“Underwater” endoscopic submucosal dissection: a novel technique for complete resection of a rectal neuroendocrine tumor

Many techniques for endoscopic resection of rectal neuroendocrine tumors (NETs) have been reported [1]. Among these, endoscopic submucosal dissection (ESD) has recently been applied [2]. Although ESD may have the advantage over conventional endoscopic mucosal resection of achieving a complete (R0) resection [3], the crush artifact caused by burn or coagulation from repeated exposure to electric current in this procedure cannot be avoided, and often results in non-R0 resection [4]. We present the case of a rectal NET resected using "underwater" ESD, a new method for complete resection without the creation of unnecessary burn artifacts (Video 1).

A 73-year-old man was diagnosed with a distal rectal NET by colonoscopy. (Fig. 1). Endoscopic ultrasonography revealed that the tumor had invaded the deep submucosa, and that the submucosal margin between the tumor and the muscle layer was narrow and might be insufficient for R0 resection using the conventional endoscopic technique (Fig. 2). A circumferential incision was made as for conventional ESD, and the rectal lumen was filled with saline. A bipolar needle-knife (Jet B-knife; Zeon Medical Co., Tokyo, Japan) with swift coagulation mode was used to dissect the submucosa underwater. Although moderate bleeding occurred once during the submucosal dissection, this only required removal of the water to maintain a clear view and to use a hemostatic forceps; pre-coagulation underwater was possible against most
vessels using the Jet B-knife with swift coagulation mode. Water was delivered via the waterjet function of the Jet B-knife when needed, and the lesion was precisely resected underwater, just above the muscle layer (Fig. 3). Histological examination of the resected specimen revealed a grade 1 NET invading the deep submucosal layer with tumor-free resection margins (Fig. 4). The patient followed an uneventful clinical course.

For complete R0 resection of a rectal NET invading the deep submucosal layer endoscopically, the crush artifact associated with the electric current should be reduced. The “heat-sink” effect of water immersion can help to minimize the thermal damage to the resected specimen and muscle layer [5]. In addition, the “floating” effect of the mucosa and submucosa relative to the outer muscle layer provides good traction for resection, and the optical “zoom” effect of water immersion enables a more precise procedure [5]. Underwater ESD can therefore be a useful technique for R0 resection of rectal NETs.

**Fig. 3** The resected specimen was a well-differentiated grade 1 neuroendocrine tumor invading the deep submucosal layer with tumor-free resection margins. a Loupe view (hematoxylin and eosin [H&E] stain × 5), b High-power microscopic view (H&E × 25).

**Fig. 4** The resected specimen was a well-differentiated grade 1 neuroendocrine tumor invading the deep submucosal layer with tumor-free resection margins. a Loupe view (hematoxylin and eosin [H&E] stain × 5), b High-power microscopic view (H&E × 25).

**Competing interests:** None

**References**

**Corresponding author**
Tetsuo Takehara, MD, PhD
Department of Gastroenterology and Hepatology
Osaka University Graduate School of Medicine
2-2, Yamadaoka suita
Osaka 565-0871
Japan
Fax: +81-6-68793629
takehara@gh.med.osaka-u.ac.jp