

CASE REPORT

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Endoscopic Management of Gastrointestinal Leaks and Perforation with Polyglycolic Acid Sheets

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Gastrointestinal (GI) leakage, fistulae, and perforations can be serious and life threatening. There has been a paradigm shift in the management approach of these conditions, from surgical to conservative, including endoscopic management. Here, we report two cases of endoscopic closure of a GI fistula and perforation using polyglycolic acid (PGA) sheets with fibrin glue. The first case is of an anastomotic leak detected after subtotal gastrectomy with gastroduodenostomy. After failed application of endoclips, a PGA sheet was applied, and the fistula was successfully closed. The second case was of a 15-mm large perforated gastric ulcer, which was also successfully closed with a PGA sheet. This is the first case report that PGA sheet was used for the treatment of overt perforation. The outcome of these cases suggests that endoscopic closure using PGA sheets can be considered as a useful alternative for the management of GI leakage, fistulae, and perforations. **Clin Endosc 2017;50:293-296**

Key Words: Fistula; Leakage; Perforation; Polyglycolic acid; Closure

INTRODUCTION

Polyglycolic acid (PGA) sheet is a bio-absorbable suture reinforcement material that has numerous uses in surgery, from closing pulmonary fistulae in lung surgery to preventing bile and pancreatic juice leakage after hepatic and pancreatic surgery.¹⁻³ Previous reports have shown that the use of PGA sheets with fibrin glue to cover open wounds after oropharyngeal surgery could help prevent scar contracture.⁴

In recent studies, PGA sheets with fibrin glue were used endoscopically on an ulcer that developed after endoscopic submucosal dissection (ESD), to prevent perforation of the duodenum and colon.^{5,6} Takimoto et al. reported a novel endoscopic tissue shielding method using PGA sheets with

fibrin glue (Beriplast P Combi-Set, CSL, Behring Pharma, Pennsylvania, USA) to prevent delayed duodenal perforation after duodenal ESD.⁵ Attempts to prevent post-ESD stricture by application of a PGA sheet onto post-ESD scars were reported to be beneficial.⁷

However, no studies have evaluated the use of PGA sheets as the primary treatment for the overt perforation of gastric ulcers or as the material for closing anastomotic leaks with the help of flexible gastrointestinal (GI) endoscopy. Here, we report two cases, one of anastomotic leakage and another of perforated gastric ulcer, that were successfully managed using PGA sheets in combination with fibrin glue and endoclips.

CASE REPORTS

Case 1

A 51-year-old man underwent radical subtotal gastrectomy with gastroduodenostomy for gastric adenocarcinoma. After surgery, he experienced daily febrile spikes starting from the first postoperative day (POD), and abdominal pain. Duodenoscopy and fluoroscopy using a water-soluble contrast medium (Gastrografin, Bracco Diagnostics Inc., Monroe Town-

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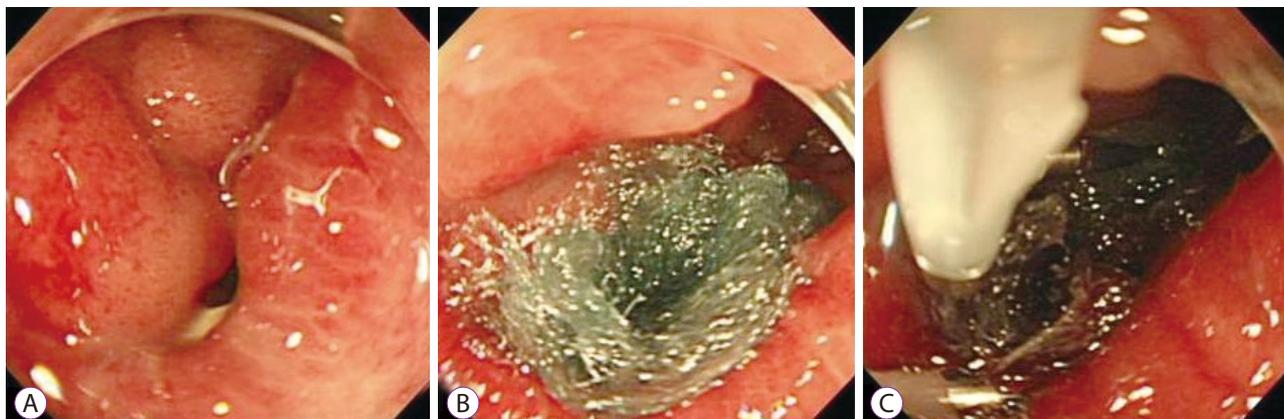


Fig. 1. Endoscopic views after endoscopic closure of the fistula. (A) A fistula after endoscopic closure using endoclips and fibrin glue. Endoclips and fibrin glue applied in the previous endoscopy have disappeared. (B) The polyglycolic acid (PGA) sheet placed to cover the fistula and (C) The fistula covered by the PGA sheet and fibrin glue.

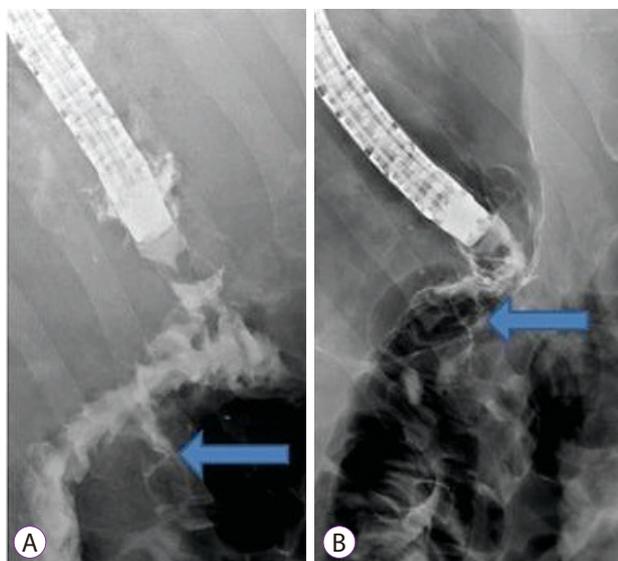


Fig. 2. Fluoroscopic views showing. (A) leakage before closure of the fistula. (B) No leakage of dye after closure of the fistula using polyglycolic acid (PGA) sheet.

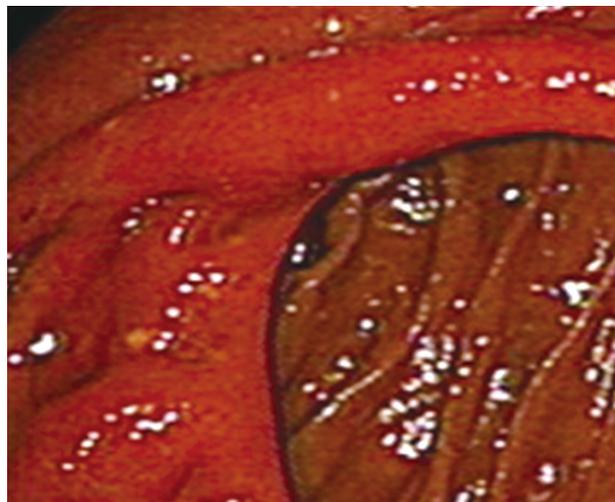


Fig. 3. Endoscopic view of closure of the fistula 2 months after endoscopic closure.

ship, NJ, USA) was performed on POD 8, which revealed an anastomotic leak due to fistula. Endoscopic clip (EZ Clip, Olympus, Tokyo, Japan) closure and fibrin glue application were initially attempted to close the fistula. However, the abdominal pain and fever did not subside after the procedure. On POD 14, upper GI series using fluoroscopy was performed to reveal the leakage again. Endoscopy performed on the following day (POD 15) revealed that the endoclips and fibrin glue applied in the previous session had disappeared, and the opening of the fistula was observed (Fig. 1A).

Pieces of PGA sheets were orally inserted via the endoscope into the site of the fistula. The overtube was inserted to deliver the PGA sheet, which was larger than the biopsy channel. The cap was attached to the tip of the endoscope.

The end of the PGA sheets was held using biopsy forceps, and the rest of the unfolded PGA sheets were wrapped around the endoscope. Subsequently, the endoscope with the PGA sheets was inserted into the site of the fistula via the overtube. PGA sheets were applied to completely cover the fistula, and they were affixed with three endoclips and fibrin glue (Fig. 1B, C). Fluoroscopy performed after this procedure revealed no contrast leak (Fig. 2).

After the procedure, the patient took sips of water for the next day, followed by liquid diet for the next 2 days and soft diet for the next 2 days. He was discharged 5 days after the procedure and was followed up on an outpatient basis 3 weeks after the procedure to check his laboratory findings and symptoms. Two months after the procedure, the patient underwent follow-up endoscopy, which showed successful closure of the fistula (Fig. 3). Abdominal computed tomography (CT) performed 6 months after the procedure showed no sign

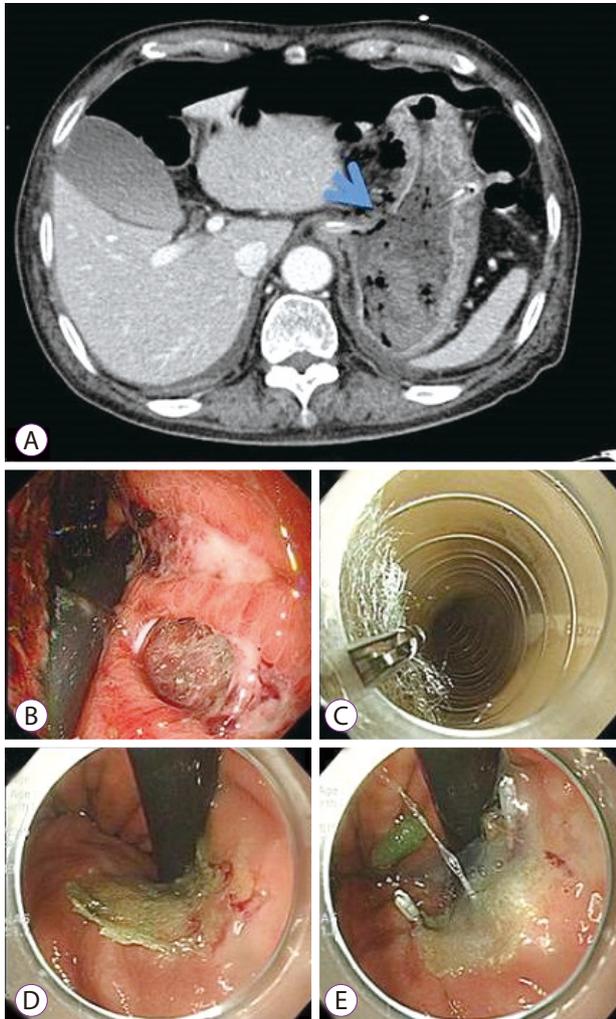


Fig. 4. (A) Abdominal–pelvic computed tomography (CT) showing gastric perforation. (B) Endoscopic view showing the 15-mm perforated ulcer at the lesser curvature. (C) Polyglycolic acid (PGA) sheet delivered to the perforation site using an overtube. (D) PGA sheet applied on the perforation site; (E) Endoclips applied at the edge of the PGA sheet for strong adherence, and fibrin glue applied.

of leakage or inflammation around the previous fistula site.

Case 2

An 83-year-old man with hypertension, diabetes mellitus, and coronary arterial occlusive disease presented with complaints of melena and hematemesis. The patient was taking aspirin for coronary arterial occlusive disease. Abdominal plain radiography showed free air above the liver, and abdominal–pelvic CT showed intraperitoneal free air, suggesting perforation of the GI tract. CT image revealed that the site of perforation was at the lesser curvature of the stomach (Fig. 4A). Surgical management routinely performed for perforated gastric ulcer was initially considered. However, surgery could not be performed owing to the advanced age and comorbidities of the patient, so he had to be managed conservatively.



Fig. 5. Endoscopic view showing successful closure of the perforation.

Endoscopy revealed a 15-mm large perforated ulcer at the lesser curvature of the stomach (Fig. 4B).

PGA sheets cut slightly larger than the perforation site were delivered to the perforation site via the overtube (Fig. 4C, D). The delivery method was the same as that in our first case. The sheets were affixed to the perforation site by using four endoclips and fibrin glue (Fig. 4E).

The laboratory findings and clinical signs of the patient improved from after the endoscopic closure. Intravenous proton pump inhibitor and antibiotics were administered with nil per os for 5 days following the procedure. Follow-up endoscopy performed 12 days after the procedure showed complete closure of the perforation (Fig. 5). Therefore, the patient was started on a liquid diet. Gradually, his diet was built up to a general diet, and he was discharged from the hospital on POD 17.

DISCUSSION

Surgical treatment has been the mainstay for the management of GI leakage resulting from perforations, fistulae, or anastomotic dehiscence.

However, endoscopic treatments using various tools such as endoclips, fibrin glue, and fully covered stents are being increasingly used for small-sized leaks and fistulae as less invasive alternatives to surgery.^{8–12} Moreover, in the era of minimally invasive surgery, the need for endoscopic management is increasing. In particular, epithelialization is aided by the endoscopic use of surgical materials. The use of new endoscopic closure devices such as the endoscopic suturing system and over-the-scope clip allows endoscopists to expand the indications of endoscopic treatment.^{9,13}

The PGA sheet is a bio-absorbable synthetic polymer that

enhances the strength of sutures and is widely used in surgical procedures such as pulmonary fistula repair and pancreatic fistula repair.^{1,2} When PGA sheets are affixed with fibrin glue, they strongly adhere to the wound area, and sutures are rendered unnecessary. Yonezawa et al. conducted an experiment involving rabbits and showed that PGA sheets combined with fibrin glue aided in early epithelialization.¹⁴ In oral surgery, when a primary closure is inadequate for large mucosal defects, PGA sheets are used for better healing outcomes.⁴ PGA sheets have also been used in the endoscopic field for preventing delayed perforation of the duodenum after duodenal ESD for duodenal neoplasms.⁵

So far, there have been several case reports on endoscopic procedures using PGA sheets. However, no study has specified the protocol of PGA sheet in detail. In our cases, PGA sheets were applied to close an overt fistula and to repair a perforation.

In Case 1, an anastomotic leak and complex fistula developed following gastrectomy and gastroduodenostomy for gastric adenocarcinoma. Initial attempts of endoscopic clip closure with fibrin glue were ineffective. Therefore, PGA sheets were applied, and the leak was successfully closed. The outcomes of this case show the feasibility of using PGA sheets with fibrin glue as a potential endoscopic measure for closing the GI fistula. It is probable that the mucosa surrounding the fistula was inflamed and not sufficiently robust for the endoscopic clip closure. However, if PGA sheets are used to cover the lesion and its surrounding tissue, clips and fibrin glue can be applied to the healthy mucosa, and the inflamed mucosa can be avoided.

In Case 2, the patient, aged 81 years, had coronary artery disease, and a 15-mm large ulcer. Advanced age, concomitant diseases, and large size of the perforation are risk factors that determine the postoperative mortality and morbidity of perforated ulcers.¹⁵ Therefore, surgery was not performed. Instead, endoscopic closure was attempted, and a PGA sheet was applied, as the size of the perforation was too large to expect spontaneous closure. Successful closure of the perforation was achieved, which was attributed to the supportive care and the accelerated early epithelialization caused by the PGA sheets. The patient required a short hospital stay and was discharged soon after the endoscopic procedure. The outcomes of this case suggest that endoscopic closure of perforated ulcers by using PGA sheets in combination with fibrin glue and endoclips can be considered as a useful alternative for the management of perforated ulcers.

We hope that our experiences with PGA sheets will provide

a useful reference in the endoscopic management of GI leakage, fistulae, and perforation.

Conflicts of Interest

The authors have no financial conflicts of interest.

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