

Endoscopic Repair of an Iatrogenic Perforation During Gastric Endoscopic Submucosal Dissection



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Received 20 September 2012; Revision submitted 20 September 2012; Accepted 26 September 2012

Abstract

Perforation is a severe complication of endoscopic submucosal dissection (ESD), and the incidence is reported to be 2–6%. Appropriate endoscopic repair should be administered immediately to prevent severe complications. As a first step, it is very useful to create a neoplasia-free area around the edges of the perforation with a dual knife. Then this area can be safely closed with endoclips. During the procedure, it is strongly advisable to use CO₂ insufflation instead of air to reduce abdominal discomfort. Here, this method is demonstrated in a case with a large perforation that occurred during the ESD procedure. This article is part of an expert video encyclopedia.

Keywords

CO₂ insufflation system; Dual knife; ESD; Perforation; Standard endoscopy; Video.

Video Related to this Article

Video available to view or download at [doi:10.1016/S2212-0971\(13\)70055-4](https://doi.org/10.1016/S2212-0971(13)70055-4)

Materials

- Endoscope: H260Z; Olympus, Tokyo, Japan.
- Dual Knife; Olympus, Tokyo, Japan.
- Insulated Tip (IT) Knife; Olympus, Tokyo, Japan.
- Metal Clips: EZ Clip; Olympus, Tokyo, Japan.
- CO₂ Insufflation System; Olympus, Tokyo, Japan.

Background and Endoscopic Procedures

Endoscopic submucosal dissection (ESD) has various advantages and drawbacks. The advantages include en bloc resection of the lesion, precise histological evaluation, and a low recurrence rate. However, ESD does require complex endoscopic techniques and a long operation time. In addition, there is a high incidence of perforation and bleeding. Perforation is a severe complication of ESD. It is reported in 2–6% of all cases, and it should be avoided during the ESD procedure.^{1–2}

When perforation occurs during the procedure, it is imperative to create an area for clipping rather than to close the perforation immediately. To this end, it is useful to create an additional area around the perforation that is free of neoplasia. This is best performed using a dual knife; it does not have an insulated tip as the IT knife and allows better dissection of the submucosal layer of the lesion's edges. After creation of this area, the perforation can be safely closed with endoclips.

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It is also important to obtain a good endoscopic view for closing the perforation by using a transparent hood.

After a perforation occurs, it is essential to avoid compartment syndrome. Using a CO₂ insufflation system may prevent the occurrence of abdominal discomfort after the perforation.

Appropriate treatment should be administered in the early stages to prevent severe complications. Severe complications were prevented in this case by using various devices, namely a dual knife and CO₂ insufflation system.

Key Learning Points/Tips and Tricks

- Additional dissection around the edges of the perforation using a dual knife facilitates clipping.
- Optimize imaging of the perforation with a transparent hood.
- CO₂ is used instead of air insufflation to prevent abdominal discomfort.

Scripted Voiceover

Endoscopic repair of an iatrogenic perforation during gastric ESD.

Time (min:sec)	Voiceover text
00:00	Here we demonstrate management of an iatrogenic perforation occurring at endoscopic submucosal dissection (ESD). In this patient there are two lesions, and the target lesion is the proximal one. The incision around this lesion is already done and we perform submucosal dissection with the IT knife-2.
00:20	As we dissect we recognize this defect with some yellowish omental tissue, indicating a large perforation.

00:27 First we need to continue dissection to create an area that would be free of neoplasia and easy to clip. To this end we change the knife to a dual knife. This knife does not have an isolated tip and allows better dissection of the edges of the perforation.

00:49 However, in this case, it is difficult to enter the submucosal layer. To optimize the endoscopic view of the edges we attach a transparent hood and push it forward slightly. Now the view is better and we can safely initiate closure of the perforation.

01:12 The first metal clip is placed at the distal edge of the perforation and then more endoclips are added step-by-step. It is strongly advisable to use CO₂ insufflation in these cases, as CO₂ prevents abdominal discomfort and reduces free air after the perforation.
Of course, the vital signs of the patient need to be monitored. In this case they are stable during the complete procedure.

01:48 Now the perforation is completely closed and we can restart ESD.

01:57 At this stage the lesion is already completely resected. A CT scan after ESD shows only little free air around the stomach, despite the large size of the perforation.

Antibiotics were administered for a few days and the patient was discharged after 1 week without severe problems. The final histopathological diagnosis was mucosal gastric cancer with R0 resection.

References

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2. Toyokawa, T.; Inaba, T.; Omote, S.; *et al.* Risk Factors for Perforation and Delayed Bleeding Associated With Endoscopic Submucosal Dissection for Early Gastric Neoplasms; Analysis of 1123 Lesions. *J. Gastroenterol. Hepatol.* **2012**, *27*, 907–912.