC, Leung JW, Li AK: Peptic pyloric stenosis treated by endoscopic balloon dilatation. *Br J Surg* 1989;76:1147–1148.
- 3 Schmudderich W, Harloff M, Riemann JF: Through-the-scope balloon dilatation of benign pyloric stenoses. *Endoscopy* 1989;21:7–10.
- 4 Kochhar R, Dutta U, Sethy PK, Singh G, Sinha SK, Nagi B, et al: Endoscopic balloon dilation in caustic-induced chronic gastric outlet obstruction. *Gastrointest Endosc* 2009;69:800–805.
- 5 Muñoz-Navas M, García L, Macías E, Val J, Zozaya JM: Through-the-scope balloon dilatation of benign gastric outlet stenosis. Medium and long-term results. *Endoscopy* 1992;24:629–630.
- 6 Kim JH, Shin JH, Di ZH, Ko GY, Yoon HK, Sung KB, et al: Benign duodenal strictures: treatment by means of fluoroscopically guided balloon dilation. *J Vasc Interv Radiol* 2005;16:543–548.
- 7 Matsui T, Hatakeyama K, Ikeda K, Yao T, Takenaka K, Sakurai T: Long-term outcome of endoscopic balloon dilation in obstructive gastroduodenal Crohn's disease. *Endoscopy* 1997;29:640–645.
- 8 Kuwada SK, Alexander GL: Long-term outcome of endoscopic dilation of non-malignant pyloric stenosis. *Gastrointest Endosc* 1995;41:15–17.
- 9 Muñoz-Navas M, Jimenez J, Subtil JC, Betes M, Macias E, Borda F: Long-term outcome of endoscopic dilation of benign gastric outlet obstruction. *Gastrointest Endosc* 1997;45:AB97.
- 10 Kochhar R, Sethy PK, Nagi B, Wig JD: Endoscopic balloon dilatation of benign gastric outlet obstruction. *J Gastroenterol Hepatol* 2004;19:418–422.
- 11 Cherian PT, Cherian S, Singh P: Long-term follow-up of patients with gastric outlet obstruction related to peptic ulcer disease treated with endoscopic balloon dilatation and drug therapy. *Gastrointest Endosc* 2007;66:491–497.
- 12 Lam YH, Lau JY, Fung TM, Ng EK, Wong SK, Sung JJ, et al: Endoscopic balloon dilation for benign gastric outlet obstruction with or without *Helicobacter pylori* infection. *Gastrointest Endosc* 2004;60:229–233.
- 13 Kochard R, Sriram PV, Ray JD, Kumar S, Nagi B, Sing K: Intralesional steroid for corrosive induced pyloric stenosis. *Endoscopy* 1998;30:734–736.
- 14 Kozarek RA, Botoman VA, Patterson DJ: Long-term follow-up in patients who have undergone balloon dilation for gastric outlet obstruction. *Gastrointest Endosc* 1990;36:558–561.
- 15 Pong CL, Lin HJ, Lo WC, Lai CR, Guo WS, Lee SD: Characteristics of patients with benign gastric outlet obstruction requiring surgery after endoscopic balloon dilation. *Am J Gastroenterol* 1996;91:987–990.

- 16 Boylan JJ, Gradzka MI: Long-term results of endoscopic balloon dilatation for gastric outlet obstruction. *Dig Dis Sci* 1999;44:1883–1886.
- 17 DiSario JA, Fennerty MB, Tietze CC, Hutson WR, Burt RW: Endoscopic balloon dilation for ulcer-induced gastric outlet obstruction. *Am J Gastroenterol* 1994;89:868–871.
- 18 Fujii T, Ono A, Fu KI: A novel endoscopic suturing technique using a specially designed so-called '8-ring' in combination with resolution clips. *Gastrointest Endosc* 2007;66:1215–1220.
- 19 Matsuda T, Fujii T, Emura F, Kozu T, Saito Y, Ikematsu H, et al: Complete closure of a large defect after EMR of a lateral spreading colorectal tumor when using a two-channel colonoscope. *Gastrointest Endosc* 2004;60:836–838.

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