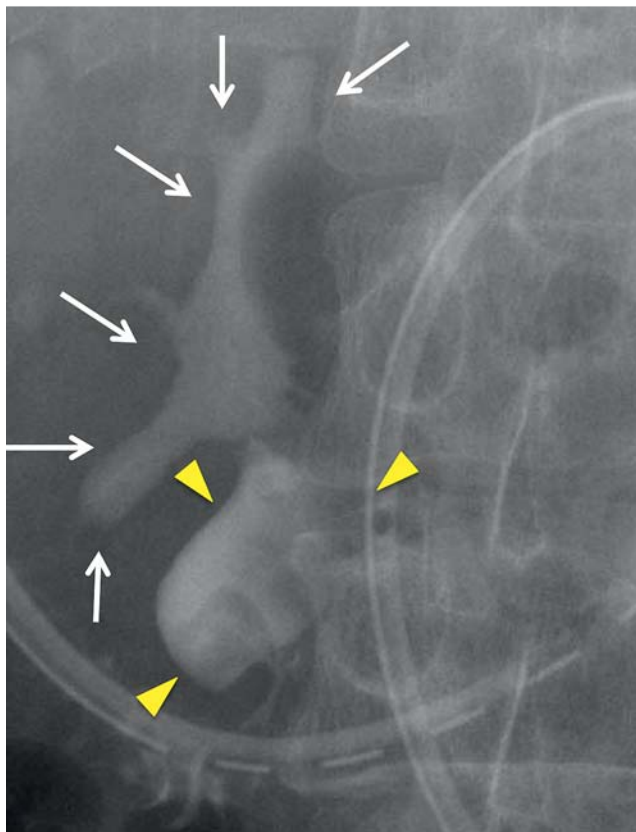


## Double-balloon enteroscopy-assisted closure of perforated duodenal diverticulum using polyglycolic acid sheets

Polyglycolic acid (PGA) sheets and fibrin glue adhere firmly and for a long time, are naturally absorbable, and are used in various fields, including endoscopic therapy [1–8]. We report a case of perforation of a duodenal diverticulum that was treated with an endoscopic tissue-shielding method using PGA sheets and fibrin glue. A 58-year-old man was hospitalized in the nephrology department of our hospital for exacerbation of chronic renal failure due to lupus nephritis. He developed a sudden onset of severe abdominal and back pain, and an abdominal computed tomography (CT) scan showed free air in the retroperitoneum. We diagnosed a perforated diverticulum of the third portion of the duodenum.

We used an elemental diet tube to reduce the gastrointestinal (GI) pressure without surgery. However, leakage of contrast medium into the retroperitoneum was demonstrated by upper GI tract radiography (● Fig. 1). We decided that it would not be possible to conservatively treat the duodenal perforation and therefore opted to perform endoscopic tissue shielding using PGA (Neoveil; Gunze, Kyoto, Japan) sheets and fibrin glue (Bolheal; Kaketsuken, Kumamoto, Japan).

We used double-balloon endoscopy (EC-450BI; Fujifilm, Tokyo, Japan) to approach the diverticulum in the third portion of the duodenum. A 100×100-mm PGA sheet was cut into 20×10-mm pieces, which were held with a biopsy forceps and delivered to the duodenal diverticulum through the channel of the scope. Once the lesion had been covered sufficiently



**Fig. 1** Gastrointestinal tract radiography showing the duodenal diverticulum (yellow arrowheads) and leakage of contrast medium (white arrows) from the ED tube into the retroperitoneum.

with several PGA sheets, the fibrin sealant Bolheal was applied. First, 3 mL of solution A (fibrinogen) was applied using a catheter (PR-104Q; Olympus, Tokyo, Japan), then the same type of catheter was used to spray 3 mL of solution B (thrombin) onto the sheets to fix them to the duodenal diverticulum (● Fig. 2; ● Video 1). Leakage of contrast medium into the retroperitoneum disappeared after the endoscopic therapy (● Fig. 3). This method may be useful for diverticular perforation of the GI tract.

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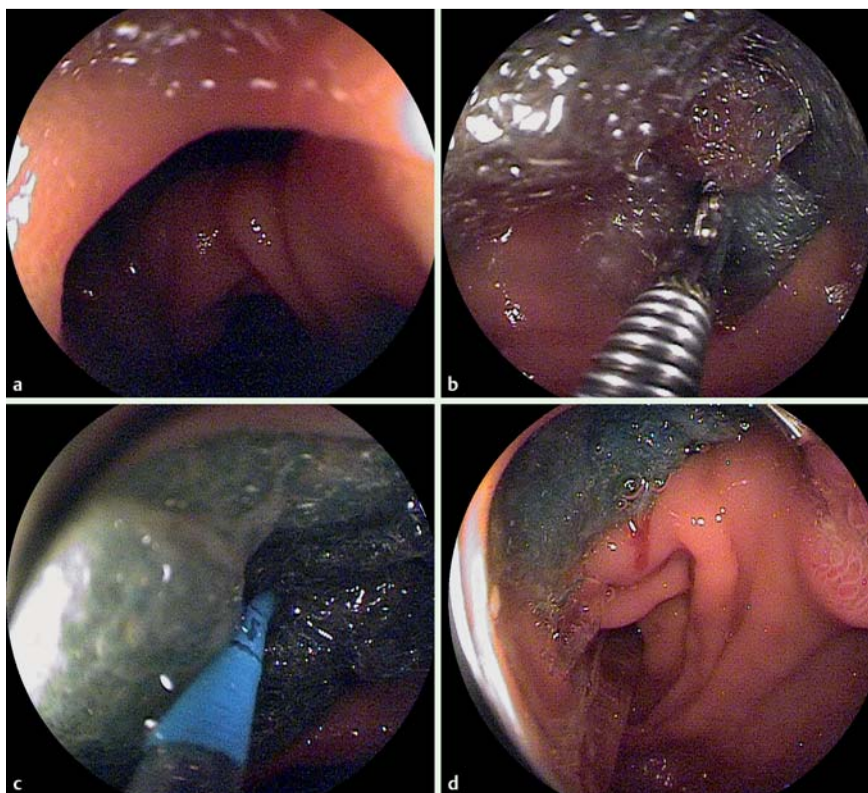
**Competing interests:** None

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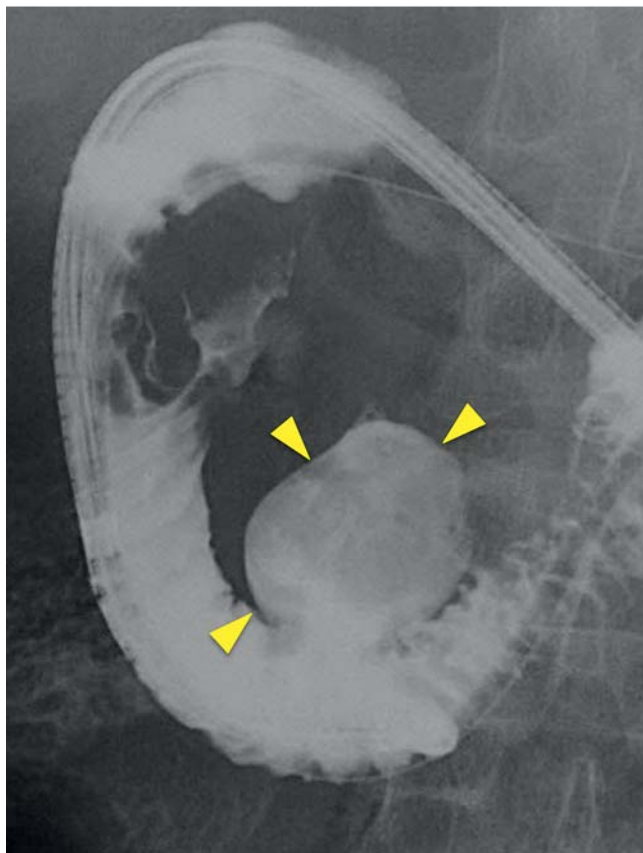
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### Video 1

A perforated duodenal diverticulum being treated by endoscopic tissue shielding using polyglycolic acid (PGA) sheets and fibrin glue.



**Fig. 2** Endoscopic images showing: **a** the opening of the duodenal diverticulum; **b** a 20×10-mm piece of polyglycolic acid (PGA) sheet being delivered to the duodenal diverticulum by biopsy forceps; **c** solution A (fibrinogen) of the fibrin glue solution being applied using a spray tube pressed against the sheets; **d** the PGA sheets fixed to the duodenal diverticulum by the fibrin glue solution.



**Fig. 3** Gastrointestinal tract radiography 3 weeks later showing that there was no further leakage of contrast medium into the retroperitoneum from the duodenal diverticulum (yellow arrowheads).

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