Magnetic compression anastomosis for the treatment of complete gastric outlet obstruction due to corrosive injury

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The use of magnets in endoscopy has been described for over 75 years.[1] The first experimental study of magnetic compression gastrojejunostomy was described in 1995, with the magnets introduced by means of the endoscopic technique perorally or through a gastrostomy.[2] Chopita et al[3] demonstrated the results of magnetic endoscopic gastroenteric anastomosis in humans, with a success rate of 86.6%. Other authors achieved success creating a gastroenteric anastomosis formed by magnetic compression for palliation of malignant gastric outlet obstruction. However, the concomitant use of a stent to prevent stenosis led to serious morbidity and even mortality in this study.[4]

We report a case of a 14-year-old girl who was referred to our unit for endoscopic treatment of caustic esophageal stricture and complete gastric outlet obstruction after voluntary ingestion of sodium hydroxide (lye solution). She underwent gastrostomy for gastric drainage and jejunostomy for enteral nutrition. Barium-contrast esophagogram (Fig. 1) revealed a severe, long, irregular stricture of the esophagus and complete gastric outlet obstruction. The treatment strategy was set in 2 steps: The first step was endoscopic dilation of the esophageal stricture, and the second was treatment for the gastric outlet obstruction. After 3 months of endoscopic dilation, it was possible to advance the 9.8-mm endoscope into the gastric lumen, and a complete gastric outlet obstruction was identified (Fig. 2).

The proposed treatment for the obstruction was the use of magnets as a minimally invasive approach for performing a gastric duodenal anastomosis (Fig. 3) (Video 1, available online at www.giejournal.org). One magnet was placed into the stomach and another was placed into the duodenum through the jejunostomy (Figs. 4 and 5). We

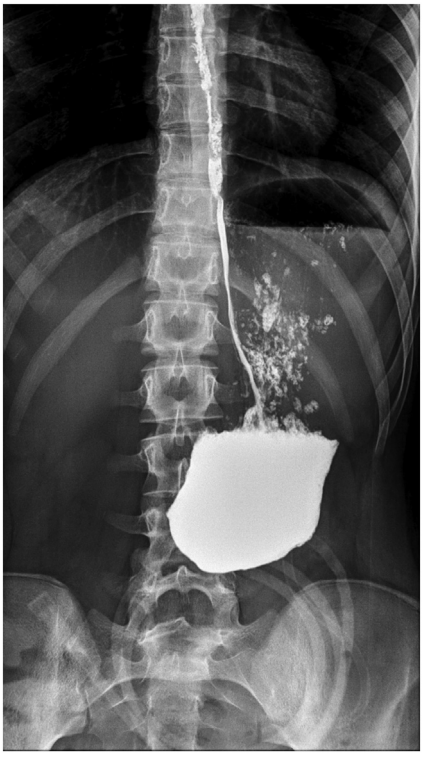

Figure 1. Barium-contrast esophagogram revealed a severe, long, irregular stricture of the esophagus and complete gastric outlet obstruction.

Figure 2. Schematic image showing complete gastric outlet obstruction.

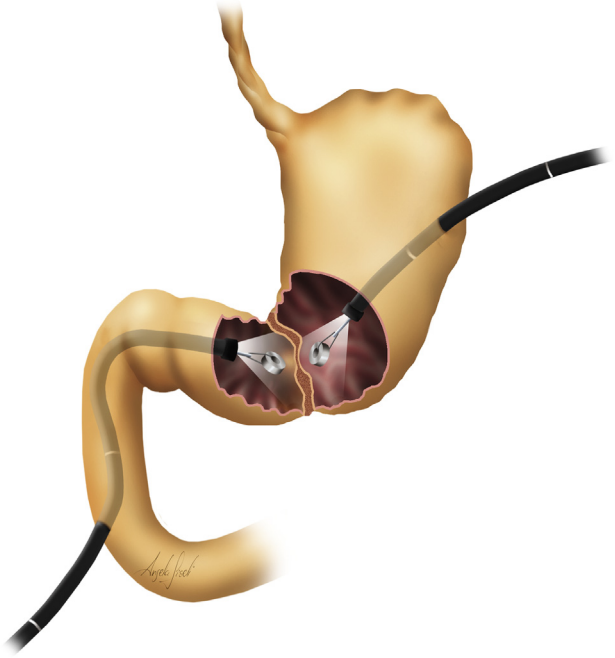

Figure 3. Illustration showing the proposed treatment for obstruction using magnets as a minimally invasive approach for gastric duodenal anastomosis.

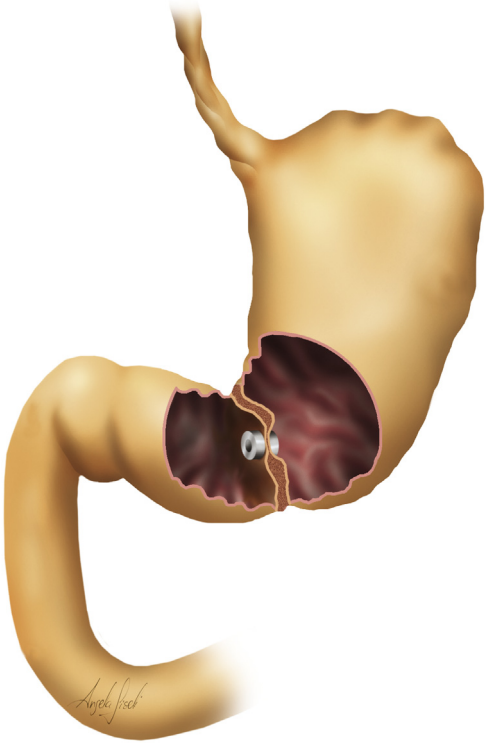

Figure 4. Schematic image showing gastric and duodenal magnets in position.

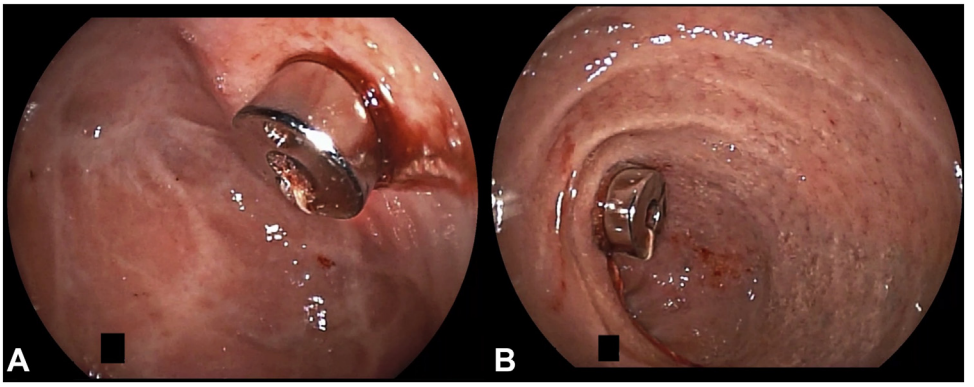

Figure 5. Endoscopic view showing **(A)** gastric magnet in position and **(B)** duodenal stump magnet in position.

prepared 2 ring-shaped 8-mm-thick neodymium magnets, 10 mm in diameter, for use in the procedure. Each magnet had a small, 3-mm hole. A silk thread was introduced into each of the holes and was tied to them to facilitate grasping with a biopsy forceps. The sterilized magnets were applied via gastrostomy (superiorly) and jejunostomy (inferiorly), using endoscopic guidance.

Dilation of the gastrostomy stoma was performed with a 16-mm bougie (Savary-Gilliard; Cook, Winston Salem, NC) to insert the magnet into the stomach, using a conventional endoscope (Eluxeo 7000, EG 590WR, Fujifilm, Tokyo, Japan). Dilation of the jejunostomy was performed through the scope with a 12-mm balloon (CRE, Boston Scientific, Marlborough, Mass) to insert the magnet into the duodenal stump by using an enteroscope (EN 530P, Fujifilm), which avoids use of an overtube.

Ten days after the procedure, an upper GI endoscopy was performed to retrieve the magnets (Fig. 6). Completion of the gastroduodenal anastomosis was confirmed, allowing a 9.8-mm endoscope to pass into the duodenum (Fig. 7). Dilation of the new lumen was performed to achieve a diameter exceeding 15 mm (CRE, Boston Scientific). Oral feeding was initiated, the patient was asymptomatic, and the gastrostomy tube was

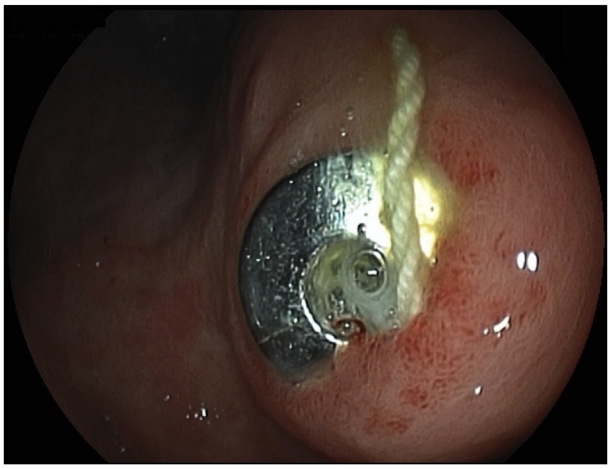

Figure 6. Endoscopic view showing a gastric magnet in position, just before retrieval.

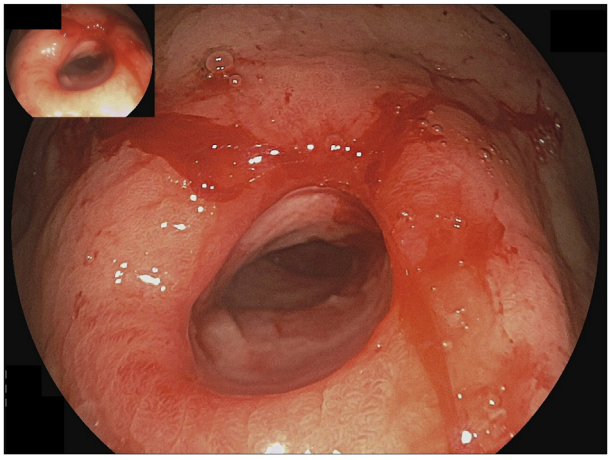

Figure 7. The complete gastroduodenostomy was confirmed, allowing a 9.8-mm endoscope to advance into the duodenum.

removed. One week later, a new upper GI endoscopy demonstrated a moderate stricture of the anastomosis. Over the course of 6 weeks, the patient underwent 6 sessions of balloon dilation to a diameter of 18 mm (CRE, Boston Scientific), until the jejunostomy tube was removed. Eighteen months after the procedure, the patient remains asymptomatic. The patency of the lumen anastomosis was endoscopically confirmed (Fig. 8).

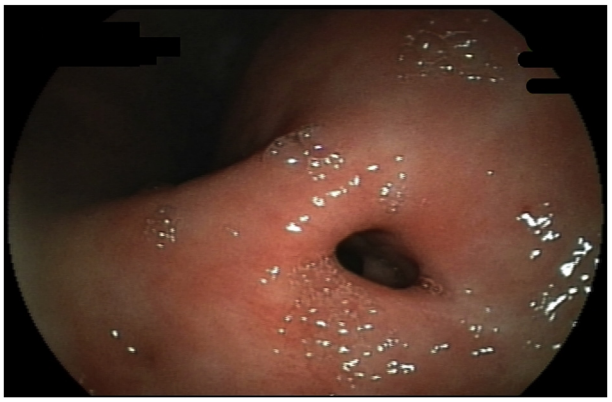

Figure 8. Final appearance of the new lumen of the anastomosis.

DISCLOSURE

All authors disclosed no financial relationships.

REFERENCES

1. Equen M. A new magnet for the removal of foreign bodies from the food and air passages. JAMA 1945;127:87-8.
2. Cope C. Creation of compression gastroenterostomy by means of the oral, percutaneous, or surgical introduction of magnets: feasibility study in swine. J Vasc Interv Radiol 1995;6:539-45.
3. Chopita N, Vaillaverde A, Cope C, et al. Endoscopic gastroenteric anastomosis using magnets. Endoscopy 2005;37:313-7.
4. van Hooft JE, Vleggaar FP, Le Moine O, et al. Endoscopic magnetic gastroenteritis anastomosis for palliation of malignant gastric outlet obstruction: a prospective multicenter study. Gastrointest Endosc 2010;72:530-5.

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