


Hemorrhagic Shock Caused by Spontaneous Bleeding from Early Gastric Cancer Was Successfully Cured by Emergency Endoscopic Submucosal Dissection: A Case Report

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ABSTRACT: Cases and studies of protruding early gastric cancer (EGC) combined with spontaneous bleeding are relatively rare. The current study present a female patient aged 70 to 75 years old with hemorrhagic shock caused by spontaneous bleeding from EGC type 0-Isp, which was successfully cured by rapid emergency endoscopic submucosal dissection (ESD).

KEYWORDS: Early gastric cancer, hemorrhagic shock, endoscopic submucosal dissection, spontaneous bleeding, case report

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Introduction

Spontaneous bleeding rarely occurs in protruding early gastric cancer (EGC), and cases of early gastric cancer combined with spontaneous bleeding that eventually leads to hemorrhagic shock are even rarer.¹ For the first time, we present a patient with hemorrhagic shock caused by spontaneous bleeding from EGC type 0-Isp, which was successfully cured by rapid emergency endoscopic submucosal dissection (ESD). Then, we summarize the experience that might be useful in treatment for similar patients.

Case Report

A female patient aged 70 to 75 years old who was diagnosed with diabetes several years prior, presented with black stools for 2 months. She was urgently taken to the clinic because of dizziness, profuse sweating, irritability, palpitations, and fainting. The emergency examination results are as follows: blood pressure (BP): 80/44 mmHg, respiratory rate (RR): 24 bpm, heart rate (HR): 120 bpm, hemoglobin (HGB): 41 g/L, hematocrit (HCT): 0.178, and fecal occult blood (FOB) test: (+). Based on the patient's symptoms, signs, and examination results, she was diagnosed with hemorrhagic shock.^{2,3} Her HGB increased to 94 g/L after being transfused with 4 units of red blood cells, then, the gastroscopy was performed.

We found a 0-Isp type lesion with a size of 22 mm × 20 mm on the posterior wall of the gastric antrum (Figure 1a), at the same time, a fading type 0-IIa lesion in the angular incisure of the stomach was detected. The surface microstructure and

microvessels of the 2 lesions were quite different from the surrounding normal mucosa under the observation of magnifying endoscopy combined with narrow-band images (Figure 1b). The submucosa below the lesion located in the gastric antrum was continuous and intact based on endoscopic ultrasonography inspection (Figure 1c). According to the vessel plus surface classification system of EGC endoscopic diagnosis (Kenshi Yao),^{4,5} both lesions were diagnosed as differentiated EGC from the perspective of endoscopic observation. Hematoxylin-eosin staining of the biopsy tissue taken from the 2 lesions were confirmed as high-grade intraepithelial neoplasia (HGIN) by experienced pathologist (Figure 1d). Both the subsequent colonoscopy and capsule endoscopy examination showed no definite bleeding from large intestine and small intestine. We were unable to determine the real cause of hematochezia. Since then, the patient no longer had black stools, so she was discharged with oral proton pump inhibitors (PPI, 40 mg/day) and planned to undergo the endoscopic resection of the EGC in a short period of time after she recovers better.⁶⁻⁸

Two weeks after the patient took PPI orally, she was readmitted to the hospital for endoscopic resection, she developed a small amount of black stool again. Her BP, HR, and HGB at that time was 110/74 mmHg, 98 bpm, and 80 g/L. So the second gastroscopy was performed, and unexpectedly, there was an active outflux of blood at the top of the 0-Isp type lesion located on the gastric antrum surrounded by a large quantity of fresh red blood clots (Figure 2a). It was almost certain that this was the real cause of the patient's recurrent bleeding. An emergency ESD was performed by experienced endoscopist under

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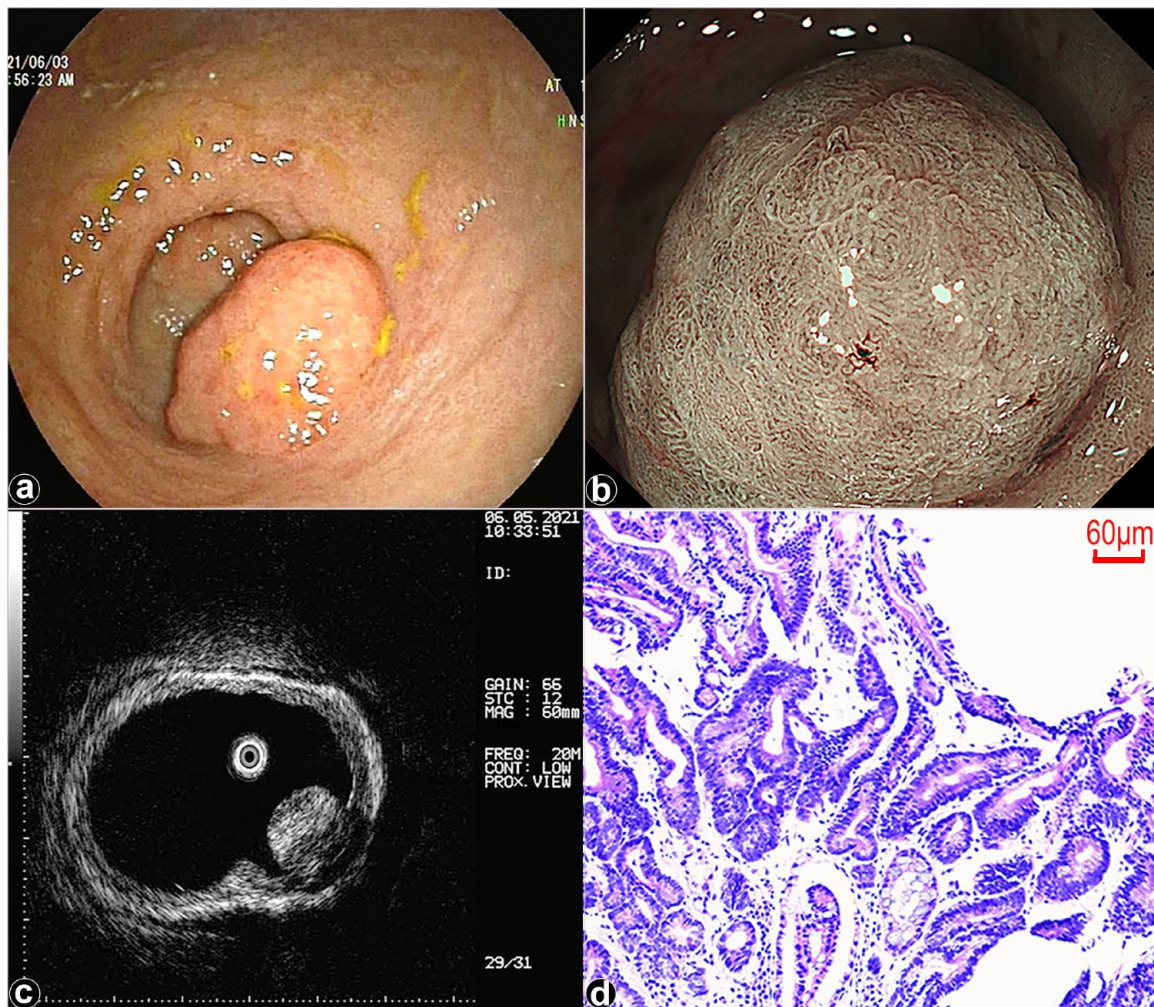


Figure 1. A 0-Isp type lesion on the posterior wall of the gastric antrum (a), irregular microstructure pattern, irregular microvessels arrangement pattern, and demarcation line were observed under the magnifying endoscopy combined with narrow-band images (b), the submucosa underlying the lesion was continuous and intact based on endoscopic ultrasonography inspection (c), hematoxylin-eosin staining of the biopsy tissue taken from the lesion was confirmed as high-grade intraepithelial neoplasia (d).

the conditions of tracheal intubation, general anesthesia and blood transfusion. The patient was placed in the left decubitus position so that the blood could quickly follow along the lesser curvature to the fundus of the stomach. After rapidly peeling the lesion for 10 minutes, it was completely removed and the active outflux of blood was stopped. We also dissected the EGC in the angular incisure of the stomach (Figure 2b). In the isolated specimen from the gastric antrum, the blood vessel stump on the top of the tumor could be clearly distinguished by the naked eye (Figures 2c and d). The pathology images confirmed differentiated adenocarcinoma, and both lesions have achieved to endoscopic curability A (eCuraA) in the 6th Japanese Gastric Cancer Association (JGCA) guidelines.⁶ Unusually, thick and abundant blood vessels extending from the inside to the surface of the tumor corresponded accurately to the active bleeding site under the endoscopy (Figure 3a and b). After ESD, the patient recovered well with intravenous infusion of PPI and oral mucosal protectants, and was discharged 5 days later. Oral PPI lasted for 2 months, and during

the follow-up period of 2.5 years, there was no further gastrointestinal bleeding.

Discussion

Cases of EGC combined with spontaneous bleeding are relatively rare.^{1,9} In total, 85.1% of them are depressed types, 56.5% are combined with ulcers, and 63% to 72% are undifferentiated adenocarcinomas.¹⁰ The true cause of bleeding in our patient was not confirmed until the second gastroscopy, and it exhibited many similarities with the clinical features of Dieulafoy's disease and intestinal diverticula.¹¹⁻¹³ However, no large arteries passing through the muscular layer were encountered during the peeling process. Our case demonstrates the fact that hemorrhagic shock induced by differentiated EGC without ulcer combined with spontaneous bleeding is possible, and the distribution of tumoral vascular malformations may be the most likely cause of the bleeding. Compared with the vessels in the normal mucosal epithelium surrounding the tumor, which were evenly distributed, uniform in shape, and

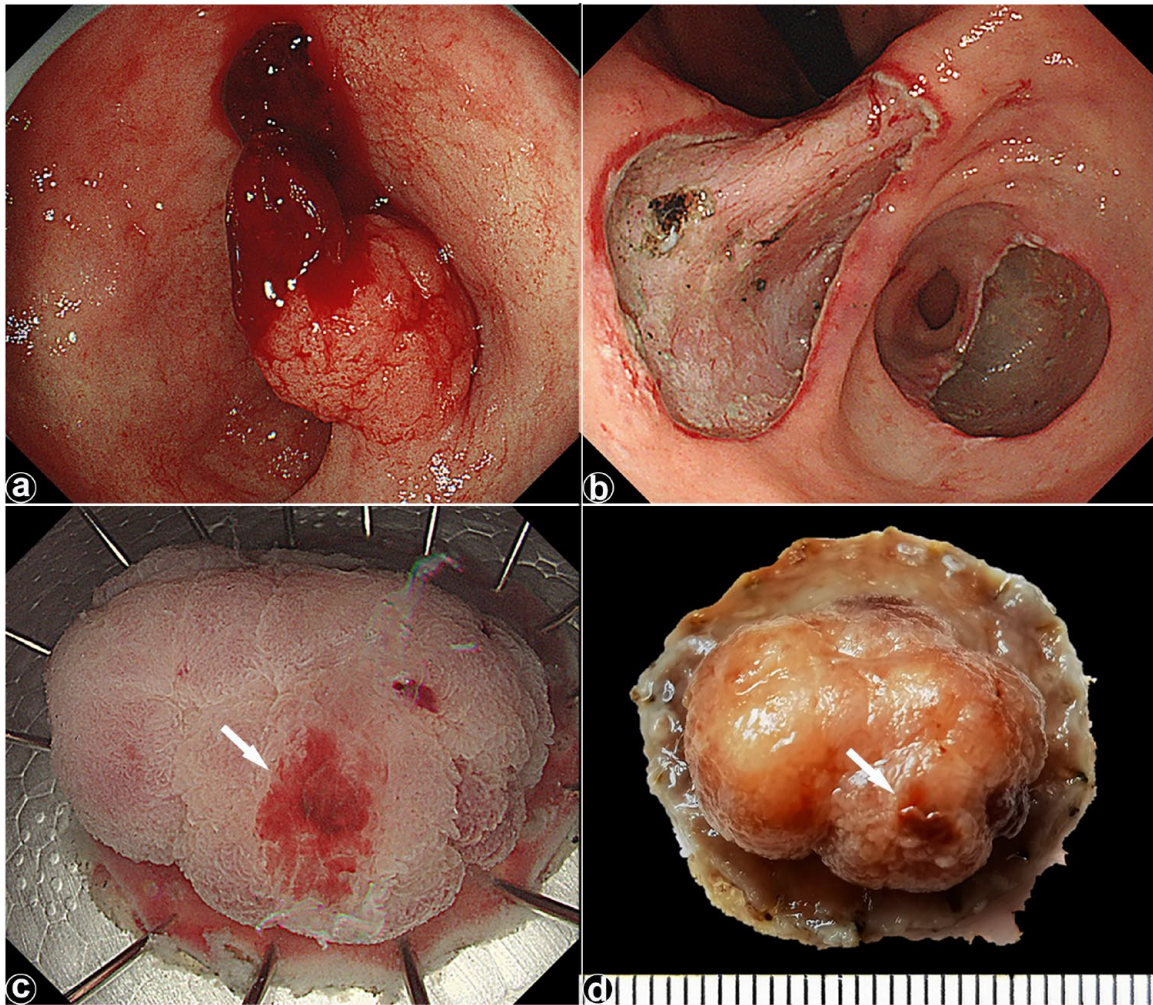


Figure 2. An active outflux of blood at the top of the 0-Isp type lesion surrounded by a large quantity of fresh red blood clots (a), both of lesions were peeled by emergency ESD (b), freshly isolated specimens and formalin-fixed specimens from the gastric antrum (c, d). The blood vessel stump on the top of the tumor could be clearly distinguished by the naked eye (white arrow).

only 30 to 45 μm in diameter (Figure 3d), the abnormal vessels consisted of only a single layer of endothelial cells at the top of the tumor, which were excessively proliferating and unevenly distributed, and the average diameter reached 140 to 160 μm (Figure 3c). At the same time, the diameter of the vessels in the angular incisure of the stomach was limited within a range of 40 to 80 μm (Figure 3e).

During the treatment, the patient's vital signs were stable and the endoscopist who performed rapid endoscopic resection had experienced >300 cases of upper gastrointestinal ESD. The location of the bleeding point was placed in the opposite direction of gravity, the amount of bleeding would not seriously affect the clarity of the visual field of the ESD. And with the support of blood transfusion, the speed of bleeding estimated accurately would not cause circulatory disturbance in the very short expected ESD operation period. These are the key factors for the success of ESD treatment in our case.

Obviously, our experience cannot completely replace the more reliable procedures for handling this situation, for example, the detailed ultrasound gastroscopy or contrast-enhanced

CT examination to explore the mutated blood vessels inside the tumor will definitely help determine whether endoscopic resection or surgical treatment is appropriate. However, because we lacked experience and confidence in using ultrasound endoscopy with a small probe to explore the internal blood vessels of tumor, and it needs at least 18 to 24 hours for enhanced CT scans to generate reconstructed images of blood vessels, in addition, we had never encountered this situation before, so we did not undergo the above examination again at that time. Furthermore, we did not use hemostatic forceps because thermal coagulation would interfere with the pathological evaluation of the tissue. Moreover, since the tumor tissue near the bleeding point was very fragile, there was no solid area for metal hemostatic clips to stabilize the attachment, and the clip would have very likely to fell off within a short period. In addition, the tips of the clip would have damaged the surrounding tissues, which may have led to more bleeding.

If we have to carried out an emergency ESD to completely resect the lesion to achieve hemostasis, we must comprehensively evaluated the speed of active bleeding, the clarity of the

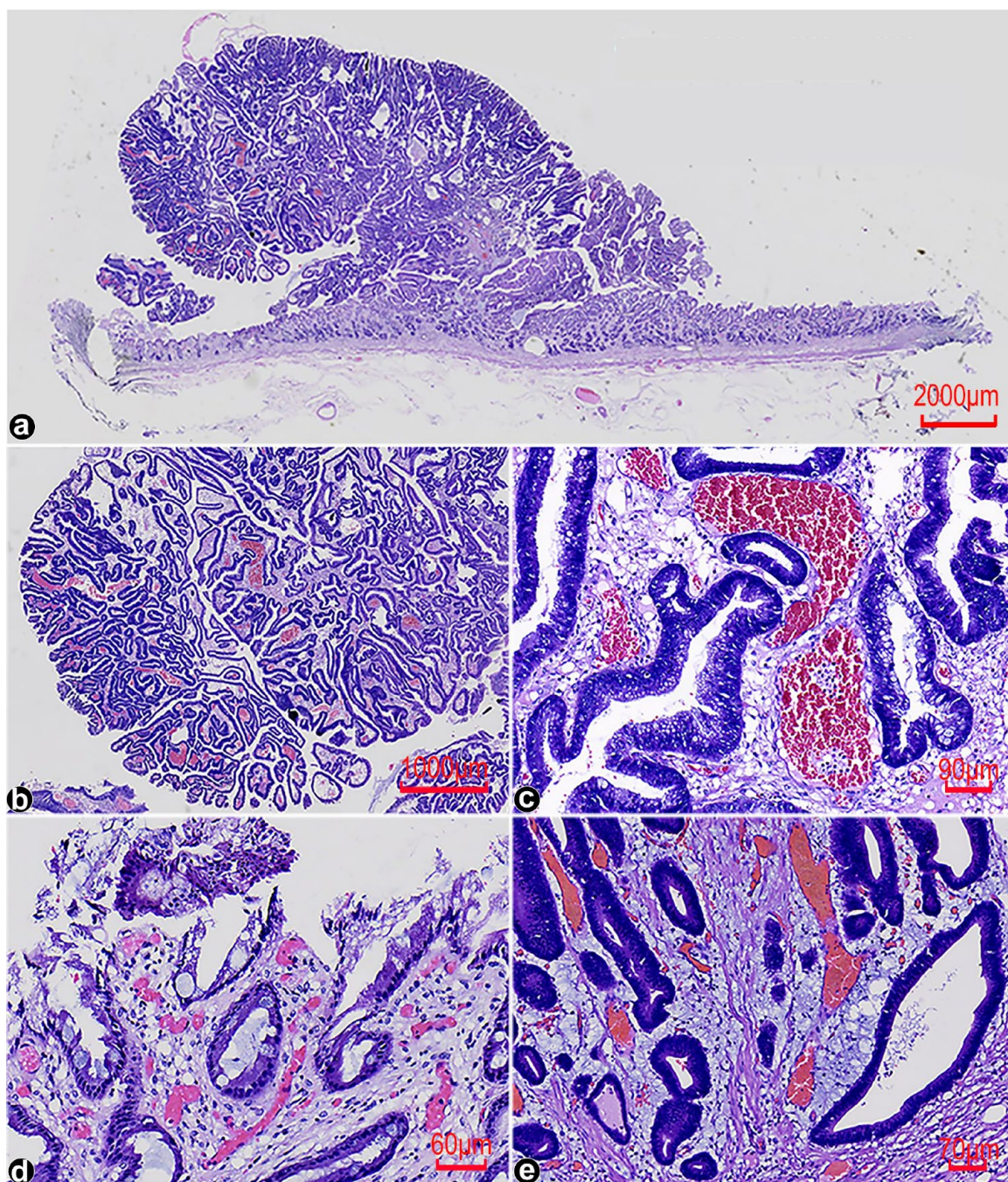


Figure 3. The abnormal vessels at the top of the tumor were excessively proliferating and unevenly distributed (a and b), and the average diameter reached 140 to 160 μm (c). The vessels in non cancerous epithelium were evenly distributed, uniform in shape, and only 30 to 45 μm in diameter (d), while in another specimen, the diameter of the tumor blood vessels was limited within a range of 40 to 80 μm (e).

operating area, the expected duration of the dissection, the condition and tolerance of the patient, the proficiency of ESD technology, and the psychological endurance of the doctor. Obviously, emergency ESD is not suitable for submucosal tumors with active bleeding and long expected resection time, such as gastrointestinal stromal tumors. If the speed of bleeding estimated may cause circulatory disturbance in the expected

ESD period, the use of electrocoagulation forceps or hemostatic clips for rapid hemostasis or even emergency surgical procedures should be the best choice, rather than ESD.

Conclusion

Protuberant differentiated EGC can be accompanied with spontaneous bleeding and even lead to hemorrhagic shock.

Whether to choose ESD to resect the lesion while simultaneously achieving hemostasis depends on a comprehensive and accurate assessment of the patient's condition, the doctor's technical ability, and the characteristics of the lesion itself.

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Authorship Contributions

PFW reported this case and wrote the article. HZ, SCX, YNZ, HMM, and JF contributed to the composition of the article. XW and DKZ critically reviewed the article. All authors approved the final version of the manuscript.

Availability of Data and Materials

Data available on request from the authors.

Ethics Approval and Consent to Participate

This study was approved by the Medical Ethics Committee of the Second Hospital of Lanzhou University (NO: 2021A-225). Moreover, the study was in accordance with the guidelines of the Declaration of Helsinki. The written informed consent of the patient was obtained for publication of this case report.

Consent for Publication

All authors support the publication of this report.

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