INTRODUCTION

The introduction of population-based screening has resulted in an increased incidence of early-invasive (T1) rectal cancer. For these tumors, local treatment is considered curative when the resection margins are negative (R0) and histological high-risk factors for lymph node metastasis (LNM) are absent. Although deep submucosal invasion has long been considered a high-risk factor, recent reports showed that Kikuchi level (Sm) 2 to 3 lesions without other high-risk factors are associated with a negligible LNM risk (<2%). In addition, a recent meta-analysis suggested that the risk of future metastatic disease is unlikely to exceed the baseline risk of synchronous LNM considerably, as the overall risk of any distance recurrence for deeply invasive T1CRCs, with or without other histological risk factors, was 3.3%. This implies that it is important to maximize the chance of achieving complete R0 resection for deeply invasive T1 rectal cancers because this could be considered curative in some cases.

Endoscopists usually perform dissection in the submucosal space (endoscopic submucosal dissection [ESD]), but a major disadvantage is that the vertical resection margin is more likely to become positive upon deeper invasion into the submucosa. A more suitable alternative would be endoscopic intermuscular dissection (EID), a novel resection technique that involves dissection in the intermuscular plane, the plane between the longitudinal (external) and circular (internal) muscle layer. EID was described for the first time by Rahni et al, who used this technique to remove rectal lesions with extensive fibrosis. More recently, this resection technique has also been used to resect rectal cancers with suspected >Sm1 invasion. The results from this prospective series of 67 patients suggest that EID is safe (no surgery for EID-related adverse events, 12% minor adverse events) and feasible (technical success rate 96%). Here, we present a step-by-step video explanation of the EID technique, which was used to resect a rectal lesion with a small focus of suspected deep submucosal invasion (Video 1, available online at www.giejournal.org).

CASE PRESENTATION

A 70-year-old man underwent a screening colonoscopy after a positive fecal occult blood test. Colonoscopy revealed a 25-mm rectal tumor, located 2 cm above the dentate line (Fig. 1). Virtual chromoendoscopy of the depressed area showed nonstructured amorphous pits and nearly avascular and loose microcapillary vessels (Fig. 2). Magnetic resonance imaging staging showed a cT1-2N0M0 rectal lesion in the anterior wall of the rectum, 3 cm above the anal verge. After discussion in a multidisciplinary team meeting, the patient was referred to our department for local endoscopic resection. Two expert
Figure 2. A, Advanced imaging of the tumor and B, the central depression.

Figure 3. Schematic representation of endoscopic intermuscular dissection. A, Injection of a viscous fluid. B, Mucosal incisions at the oral and anal side of the lesion. C, Endoluminal view on the mucosal incision. D, Intermuscular dissection. E, Retrieval of the resection specimen. F, Fixation of the resection specimen.
endoscopists reevaluated the endoscopic images and deemed the lesion not suitable for ESD because of optical findings strongly suggestive of deep submucosal invasion (Fig. 2). Considering the size and optical diagnosis of the lesion, EID was selected (with informed consent from the patient).

ENDOSCOPIC INTERMUSCULAR DISSECTION

EID (Fig. 3) was performed with the patient under propofol sedation. A standard therapeutic gastroscope (Olympus GIF-1TH190, Olympus, Tokyo, Japan) with a transparent tapered hood (DH-30CR; Fujiﬁlm, Tokyo, Japan) was introduced. A 1.5-mm BT Flush Knife (Fujiﬁlm) was used with the Endocut mode of the ERBE VIO 300D (ERBE Elektromedizin, Tübingen, Germany). First, the perimeter of the lesion was marked using soft tip coagulation. Submucosal lifting was performed with a mixture of hydroxyethyl starch, indigo carmine, and adrenaline. A submucosal incision was created at the oral side and then at the anal side of the lesion. The entrance of the tunnel was created at the anal side using submucosal dissection. After 1 cm, the inner circular muscle was incised between 2 muscular bundles, thereby exposing the outer longitudinal muscle layer. The direction of the fibers was clearly visible, but the intermuscular space is quite narrow. To facilitate safe intermuscular dissection, optimal countertraction was obtained using gravity and the transparent hood (Fig. 4). After 2 to 3 cm of intermuscular tunneling under the lesion, the submucosal space was reentered and the oral incision was reached. The lateral margins were then incised to complete the dissection. En bloc resection was achieved. The total procedure time was 90 minutes. The resection site was left open (Fig. 5). After the procedure, the patient was discharged the same day and received oral antibiotics for 5 days.

The pathology report showed a pT1Sm3 adenocarcinoma with negative lateral and vertical resection margins (both >1-mm margin), moderate differentiation, and low-grade tumor budding (Fig. 6). However, lymphovascular invasion was present, and additional treatment was recommended after discussion in the multidisciplinary team meeting. After shared decision-making, the patient agreed to participate in the TESAR trial13 and was randomized for additional chemoradiotherapy. Three months after completion of chemoradiotherapy, restaging with magnetic resonance imaging and rectoscopy showed no signs of residual tumor tissue (Fig. 7).

CONCLUSIONS

In this video report, we provided a step-by-step explanation of EID with intermuscular tunneling. The EID technique may be particularly useful for local treatment of
T1 rectal cancers with deep submucosal invasion because it enables complete R0 resection of these tumors with minimal interference with the total mesorectal excision plane.

**DISCLOSURE**

*Dr Boonstra is a consultant for Boston Scientific. All other authors disclosed no financial relationships.*

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**Figure 6.** Histology of the resected specimen, left (A) and right half (B). H&E, orig. mag. ×2.

**Figure 7.** Post-endoscopic intermuscular dissection resection scar after 3 months of follow-up, visualized using white-light (A) and advanced imaging (B).
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Abbreviations: EID, endoscopic intermuscular dissection; ESD, endoscopic submucosal dissection; R0, resection margins are negative; Sm, Kikuchi level.

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