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# Local Surgical Treatment of Rectal Cancer

G.F. Buess

Local surgical treatment of rectal cancer as a curative procedure is only indicated in early rectal cancers. Our indication is T1 low risk cancer according to Hermanek. Conventional transanal procedures are limited to tumours located in the lower rectum and the precision of the excision is restricted by the limitation of the surgeon's visualisation during the procedure. Dorsal approaches show a high rate of complications and should no longer be performed. Transanal endoscopic microsurgery is a technique which has been in clinical use since 1983. By the use of complex technology, precise surgical dissection under a magnified stereoscopic view is possible. With the use of up to three instruments and new instrument technologies, full thickness excision up to segmental resection is possible. The resulting defect is routinely closed at the end of the procedure by a continuous endoscopic suture. The latest results based on 265 tumour resections at the University of Tübingen and 1900 operations based on a German review show positive results. The recurrence rate as a sign of precision of procedure is low and the postoperative complication rate is lower than with conventional procedures.

**Key words:** rectal carcinoma, local excision, transanal excision, transanal endoscopic microsurgery (TEM)

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## INTRODUCTION

MOST DATA concerning the results of local excision of early rectal cancer derive from patients operated on with the intent to resect a sessile adenoma, where histological assessment showed the presence of an invasive cancer within a tubulovillous adenoma. The outcome and late results of these operations and of selected intended cancer operations in old and high risk patients are the basis of the current rules for local cancer excision.

The literature shows that local excision was the first surgical treatment for rectal cancer. Kraske [1] published the first sphincter splitting approach for resection of a rectal tumour in 1885 before transabdominal resections were possible. Strauss [2] described the use of a rectoscope to fulgurate rectal carcinomas in 1910.

The main data providing the basis for the evidence for local excision as a curative procedure have been published by two of the major European centres for colorectal surgery. The data of St. Mark's Hospital, London, U.K. [3-6] including the pathological interpretations of Morson, have shown that in patients with favourable histology, acceptable recurrence and survival rates can be achieved by transanal excisions. In Germany, Hermanek focused on the evidence for local excision and showed that, for example, T1 cancers with favourable histology have a very low rate of lymph node metastases (3%) [7,8]. Based on these examinations and the clinical outcome after local excision [9], Hermanek has defined the main evidence as T1 low risk cancers.

The operative technique for local excision has been mainly transanal procedures using different forms of retractors, for example according to Parks. Using this technique, tumours in

the lower half of the rectum can be excised. For higher located tumours, dorsal approaches such as the Mason [10] or Kraske [1] techniques have been electively performed. In recent years the numbers of these dorsal procedures have decreased because of the more refined techniques of anterior abdominal rectal resections and the further development of different endoscopic procedures. In 1983, the technique of transanal endoscopic microsurgery (TEM) was clinically established. The international use of TEM is now increasing.

## THE TECHNIQUES FOR LOCAL SURGICAL TREATMENT

### *Conventional transanal procedures*

These procedures are performed using any type of mechanical retraction. Conventional retractors can be used, but require an assistant for retraction due to the inconvenience of the working position. Easier to use are the self-holding retractors, such as the type used by Parks and Stuart [11]. These retractors (Figure 1) can be introduced via the anus into the lower rectum and are extended to the diameter necessary to perform the surgical task. Some retractors have a third blade, so that the mechanical retraction works like a triangle. By using retractors, conventional surgical instruments can be used to perform the surgical task. For resection of adenomas, the submucosal plane usually is infiltrated with saline to make the submucosectomy easier. In planned local excisions of carcinomas, full thickness excision should be performed which becomes progressively more difficult with increasing distance from the anal verge.

By using retractors the sphincter has to be dilated up to a diameter of 7 cm to enable sufficient overview during the procedure. When three blades are used for retraction, the view on the operative area is significantly reduced and surgical actions such as dissection and suturing are made difficult because of this.

Correspondence to G.F. Buess at the Eberhard-Karls-Universität Tübingen, Sektion für Minimal Invasive Chirurgie, Klinikum Schnarrenberg, Hoppe-Seyler-Strasse-3 D-72076 Tübingen, Germany.

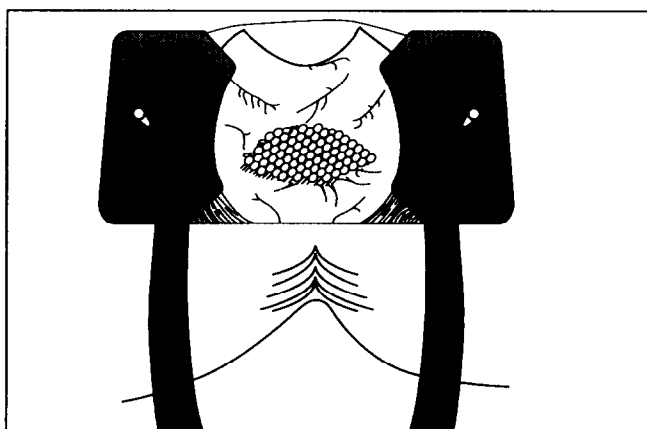


Figure 1. Transanal excision with the use of a Parks retractor.

#### *Dorsal approaches*

The first dorsal access technique for resection in the upper rectum was performed by Kraske [1] and today similar procedures are performed with or without transection of the sphincter. Extensive clinical work has been performed using modifications of the Kraske approach by Mason [10]. Dorsal approaches are performed with the patient in the prone position. Depending on the location of the tumour and the technique used, either the whole anal canal and the complete sphincter are transected to gain access to the area of the tumour, or in higher located tumours, the sphincter region is preserved. Via an oblique incision along the sacrum, the middle and upper rectum are opened dorsally and the sphincter is only partly incised in the upper region, while the main portion is pulled downwards to gain an acceptable view over the operative site. The tumour-bearing area of the rectal wall is usually resected using the full thickness technique, but mucosectomy is also possible. Segmental resection and end to end anastomosis can be performed. The clinical course of the dorsal approaches is characterised by postoperative pain in the area of the excision and wound healing problems can occur in a significant number of patients [12]. During recent years the popularity of the dorsal approach has been decreasing due to the safer technique of anterior resection and the development of modern intraluminal procedures.

#### **TRANSANAL ENDOSCOPIC MICROSURGERY (TEM)**

In TEM, the potential of advanced optical imaging and conventional surgical operative techniques have been combined, so that precise surgical work within the reach of a rigid endoscope become possible. The method was developed between 1980 and 1983 at the surgical department of the University Koeln-Lindenthal in co-operation with Wolf, Knittlingen. The co-workers during development have been R. Theiss, F. Hutterer and S. Said. Clinical application began in 1983 in Cologne [13].

#### **THE INSTRUMENTATION**

The rectoscope for TEM (Figure 2) has an outer diameter of 40 mm and tubes varying in length. A glass window and gas insufflation allow positioning. Once in the correct position towards the tumour, the rectoscope is attached to the operative table via a retractor. A working insert is attached to the rectoscope, which allows the introduction of three or four different instruments through appropriate sealings. A stereoscopic optic gives a precise image to the surgeon, the quality of the direct

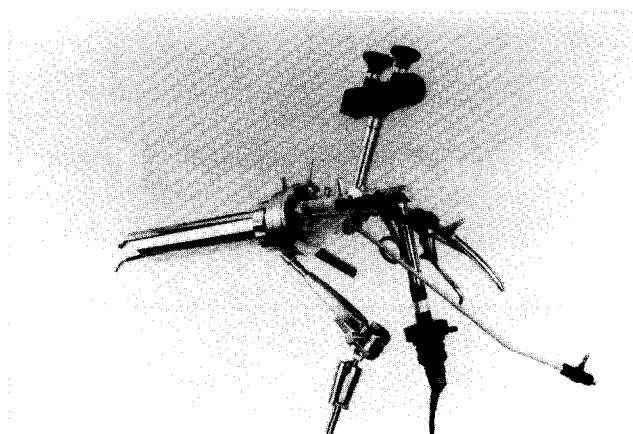


Figure 2. The operative rectoscope for TEM.

view being much better than with a video camera. A third optic is attached to the video camera, so that the assistant and the crew can follow the procedure via the monitor. Instruments are similar to those used in laparoscopic surgery. Curved instruments have been designed, to allow more flexibility in manipulation (Figure 3). The cost of the complete set of instruments and ancillary techniques is DM 50 000.

A new combination instrument has been designed together with Erbe, Tübingen, which allows faster and safer dissection procedures owing to a unique combination of functions. This instrument (Figure 4) [14] is computer-controlled and allows monopolar coagulation, bipolar cutting, suction and rinsing through one instrument. In the case of bleeding during dissection with the bipolar needle, activating the blue footpedal pulls the needle back automatically, so that direct control of the bleeding via monopolar coagulation is possible.

#### **PREPARATION OF THE PATIENT**

A well prepared clean bowel is mandatory for TEM. Bowel preparation should therefore be governed by the rules for major surgical resections. We prefer a saline lavage via a nasogastric tube with 10 l solution. Informed consent has to cover local complications such as dehiscence of the suture line followed by perirectal infections or bleeding and switching to a conventional surgical procedure. The most critical complication has been perirectal abscess formation with sepsis in 1% of cases which had to be treated by a temporary colostomy.

#### **INTRA-OPERATIVE PROCEDURE**

The single steps of the operation are described in detail in [15]. TEM has to be performed under general anaesthesia. The positioning of the patient on the operative table depends on the position of the tumour relative to the circumference. Tumours at the anterior wall are operated in the prone position, those at the posterior wall in the lithotomy position.

The operation starts with insertion of the rectoscope, inspection of the rectum under manual air insufflation, and positioning towards the tumour. The rectoscope is attached to the operative table using a self-holding retractor. Optics and operative instruments are introduced. The margin of clearance is defined with marking dots using the high frequency combination instrument of Erbe. The tumour is surgically removed (Figure 5), the depth of excision depending on the stage and location of the tumour. In the extraperitoneal part of the rectum full thickness excision is standard. During all dissections, the tumour should not be

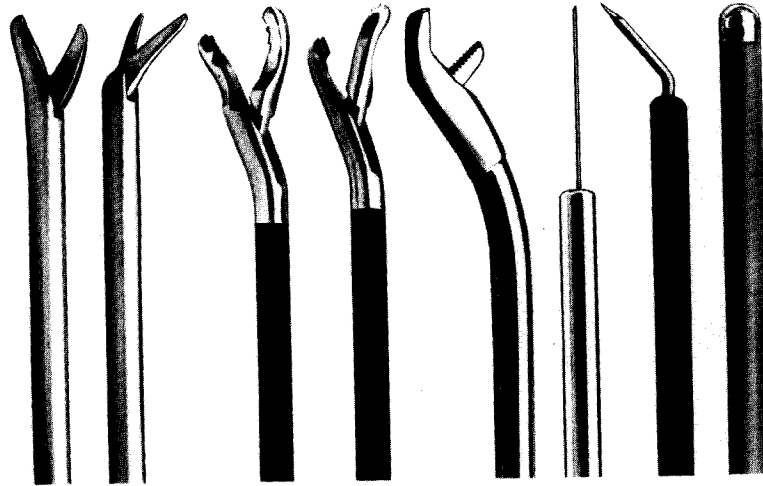


Figure 3. Operative instruments for TEM.

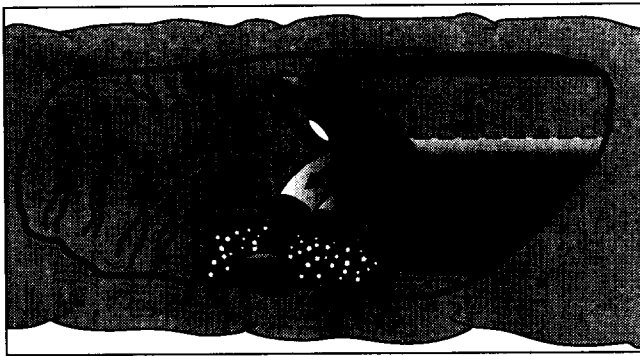


Figure 4. Combination instrument for TEM.

touched by the forceps — only the tumour-free margin of the excision should be held between the branches. This approach prevents tearing of parts of the tumour and spreading of tumour cells. Dissection towards the perirectal fat is generally performed close to the dorsal muscular plane of the bowel wall. Spurting bleeders may sometimes require compression of the vessel stump by the forceps before coagulation.

After completion of the excision the working insert of the rectoscope is removed and the sample is prepared for histological examination. The wall defect is rinsed by beta-iodine and the defect closed by continuous running suture (Figure 6) using resorbable material. At the end of the procedure a silver clip is pressed on the suture so that endoscopic knotting is not necessary.

#### RESULTS OF LOCAL EXCISION

Dorsal approaches are of a rather invasive character and lead to significant postoperative pain. The complication rates in the literature show figures up to 30% [16] and further, a recent publication of Staimmer, a colorectal surgeon with a good reputation in Germany, reports four local complications in 6 patients [17] with 2 patients dying following septic compli-



Figure 5. Excision of the tumour using a high frequency instrument.

cations. Functional results with objective documentation are not available, but impairment of sphincter function particularly after sphincter splitting procedures is likely to occur.

Transanal excisions using retractors are performed frequently, mainly for the treatment of sessile adenomas. In these procedures mucosectomy techniques are mainly reported in the literature. No data are available on how often the samples can be removed in one piece and whether a clear safety margin can be documented by the pathologist. The figures for recurrence of adenomas following local excision are relatively high [18]; we interpret this as indicative of incomplete primary resection because of the limited overview over the operative field during the transanal procedure. No clear data can be found in the literature showing complication rates of transanal full thickness resections.



Figure 6. Continuous suture of the wall defect.

TEM has increasingly spread within recent years. In Tübingen between August 1989 and May 1993 we have operated on 265 patients with tumours; 75 have been carcinomas. The mean operative time for carcinomas was 92 min, the average blood loss 171 ml. Tumour location was 2–24 cm from the anal verge. The complication rate of the cancer operation was 8%. The follow-up after cancer operation could be documented for 96% of patients with a mean follow-up time of 14 months. In 32 patients with T1 low risk cancers who had only local excision, two recurrences of carcinoma were found. Detailed documentation of the last results can be found in [19] and a survey of 44 German clinics with 1900 operations, 433 being carcinomas, is reported in [20]. The most detailed documentation of the technical steps is to be found in [15].

### DISCUSSION

Local excision of rectal cancer is a procedure which has been extensively used in the last few years mostly via the technique of transanal excision using retractors for visualisation. Often the impetus for the procedure has been the intent to resect a sessile adenoma where the final histological evaluation has shown the presence of a carcinoma.

Transanal procedures for adenomas can be performed in a regular way with acceptable overview only in the lower half of the rectum. Sometimes higher located adenomas can be pulled downwards by holding sutures. The use of this technique is ill-advised when full thickness resection is intended in elective cancer operations. We are convinced that transanal excisions of early rectal cancers should only be performed in the lower half of the rectum.

Dorsal approaches show a higher rate of complications [16, 17] compared with transanal resections and functional restrictions have to be taken into consideration, but there are no data based on precise evaluations including function tests. The main area of application is the middle third of the rectum. The overall number of dorsal approaches seems to have decreased in the last few years. This might be due to the advances achieved in the techniques of transabdominal anterior resection, especially in

the sector of stapling techniques. An explanation, at least in Germany, could be the impact of the increasing numbers of application of TEM techniques, which are mostly well documented.

TEM is the technique which allows standardised local excision of early rectal cancers in full thickness technique in the whole area of the extraperitoneal rectum, which means up to 10 cm at the anterior wall, 15 cm at the side walls and 20 cm at the posterior wall. The stereoscopic optic provides an excellent overview during the dissection, so that a precise surgical procedure can also be performed in tumours located higher up. A newly designed combination instrument for TEM allows ideal dissection due to the combination of different functions. By the use of this new technique the number of instruments which have to be simultaneously used could be reduced from three to two. This results in free guidance of the single instruments, smoke reduction because of the suction automatically used at the tip of the combination, and fast reaction in the case of bleeding.

The low recurrence rates compared with all other operative techniques for local resection of adenomas should be based on the precision of the procedure which is possible due to the perfect instrument technique and the superior quality of vision which can be achieved with gas dilatation and the high resolution and three dimensional information provided by the direct view through the rigid stereoscopic endoscope. In contrast to this, mechanical retraction always results in restricted viewing owing to the blades.

Anterior resection is briefly mentioned as an increasingly used surgical procedure for the resection of higher located tumours, which could also be an indication for a local procedure. Stapling techniques, which are today routinely used for anastomosis after rectal resection, have reached a high technical standard, which has also made easier and safer anastomosis in the area of the lower rectum.

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