

[ CASE REPORT ]

## A Rare Case of Delayed Perigastric Abscess after Curative Resection of Early Gastric Cancer by Uncomplicated Endoscopic Submucosal Dissection: Successful Treatment with Endoscopic Ultrasound-guided Drainage

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### Abstract:

A 72-year-old man had undergone uncomplicated endoscopic submucosal dissection (ESD) with en bloc resection of a localized 20-mm IIc lesion in the anterior wall of the gastric angle. Twenty-eight days later, he was re-admitted with epigastric pain of one-week duration. Contrast-enhanced computed tomography (CT) revealed a 60-mm mass bordered by viscera; repeat endoscopy confirmed a smooth elevated submucosal tumor at the greater curvature on the oral side of the post-ESD ulcer. We diagnosed him with a perigastric abscess as a complication of ESD and performed endoscopic ultrasound-guided drainage. Subsequently, the symptoms and blood inflammatory parameters improved, and follow-up CT showed the disappearance of the abscess.

**Key words:** endoscopic submucosal dissection, early gastric cancer, endoscopic ultrasound-guided drainage, perigastric abscess

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### Introduction

Endoscopic submucosal dissection (ESD), a technique developed in Japan, is associated with a high success rate for en bloc resection of early gastric cancer (EGC). The procedure is associated with a low risk of lymph node metastasis and is considered to be relatively safe with low invasiveness. Bleeding and perforation are the most frequent complications associated with ESD, but they can be adequately managed without surgical intervention in most cases (1).

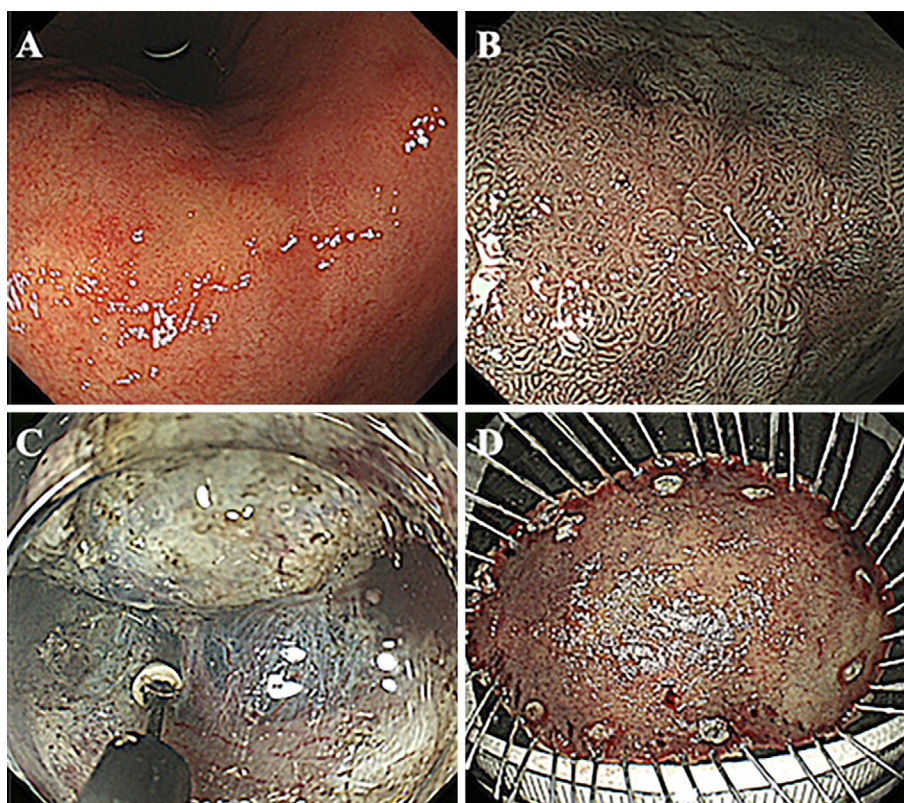
In a Japanese multicenter prospective cohort study on endoscopic resection (ER) for EGC, 10,821 lesions in 9,616 patients were treated by ER (ESD: 99.4%), with intraoperative perforation and delayed perforation occurring in 2.3% and 0.4% of cases, respectively (1). Reports of gastric wall abscess and perigastric abscess after ESD are rare, but all have described intraprocedural micro-perforation or delayed perforation as a complication of ESD (2, 3).

We herein report a very rare case of perigastric abscess after curative resection of EGC using ESD without delayed perforation.

### Case Report

A 72-year-old man was referred to our hospital for suspected EGC. He had undergone uncomplicated ESD with en bloc resection for early esophageal cancer six years earlier and for EGC two years earlier (both histologically complete R0 resection). The patient had previously been a heavy drinker. He had abstained from alcohol since undergoing ESD for early esophageal cancer six years earlier. He had been taking medication for hypertension during the same period.

Laboratory test findings were unremarkable. Endoscopy showed a localized 20-mm IIc lesion in the anterior wall of the gastric angle (Fig. 1A, B). A biopsy confirmed well-differentiated adenocarcinoma. Abdominal computed to-



**Figure 1.** Endoscopic images from a 72-year-old man with a 20-mm depressed-type (IIc) lesion in the anterior wall of the duodenal angle resected en bloc via ESD. A, B: Endoscopy showing a localized 20-mm IIc lesion in the anterior wall of the duodenal angle. C: The lesion was safely and completely resected en bloc via endoscopic submucosal dissection (ESD). D: Histopathology confirming curative resection.



**Figure 2.** Endoscopic images 1 day after ESD. Endoscopy showing a smooth post-ESD ulcer with no exposed vasculature 1 day after ESD.

mography (CT) showed no abnormalities.

We used a single channel endoscope (GIFH260Z; Olympus) with a transparent hood attached to the tip with carbon dioxide insufflation and a standard tip hood. Indigo carmine added glycerol solution was injected into the submucosal layer using a 25-gauge needle. Marking was achieved using argon plasma coagulation (Erbe Elektromedizin GmbH,

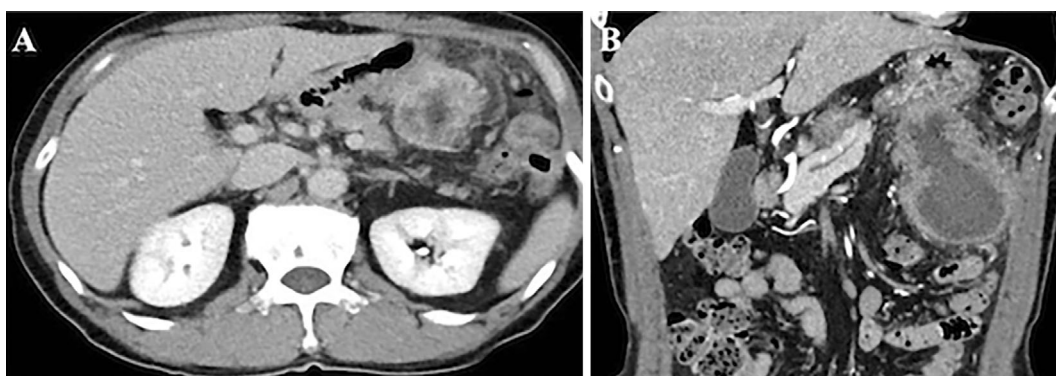
Tübingen, Germany). The electrosurgical unit was set to Dry Cut mode (Effect 4, 50 W, VIO 300; Erbe Elektromedizin GmbH) for making incisions, with cutting performed using an insulated-tip knife [ITknife2 (KD-611 L), Olympus, Tokyo, Japan]. When bleeding occurred, hemostasis was performed using high-frequency hemostatic forceps (HDB2418 W; PENTAX Medical, Tokyo, Japan) with the electrosurgical unit set to Soft Coagulation mode (Effect 6, 80 W, VIO 300; Erbe Elektromedizin GmbH). During ESD, no muscular layer damage or perforation was evident, and there was no bleeding that was difficult to stop. The lesion was safely and completely resected en bloc (Fig. 1C, D). The procedure time was 45 minutes. We performed prophylactic hemostasis for the post-ESD ulcer after the lesion had been resected.

One day after ESD, he was afebrile with high-normal leukocytes (7,470/ $\mu$ L) and elevated C-reactive protein (CRP) (0.52 mg/dL). The post-ESD ulcer was smooth with no exposed vasculature (Fig. 2). He was stable with no peritonitis and was discharged five days after ESD.

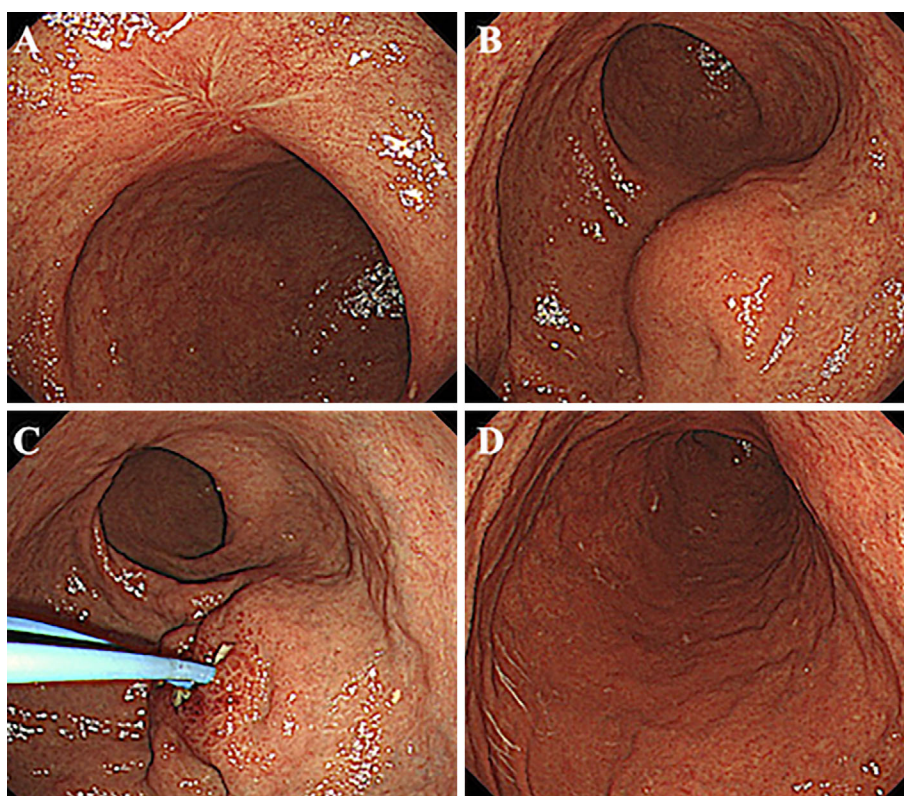
The en bloc resection specimen measuring 45×30 mm (length × width) included a cancerous lesion (20×20 mm) that was histopathologically confirmed to be moderately differentiated tubular adenocarcinoma limited to the lamina propria with no lymphovascular invasion.

The patient was re-admitted 28 days after ESD with epigastric pain of 1-week duration. He was afebrile with leuko-





**Figure 3.** Contrast-enhanced computed tomography (CT) images on readmission. Contrast-enhanced CT showing a 60-mm mass bordered by viscera. (A) Axial view, (B) coronal view.



**Figure 4.** Endoscopic findings before and after treatment. A, B: Repeat endoscopy confirming a smooth elevated submucosal tumor at the greater curvature on the oral side of the post-ESD ulcer. C: Endoscopic ultrasound (EUS)-guided drainage through the gastric wall. A 10-cm-long 7-Fr double-pigtail catheter from the abscess cavity to the stomach and a 250-cm-long 7-Fr endoscopic nasobiliary drainage tube were placed to efficiently wash out the abscess. D: Follow-up upper gastrointestinal endoscopy showing the disappearance of the mass at the greater curvature of the upper body on the oral side of the post-ESD ulcer.

cytosis (12,900/ $\mu$ L) and elevated CRP (14.3 mg/dL). Contrast-enhanced CT showed a 60-mm mass bordered by viscera (Fig. 3), and repeat endoscopy confirmed a smooth elevated submucosal tumor at the greater curvature on the oral side of the post-ESD ulcer (Fig. 4A, B). We diagnosed him with perigastric abscess as a complication of ESD for EGC. Because no free air was seen and the patient's general condition was good, we opted for conservative treatment with intravenous antibiotics (sulbactam/ampicillin 12 g/day

for 7 days).

However, the clinical symptoms and blood inflammatory parameters did not improve (blood leukocytes, 11,800/ $\mu$ L; CRP, 10.4 mg/dL), and CT revealed no improvement in the size of the mass. Furthermore, because the abscess was surrounded by abdominal organs and would have been difficult to puncture percutaneously, we decided to perform endoscopic ultrasound (EUS)-guided drainage through the gastric wall. The abscess cavity was identified on EUS, and there



**Figure 5.** CT findings after treatment. Follow-up CT showing a marked reduction in the size of the abscess and no collection of pus.

were no changes in the mucosa of the stomach wall between the post-ESD ulcer scar at the gastric angle and the site of abscess formation at the greater curvature on the oral side of the post-ESD ulcer.

After confirming that there was almost no blood flow along the proposed needle track on color Doppler ultrasound, we performed needle puncture through the greater curvature of the stomach to the wall of the abscess using a 19-gauge needle (Sono Tip Pro Control 19 G needle; Medi-Globe GmbH, Rosenheim, Germany). However, aspiration was unsuccessful due to viscous aspirate. We therefore passed a 0.025-inch guidewire (VisiGlide 2; Olympus Medical Systems, Tokyo, Japan) into the abscess and expanded the fistula using a balloon dilatation catheter (GIGA2; Kaneka, Tokyo, Japan). Finally, we placed a 10-cm-long 7-Fr double-pigtail catheter (Zimmon Biliary Stent; Cook Medical, Tokyo, Japan) from the abscess cavity to the stomach along with a 250-cm-long 7-Fr endoscopic nasobiliary drainage tube (Nasal Biliary Drainage Set; Cook Medical) to more efficiently wash out the abscess (Fig. 4C). The elevated blood inflammatory parameters rapidly decreased thereafter (blood leukocytes, 5,510/ $\mu$ L; CRP, 2.68 mg/dL). Five days after the procedure, abdominal CT confirmed a significant decrease in the abscess contents, and the nasocystic catheter and intradrainage stent were removed. *Streptococci* were isolated from culture of the abscess contents.

The patient was discharged 1 week after abscess drainage (on hospital day 21) with 1 week of oral antibiotics prescribed (amoxicillin 750 mg/d). Three weeks after discharge, the blood inflammatory parameters had normalized (blood leukocytes, 4,060/ $\mu$ L; CRP, 0.05 mg/dL), and follow-up upper gastrointestinal endoscopy showed the disappearance of the mass at the greater curvature of the upper body on the oral side of the post-ESD ulcer (Fig. 4D).

One month after discharge, follow-up CT showed a remarkable reduction in the size of the abscess and no collection of pus (Fig. 5). Two months later, follow-up CT showed the disappearance of the abscess and no abnormal findings. At the 28-month follow-up examination, the patient was asymptomatic, and no abnormalities were noted on abdominal CT.

## Discussion

To our knowledge, this is the first report of perigastric abscess after curative resection of EGC using ESD (2, 3) without delayed perforation that was successfully treated with endoscopic drainage via the gastric lumen and antibiotics. The procedure we used for endoscopic drainage proved safe, low-invasive, and uneventful in this case.

The exact pathogenesis of perigastric abscess is unclear but is presumed to involve bacterial infection of the gastric serosa via a mucosal breach or via the blood from a distant focus (4). Although we could not confirm in detail the cause of the perigastric abscess in this case, we speculate that mucosal and submucosal diathermic injury caused bacterial translocation to the subserosa by endo-electrosurgical cutting and coagulation. The mechanism underlying delayed perforation is thought to involve electrical cautery during submucosal dissection or repeated coagulation that causes ischemic changes in the gastric wall and results in necrosis (3). The procedure time for ESD in this case was 45 minutes, which is not especially long; furthermore, no damage or perforation was evident in the muscular layer, and there was no bleeding that was difficult to stop during ESD. However, there might have been thermal denaturation of the tissue in the muscular layer or micro-perforation due to excessive energy delivery, although we were unable to evaluate this. It is plausible that micro-perforation formed during ESD allows microbial access to the peritoneal cavity, with contaminants then traversing the gastric serosa to the lower stomach or to the greater curvature side of the fundus, as in our case. One factor that might have contributed to abscess formation after ESD in the present case was that we did not administer antibiotics, which in principle are not used before or after ESD in our institution. The administration of proton pump inhibitors (PPIs) has been recommended to reduce post-ESD hemorrhaging (5). Normal gastric juice is generally known to have a pH of  $\leq 3$ , and almost no bacteria are able to propagate in the normal stomach. In elderly patients, however, it has been reported that as gastric acid secretion declines due to advancing age, the administration of PPIs results in a sufficient increase in the pH of gastric juice to allow indigenous oral bacteria to infect the stomach and propagate there (6-9). Under these conditions, *Streptococci* present in the oral cavity and the resident flora of the intestinal tract might have infected the post-ESD ulcer, leading to abscess formation.

A previous study reported that 38.1% of patients who underwent ESD for EGC had intraperitoneal free air on abdominal CT (10). CT in the early post-ESD period might have revealed useful findings for elucidating the pathogenesis of perigastric abscess in this case, had it not been performed.

The causative organism in this case was identified as *Streptococci*, the most common bacteria isolated in cultures of gastric abscess contents, accounting for 75% of cases (4).



Other isolated pathogens that have been reported include *Staphylococci*, *Escherichia coli*, *Haemophilus influenzae*, *Proteus species*, *Clostridium welchii*, *Pseudomonas aeruginosa*, and *Bacillus subtilis* (11).

One particularly interesting aspect of the present case is that perigastric abscess occurred even though EGC was safely and completely resected en bloc via ESD, and the patient was stable without peritonitis. Therefore, we did not consider a differential diagnosis of perigastric abscess before imaging (CT and endoscopy) confirmed it.

The patient did not require emergency surgery because the perigastric abscess was localized, his symptoms were tolerable, and there were no signs of peritoneal irritation. However, optimal treatment is needed for patients with perigastric abscess. Conservative treatment with antibiotics might be an option, but we judged that direct drainage of the abscess was necessary because the elevated blood inflammatory parameters (leukocytes and CRP level) did not improve with antibiotic therapy alone.

EUS-guided drainage of the perigastric abscess was safe and effective in this case. Such a draining approach has several technical advantages, including (1) excellent visualization of the location and anatomy of the subphrenic space; (2) direct passage of the needle into the abscess cavity through the gastric wall alone, thus avoiding accidental puncture of the lung and pleura; (3) avoidance of iatrogenic injury to interposed vessels through the use of color Doppler ultrasound; and (4) avoidance of transcutaneous infection (12). No complications developed in this case, allowing us to avoid open surgical drainage, which would have been extremely invasive. Instead, we opted for conservative treatment with endoscopic transgastric drainage plus antibiotics.

Although cases of ESD in elderly patients and patients with underlying disease are now increasing, reported cases of perigastric abscess after ESD are extremely rare. The critical cause is not yet clear, and the further accumulation of cases and investigation will be needed. In our patient, it was difficult to predict perigastric abscess after ESD based on the clinical symptoms and physical and endoscopic findings. It is necessary to consider the risk of perigastric abscess after ESD, and it may be beneficial to administer antibiotics after ESD when the procedure time for ESD is long, although no evidence supporting prophylactic measures has yet been established.

In conclusion, we reported a case of perigastric abscess as a very rare complication of curative resection using ESD without delayed perforation. The successful treatment of the abscess and uneventful course in this case show that EUS-guided drainage via the gastric lumen and antibiotic therapy offers safe, less invasive, and uneventful management. When

a patient presents with epigastric pain of unknown origin in the early days after ESD, physicians should be aware of the possibility of perigastric abscess as the underlying cause and proper diagnostic modalities, such as abdominal CT, should be used.

**The authors state that they have no Conflict of Interest (COI).**

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