

# Limited Endoscopic-Assisted Wedge Resection for Excision of Colon Polyps

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**BACKGROUND:** Combined endoscopic laparoscopic surgical removal is used for polyps in the colon that are not suitable for endoscopic removal because of size, location, or scarring. However, the placement of a linear stapler can be challenging. Currently a wedge resection is mostly documented in the cecum or ascending colon.

**OBJECTIVE:** We report on our experience with limited endoscopy-assisted wedge resections in the entire colon.

**DESIGN:** A retrospective study was performed.

**SETTINGS:** This was a single-center study.

**PATIENTS:** Eight patients were included between March 2015 and April 2016.

**INTERVENTIONS:** The laparoscopic surgical technique consisted of placing a suture under endoscopic view through the base of the polyp into the lumen. Subsequently, traction was given on the suture to enable stapling of a wedge of the colon.

**MAIN OUTCOME MEASURES:** Medical data were collected (ie, indication for referral for surgery, location and size of the polyp, duration of surgical procedure, length of hospital stay, and perioperative and postoperative complications). Operative time was defined as the total time of general anesthesia.

**RESULTS:** Eight patients, with a mean age of 74.5 years (range, 68.0–82.0 years), were treated. The main

indications for laparoscopic resection were the size and difficult location of the polyp. There were no complications. Mean operative time was 132 minutes. Five patients were discharged the day after surgery, and the other 3 patients were admitted for a total of 2 days.

**LIMITATIONS:** The study was limited by its small sample size.

**CONCLUSIONS:** Our study found that limited endoscopy-assisted wedge resection is a feasible and easy technique for the removal of colon polyps and residual adenomatous tissue in scars that are not accessible for endoscopic removal. Because of traction given on the suture through the base of the polyp, the linear stapler is easily used for wedge resections of polyps, even for those that are not in favorable positions.

**KEY WORDS:** Adenoma; En bloc; Endoscopic assisted; Laparoscopic colorectal surgery; Wedge resection.

The new combined endoscopic laparoscopic surgical (CELS) approach for the removal of difficult colon polyps, the so-called CELS full-thickness excision, was recently described by Lin et al.<sup>1</sup> They describe how to create a defect in the seromuscular layer circumferentially over the location by laparoscopy where indigo carmine solution was injected previously. Then, the dissected area is invaginated into the bowel lumen with a laparoscopic instrument. A snare is introduced and looped around the polyp. Before cutting through the polyp, the peritoneal surface is examined, and there is laparoscopic closure to repair the colonic defect.<sup>1</sup> Three patients are described who underwent CELS full-thickness excision for difficult benign polyps. The average surgery time was 179 minutes. There was minimal blood loss, and there were no perioperative complications. The authors describe that a (limited) wedge resection using a linear stapler without anastomosis is only feasible if the polyps are in a favorable position, such as in the cecum.<sup>1,2</sup> We report on our experi-

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ence with limited endoscopy-assisted wedge resections in 8 patients in Isala, Zwolle, the Netherlands.

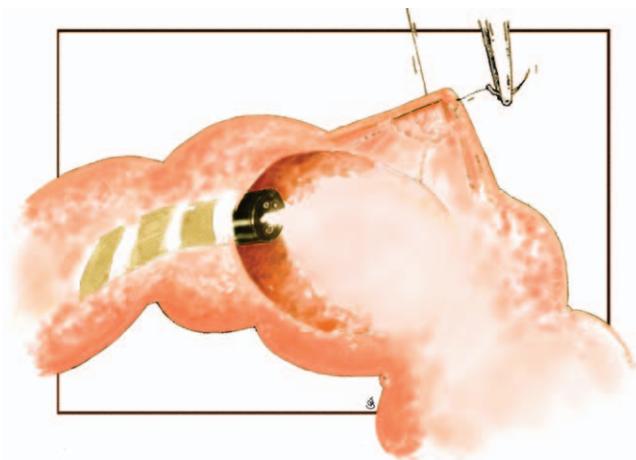
## PATIENTS AND METHODS

### Study Design

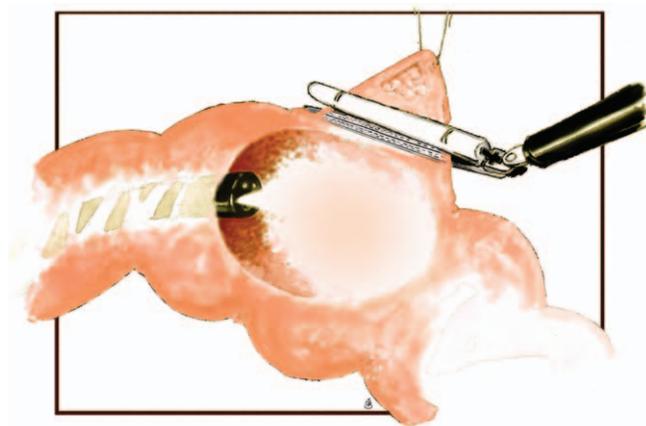
A retrospective, single-center study was performed in Isala Hospital between March 2015 and April 2016. We included patients with polyps who were eligible for a combined endoscopic laparoscopic surgical removal. Patients were mainly referred from our own department of gastroenterology. There were various reasons for referral for surgical resection, including endoscopic unresectability, size, localization, or incomplete/failed resection. One surgeon, who specialized in minimal invasive colorectal surgery, performed all of the procedures. We collected data on age, sex, localization of the polyp, preoperative and postoperative pathology findings, indication for surgical resection, duration of surgical procedure, length of hospital stay, and perioperative and postoperative complications. We defined complications as excessive blood loss during surgical procedure, postoperative blood loss, perforation, and perioperative infections. Operative time was defined as total time of general anesthesia.

### Surgical Technique

All of the patients underwent split-dose bowel preparation. Patients were placed under general anesthesia in the French position. The surgeon started with a diagnostic laparoscopy with 3 trocars. At first, the spot in the colon was identified, and the concerning part of the colon was mobilized to ensure the limited endoscopy-assisted wedge resections. Second, the colonoscopy was performed by the gastroenterologist. A suture was placed laparoscopically with intraluminal endoscopic visualization through the base of the polyp (Fig. 1). Traction was given on the suture



**FIGURE 1.** Placing a suture through the base of the polyp into bowel lumen under endoscopic view.



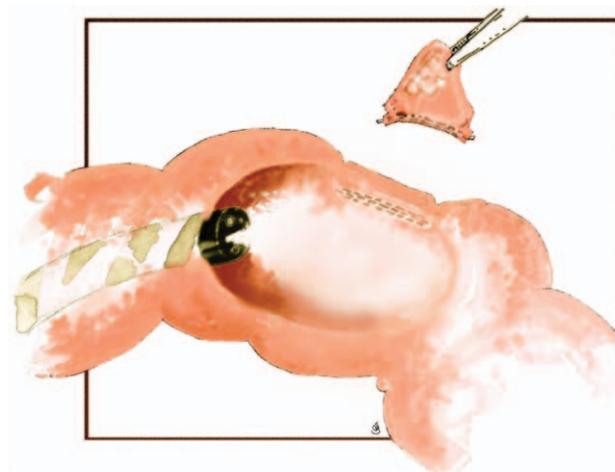
**FIGURE 2.** Traction given on the suture before stapling off and to ensure positioning of the linear stapler.

to enable positioning of the linear stapler (Endo-GIA tri-staple, Covidien, Dublin, Ireland; Fig. 2). Before stapling off the polyp, the patency of the lumen (ie, the lumen of the colon or, in case of a cecal lesion, the lumen of the ileum) and total inclusion of the polyp tissue were checked endoscopically by the gastroenterologist (Fig. 3 and see Video, Supplemental Digital Content 1, <http://links.lww.com/DCR/A262>). The resected specimen was removed in an endobag through the 12-mm trocar. The surgeon, as well as the endoscopist, checked the colon for signs of bleeding or perforation before ending the procedure.

## RESULTS

Eight patients with endoscopically unresectable colon polyps were treated. Seven patients were referred from our own department of gastroenterology; 1 patient was referred from another hospital.

Seven patients were men, and the mean age of all patients was 74.5 years (Table 1). The main indications for



**FIGURE 3.** Before stapling off the polyp, the patency of the lumen is checked endoscopically.

**TABLE 1.** Demographics and mean operative time

| Parameter                           | Data (N = 8)  |
|-------------------------------------|---------------|
| Age, median (range), y              | 75 (68–82)    |
| Sex, n (%)                          |               |
| Men                                 | 7 (87)        |
| Women                               | 1 (13)        |
| ASA, n (%)                          |               |
| 1                                   | -             |
| 2                                   | 6 (75)        |
| 3                                   | 2 (25)        |
| Operative time, median (range), min | 132 (110–170) |

laparoscopic resection were the size and difficult location of the polyp. In 3 patients, the indication was suspected residual adenomatous tissue after polypectomy (Table 2, patients 1, 4, and 6). There were no complications in our patients. The mean operative time was 132 minutes. In 2 patients the operative time was longer. In patient number 2 (Table 2), this is explained by the fact that we started with a transanal endoscopic microsurgery procedure, which failed. In the other patient (Table 2, patient 1), 2 wedge resections were performed. The perioperative blood loss was negligible. Five patients were discharged the day after surgery; the other 3 patients left the hospital 2 days after surgery (Table 2). In 7 patients the margin of resection was clear of adenomatous tissue. In 1 patient (Table 2, patient 1) who underwent 2 wedge resections, the margin of resection in 1 of the specimens was clear of adenomatous tissue. However, radicality of the other specimen was unclear because of the fact that the margin of this lesion (a sessile serrated adenoma with low graded dysplasia) was in the staples of the resection site that were removed be-

fore histological examination. Although we are convinced that this polyp is completely removed, we cannot prove radicality, and we will plan this patient for surveillance endoscopy. One of 8 patients underwent a follow-up colonoscopy 6 months after operation; there was no stenosis of the colon.

## DISCUSSION

We have demonstrated that limited endoscopic-assisted wedge resection (EAWR) is a feasible and safe procedure for polyps in the colon that are not suited for endoscopic removal because of size, place, or scarring. Although patient numbers were low, we did not encounter any difficulties in placing the stapler. Because of traction given on the suture through the base of the polyp, the linear stapler was also easily used for wedge resections of polyps that were not in a favorable position. In the literature we did not find an earlier study that used traction on a suture to perform a wedge resection. We performed a limited EAWR for polyps with sessile, as well as (semi-)pedunculated, morphology. Indication for limited EAWR of (semi-)pedunculated polyps was difficult location attributed to instability of the scoop.

Obviously, a limited EAWR is not suitable for the resection of malignant polyps, because radical lymph node dissection is not part of this technique.<sup>3</sup> In addition, leaving residual neoplasia could not be ruled out in 1 patient, as described above. Patients with previous biopsies consistent with invasive cancer should be excluded from the limited EAWR. However, we treated 1 patient (Table 2, patient 2) for a polyp that was macroscopically suspect for

**TABLE 2.** Details of patients undergoing endoscopic-assisted laparoscopic full-thickness excision

| Patient No. | Age, y | Sex   | ASA | Polyp location                                      | Size, mm             | Preoperative pathology | Indication                     | Operative time, min | Final pathology        | LOS, d | Complications |
|-------------|--------|-------|-----|---|----------------------|------------------------|--------------------------------|---------------------|------------------------|--------|---------------|
| 1           | 68     | Men   | 2   | Transverse colon/<br>descending colon<br>(2 polyps) | 10/scar <sup>a</sup> | TA-HGD                 | Difficult location/<br>SRATAP  | 165                 | SSA-LGD/scar<br>tissue | 1      | None          |
| 2           | 82     | Men   | 3   | Sigmoid   | 10                   | AC                     | Early carcinoma                | 170                 | pT1NxMx AC             | 2      | None          |
| 3           | 76     | Men   | 3   | Transverse colon                                    | 28                   | TA-LGD                 | Size and difficult<br>location | 126                 | TVA-LGD                | 2      | None          |
| 4           | 78     | Women | 2   | Cecum, valvula<br>Bauhini                           | Scar <sup>b</sup>    | TA-HGD                 | Nonlifting and<br>SRATAP       | 117                 | TVA-HGD                | 1      | None          |
| 5           | 79     | Men   | 2   | Splenic flexure                                     | 20                   | TVA-HGD                | En bloc resection <sup>c</sup> | 119                 | TVA-HGD                | 1      | None          |
| 6           | 69     | Men   | 2   | Hepatic flexure                                     | Scar <sup>d</sup>    | TA-LGD                 | SRATAP                         | 122                 | No polyp tissue        | 2      | None          |
| 7           | 70     | Men   | 2   | Cecum   | 40                   | SSAP                   | Size and difficult<br>location | 110                 | SSAP                   | 1      | None          |
| 8           | 74     | Men   | 2   | Cecum   | 43                   | SSAP                   | Size and difficult<br>location | 124                 | TVA-LGD                | 1      | None          |

Size of the polyp is based on the pathology report.

AC = adenocarcinoma; TVA = tubulovillous adenoma; TA = tubular adenoma; SSAP = sessile serrated adenoma/polyp; HGD = high-grade dysplasia; LGD = low-grade dysplasia; SRATAP = suspected residual adenomatous tissue after polypectomy; LOS = length of stay.

<sup>a</sup>A scar after piecemeal removal of a 45-mm lateral spreading tumor.

<sup>b</sup>A scar after piecemeal removal of a 15-mm sessile serrated polyp on the valvula Bauhini.

<sup>c</sup>Scar after incomplete removal of a 14-mm tubular adenoma.

<sup>d</sup>A 14-mm tubular adenoma with low-grade dysplasia was removed for suspected irregularity.

cancer because he refrained from treatment with an oncologic bowel resection. Histology in this patient showed a T1 carcinoma with 2.6-mm submucosal invasion without angioinvasion or signs of perineural growth.

Even with laparoscopic assistance, endoscopic removal is not always technically possible or may not be effective in cases where a snare cannot be placed over the polyp because of size, location, or scarring from previous biopsies. This may lead to piecemeal resection and subsequent inadequate histopathological assessment of the specimen, as well as a higher risk of recurrence.<sup>1,4</sup> Endoscopic submucosal dissection is a well-established technique that facilitates en bloc excision of large polyps. However, there are several disadvantages to endoscopic submucosal dissection that limit its use in routine clinical practice, including the need for specialized equipment, procedure length, and a long learning curve.<sup>5</sup>

Many patients who are now indicated for endoscopic submucosal dissection can also easily be treated with limited EAWR. Caution is taken when polyps are situated in a sigmoid with multiple diverticula, in these patients endoscopic wedge resection might be challenging.

A possible concern of a limited EAWR could be narrowing of the bowel. We prefer to place the stapler in a transverse direction, however, this is not always possible. In our patients we did not have any symptoms related to possible narrowing of the colon. In 1 patient who underwent a limited wedge resection for an adenoma located in the hepatic flexure, follow-up colonoscopy, showed no signs of stenoses. Two patients had a limited wedge resection on the left side of the colon; they did not report any symptoms that could be related to possible narrowing of the colon.

## CONCLUSION

Limited EAWR is a safe technique with a relative short operative time. The technique seems feasible for colon polyps and residual adenomatous tissue in scars in practically all positions that are not accessible for endoscopic removal. If limited EAWR for any reason is not possible, CELS full-thickness excision, as described by Lin et al,<sup>1</sup> appears to be a good alternative.

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