

## Case Report

# Endoscopic Stenting Only for a Duodenal Perforation: An Alternative to Conventional Surgical Repair

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Sources of Support: None. Conflicts of Interest: None.

Submitted: Sep 13, 2023; First Revision Received: Nov 16, 2023; Accepted: Dec 12, 2023

Aggarwal S, Siddiqui H, Gagen A. Endoscopic stenting only for a duodenal perforation: an alternative to conventional surgical repair. *Innov Surg Interv Med*. 2024; 4:6–8. DOI: 10.36401/ISIM-23-03.

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## ABSTRACT

Perforation of the duodenum is a rare, life-threatening complication of balloon dilation of duodenal strictures, which is managed surgically. Our case is of duodenal perforation as a complication of endoscopic balloon dilation for duodenal stricture. The perforation and stenosis were successfully managed by placement of an 18 mm × 12.3 cm WallFlex fully covered stent secured by clips to prevent migration. A follow-up endoscopy with stent removal revealed no perforation and resolution of the duodenal stricture. Our case emphasizes endoscopic stenting as an alternative to conventional surgical repair for iatrogenic duodenal perforations secondary to recurring duodenal strictures.

**Keywords:** duodenal perforation, duodenal stent, endoscopy, duodenal stricture

## INTRODUCTION

Benign duodenal strictures can occasionally cause gastric outlet obstruction (GOO). Standard of care involves stepwise balloon dilation to gradually open the lumen and relieve obstructive symptoms. A complication of this is intestinal perforation, with incidence ranging from 4.3–7.4%.<sup>[1]</sup> Upon perforation, most patients require immediate surgical intervention to limit abdominal contamination from the perforated site. However, surgical closure of perforations has associated risks, including prolonged recovery, postoperative paralytic ileus, peritonitis, and surgical site infection. With the availability and advancement in endoscopic stenting and clips, duodenal perforations may be managed endoscopically as an alternative to conventional open surgery.

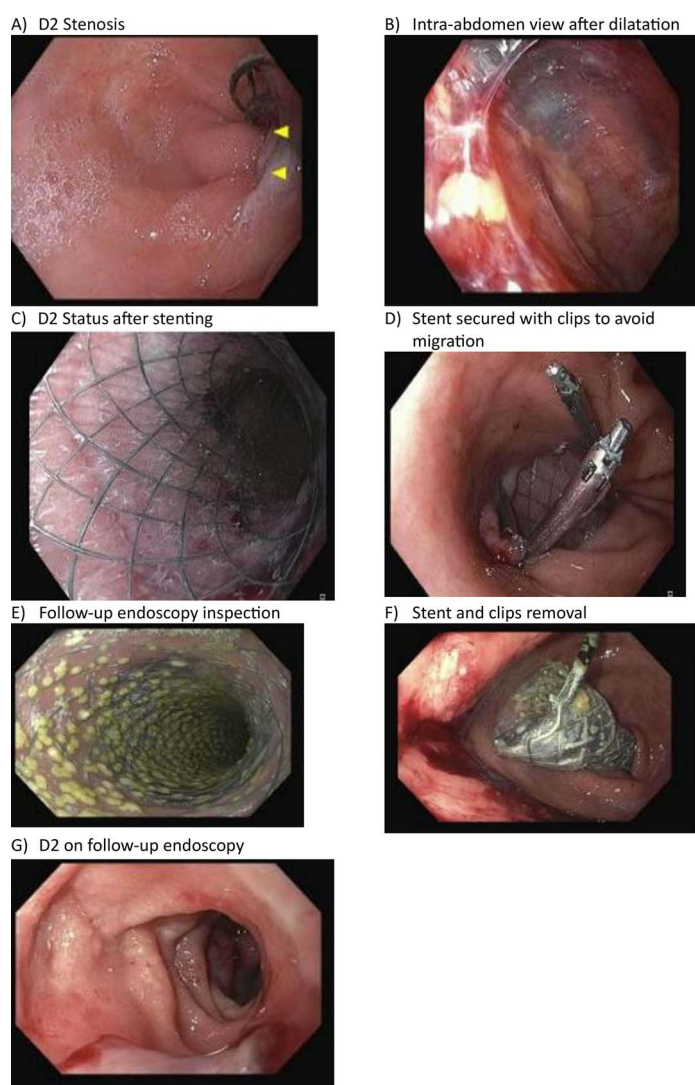
## CASE REPORT

A 93-year-old female with a past medical history of a spontaneously perforated duodenal ulcer status post open laparotomy 6 months earlier managed by open Graham patch repair, atrial fibrillation on diltiazem, and remote history of lymphoma status post chemotherapy and radiation presented with nausea, vomiting,

decreased appetite, intermittent hematemesis, and melanic stools. The patient was a lifetime nonsmoker and had no past history of *Helicobacter pylori*. Vital signs were stable. Laboratory evaluation showed a hemoglobin level of 11.0 g/dL, white blood cell count of 10.1 k/ $\mu$ L, blood urea nitrogen of 44 mg/dL, and creatinine of 1.1 mg/dL. The patient was admitted and started on 40 mg of intravenous (IV) pantoprazole, given the concerns for ongoing upper gastrointestinal bleeding. Her hemoglobin subsequently dropped to 8.2 within 24 hours. The gastroenterology team was consulted, and an esophagogastroduodenoscopy (EGD) revealed Los Angeles Grade D severe reflux esophagitis with bleeding in the lower third of the esophagus, a 3-cm hiatal hernia, a non-bleeding cratered duodenal ulcer, and a duodenal stricture in D1-D2 junction with significant scarring and fibrosis causing gastric outlet obstruction. The decision was made to dilate the stricture during this session as we hypothesized her severe esophagitis secondary to GOO and acid reflux. Biopsies of the stricture were taken before dilatation, which revealed no evidence of dysplasia or *H. pylori*. The duodenal stricture was treated with through-the-scope (TTS) balloon dilation to 13.5 mm.<sup>[2]</sup> The patient's gastric outlet obstruction scoring system (GOOSS) score was 0 preendoscopy and

dilation. The patient was started on a proton pump inhibitor twice daily. A 4-week follow-up EGD revealed Grade B esophagitis and persisted duodenal stricture, which was dilated to 16.5 mm. The patient's GOOSS score had improved from 0 to 2 to 3 after the second dilation session. The patient had a recurrence of dysphagia to solids with some nausea after a couple of weeks (GOOSS 1). A follow-up EGD revealed persistent severe stenosis at D1-D2. It was not possible to traverse using an adult gastroscope of 9.6 mm. A 0.035 guidewire was placed into the third part of the duodenum, and TTS balloon dilation to 17 mm was performed. After the withdrawal of the balloon, an inspection of the duodenal lumen revealed a small free perforation at the duodenum with visualization of abdominal/retroperitoneal fat from that area with endoscopy. Immediately, the guidewire was mobilized deep into the jejunum, and a fully covered TTS esophageal-type stent (18 mm × 12.3 mm WallFlex fully covered; Boston Scientific) was placed under endoscopy. A second look via gastroscope confirmed the proper stent position. Three resolution clips (Boston Scientific) were placed at the proximal edge of the stent and fixed to the prepyloric area to avoid migration. No bleeding occurred during or at the end of the procedure. The patient was afebrile with stable vital signs and a nontoxic appearance. She was placed on 4.5 mg of piperacillin and tazobactam for anaerobic and gram-negative coverage and admitted inpatient for close observation. General surgery was consulted, and a nasogastric (NG) tube trial was recommended. An NG tube was placed for gastric decompression and suctioning. A postprocedure computed tomography (CT) scan of the abdomen and pelvis with oral and IV contrast revealed pneumoperitoneum and a small amount of free fluid within the right upper quadrant. No extraluminal enteric contrast was visualized to indicate a persistent leak.

The NG tube was removed 2 days after the procedure, and the patient began a clear liquid diet. She was subsequently discharged with close follow-up. Her GOOSS score was 3 at the time of discharge. A repeat EGD 6 weeks later demonstrated a metal stent in the prepyloric region traversing the pyloric channel down to the duodenal bulb and the distal end within the third portion of the duodenum. Stent removal was accomplished by slowly withdrawing on the proximal end using rat-toothed forceps with no fluoroscopy or over the tube. Segmental moderate inflammation characterized by shallow ulcerations was found in the second portion of the duodenum, where the stent was located from mesh irritation. The lumen remained widely open without the initial duodenal stricture or further strictures (Fig. 1). The duodenal bulb and second portion of the duodenum were injected with contrast using an endoscopic retrograde cholangiopancreatography ball-tip cannula and no extravasation of contrast was appreciated (Fig. 2).



**Figure 1.** Endoscopic images (A–G) show the procedure for stenosis resolution.

On 1-year follow-up, the patient reported no trouble with dysphagia, nausea, or vomiting (GOOSS score 3) since the stent removal. The patient consented to the publication of this case.

## DISCUSSION

Endoscopic balloon dilation is a potential treatment in the management of benign duodenal strictures. There is no consensus on the endpoint of balloon dilation, but wider diameters are associated with a greater risk of perforation. Some experts recommend dilation under fluoroscopy, but it is not always practiced because of the requirement for a fluoroscopy room and equipment. After dilation, the lumen should be assessed for excessive bleeding or perforation. In our case, retroperitoneal fat was immediately visualized, indicating intestinal perforation.

Though conventional open surgery has been the standard treatment for iatrogenic duodenal perforations, it is



**Figure 2.** Intraoperative fluoroscopic spot images over the upper abdomen show an endoscope in place, presumably within the stomach. The stent is seen on the initial images but not on subsequent images when the contrast injection opacifies the small bowel, presumably the duodenum, correlating with the intraoperative procedure.

associated with several risks, and nonsurgical methods to treat duodenal perforation vary. Tringali et al<sup>[3]</sup> reported successful self-expandable metallic stent treatment in patients with pyloric stenosis who failed to respond to balloon dilation or surgery with no recurrence of stenosis. Matsuoko et al<sup>[4]</sup> reported successfully managing an acute duodenal perforation during an endoscopic ultrasound using endoclips and polyglycolic acid sheets with fibrin glue. Holm et al<sup>[5]</sup> reported a perforated duodenal ulcer that was initially managed with a Graham patch, but later a partially covered duodenal stent was placed because of significant abdominal drainage. In our case, the patient's duodenal perforation was treated only with a fully covered esophageal-type metal stent. Over-the-scope clips or through-the-scope clips were not used, given the fibrosis and scarring around the perforation site from her stricture and previous perforation 6 months ago.

In conclusion, we believe that stent placement may provide an alternative to surgery for iatrogenic duodenal perforations as a complication of balloon dilation. In our case, the fully covered metal stent served the following dual purpose: To tamponade the perforation to allow healing and the resolution of the patient's severe duodenal stricture causing GOO. However, close surveillance is necessary after this intervention to ensure that stent stenosis, stent migration, or additional perforation does not occur.<sup>[6]</sup> Noninvasive measures to manage duodenal perforation may be associated with lower risks of postoperative complications, faster recovery, and decreased length of stay compared with open surgery. However, further studies may be needed to compare the two practices measuring these endpoints.

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