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Prevention of post-ESD bleeding using sprayed tissue adhesive for massive early gastric cancer: a case report

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Abstract

Endoscopic submucosal dissection (ESD) offers a minimally invasive yet curative treatment for patients with early gastric cancer (EGC), but hemorrhage during ESD procedures is almost inevitable, particularly in large-size lesions with large mucosal defects, where traditional hemostatic methods do not work well. Here we report a case of innovatively spraying tissue adhesive to prevent postoperative bleeding in a large-size and widely-involved EGC lesion after gastric ESD.

Keywords: Early Gastric Cancer, Endoscopic Submucosal Dissection, Endoscopic tissue adhesive, Postoperative hemorrhage

Introduction

Early gastric cancer (EGC) refers to gastric malignancies that are confined to the mucosa or submucosa, irrespective of lymph node metastasis[1,2]. Endoscopic submucosal dissection (ESD) furnishes the benefit of en-bloc removal and provides the histological evidence to confirm curative resection and is currently particularly pivotal for the management of such early lesions[3]. However, high technical expertise is required for conducting ESD, as ESD is quite complicated to perform and requires a high level of skill, and also may lead to various complications like hemorrhage and perforation[4]. Hemorrhage during ESD procedures is almost inevitable, particularly in large-size lesions with large mucosal defects[5], where traditional methods such as titanium clips and nylon strings do not work well. Thus the appropriate management of hemostasis during the procedure is extremely important for the safe performance of ESD. Here we report a case of spraying tissue adhesive to hemostasis and prevent delayed bleeding in a large-size and widely-involved EGC lesion after gastric ESD.

Case presentation

A 59-year-old male patient referred to our hospital complaining of paroxysmal dull pain and discomfort in the upper abdomen for 2 years, with occasional acid regurgitation and nausea. All other physical examinations and medical history were essentially normal. The laboratory findings, including complete blood count, liver function test, electrolyte and serum creatinine measurements, as well as coagulation system and electrocardiogram (ECG) revealed no abnormalities, computed tomography (CT) of the abdomen did not reveal abnormal.

Diagnostic Electronic endoscopy examination was conducted and showed a patchy mucosal roughness and edema on the near lesser curvature side of the middle and lower posterior walls of the stomach, extending to the posterior wall of the gastric angle. Multiple point biopsies were performed for pathological examination, and histopathology confirmed low-grade intraepithelial neoplasia of gastric horn and gastric mucosa, involving a large lesion area.

After obtaining informed consent from the patient, gastric ESD operation was planned to be performed. The submucosal layer of the lesion was cut around the mucosal incision knife ring, and the lesion was completely resected, leaving a large area wound (60 mm*100 mm) (Figure 1). Due to the large size of the wound, neither the traditional clamps nor nylon strings were suitable for stopping bleeding after heat coagulation treatment. In that case, endoscopic tissue adhesive was applied in the form of spraying on the wound surfaces widespread, and we did observed effective hemostasis on the surface of the bleeding wound (Figure 1). The ESD operation was completed successfully, and we did not observe any signs of bleeding in the patient during postoperative monitoring.

There were no short-term complications, such as bleeding, perforation or infection, after endoscopic surgery. Postoperative pathological showed high-grade intraepithelial neoplasia (Figure 2). We advised him to undergo a four-month follow-up with gastroscopic surveillance. An ESD scar in the gastric body and gastric angle was observed by the gastroscopy at the end of fourth month, indicating a well- recovered wound without postoperative bleeding (Figure 3).

Discussion

Endoscopic submucosal dissection provides a minimally invasive yet curative treatment for patients with early gastric cancer. Previously, many of these patients were treated surgically at

substantial cost and with significant risk of gastrointestinal function impairment. En-bloc excision of these early cancers allowed complete diagnosis of the tumor, stratification of the subsequent therapeutic approach, and potential cure [6], making it a preferred treatment option for early gastric cancer and promote the innovation in this field.

However, ESD procedures are technically difficult, especially for large and deep invasive lesions [7], and bleeding is one of the most frequent adverse events in ESD, menacing the patient's life safety. The size of the resection wound positively correlates with the incidence of postoperative bleeding [8, 9]. Commonly, consumables such as titanium clips, nylon strings, and hot biopsy forceps are used to prevent postoperative bleeding. However, these methods are only suitable for small wounds, and not feasible for large-size resection wound. In our case, the tumor lesion invaded gastric body, angle, and antrum, diffusely. And it was impossible to seal the resection wound with titanium clips nor nylon strings due to the large size of the wound, yet the method of spraying tissue adhesive onto the wound surface demonstrated promising results.

In theory, the main components of tissue adhesive, α-cyanoacrylic acid butyl enzyme, can be rapidly polymerized and solidified into a protective membrane under the action of anions contained in the blood and tissue fluid on the surface of the wound, and the mesh structure of the membrane can prevent the passage of red blood cells and platelets, seal the broken vascular network of the wound, and thus play a hemostatic effect. At the same time, it can isolate the direct contact of the wound surface to the digestive fluids such as bile and stomach acid, and promote wound healing. Compared with the traditional method, spraying tissue adhesive to cover the resection wound deems to be simpler and less time-consuming, and is recommended for postoperative hemostasis, particularly in patients with a large size wound and high risk of hemorrhage [10].

Some researchers have derived and validated a prediction model for bleeding after ESD for EGC, which demonstrated good predictive performance [8]. In the future, we may score the patient's bleeding risk based on the corresponding bleeding score models. And then clinical studies may be conducted to compare the degree of bleeding risk at which the method of spraying tissue adhesive for hemostasis will benefit patients more than the traditional way.

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Authors' contributions:

Yiming Chen collected data and wrote the manuscript. Zhiyuan Zou and Zhenglei Xu performed gastric ESD operation. Lisheng Wang revised the manuscript. All authors have read and approved the final manuscript.

Conflict of interest statement: The authors declare that they have no competing interests.

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Figure 1

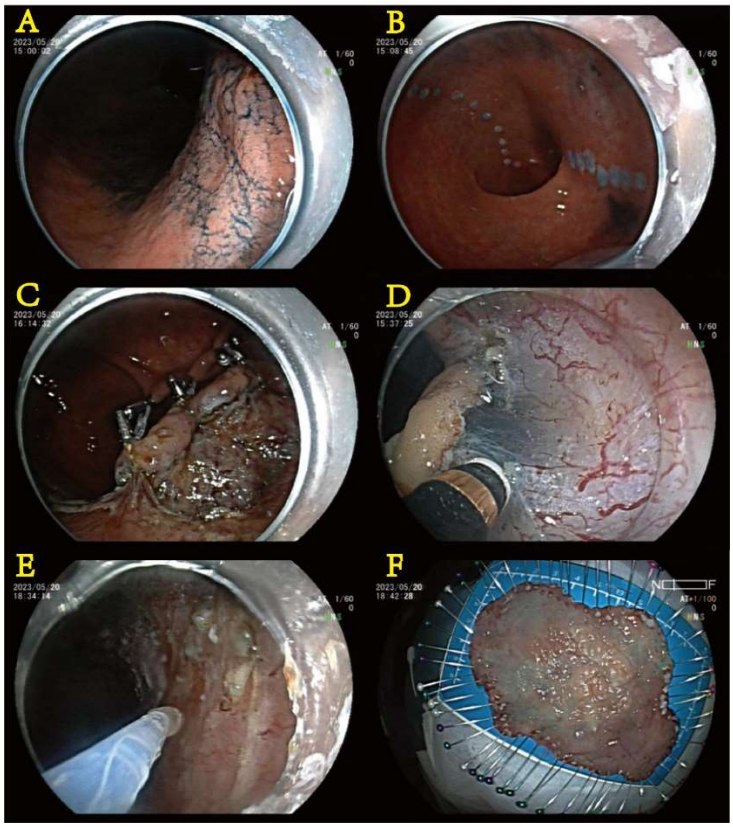

Fig 1. **Endoscopy images during ESD operation.** A: After spraying indigo rouge, the stain on the lesion is obvious and the edge of the lesion is clear. B: Mark the scope of operation: the lesion extends from the stomach body to stomach angle o, and the posterior wall of the inferior curvature of the antrum was also violated. C-D: Under the traction and assistance of titanium clips, the submucosal lesion was completely removed by ESD. E: Spraying tissue adhesive onto the surface of the excision wound to prevent postoperative bleeding. F: Complete resection of the lesion, about 60mm*100mm in size.

Figure 2

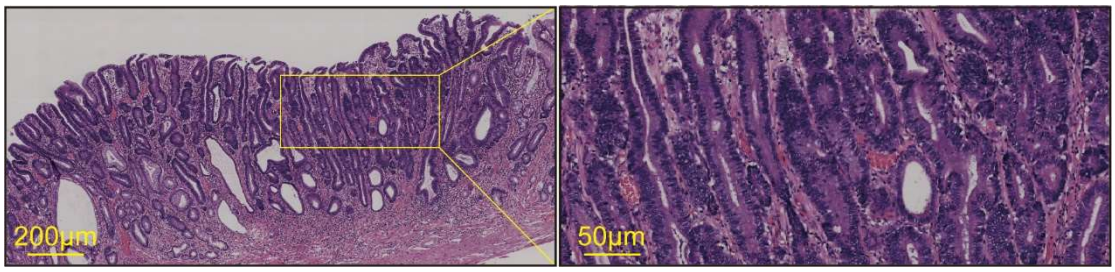

Fig 2. Findings of histopathology examination of the endoscopically resected specimen. There were no lesions at the lateral and basal incisal margins of the lesion. High-grade intraepithelial neoplasia presented a multifocal and scattered distribution, some of which showed adenocarcinoma in situ-like changes without invading the stroma and muscularis mucosa. The surrounding mucosa presented low-grade intraepithelial neoplasia, showing intestinal metaplasia and atrophy.

Figure 3

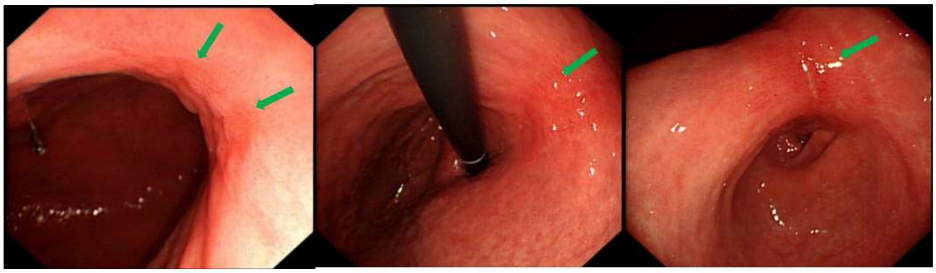

Fig 3. **Endoscopy images of the reexamination 4 months after ESD.** An ESD scar in the gastric body and gastric angle was observed by the gastroscopy four months after the operation, indicating a well- recovered wound without postoperative bleeding.