Is transanal endoscopic microsurgery (TEM) a valid treatment for rectal tumors?

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Received: 31 July 1995/27 November 1995

Abstract

Background: In 1983 G. Buess, in Germany, developed transanal endoscopic microsurgery (TEM), a new minimally invasive technique for the treatment of rectal tumors.

Methods: Rectal lesions are excised through a modified rectoscope of 40 mm in diameter under stereoscopic control in the gas-dilated rectal cavity. Full-thickness excision, partial-wall excision, or mucosectomy can be performed. Seventy-one patients were treated with the TEM technique in our department. Major complications were observed in one patient (1.4%). No mortality was reported.

Results: Histological examination revealed 40 (56.3%) villous adenomas, 6 (8.4%) pT1; 17 (23.9%) pT2; 5 (7%) pT3 carcinomas; and 3 (4.2%) other lesions. The recurrence rate was 2.8% for adenomas and 2.8% for carcinomas. The overall survival at mean follow-up of 17 months was 96.4%.

Conclusions: The advantages of TEM are less or no postoperative pain, unrestricted mobility, short hospitalization, quick rehabilitation, and absence of skin scars.

Key words: Rectal tumors — Rectal cancer — Rectal adenoma — Local excision — Transanal endoscopic microsurgery

In 1983 G. Buess introduced transanal endoscopic microsurgery (TEM) into clinical practice for the local treatment of rectal tumors [3, 4]. This technique provides a good endoscopic exposure of the operative field with a three-dimensional vision and allows one to perform either a mucosectomy or a full-thickness excision of the lesion. The resulting defect is then closed accurately with a running suture.

Both benign lesions and early stages of rectal cancer can be treated with this technique, which offers the same patient benefits of other minimally invasive procedures: less pain, faster recovery, and better cosmetic results.

In this paper we report our clinical experience on 71 TEM procedures for rectal tumors, which represents the largest Italian experience to date. The total number of cases treated in Italy by TEM has been recently reported in a multicenter study [12].

Patients and methods

Instrumentation

The TEM technique was performed as previously described by Buess [3, 4]. A rectoscope of 12 or 20 cm in length with an external diameter of 4 cm was employed (Richard Wolf, Knittlingen, Germany). After the lesion was precisely localized, the rectoscope was maintained in the correct position by fixing it to a self-retaining arm. A working insert with sealing elements was then connected to the rectoscope; a three-dimensional stereoscope with ancillary bidimensional optic connected to a video system provided vision for the surgeons.

The modified surgical instruments that were employed were an electrosurgical knife, a forceps, a needle holder, a clip applicator, and a cannula for suction and coagulation. Water was injected to clean the optic and the operative area while an endosurgical unit controlled carbon dioxide insufflation to dilate the rectum, with constant measurement of the endoluminal pressure.

Clinical protocols

Diagnostic protocol. Two protocols were employed, one for benign and one for malignant tumors. Both diagnostic protocols included history, clinical examination, routine laboratory tests, and pancolonoscopy with multiple macrobiopsies of the lesion in all patients.

In case of flat lesions with irregular margins and of recurrent tumors, multiple biopsies of the lesion and of normal surrounding tissue were taken.
and identified by a reference number. The biopsy site was then marked with india ink to guide tumor excision with an adequate free margin, confirmed by preoperative histological findings.

Transanal endoluminal ultrasound (EUS) was obtained in all patients with tumors located within 12 cm of the anus. Distance of the tumor from the anal verge, position of the tumor with respect to rectal circumference, and circumferential tumor spread were accurately measured by standard rigid rectoscopy. The position of the patient on the operative table was selected according to the tumor site. In fact, the design of the TEM rectoscope mandates that the working area be in the bottom of the endoscopic field of view, and the patients were therefore placed in the lithotomy, prone, or lateral decubitus position, accordingly.

If endoscopy and histology were suggestive for a benign lesion, confined to the mucosa on the endoluminal ultrasound (for lower tumors), a TEM was performed without submitting the patient to other examinations. Instead, if a malignant lesion was suspected or confirmed, the diagnostic protocol was completed with magnetic resonance imaging (MR) that we considered mandatory for accurate tumor staging [4, 25] and/or computerized tomography (CT) [23].

The accuracy of transanal endoluminal ultrasound, magnetic resonance imaging, and computerized tomography was calculated by dividing the number of correct diagnoses by the total number of examinations performed.

**Therapeutic protocol**

Indications to transanal endoscopic microsurgery (TEM). The choice of type of anesthesia to be used was left to the anesthesiologist. TEM was performed under general anesthesia for patients of physical status classification ASA 1–3, or under regional anesthesia for patients of physical status classification ASA 3 or 4.

Six groups of lesions were considered eligible for TEM treatment:

- **Group a.** Sessile adenomas in the rectum and lower sigmoid colon, within 25 cm from the anal verge, histologically confirmed by multiple biopsies.
- **Group b.** Well and moderately well-differentiated pT1 carcinomas in the extraperitoneal part of the rectum.
- **Group c.** Well and moderately well-differentiated pT2 carcinomas in patients over 75 years of age, in the extraperitoneal part of the rectum.
- **Group d.** pT2 or pT3 tumors in patients at high risk for major surgery (physical status classification ASA 3 or 4), in the extraperitoneal part of the rectum.
- **Group e.** Chronic rectal ulcers, carcinoid tumors, endometriosis.
- **Group f.** A group of patients with T2-T3 tumors (physical status classification ASA 1–3) refusing to undergo abdominoperineal resection (APR) underwent local tumor excision by TEM associated with radiotherapy.

**Technique.** After positioning the modified operative rectoscope, including optics and instruments, and before starting the excision, a 1-cm safety margin of normal tissue around the rectal tumor was marked by high-frequency electrocoagulation spots, guided by the previously placed endoscopic india ink markings.

Operative options were:

1. **Mucosectomy,** to remove the mucosa including the polyp from the inner circular layer of the muscularis.
2. **Partial wall excision,** recommended to reduce the risk of a peritoneal opening for lesions in the extraperitoneal part of the rectum. This technique consisted of dividing the circular from the longitudinal muscle layer.
3. **Full-thickness excision,** only for lesions located in the extraperitoneal part of the rectum, including the perirectal fat and the adjacent lymph nodes on the basis of the preoperative identification.
4. **A segmental resection,** in case of circumferential tumor growing.

After excision and removal of the lesion, in malignant tumors, the residual cavity and the rectum were cleansed by irrigation with povidone iodoine solution and a chemotherapeutic agent (mitomycin C diluted in 200 ml of saline). The defect was then closed by a running suture of PDS 3.0 monofilament (Ethicon Endo-Surgery, Cincinnati, OH, code number Z 316). A silver clip (Wolf Company, Tuttlingen, Germany), placed at each end of the suture, allowed one to avoid tying intracorporeal knots in a restricted space.

Each specimen was pinned onto a cork plate immediately after removal in order to measure the diameters of the lesion and the surrounding safety margins (Fig. 1). Subsequent histological examination by frozen section and after fixation determined depth of tumor infiltration, therefore allowing more accurate tumor staging.

**Radiotherapy.** In the early phase of our experience and until April 1994 we followed a prudential radiotherapy approach since previous reports on the effects and the results of radiotherapy associated with TEM had not been published yet. Patients in groups c, d, and f underwent pre- and post-TEM radiotherapy with 2,500 and 3,200 cGy respectively, except for patients refusing radiotherapy.

From May 1994 onward, on the basis of our personal experience, we have progressively increased the dose of pre-TEM radiotherapy from 2,500 cGy to 4,500–5,000 cGy (divided over 4 weeks). In selected cases, a postoperative dose of 500–1,000 cGy was administered 4 weeks after TEM on the excisional area in order to reduce the risk of local tumor cell implant due to intraoperative manipulation.

**Postoperative follow-up.** Each patient was examined 1 and 3 months after dismissal, with clinical examination (including rectal digital exploration) and endoscopy. Subsequent follow-up dates were:

- **For adenomas,** every 6 months for the 1st year and then once a year. The protocol in these patients included clinical examination, endorectal ultrasound if feasible in relation to previous tumor location, and multiple endoscopic biopsies.
- **For carcinomas,** every 3 months during the first 2 years and then every 6 months. The follow-up in these patients included clinical examination, endorectal ultrasound if feasible in relation to previous tumor location, endoscopy with multiple biopsies and MR, or CT scan when magnetic resonance imaging could not be performed.

**Patients**

From April 1992 on, 71 operations were performed in 69 patients by TEM in the Divisione di Patologia Chirurgica of the University of Ancona and in an affiliated Institution ("Ini Canistro") by one surgeon.

Average patient’s age was 64 years (range 38–95 years), with a male-to-female ratio of 1:2. Orthogradewashout of the colon with short-term antibiotic prophylaxis was performed in all patients.

The preoperative diagnoses were as follows: