Surg Endosc (1988) 2: 71–75

Surgical Endoscopy

Technique of transanal endoscopic microsurgery

G. Buess, K. Kipfmüller, D. Hack, R. Grüßner, A. Heintz, and T. Junginger

Klinik und Poliklinik für Allgemein- und Abdominalchirurgie der Johannes-Gutenberg-Universität, Langenbeckstrasse 1, D-6500 Mainz 1, Federal Republic of Germany

Summary. Sessile adenomas are predominantly localized in the rectum and lower sigma. Surgical removal is indicated but often implies an invasive surgical procedure. Using conventional transanal surgical techniques, only the lower rectum can be reached and there are high rates of recurrence. The new technique combines an endoscopic view of the rectum under gas insufflation via a stereoscopic telescope with conventional surgical preparation and suturing. Adenomas can be excised using the mucosectomy technique or full-thickness-excision, whereas carcinomas should be excised using full-thickness excision with a sufficient border of healthy mucosa. In carcinomas of the sacral cavity, we remove the retrorectal fat up to the fascia of Waldeyer, including the regional lymph nodes. Transanal endoscopic microsurgery is the most economical and tissue-saving surgical technique for the removal of rectal adenomas and early rectal carcinomas.

Key words: Rectal adenoma – Early rectal carcinoma – Rectal surgery – Endoscopic microsurgery – Transanal surgery – Polyp surgery.

Pedunculated polyps can be removed in the whole colorectal region without any problem if they are smaller than 3 cm in diameter [2]. Big polyps and sessile polyps must be removed surgically. Using conventional transanal procedures, only the lower part of the rectal cavity can be reached [11]. Polyps located higher must be removed by a local surgical technique such as the Mason procedure (Fig. 1) [7] or the transabdominal approach.

Offprint requests to: G. Buess

Transanal endoscopic microsurgery

Instrumentation

A rectoscope with a diameter of 40 mm is introduced into the rectum under manual gas insufflation (Fig. 2). Depending on the location of the tumor, we use the rectoscope tube with a length of 12 or 20 cm. After visualization of the polyp, the rectoscope (Fig. 3) is attached to the operating table by means of a double ball-and-socket joint. Through sealing elements, up to four different surgical instruments can be introduced. The rectal cavity is widened by constant gas insufflation. The stereoscopic optic permits an overview to be achieved. The "combined endosurgical unit" (Fig. 4) enables pressure-controlled gas dilation of the rectum with CO_2 to the adjusted level. The suction rate of the roller pump, integrated into the combined unit, is lower than the insufflation rate of CO_2, so that suction does not reduce the gas distension of the cavity.

The stereoscopic telescope (Fig. 5a) is angulated at the end and at the tip. Two optics are integrated into this telescope to give the surgeon a stereoscopic view (Fig. 5b). A teaching attachment allows the assistant to take part in the operation directly via the optic or video screen. Water can be injected automatically through a rinsing channel to clean the optics. Surgical instruments (Fig. 6) allow precise surgical preparation, coagulation of bleeding and closure of defects using the continuous suture technique (Fig. 7).

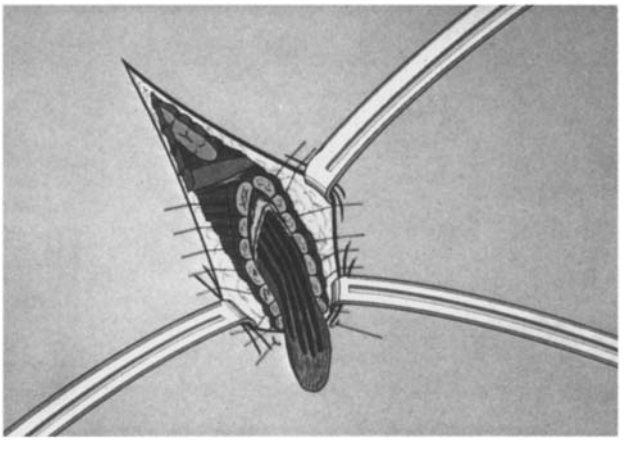
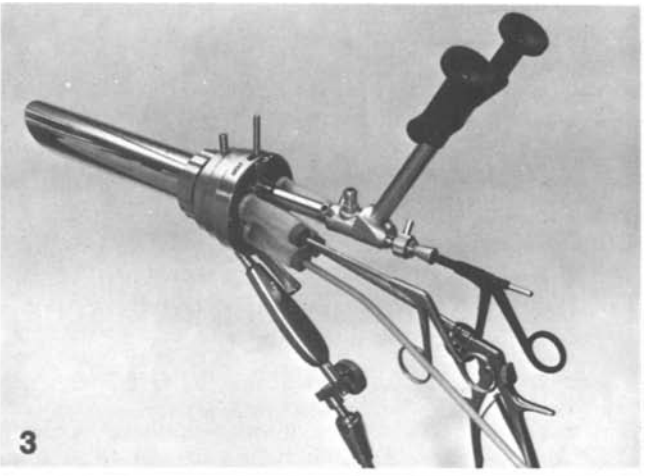
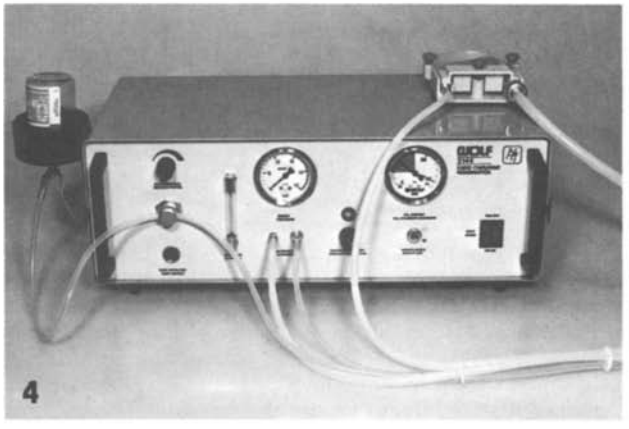
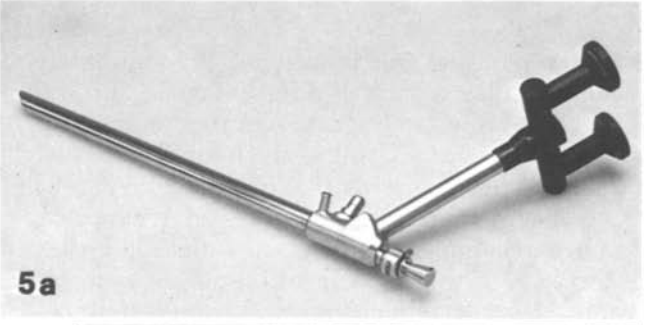
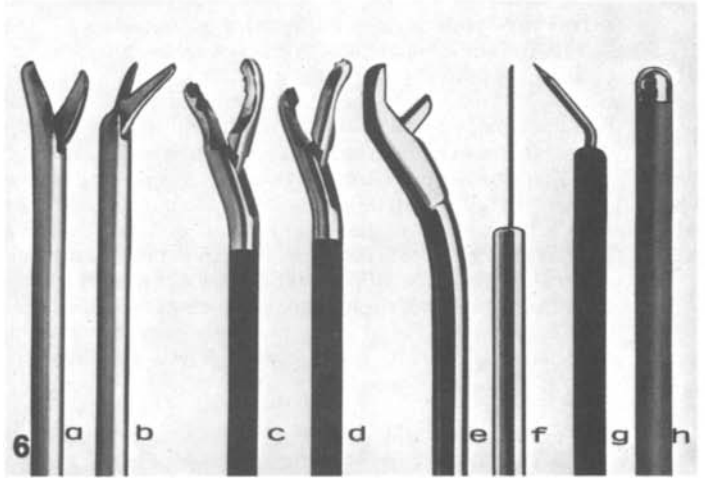


Fig. 1. The principle of the Mason approach









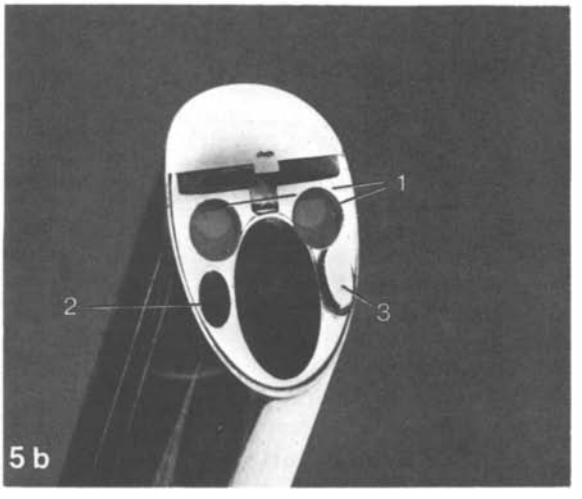


Fig. 2. The rectoscope tube with viewing window for insertion under manual gas distension

Fig. 3. Rectoscope tube with inserted instruments and stereo telescope

Fig. 4. The combined endosurgical unit

Fig. 5. a The double-angled stereo telescope. **b** Front view of the stereo telescope. *1* Optics, *2* insufflation channel, *3* rinsing channel

Fig. 6. Operating instruments for transanal endoscopic microsurgery. *a* Scissors angled to the left; *b* scissors angled to the right; *c* forceps angled to the left; *d* forceps angled to the right; *e* needle holder; *f* injection needle; *g* high-frequency (HF) knife; *h* coagulating aspiration tube

Preparation of the patient for surgery

Preparation is the same as for conventional colorectal surgery: lavage of the colon with 10 l of saline solution and perioperative antibiotic prophylaxis. In small polyps requiring a short operating time, regional anesthesia is sufficient. Patients with large polyps need general anesthesia because of the longer operating time.

Positioning of the patient on the operating table depends on the location of the polyp in the circumference of the operating field. The polyp must be situated at the bottom of the field because of the previous angulation of stereoscopic optics. This means that a polyp located towards the sacrum is oper-

ated on in the lithotomy position, a polyp at the anterior wall in the prone position, and polyps at the side wall in a corresponding position on the side.

Surgical procedure

When the polyp is visualized, the margin of clearance must be defined. In small adenomas, the margin should exceed 5 mm; in big adenomas and in carcinomas we recommend a margin of 10 mm. For easier preparation the margin is defined by marking dots using the electric HF-knife (Fig. 8).

The depth of excision depends on the type and location of the polyp. Small polyps with a benign aspect macroscopically and all polyps in the intraperitoneal part of the rectum should be removed using the mucosectomy technique (Fig. 9a). Proven carcinomas and big sessile adenomas in the extraperitoneal part of the rectum are excised with the full-thickness technique (Fig. 9b). In these cases the perirectal fat up to the fascia of Waldeyer can be excised. Even lymph nodes can be removed, as demonstrated in two cases.

During preparation, the region of the polyp is elevated with the forceps while the diathermy instrument transects the bowel wall (Fig. 10a). After cutting through the bowel wall all around the polyp, the tissue layer below the polyp is transected. In full-thickness excision, this preparation step is often associated with pulsating arterial bleeding from the perirectal vessels. This bleeding can be stopped using the coagulating suction device (Fig. 6h) or insulated forceps in combination with diathermy coagulation. The resected polyp is removed with the forceps through the tube of the rectoscope (Fig. 10b).

After complete excision of the polyp, it must be ensured that there is no more bleeding from the perirectal tissue. The next step is suturing the wall defect. A short monofilament, resorbable thread with a silver clip pressed on its end is introduced into the rectoscope using the needle holder. Now the defect is closed by continuous transverse suture (Fig. 11).

The suture is finished by pressing a second silver clip on the thread (Fig. 12).

Handling of the specimen

We take care that the specimen is obtained together with the polyp and the surrounding healthy tissue in one piece. The specimen is then stretched and pinned on a cork plate. This procedure allows photodocumentation (Fig. 13), as well as exact macroscopic and microscopic evaluation.

Treatment of the patient after surgery

After operations under general anesthesia, patients can get up on the same day. The duration of the intravenous infusion depends on the extent of the surgical excision: after mucosectomy, oral nutrition starts on the 3rd postoperative day; after full-thickness excision, we use the same procedure as for colonic anastomosis in conventional surgery and start oral nutrition on the 5th postoperative day.

Discussion

Precise removal of all polyps is necessary both for treatment of early carcinoma and to prevent the development of carcinoma out of an adenoma [10].

In colorectal surgery, radical surgical resection is necessary to remove the carcinoma-bearing part of the bowel and the area of lymph drainage. Even in adenomas with severe atypia there is no risk of lymphatic spread, so that a radical resection with dissection of the lymph nodes is overtreatment. In early carcinomas [5, 9] confined to the submucosa (pT1 carcinoma), the risk of metastatic spread to the regional lymph nodes is extremely low (approximately 2% for well and moderately differentiated carcinomas); thus, complete local excision is an adequate procedure in most cases.

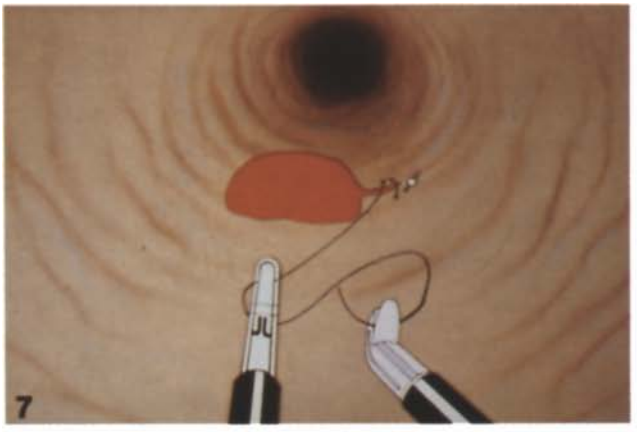
The main location of sessile polyps is the rectal cavity and the lower sigma. This region, which is difficult to reach by conventional surgical techniques, is the focus of interest in polyp surgery. Polyps in the lower rectum can be reached by means of retractors as the Parks or the Mayo types [11, 12], but mechanical dilation often obstructs visualization of the polyp, resulting in lack of precise preparation. This is the reason why there is a high recurrence rate after transanal resection of rectal polyps (17.3%) [4].

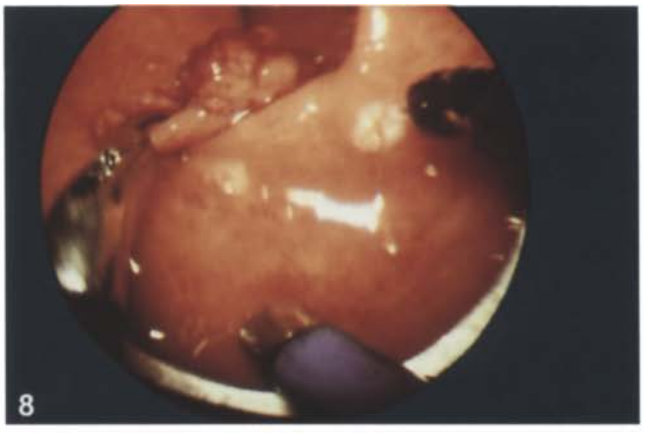
To date, endoscopic procedures have been confined to snare resection, which is inadequate for exact preparation of sessile adenomas from the fibers of the muscularis propria. Therefore, polyps in the higher rectum require invasive surgical procedures such as the Mason [7, 13] or Kraske [6] approach. The complication rates for these techniques are high [1, 8]. Therefore, for big sessile adenomas in the upper part of the rectum, mostly deep anterior resection is used.

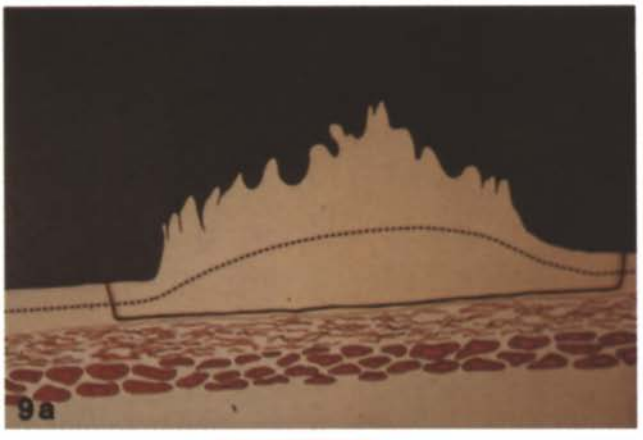
The aim of creating an operative system for endoscopic microsurgical resection of rectal polyps must be considered a development to make surgery both less invasive and more precise [3]. The recent introduction of current technology in endoscopic surgery results in a resecting procedure that is less invasive, without pain for the patient, and that shows a lower rate of recurrence after the operation. With our procedure, the hospitalization time is shorter than after invasive surgery, and no rehabilitation time is usually necessary.

Although the instrumental system for this endoscopic operation is expensive, the overall effect is cost saving, with the condition that this new method is applied skillfully. Therefore intensive training before patients are operated on is mandatory. A video-supported training system allows optimal training in this new and important surgical technique.

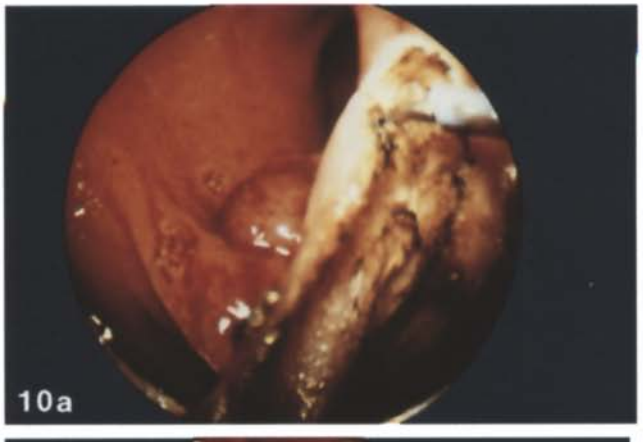
Our latest results, after over 116 operations on rectal adenomas in a prospective clinical trial, will be presented soon in this journal.

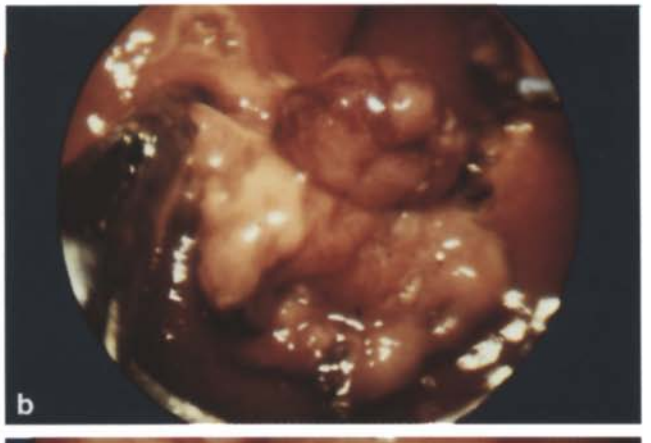

7

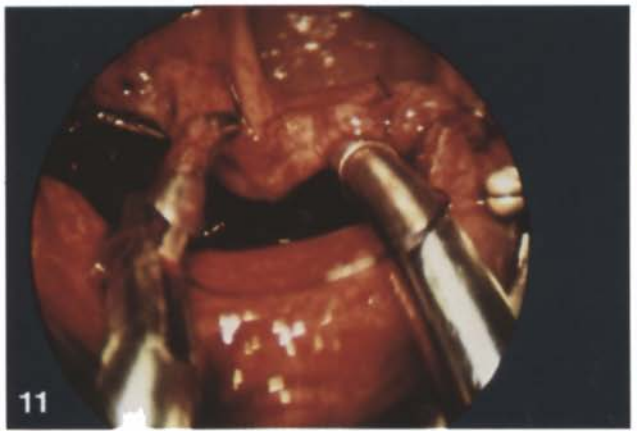

8

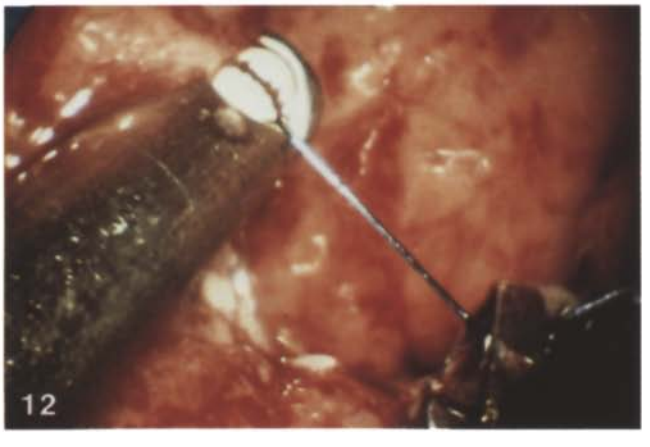

9a


b


10a


b


11


12

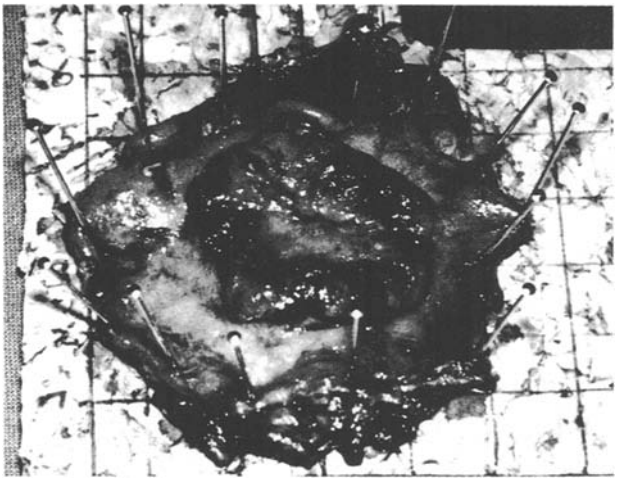


Fig. 13. Specimen fixed on a cork plate

Fig. 7. Principle of closure of defect by transverse, continuous suture

Fig. 8. Marking dots using the high-frequency (HF) needle-knife

Fig. 9. a The principle of mucosectomy technique. **b** The principle of the full-thickness technique

Fig. 10. a Transection of bowel wall by means of the HF knife. The cut bowel muscle is visible in the right upper-hand corner of the picture. **b** Removal of the completely excised polyp. Wide margin of clearance around the polyp; wall defect in the background

Fig. 11. Closure of defect by transverse, continuous suture. On the right side of the picture, the needle-holder with the needle and silver clip; on the left side, the forceps are ready to take the needle

Fig. 12. Suture finished by pressing on a silver clip

References

1. Allgöwer M, Dürig M, Hochstetter A von, Huber A (1982) The parasacral sphincter-splitting approach to the rectum. World J Surg 6: 539–548
2. Bühler H, Nüesch HJ, Kobler E, Deyhle P (1979) Der große Kolonpolyp – endoskopische oder chirurgische Entfernung? Dtsch Med Wochenschr 109: 619–620
3. Buess G, Theiß R, Günther M, Hutterer F, Hepp M, Pichlmaier H (1984) Endoskopische Operationen zur Polypabtragung im Rektum. Colo-proctology 5: 254–261
4. Häring R, Karavias T, Konradt J (1978) Die posteriore Proktorectotomie. Chirurg 49: 265–271
5. Hermanek P, Gall FP (1986) Early (microinvasive) colorectal carcinoma. Int J Colorect Dis 1: 79
6. Kraske P (1885) Zur Exstirpation hochsitzender Mastdarmkrebse. Verh Dtsch Ges Chir 14: 464–474
7. Mason AY (1970) Surgical access to the rectum – a transsphincteric exposure. Proc R Soc Med 63: 91–94
8. Mason AY (1974) Transsphincteric surgery of the rectum. (Progress in Surgery, vol 13) Karger, Basel, pp 66–97
9. Morson BC (1966) Factors influencing the prognosis of early cancer of the rectum. Proc R Soc Med 59: 607–608
10. Morson BC, Sobin LH (1976) Histological typing of intestinal tumors. (WHO International histological classification of tumors, vol 15) WHO, Geneva, p 56
11. Parks AG (1968) A technique for excising extensive villous papillomatous change in the lower rectum. Proc R Soc Med 61: 441–442
12. Schiessel R, Wunderlich M, Kerner-Hanusch J (1986) Transanale Excision und Anastomosentechnik. Chirurg 57: 773–778
13. Schildberg FW, Wenk H (1986) Der posteriore Zugang zum Rectum. Chirurg 57: 779–791