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Endoscopic Full-Thickness Resection Using a Novel Over-the-Scope Device

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Endoscopic mucosal resection is an established therapy for nonpedunculated colorectal adenomas. However, local recurrence is reported to occur in $\leq$24% of cases.[1] Endoscopic retreatment can be challenging due to fibrosis leading to a "nonlifting sign."[2]

Over-the-scope clips (OTSC) have successfully been used to close defects after endoscopic full-thickness resection (eFTR) in the upper and lower gastrointestinal tract.[3,4] Endoscopic resection of lesions by application of an OTSC followed by snare resection has been described to be feasible.[5–7] We report herein our clinical experience using a novel over-the-scope device for eFTR of nonlifting recurrent adenomas.

Description of Technology

The Full-Thickness Resection Device (FTRD, Ovesco Endoscopy, Tübingen, Germany) is a preassembled, over-the-scope device (Figure 1). A transparent cap with a modified 14t OTSC is mounted over a standard colonoscope. The cap has an inner diameter of 13 mm and is longer (23 mm) than a standard OTSC cap (3–6 mm). A monofilament, 14-mm polypectomy snare is preloaded in the tip of the cap. The snare is not advanced through the working channel, but rather runs at the outer surface of the endoscope under a plastic sheath. This sheath is fixed on the cap and pulled over the scope shaft after mounting the cap (Supplemental Figures 1–3 provide a detailed description of the device assembly). For resection, a grasping forceps or a tissue anchor (Ovesco Endoscopy) is advanced through the working channel of the endoscope to grasp the lesion (Figure 2). The lesion is slowly pulled into the cap to incorporate a double full-thickness layer of the colonic wall. Having the lateral margins of the lesion pulled into the cap, the OTSC is deployed. The pseudopolyp created by the OTSC is then resected with the preloaded snare while the OTSC secures patency of the colonic wall. The device has a CE mark and is commercially available in the EU.

We report on 3 patients referred for resection of recurrent nonpedunculated adenomas. The patients were 81, 72, and 70 years old. All adenomas had a negative lifting sign; the lesions were 20, 20, and 25 mm. The adenomas were located in the rectosigmoid transition (cases 1 and 3) and in the descending colon (case 2). All lesions were resected with the FTRD system. Histology confirmed complete full thickness resection (R0) in all cases. All patients were closely observed clinically after resection; x-ray was not performed. There were no signs of bleeding, perforation, or peritonitis. In cases 1 and 2, the OTSC had fallen off after 3 months. In case 2, the clip was still in place after 6 months. To exclude recurrence, the clip was removed using a novel cutting device (DC Clip-Cutter, Ovesco Endoscopy).[8] Adenoma recurrence was not observed in any of the cases after 3 or 6 months.

Perspective of eFTR With the Novel Over-the-Scope Device

Endoscopic submucosal dissection is feasible for resection of nonlifting recurrent adenomas, but is technically

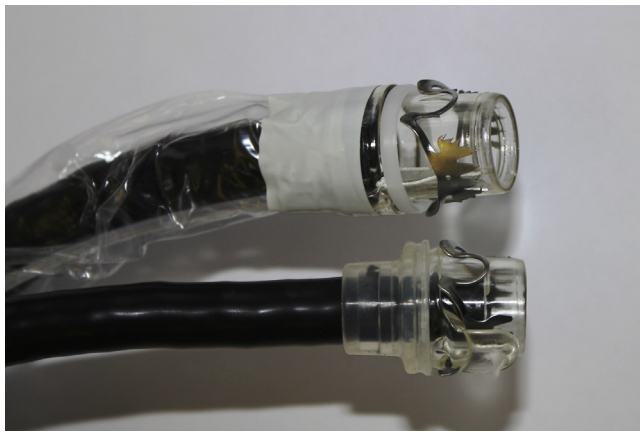

Figure 1. The Full-Thickness Resection Device (FTRD) (*top*) vs a conventional 14gc over-the-scope clips (OTSC; *bottom*) mounted on a standard colonoscope. The FTRD is equipped with a modified 14-mm OTSC and a preloaded monofilament snare, which runs on the outer surface on the endoscope underneath a transparent sheath. The FTRD cap is significantly longer than the standard OTSC cap.

Abbreviations used in the paper: **eFTR, endoscopic full-thickness resection; FTRD, full-thickness resection device; OTSC, over-the-scope.**

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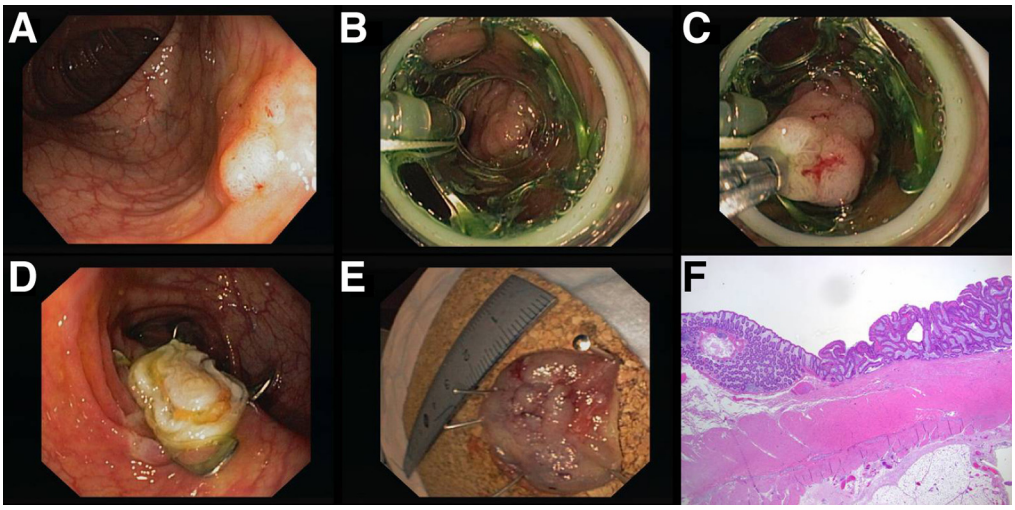

Figure 2. Full-thickness resection of a nonlifting recurrent adenoma in the descending colon. (*A*) Endoscopic image of the adenoma. (*B*) Endoscopic image of the adenoma with the mounted FTRD. (*C*) The lesion is pulled into the cap with a grasping forceps. (*D*) Resection site; patency of the colonic wall is secured by the over-the-scope clip. (*E*) Resection specimen. (*F*) Histology of the full-thickness resection specimen confirmed R0-resection (image shows lateral margin of the adenoma).

demanding and time consuming, and the perforation rate has been reported to be as high as 14.7%.[2] EFTR may be an adequate resection technique for those lesions. The technique using the FTRD is simple and not time consuming (total procedure time was 35–50 minutes). In contrast with other eFTR techniques,[3,4] patency of the colonic wall is secured by applying the OTSC before resection. This may be a more secure approach than closing the wall defect after resection, because spillage of colonic contents into the abdomen is avoided. The technique of OTSC application followed by snare resection has recently been described using the conventional OTSC system with a 11/6t Clip.[5,6] The main difference of the FTRD is the preloaded snare, which allows a 1-step resection immediately after OTSC deployment. Moreover, the cap is longer, larger in diameter, and equipped with a modified 14-mm OTSC. This allows incorporation of more tissue. In preclinical porcine experiments, the maximum size of colonic resection specimens was 40 × 42 mm.[7] However, the amount of tissue that can be pulled into the cap strongly depends on thickness, rigidity, and mobility of the gastrointestinal wall. Full-thickness resection in the stomach may not be possible owing to the thickness of the gastric wall. Moreover, the outer device diameter of 21 mm limits peroral introducibilitiy of the device. Another drawback of the system is that the long cap limits the endoscopic view and the flexibility of the tip of the endoscope. This may compromise advancing the scope through difficult anatomic lesions like the sigmoid. Also, during pulling of the tissue into the cap, the lateral margins of the lesion are usually not visible circumferentially, so it is very important to grasp the lesion right in its center to ensure that the whole circumference is incorporated into the cap.

EFTR with the FTRD may also be a valuable diagnostic tool to obtain definitive histologic diagnosis in patients with previously untreated nonlifting colorectal lesions. Another indication may be re-resection in patients after incomplete endoscopic resections of T1 carcinomas. Histology of the full-thickness resection specimen may help to determine the adequate therapy or may even be therapeutic itself. The technique may also be used to obtain full-thickness "biopsies" in patients with suspected neurogenic motility disorders. Another possible indication may be resection of subepithelial tumors and resection of colonic adenomas involving a diverticula or the appendix.

Video Description

The video first shows 2 images of the FTRD. The next 2 images schematically illustrate the resection technique as described above. Then, 3 patients with recurrent nonlifting adenomas are shown. The adenomas were marked with argon plasma coagulation and/or Toluidine blue staining. All lesions were resected with the FTRD as described. All lesions were resected macroscopically complete; histologic examination showed complete resection (lateral and deep margins) and confirmed full-thickness resection in all cases.

Take Home Message

The novel FTRD is a valuable tool for endoscopic full-thickness resection in the lower gastrointestinal tract. Further studies are warranted to investigate efficacy and safety of the device.

Supplementary Material

Note: To access the supplementary material accompanying this article, visit the online version of *Gastroenterology* at www.gastrojournal.org, and at http://dx.doi.org/10.1053/j.gastro.2014.07.045.

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Reprint requests
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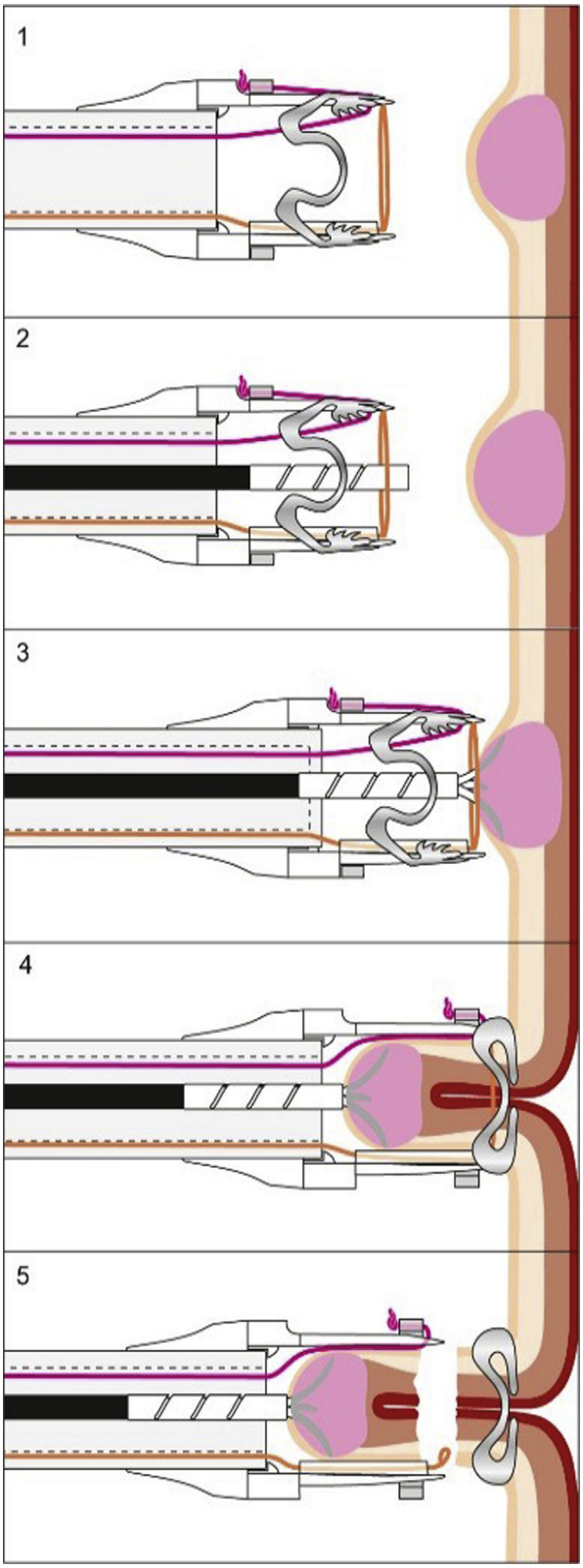
Conflicts of interest
The department Gastroenterology and Oncology in Ludwigsburg does receive financial support for coordinating and conducting a multicenter study investigating OTSC clips in recurrent peptic ulcer bleeding. The authors disclose no conflicts.

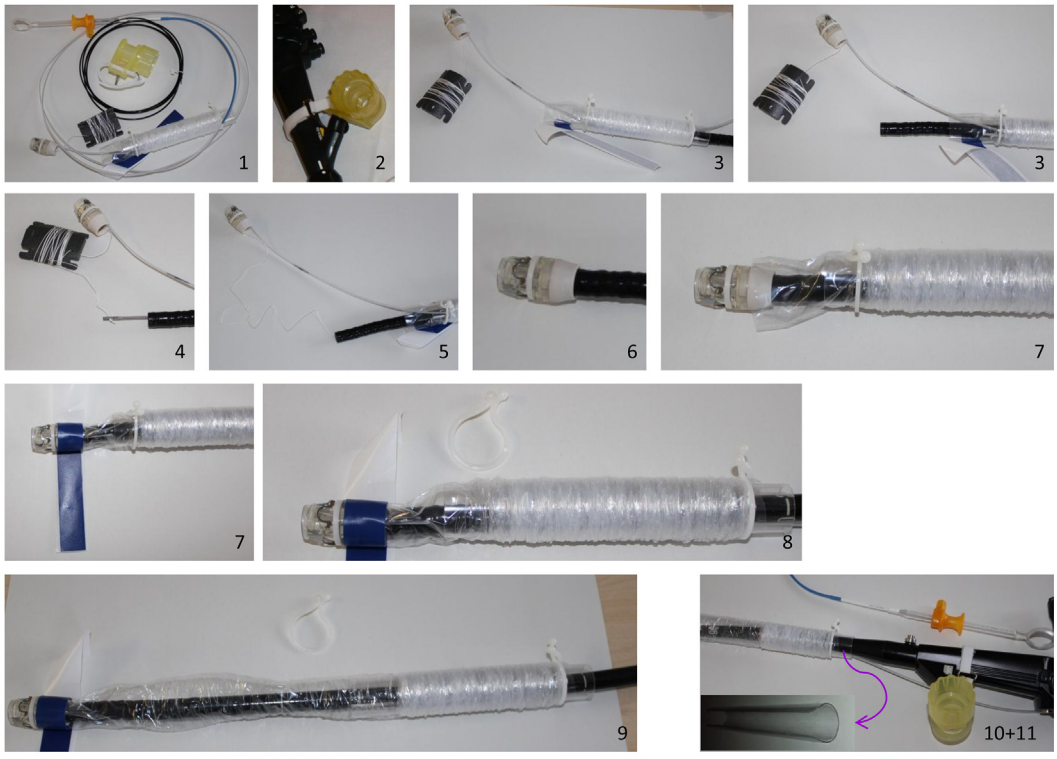


Supplementary Figure 1. Resection with the Full-Thickness Resection Device (FTRD). The endoscope is introduced with the mounted FTRD (*1*). A grasping forceps or a tissue anchor is advanced through the working channel of the endoscope (*2*). The lesion is grasped and pulled into the cap (*3*). The over-the-scope clip is deployed (*4*). The tissue above the clip is resected with the preloaded snare (*5*).

Supplementary Figure 2. The DC Clip Cutter (OVESCO). The DC ClipCutter is a monopolar grasping device that can be advanced through a 3.2-mm working channel. The nitinol of the over-the-scope clip (OTSC) is cut by application of a short direct current impulse.

FTRD System - Assembly

1. Take parts out of blister
2. Mount hand wheel on working channel of endoscope
3. Place endoscope sleeve tube on the endoscope
4. Insert thread retriever and grasp end of thread
5. Pull thread through the channel and fix it at the hand wheel (same as with OTSC System)
6. Wind up thread and place cap onto the endoscope until it reaches the stopper (same as with OTSC System)
7. Place endoscope sleeve near cap and tape end of sleeve onto cap with included tape. Making sure the tape doesn't touch the white ring.
8. Remove first plastic clamp
9. Pull sleeve by holding the tube until the end of the scope
10. Remove second plastic clamp
11. Pull out plastic tube and flap it open it to remove it from the endoscope



Supplementary Figure 3. Device assembly sheet explaining the step-by-step assembly of the Full-Thickness Resection Device.