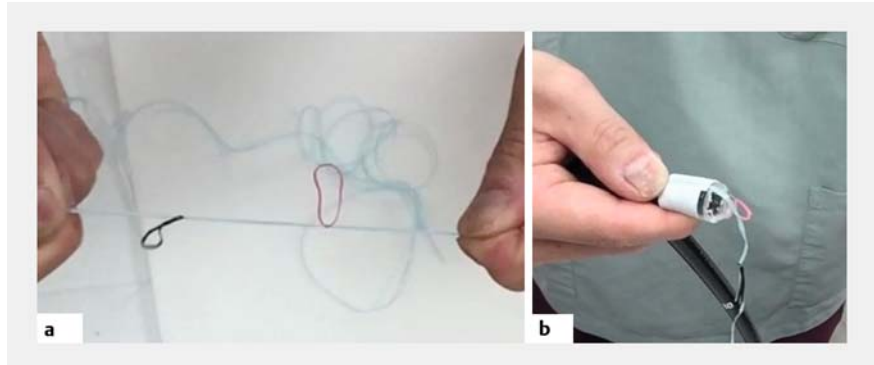


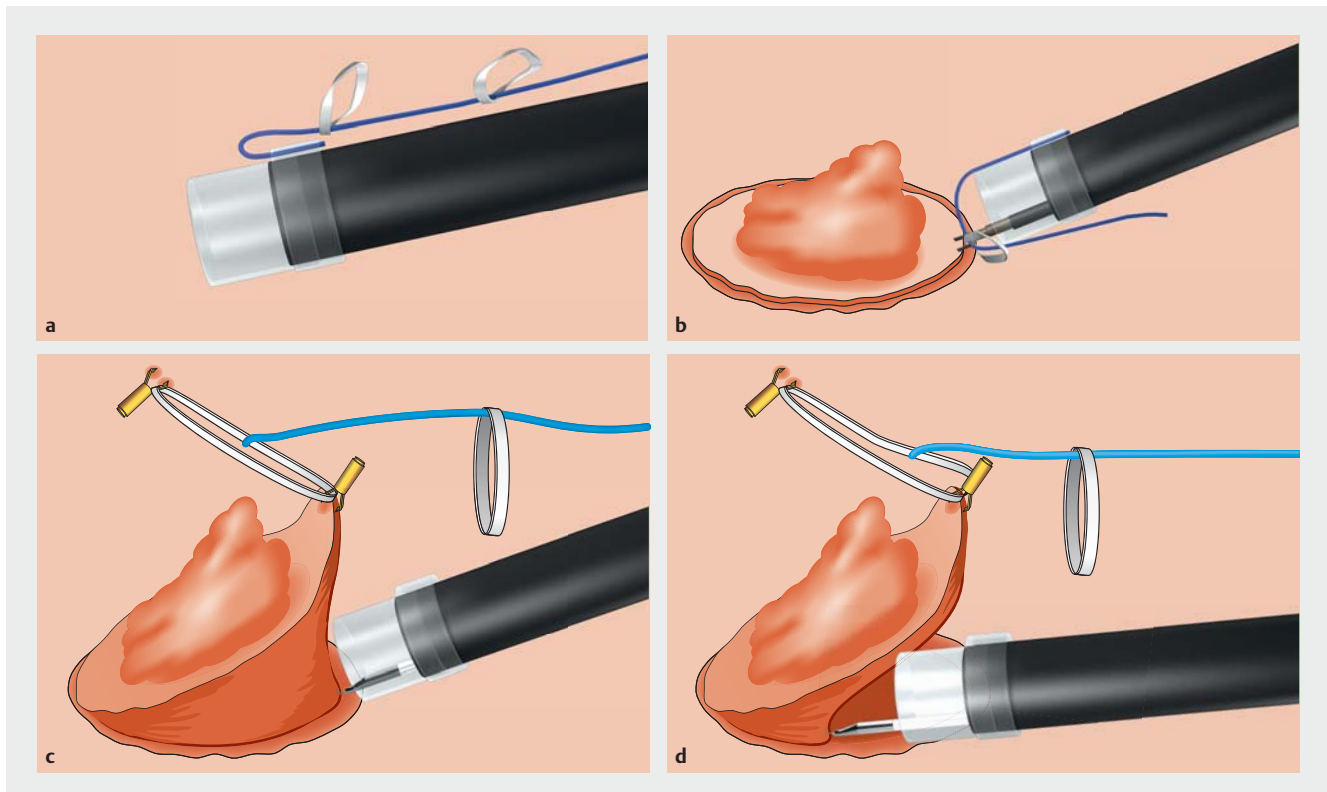
Colorectal endoscopic submucosal dissection using the “dental floss with rubber band method”

Colorectal endoscopic submucosal dissection (ESD) is considered one of the most challenging procedures owing to the difficulty in maintaining good visualization of the submucosal layer. To improve the visibility of the submucosal layer, various traction methods have been invented [1–4]. We have developed a new and efficient traction method called the “dental-floss with rubber-band method” (DRM).

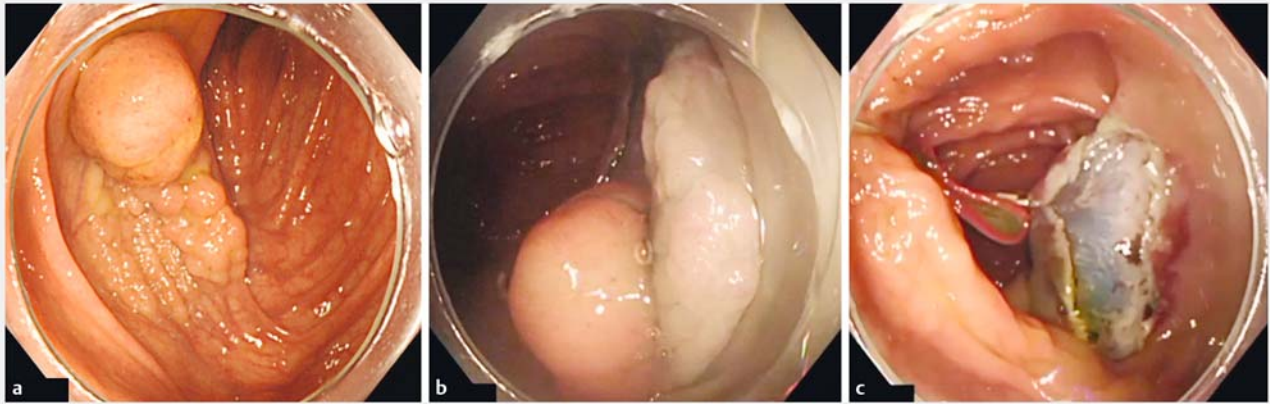
First, we connect rubber bands to the dental floss at intervals of about 3 cm (► **Fig. 1 a**). The dental floss with the rubber bands attached is then fixed in position with tape so that the rubber



► **Fig. 1** Photographs showing: **a** the rubber bands fixed at intervals of about 3 cm along the dental floss; **b** the dental floss with rubber bands attached fixed with tape in a position where the rubber bands are visible from the transparent hood.



► **Fig. 2** Schematic showing: **a** the dental floss with attached rubber bands affixed to the endoscope and transparent hood with tape; **b** a rubber band being applied to the edge of the dissected mucosa after the mucosa around the lesion has been circumferentially dissected; **c** the rubber band being affixed with a clip to the contralateral colonic mucosa; **d** the good view of the submucosa that can be obtained by gently pulling the dental floss.



► **Fig. 3** Colonoscopic views showing: **a** a large elevated lesion (65 mm) in the cecum; **b** the lesion after circumferential incision; **c** the improved visibility of the submucosa when traction is applied by the dental floss and rubber bands.



► **Video 1** The procedure for attaching the rubber bands to the dental floss and fixing the dental floss with the rubber bands attached to the colonoscope. Colonic endoscopic submucosal dissection is then performed using the “dental-floss with rubber-band method.”

Effective traction in colorectal ESD requires the following:

- it should be inexpensive
- it should not require reinsertion
- the direction of traction should be changeable, and
- it should afford continuous traction.

The DRM is a new and efficient method that satisfies all of the above.

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Competing interests

None

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bands are visible from the transparent hood when the endoscope is pulled out (► **Fig. 1 b** and ► **Fig. 2 a**). The endoscope is inserted as usual, and circumferential dissection of the mucosa around the lesion is performed. The endoscope is pulled out a little or retroflexion is performed to bring a rubber band into the view of the endoscope. The rubber band is applied to the edge of the dissected submucosa and affixed with a clip to the contralateral colonic mucosa (► **Fig. 2 b, c**). Traction is added through the dental floss and the rubber band, so improving visibility of the submucosa. The direction of traction may be changed by gently pull-

ing the dental floss, and sustained and efficient traction can be obtained (► **Fig. 2 d**).

► **Video 1** shows how to prepare the dental floss and rubber bands and an example of colonic ESD using the DRM. The patient had a large elevated lesion 65 mm in size in the cecum (► **Fig. 3 a**), and ESD was performed. After the circumferential incision, it was difficult to see the submucosal layer (► **Fig. 3 b**). Continuous traction was applied several times using the DRM and good visualization of the submucosa was obtained (► **Fig. 3 c**). The lesion was completely removed with free margins.

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