

Case Analysis

Transanal Endoscopic Microsurgery for Rectal Tumor: Single Institute Experience in Taiwan

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Key Words

Transanal endoscopic microsurgery;
Rectal tumor;
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Purpose. Transanal endoscopic microsurgery (TEM) is a minimally invasive local excision for rectal benign and malignant neoplasm. It provides good optic view and precise excision of rectal neoplasm with safe margin. The study showed our experience of operative short-term results, and long-term oncologic outcome.

Methods. From 2004/10 to 2010/8, 42 patients who had undergone TEM by a single surgeon were included. Short-term peri-operative recovery, complications, local recurrence and systemic metastatic rates were prospectively recorded.

Results. All operations were performed using full-thickness excision by TEM equipment. The median height was located 10 cm above the dentate line (4~20 cm) and the median size of the tumor was 2.2 cm (0.6~5.4 cm). 36% lesions were T1 and T2 carcinomas, and 64% were benign tumors. The median post-operative stay was 2.6 days. No patient experienced long-lasting fecal soilage. With the mean follow-up of 2.4 years, the local recurrence rate was 3.7% for benign tumors, and 0% for malignant cancers. Neither systemic metastasis nor peri-operative mortality were noted.

Conclusions. TEM is an excellent, safe local treatment and less invasive procedure for benign rectal tumors in any location of the rectum and distal sigmoid. It is also an alternative choice for rectal malignancy with low probability of lymph node metastasis.

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Local excision of rectal neoplasms is an alternative treatment for selected lesions, and it can be performed either via a transanal approach or by a posterior proctotomy. The former is hindered by poor visibility of lesions in the upper rectum, and the latter may be complicated by fecal fistula or sphincter impairment, and the approach of lateral or anterior rectal lesions is limited. Transanal endoscopic microsurgery (TEM) was first described by Buess in 1983, and it

could enable the local excision of colonic adenomas by specific equipment.¹ TEM also offers a sphincter-preserving procedure with low morbidity and faster recovery than the radical transabdominal approach for rectal cancers in high anesthetic-risk patients or those with low-risk early rectal tumors.^{2,3}

TEM involves the use of specialized equipment including an operating proctoscope, insufflations, and magnified stereoscopic vision to improve the accessi-

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bility and precision of resection. TEM could provide a wide local excision for rectal and distal sigmoid neoplasms up to 25 cm from the anal verge, which is unreachable transanally. However, it could not change the indication of local excision of rectal tumors. Virtually any adenoma of any size can be removed with TEM. The adenoma in this study was removed via submucosal plane with 5 mm safe margin of normal mucosa. Full-thickness excision with even some mesorectal tissue with a 1cm safety margin should be obtained on rectal cancer. Strict patient selection has been emphasized, and the criteria included a well-differentiated tumor, lack of vascular invasion, a tumor smaller than 4 cm, and good exposure of whole lesion.^{4,5} The favorable finding means low propensity of lymph node involvement, and local excision is enough with favorable cure rates.

Our institute adopted use of the TEM equipment in 2004, and the patients were accrued until August 2010. The purpose of this study was to prospectively evaluate the surgical morbidity and mortality associated with the TEM procedure by a single surgeon at a tertiary care university hospital in Taiwan. Besides, we also followed the incidence of local recurrence of benign and malignant tumors following surgical excision.

Materials and Methods

Between October 2004 and August 2010, 42 patients with localized rectal neoplasms who had undergone the TEM procedure by a single surgeon were included in this study. They received colonoscopy and tissue biopsy first. TEM was considered if they had benign adenoma up to 20 cm from the anal verge, or early stage rectal cancer up to 12 cm from the anal verge or below the peritoneal reflection in image evaluation. Colonoscopic biopsy was gathered, and the pathology was reviewed. The selection criteria included a well to moderately differentiated tumor in biopsy smaller than 4 cm with good exposure and visibility of entire lesion. All patients underwent pre-operative CEA and blood test, chest X-ray, and abdominal computed tomography for tumor staging. Pa-

tients presenting with clinically obvious regional lymphadenopathy or distant organ metastasis in image study were excluded. If the patient had major co-morbidity and was not suitable to receive trans-abdominal radical resection, TEM was considered after clear explanation by the surgeon.

The bowel preparation was done with split dose of Fleet, and prophylactic antibiotics with Cefazolin 1 g was given on induction of anesthesia. The TEM technique followed Buess et al. The benign tumors were removed via a submucosal dissection after injection of normal saline with 5 mm safe margin. The suspicious malignancy was removed with a full-thickness dissection to a mesorectal fat with 10 mm safe margin. After removal of the whole specimen, the defects were primarily closed with 3-0 Vicryl running suture. When post-operative histopathology confirmed high risk carcinoma, or positive deepest margin, a radical laparoscopic re-operation was performed unless the patient refused this. No adjuvant chemoradiotherapy was done in all cancer patients.

Then, follow-up was every three months for the first two years and every six months thereafter. Patients underwent routine physical examination, colonoscopy, rectoscopy, abdominal echography and chest X-ray. Besides, CEA level was also checked. Complications, local recurrence, distal metastasis and overall survival were recorded.

Results

42 patients underwent TEM for rectal neoplasm with curative intent. All tumors were primary, and none had recurrence. Patient and tumor characteristics are described in Table 1. The mean age of the patients was 55.3 years (21~83 years). The median height was located 10.1 cm above the dentate line (4~20 cm) and the median size of the tumor was 2.2 cm (0.6~5.4 cm), with 35.7% of the lesions being T1 and T2 cancers, and 64.3% were adenomas, carcinoids, hemangiomas and submucosal lipomas. The median post-operative stay was 2.6 days (1~7 days). All resections of rectal cancer were performed using full-thickness excision, and the mucosa defect was closed. The mean opera-

Table 1. Patients and tumor characteristics

	All	Adenoma	Adenocarcinoma
Gender			
Men	27	18	9
Women	15	9	6
Age			
Median	55.3	58.7	56.3
Range	21~83	21~83	28~83
Tumor size			
Median	2.29	2.11	2.63
Range	0.6~5.4	0.6~5.4	1.1~4.2
Length from AV			
Median	10.1	10.7	9.2
Range	4~20	5~20	4~14

tive time was 110 minutes, and the average blood loss was 21.2 mL.

The histological evaluation of the resection margin of the local specimen was not free in three patients: one received another TEM with negative surgical margin, and another two patients received laparoscopic radical resection. No obvious residual tumor was found, and no lymph node involvement was noted in the final pathology report. Besides, three patients had pT2 at definitive histological examination. The first one suffered from intraperitoneal perforation, necessitating conversion to laparoscopic low anterior resection. The second had received another TEM, and the third patient refused further surgery due to old age and multiple co-morbidities. All the T2 lesions were low-risk with no evidence of vessel or lymphatic tumor cell invasion. Minor morbidity occurred in five patients. Anastomosis dehiscence was presented with post-operative fever and anal pain in two patients, and they recovered fully under no oral medication and antibiotics treatment. Three patients suffered from transient tenesmus, frequency, and urinary tract infection (Table 2).

The mean follow-up period for the patient with rectal benign tumor was 32.3 months, and one recurrence was noted in the benign adenoma case (3.7 percent). He received further re-excision of the tumor by the TEM method. There was no local recurrence, systemic metastasis or disease-related deaths in all patients with malignant tumors who had undergone TEM during the mean follow-up of 21.8 months.

Table 2. Peri-operative complications of 42 patients undergoing TEM

	Number	Percentage (%)
Fever	2	4.76
Anastomotic dehiscence	2	4.76
Urinary retention	1	2.38
Intra-peritoneal perforation	1	2.38
Bleeding	1	2.38
Transient anal leakage	2	4.76
Mortality	0	0

Discussion

Removal of all colonic polyps and resection of early tumors precisely is necessary for both treating carcinomas and preventing development of carcinomas out of an adenoma. Radical resection for the whole tumor and the lymphatic basin is the basic principle of cancer treatment. However, the radical trans-abdominal approach also brought some complications such as anastomosis leakage or sexual and urinary function impairment.⁶ Besides, the risk of general anesthesia was also considered in some populations with multiple co-morbidities. Local excision may be suitable for those harboring lower risk of lymphatic spread, like malignant polyps, T1 or selected T2 rectal carcinomas with less aggressive pathologic characteristics.⁷⁻⁹

The technique could reach the upper rectum lesion easily, and provide an optimal stable operation field by CO₂ insufflations and mechanical dilation of the rectal wall by metal cylinder. Adverse effects of carbon dioxide (CO₂) pneumoperitoneum on cardiopulmonary function have been well documented in the literature. TEM is usually completed under epidural anesthesia and it represents no pneumoperitoneum, less hypercapnia and fluctuation of cardiovascular function for those with high ASA score and risk for general anesthesia. Recent data support the issue of safety and less operative stress, which can potentially lead to a reduction in post-operative morbidities and faster recovery.^{10,11} In our series, only one patient converted to general anesthesia due to colonic perforation during resection. Spreading of cancer cell

during iatrogenic penetration of colonic wall is a major complication, and it may cause further carcinomatosis in previous study.¹² For anterior wall lesions over the upper rectum, and all lesions over the sigmoid colon, submucosal dissection precisely and slowly is important to avoid transcolonic perforation.^{13,14}

The adequacy of oncologic resection remains a major issue in TEM procedure. The recurrent rate was very low in our series and the literature review. Full thickness excision is essential to keep low local recurrence. We could do local excision with a curved instrument and Harmonics for cutting, coagulating, and dissecting while checking for bleeding concurrently. Due to the magnification of proctoscopy and high-definition image quality, we could dissect the whole layer of the rectal wall with a safe margin easily and precisely. Like NOTES, this procedure provided no trauma to abdominal wall integrity, allowing faster bowel recovery, shorter hospital stay, and more rapid return to daily activity. The mean post-operative hospital stay was 2.6 days, and minimal morbidity and no peri-operative 30-day mortality was noted.

Our results concur with existing data demonstrating that TEM can be carried out with good results in selected patients with rectal neoplasms and may have some advantage over radical resection. TEM could provide an alternative local treatment that appears to be less physiologically stressful than conventional radical colectomy, and it may be considered one of the surgical approaches in high anesthesia-risk patients.

Conclusions

Transanal endoscopic microsurgery is an optimal alternative surgical modality for middle- to upper-rectal huge adenomas or early rectal carcinomas. With careful patient selection, full-thickness excision, and close surveillance, short-term peri-operative morbidity and long-term tumor recurrence rate would not be inferior to radical excision.

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病例分析

經肛門內視鏡手術於直腸腫瘤的應用： 台灣單一醫學中心之經驗

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背景 經肛門內視鏡手術是針對直腸腫瘤的一種局部切除的手術方法，他的優勢在於在內視鏡的協助下，運用特殊的器材精確的切除直腸腫瘤，以達到更廣的安全切除範圍，本文為探討本院運用這種手術方式處理直腸腫瘤短期的結果以及長期的追蹤資料。

病人與方法 自 2004 年 10 月到 2010 年 8 月，有 42 個直腸腫瘤患者接受經肛門內視鏡手術，我們前瞻性的紀錄了這些患者的短期的手術復原資料、併發症、長期局部復發以及遠端轉移的臨床資料。

結果 我們針對所有的直腸腫瘤做全層的完整切除，腫瘤平均距離肛門齒狀線 10 公分，平均腫瘤大小為 2.2 公分，有 36% 腫瘤為惡性的，他們局部分期均為 T1~T2，另外三分之二的腫瘤是良性的。平均術後的住院天數為 2.6 天，沒有任何病人有長期的大便失禁的情形。平均追蹤期間是 2.4 年，在良性的腫瘤有 1 人 (3.6%) 有局部的復發，惡性腫瘤則無，也沒有任何的遠端轉移或者是手術後的死亡。

結論 經肛門內視鏡手術是針對直腸腫瘤局部切除的好工具，可以妥善處理直腸的任何良性腫瘤，以及部分的早期惡性腫瘤。

關鍵詞 經肛門內視鏡手術、直腸癌、直腸腫瘤。