

## Gastric Mucosa Avulsion during Endoscopic Submucosal Dissection

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### Abstract

Nowadays, Endoscopic Submucosal Dissection (ESD) has been widely applied in early cancer or precancerous of gastrointestinal tract. With the development of endoscopic technique, the procedure advances and the operation time of ESD becomes shorter. However, there still exist some unpredictable complications, such as gastric mucosa avulsion caused by submucosal injection during ESD procedure. And we will report one case about it in this article.

### Case

A 69-year-old man, with the chief complains of abdominal distension and pain for one and a half years, was admitted to our hospital. Upper endoscopy showed a 1.2 × 1.2 cm flat lesion in the greater curvature of the antrum. It was an IIa+IIc form lesion [1]. Mucosal erosion and depression area could be seen on the surface of the lesion. Histopathological examination revealed a high-grade intraepithelial neoplasia lesion. Then ESD was performed [2] (Figure 1). The procedure was generally as follows. Indigo carmine was sprayed to define the form and range of the lesion. Argon Plasma Coagulation (APC) was used to mark the lesion margin.

After that, mixture liquid (1 ml indigo carmine and 100 ml normal saline) was injected into the submucosal tissue. However, when performed submucosal injection at the anal side of the lesion, we found it with great resistance and without doubt the mucosal didn't lift well. So we repeated injecting with more power, trying to lift the mucosal up. While it failed, and we found that the gastric mucosal avulsed. We had to immediately changed injection site, the mucosal lift sign of other areas were well. Then we pre-cut the mucosa along the marker by Dual knife (KD-650L; Olympus) and dissected the lesion from oral side to anal side gradually. The anal side submucosal tissue adhered to the muscularis propria firmly and was difficult to be dissected. So a snare (ASM-1; Cook) was used to resect

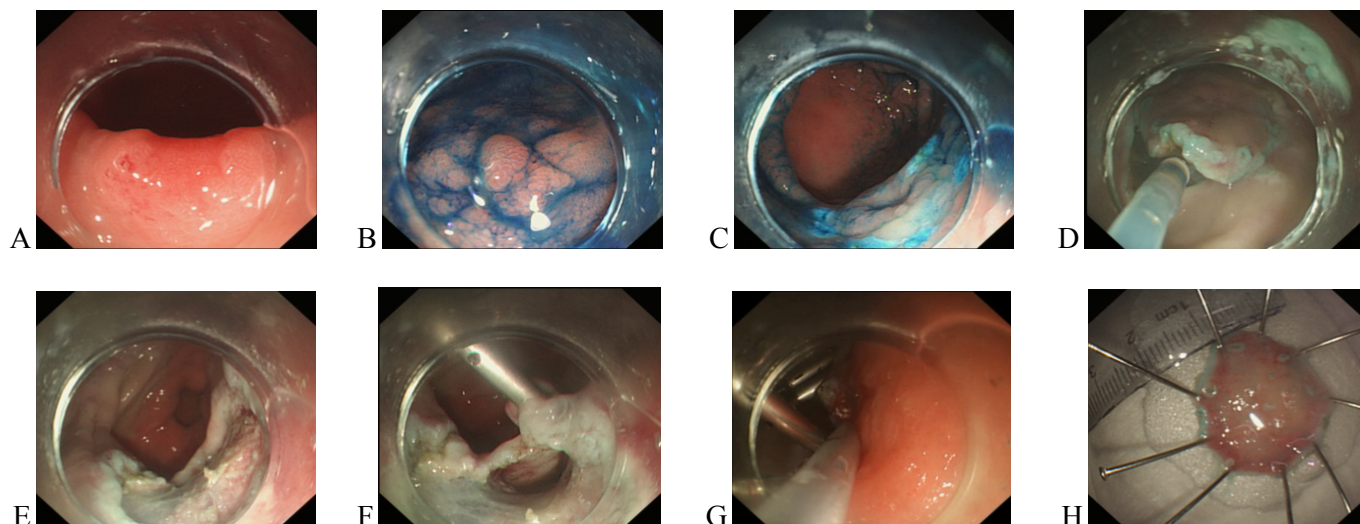


Figure 1: Mucosa avulsion during ESD procedure

- A. The lesion located in greater curvature side of antrum.
- B. Indigo carmine staining.
- C. Marked the lesion by APC.
- D. Pre-cut mucosa along the marker.
- E. Lesion was resected, cicatrix was seen on the wound.
- F. Mucosa avulsion and cavity forming.
- G. Occlude the cavity with endo-clips.
- H. Lesion specimen.

the lesion and a white scar was seen. The anal side of the wound, where the mucosa avulsed when performing submucosal injection, formed a cavity. Several endo-clips (Resolution, M00522610; Boston Scientific) were used to occlude the cavity. High-grade intraepithelial neoplasia was confirmed by the final pathologic examination and the lesion margin and base was both negative.

## Discussion

As it is minimally invasive and with notable curative effect, ESD has progressed rapidly and been used widely in the treatment for gastrointestinal early cancer or precancerous lesions in recent years. The procedure of ESD includes defining margins, marking, submucosal injection, circumferential mucosal incision and submucosal dissection. As we all know, in order to perform ESD safely, the submucosal space should be expanded by injection of a lifting solution to form a safe plane for dissection between the mucosa and muscle wall. What's more, the mucosa lifting sign during submucosal injection can be used to evaluate the adhesion degree of submucosal tissue and pre-judge that whether an en bloc and curative resection can be achieved. So submucosal injection is an important and meaningful part of ESD.

The complication of mucosa avulsion during submucosal injection is rare and just a minority of cases were reported in esophagus, of which the submucosal tissue was relatively loose, while till now, none was reported in gastro, especially in gastric antrum, as the submucosal tissue was pyknotic. We have performed ESD successfully in several thousand patients since we began to develop ESD procedure in our digestive endoscopy center in 2006. And no gastric mucosa avulsion was found during submucosal injection in ESD procedure until this case.

As for the causes, leading to gastric mucosa avulsion, are probably as follows. Firstly, the mucosa wasn't lifted well during submucosal injection. As the histopathological examination revealed a high-grade intraepithelial neoplasia lesion, which belongs to precancerosis, so adhesion caused

by malignant tumor infiltration could be excluded. The primary reason might due to the multi-block biopsy before ESD, which can easily resulted in mucosa and submucosal tissues cicatrization and adhesion, making the submucosal injection more difficult, and it could be confirmed by the white scar observed during the ESD. Secondly, the needle tip usually directs to the anal side of the lesion when performing submucosal injection. Due to the submucosal adhesion, the mucosa lifting sign was poor, and the pressure of pushing mixture liquid had to be increased. The higher the pressure was the more easily the mixture liquid spread to the anal side quickly, bypassing the submucosal adhesion which could not be lifted well, and as a result the anal side gastric mucosa avulsed instantly under the high liquid pressure and flow rate. Thirdly, individual difference also plays an important role in mucosa avulsion. Of the several thousand cases of ESD, in our digestive endoscopy center, in some patients submucosal adhesion reported, but not avulsion, because there is no long history of glucocorticoids intake, which would make the submucosal tissue around the adhesion much looser, as the case reported in this article.

When gastric mucosa avulsion occurred, we'd better continue the ESD and resect the lesion as procedure. Then we should confirm the avulsion and occlude the submucosal cavity with endo-clips (Resolution, Boston Scientific). If not, the cavity is sure to be exposed to the acidic conditions and postoperative bleeding might occur.

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