



## Water pressure method overcomes the gravitational side in endoscopic submucosal dissection for gastric cancer

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The difficulty of gastric endoscopic submucosal dissection (ESD) depends on the location of the lesion. We need to make appropriate strategies for each location. In the greater curvature of the gastric body, gravity collects water and blood, making it difficult to visualize the submucosa. The water pressure method (WPM) is a technique that uses active water pressure by waterjet function in saline solution-filled conditions.<sup>1-3</sup> Herein, we report a case of an extensive gastric ESD using the WPM (Video 1, available online at [www.giejournal.org](http://www.giejournal.org)).

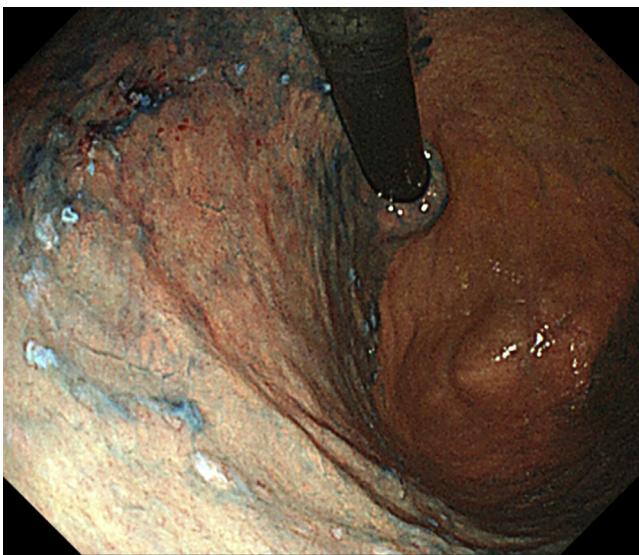
A 73-year-old woman was referred to our hospital for treatment of gastric cancer. Upper GI endoscopy revealed a 70-mm red depressed lesion located on the posterior wall in the upper body (Fig. 1). Biopsy revealed a differentiated adenocarcinoma. Based on morphologic features, the cancer was judged to be limited to the mucosa, without ulceration. CT showed the patient did not have lymph node metastasis and distant metastasis. Thus, we decided to perform ESD.

Endotracheal intubation was performed and general anesthesia was administered to prevent aspiration. A transparent hood and DualKnifeJ (Olympus Medical Systems Co, Tokyo, Japan) were used. First, we made an incision from the cardia to the fornix side of the lesion. Second,

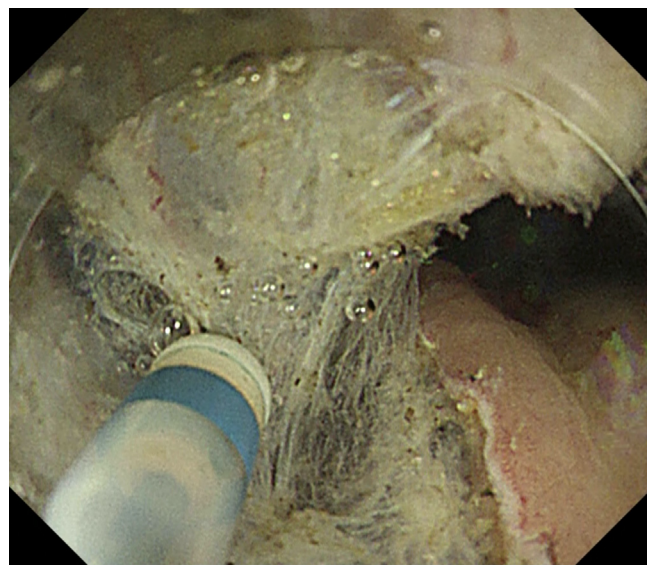
we made an incision and mucosal flap on the anal side of the lesion. We then proceeded to process the greater curvature side, which was challenging because of gravity collecting water and blood. We intentionally filled the stomach with saline solution and used active water pressure via the waterjet function (ie, the WPM technique). The WPM allowed a magnified view because of the difference in photorefractive index between water and air. Furthermore, active water pressure aids in insertion under the mucosal flap and dissection of submucosa, especially the lateral edge of the lesion (Fig. 2).

After sufficient dissection of the submucosa on the greater curvature side, including the fornix side (Fig. 3), we made the mucosal incision on the lesser curvature side and completed the full circumferential incision. Finally, we proceeded to the remaining submucosal dissection phase. In this phase, we also used the WPM as needed, which enabled us to see the submucosal layer and vessels clearly (Fig. 4). In the event of bleeding, active water pressure improved blood flow and allowed us to keep the field of view clear. We successfully achieved en bloc resection with minor bleeding (Fig. 5).

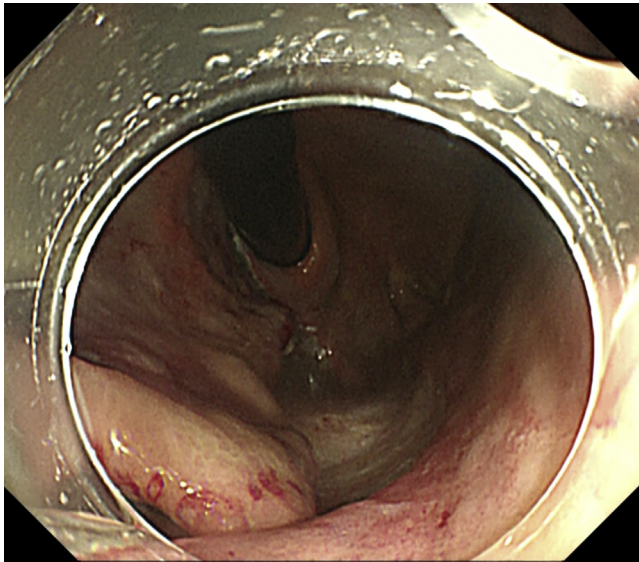
The procedure time was 105 minutes. The specimen size was 95 × 75 mm, and the lesion size was 70 ×



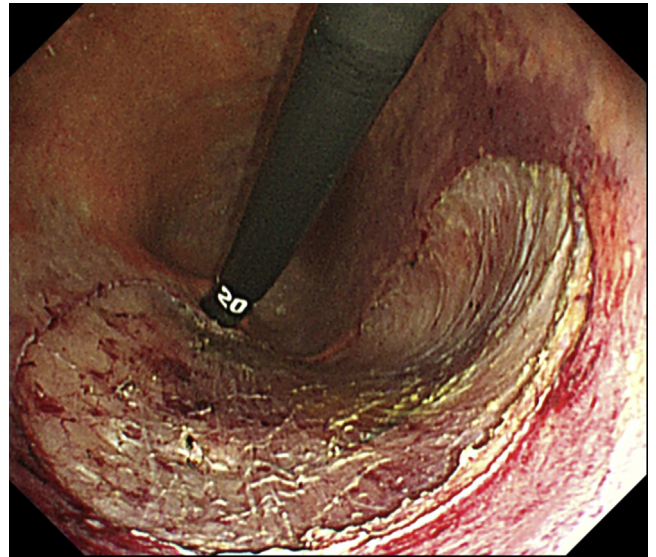
**Figure 1.** A 70-mm red depressed lesion located on the posterior wall in the upper body.



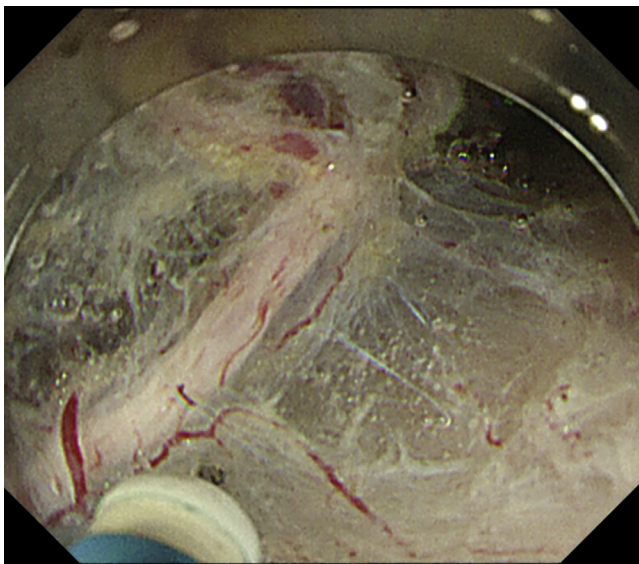
**Figure 2.** The lateral edge of the lesion was easily identified owing to water pressure.



**Figure 3.** Sufficient submucosal dissection of the greater curvature side was achieved.



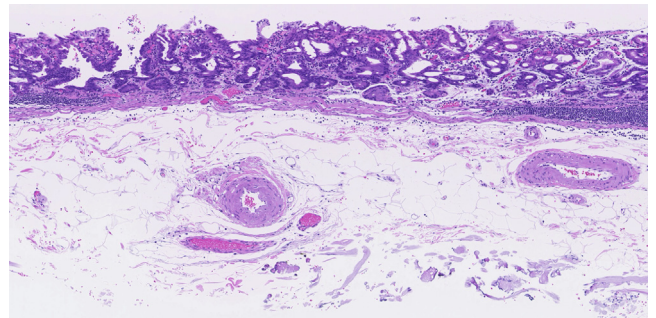
**Figure 5.** En bloc resection was achieved without adverse events.



**Figure 4.** The water pressure method allowed us to visualize the submucosal layer and vessels clearly.

55 mm after resection. The pathologic diagnosis was moderately differentiated adenocarcinoma, T1a, with free horizontal and vertical margin (Fig. 6).

To overcome difficulties in ESD, various methods have been reported, such as the pocket-creation method.<sup>4</sup> Other reports showed that ESD with saline solution immersion enhanced visualization of the submucosal space.<sup>5,6</sup> In duodenal ESD, the WPM using not only saline solution immersion but also water pressure was reported.<sup>1,2</sup> In this method, using active water pressure to create water flow is a key point to assist in insertion



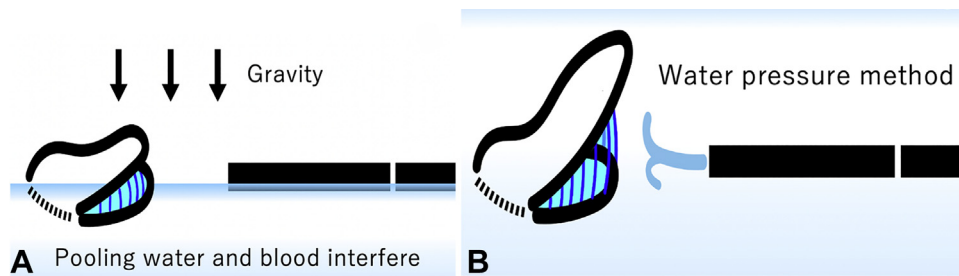
**Figure 6.** Histologic examination of the resected specimen revealed a moderately differentiated adenocarcinoma, T1a, with free horizontal and vertical margin (H&E, orig. mag.  $\times 100$ ).

under the mucosal flap and dissection of the lateral edge of the lesion. In this case, we applied the WPM to gastric ESD; this successfully enhanced the visibility of the lateral edge of the lesion and simplified the process on the greater curvature side of the body, in which water and blood interfere with the procedure owing to gravity (Fig. 7). We believe that the WPM in gastric ESD is a useful method that can overcome gravitational water pooling, although some prophylactic method for aspiration, including endotracheal intubation, may be required.

## DISCLOSURE

*All authors disclosed no financial relationships.*

*Abbreviation: ESD, endoscopic submucosal dissection; WPM, water pressure method.*



**Figure 7.** **A**, In the greater curvature side of the gastric body, gravity collects water and blood, interfering with visualization of the submucosa to be resected. **B**, The water pressure method widened the submucosa, making it easy to identify the line to be resected.

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