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Treatment of early rectal tumours by transanal endoscopic microsurgery in Hong Kong: prospective study

經肛門內視鏡顯微手術治療早期直腸腫瘤：在香港所作的前瞻研究

Objective. To summarise the results of transanal endoscopic microsurgery for the treatment of rectal villous adenoma and early rectal tumours.

Design. Prospective study.

Setting. Regional hospital, Hong Kong.

Patients. Consecutive patients between November 1995 and January 2003.

Intervention. Transanal endoscopic microsurgery.

Main outcome measures. Intra-operative morbidity and mortality, complication rate, operating time, postoperative morbidity and mortality, recurrence rate and correlation between preoperative ultrasonography staging and postoperative pathological staging.

Results. Thirty-two patients with rectal villous adenoma and early rectal carcinoma were registered, 31 of whom (14 men and 17 women) were included in the study. The median tumour size was 2.5 (range, 1-8) cm and the median operating time was 95 (45-220) minutes. The median follow-up period was 23 (2-92) months, and there was no local recurrence. There was no operation-related mortality and the resection margins were all clear. Complications included temporary flatus incontinence (n=2), acute retention of urine (n=1), exacerbation of chronic obstructive airway disease (n=1), and secondary haemorrhage in a patient on aspirin.

Conclusions. Transanal endoscopic microsurgery is a safe procedure and can achieve good local tumour control. It is ideal in the management of rectal villous adenomas at stages pT0 and pTis. Its application is now extended to the treatment of early rectal carcinoma at stage pT1 with curative intent. For tumours at stage pT2 or later, it can also serve as a good option for local palliation.

Key words:

Adenoma;
 Microsurgery;
 Proctoscopy;
 Rectal neoplasms;
 Treatment outcome

關鍵詞：

腺瘤；
 顯微手術；
 直腸鏡檢；
 直腸腫瘤；
 治療結果

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目的：總結經肛門內視鏡顯微手術治療直腸絨毛狀腺瘤及早期直腸腫瘤的結果。

設計：前瞻研究。

安排：分區醫院，香港。

患者：1995年11月至2003年1月的病人。

療法：經肛門內視鏡顯微手術。

主要結果測量：術中發病率和死亡率、併發症、手術時間長短、術後發病率和死亡率、復發率，以及術前超聲腫瘤分期和術後病理分期的相互關係。

結果：32位直腸絨毛狀腺瘤或早期直腸腫瘤患者登記入院，其中31位(14位男性及17位女性)參與本研究。腫瘤大小的中位數為2.5厘米(分佈域為1-8厘米)，手術時間的中位數為95分鐘(分佈域為45-220分鐘)，隨訪期中位數為23個月(分佈域為2-92個月)，無原位復發。手術沒有造成病人死亡。腫瘤徹底切除，周邊亦沒有殘餘。併發症包括暫時性排氣失控(n=2)、急性尿液滯留(n=1)、急性阻塞性氣道疾病發作(n=1)，以及一位病人因服用阿士匹靈而出現次發性出血。

結論：經肛門內視鏡顯微手術能有效控制原發性腫瘤，是一種安全的治療方法。用於治療pT0期和pTis期的直腸絨毛狀腺瘤，效果理想。目前已擴大用途，用於徹底消除pT1期早期直腸腫瘤，以及局部舒緩pT2和後期腫瘤帶來的不適。

Introduction

The malignant potential of rectal adenoma increases with tumour size, and is

greater for sessile villous adenomas than for tubular adenomas. Rectal adenomas should thus be excised; complete excision of early rectal carcinoma has favourable results. Rectal tumours are conventionally treated by abdominoperineal excision of the rectum and closure of the anus, or by low anterior resection. Both these procedures, however, are associated with high morbidity and low anterior resection is also associated with high leakage rates, and sometimes requires the creation of a stoma.

For early rectal tumours, endoscopic removal was indicated for small polyps or tumours, especially if pedunculated. Park's peranal submucosal excision was also effective in managing tumours near the anal region. For sessile tumours, or tumours larger than 1 cm that are situated in the mid-to-upper region of the rectum, colonoscopy and snaring were used, but the excised sample was often fragmented, thereby making precise tumour staging impossible for pathologists. Other methods, such as electrocoagulation, laser vaporisation, and transanal endoscopic resection (analogous to the resection of the prostate), have all failed to give a complete specimen for staging.

During local excision, obtaining a good-quality specimen with at least a 1-cm margin is important, because it allows pathological staging to be done. In cases of in situ carcinoma, excision is already a cure, but for more advanced staging, further surgery or adjuvant therapy will be required because of possible metastasis to a lymph node. Buess et al¹ developed a new procedure for the local resection of rectal tumours, which produces a complete specimen with good margins that can be mounted on a foam board to allow pathological staging. This surgical technique combines endoscopy, laparoscopic surgery, and microsurgery; hence, its name—transanal endoscopic microsurgery (TEM).

We started using TEM in our institution in 1995. Since then, we have prospectively evaluated this relatively new technique for resection of rectal villous adenoma or early cancers. All patients underwent preoperative endorectal ultrasonography staging, and those with tumours at stages uT0, uTis, or uT1, that were 4 to 20 cm from the anal verge (ie within the reach of the rectoscope) underwent TEM. Patients with adenocarcinomas at stage T2 or higher were excluded from curative resection.

Methods

In this article, we present findings from a prospective registry of patients who underwent TEM from November 1995 to January 2003 at the Kwong Wah Hospital.

Preoperative management

Before the procedure, a complete history was taken, which specifically included history of faecal and urinary continence, and a thorough physical examination

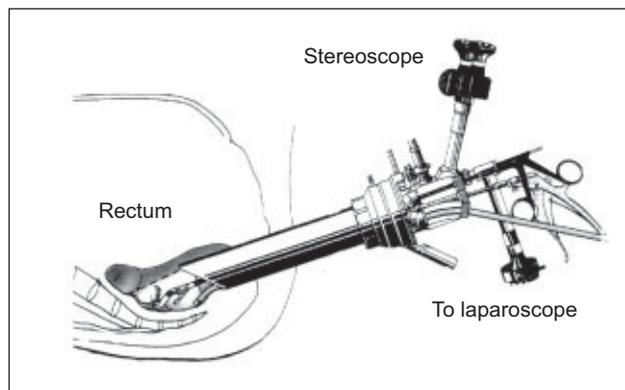


Fig 1. Instrument setup of transanal endoscopic microsurgery

was performed. Faecal continence (covering solid, liquid, and flatus) was assessed, and in cases of incontinence, we determined whether episodes were occasional or frequent (using the Williams' score). For urinary continence, we assessed if patients had stress incontinence, urge incontinence, or a mixed type.

Digital rectal examination and sigmoidoscopy were performed for all patients, because the position, site, and size of the tumour would determine the patient's position during surgery. If the tumour were situated at the 6 o'clock, 12 o'clock, 3 o'clock, and 9 o'clock positions, the patient's operative position would be lithotomy, prone, left lateral, and right lateral, respectively. In addition, transrectal ultrasonography was essential to determine the staging. Other investigations including colonoscopy and barium enema were made to rule out synchronous lesions. Bowel preparation with 3 L of polyethylene glycol was preferred in our institution, and prophylactic antibiotics (cefuroxime 1.5 g and metronidazole 500 mg) were given intravenously. The TEM procedure was performed under general anaesthesia.

Special instruments

Because of the sole access through the anus and the limited space for surgical manipulations, specific instruments were used for the TEM procedure (Fig 1). The rectoscope was attached to the operating table by means of a double ball-jointed Martin arm. The outer diameter of the rectoscope was 40 mm and the different length of the shaft of either 12 cm or 20 cm can be chosen, thereby allowing it to reach tumours at different distances from the anal verge (optimally, 5-20 cm away). There were three ports for the insertion of surgical instruments and one port for the stereoscope, which allowed the three-dimensional visualisation of the operating field. The combined endosurgical unit provided the automated carbon dioxide insufflation.

The surgical instruments included a specially designed diathermy needle, a needle for injection, custom-made forceps, a needle holder, a suction probe, a clip applicator for the silver clips for anchoring the sutures, and scissors.

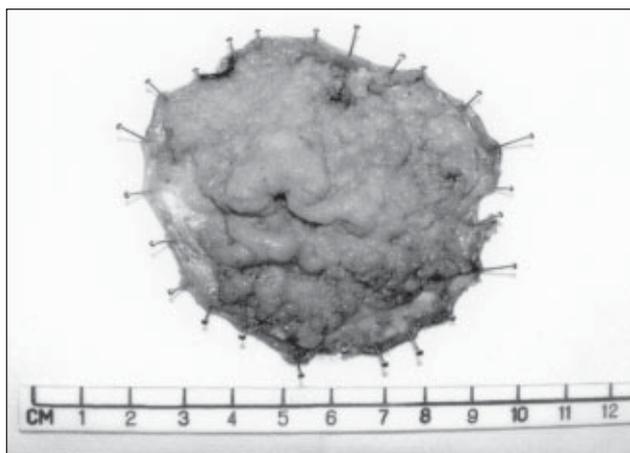


Fig 2. Mounted specimen

Surgical procedure

The rectoscope was inserted through the anus and its position was adjusted. The margin of dissection was then marked by the diathermy. We resected along the pre-set markings so that the tumour could be removed with an adequate margin. Initially, for villous adenoma, we tended to perform submucosal excision. If biopsy showed malignancy but endorectal ultrasonography showed no invasion to the submucosa, we performed full-thickness excision using an ultrasonic dissector. We ensured that the specimen was complete and had a 1-cm resection margin for staging by a pathologist (Fig 2). Intracorporeal suturing was done with the customised instruments. Postoperatively, patients were discharged home when bowel function resumed. Complications were recorded, and patients were followed up in our specialist out-patient clinic.

Results

During the study period, there were 32 consecutive patients, one of whom was excluded from analysis. The excluded woman had undergone endoscopic snaring in another hospital, during which an early invasive rectal carcinoma had been excised in a piecemeal fashion. Although we operated 2 weeks later, the resultant rectal stricture prohibited the insertion of the TEM rectoscope; instead, conventional low anterior resection was performed, revealing the lack of lymph node involvement.

Of the 31 patients, 14 were men and 17 were women. Their mean age was 71 years (standard deviation, 12 years). The final diagnoses were rectal villous adenoma (tumour stage T0; n=16), carcinoma in situ (Tis; n=2), early carcinoma (T1; n=7), and carcinoma stage T2 (n=3) and T3 (n=3) [Table]. The median tumour size was 2.5 (range, 1-8) cm, at a median distance from the anal verge of 8 (4-18) cm. The median (range) proportion of the circumference of bowel lumen involved was 30% (10%-80%), and the median operating time was 95 (45-220) minutes.

Table. No. of cases according to tumour (T) staging

Endorectal ultrasonography (u) staging	Pathology (p) staging	No. of cases
uT0	pT0*	16
uT0	pTis [†]	2
uT1	pT1 [‡]	7
uT1	pT2 [§]	2
uT2	pT2 [¶]	1
uT2	pT3 [¶]	1
uT3	pT3	2

* T0 no malignancy

[†] Tis carcinoma in situ

[‡] T1 tumour invades submucosa

[§] T2 tumour invades muscularis propria

[¶] T3 tumour invades into subserosa or perirectal tissue

There was no operation-related mortality, and all resection margins were clear. The median (range) hospital stay was 4 (2-10) days and the median (range) follow-up period was 23 (2-92) months.

Complications included flatus incontinence in two patients, both of whom had a complete recovery within 1 week. There was no liquid or solid stool incontinence. Two patients experienced an exacerbation of chronic obstructive airway disease, one of whom also had acute retention of urine. One patient had multiple co-morbidities, and resumption of aspirin therapy after surgery led to secondary haemorrhage on day 9, which required hospital re-admission; bleeding was successfully stopped under local anaesthesia.

For two patients, the peritoneum was entered during an intended full-thickness excision with no significant pneumoperitoneum. The procedure went on as usual, but in one of the patients, the postoperative chest X-ray revealed pneumoperitoneum. Both patients had a fever that subsided spontaneously after 2 days.

Transrectal ultrasonography was quite accurate in terms of delineating invasion to the muscularis propria. Only two cases with uT1 staging were in fact pT2. Another understaging was a uT2 tumour, but histology revealed a pT3 tumour. All three patients underwent traditional rectal resection; lymph nodes were not involved in any of the three cases (more than 10 lymph nodes were harvested from each patient and reviewed by the pathologist).

All patients with pT2 and pT3 tumours chose to undergo TEM because of multiple co-morbidities, poor chest function, and advanced age (the exception was a patient early in the series who had a tumour that had been understaged by transrectal ultrasonography). Adjuvant radiotherapy was suggested to these patients, but all of them turned down the offer owing to chronic ill health.

During follow-up, five patients died of causes not related to the procedure: carcinoma of the bladder at 2 years,

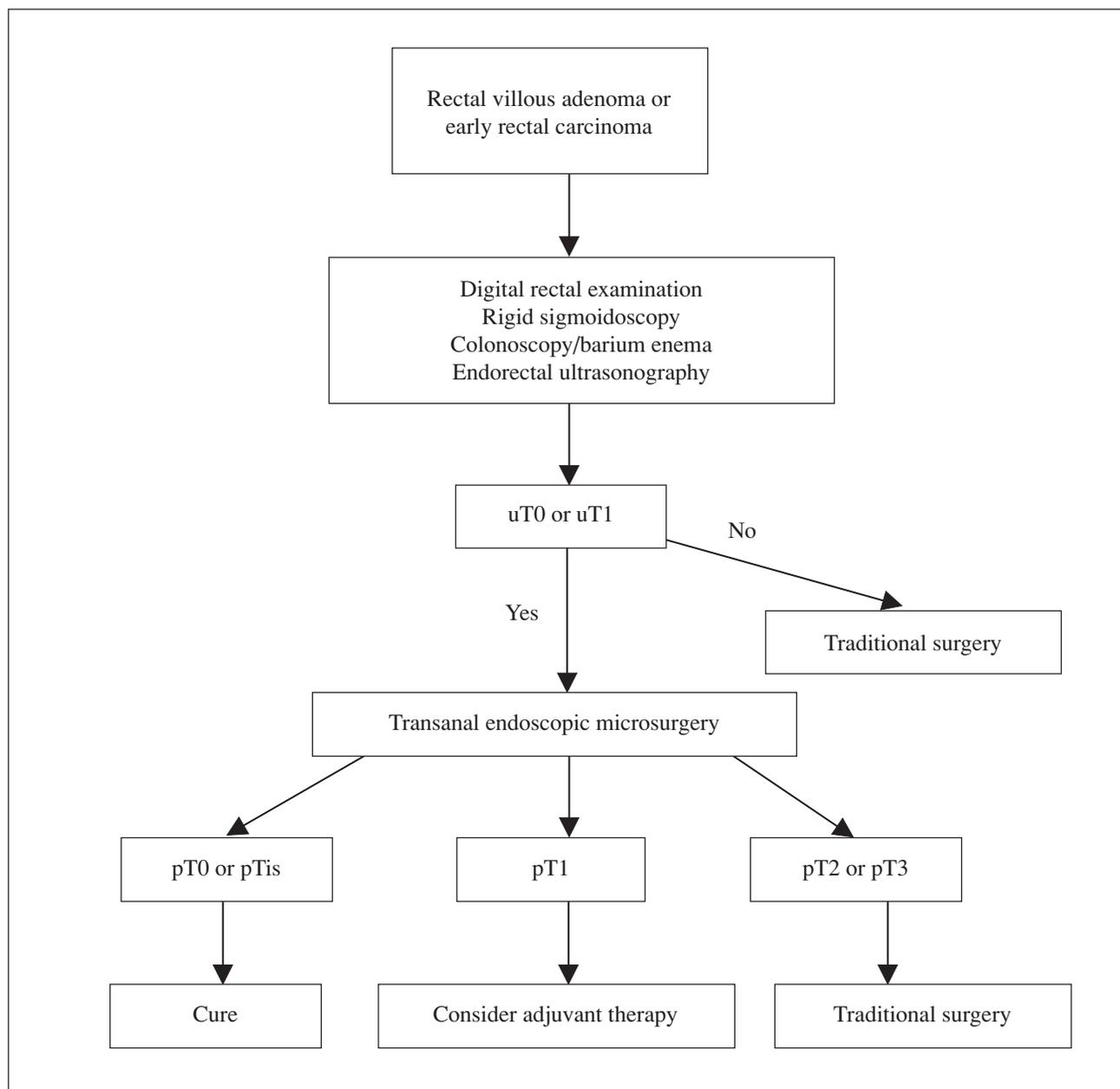


Fig 3. Management flowchart

exacerbation of chronic obstructive airway disease at 5 months, extensive cerebrovascular accident at 17 months, and massive oesophageal variceal bleeding at 67 months. One of the five patients died of frozen pelvis from an unknown primary tumour at 69 months after surgery (which was first detected at 52 months); the rectal lesion was a pT0 rectal villous adenoma but she refused subsequent investigation.

In subsequent colonoscopy or flexible sigmoidoscopy examinations, 2 of the 31 patients were shown to have small metachronous tubular adenomas, which were removed by hot biopsy. There was no local recurrence except in the patient who had an understaged pT2 tumour with clear resection margins. One week later,

Hartmann's operation was performed and yielded negative biopsy results (N0M0). One year later, the remaining rectal stump revealed that the tumour had recurred; abdominoperineal excision of the rectum was performed and showed a staging of pT3N0M0.

Discussion

Transanal endoscopic microsurgery provides a means of achieving complete excision of rectal tumours.² The method is associated with low morbidity and mortality and avoids the creation of a stoma. For large sessile adenomas that carry an increased probability of in situ carcinomatous changes, TEM would be a cure (Fig 3). For early rectal carcinomas (eg at stage T1), the operation offers a high

chance of a cure. In Europe, trials of adjuvant therapy with local excision of early rectal carcinoma are underway.³ For mobile T2 or T3 carcinomas, TEM would be a good palliative method.

The extent of lymph node involvement has been reported to be 5% for pT1 tumours, more than 10% for pT2 tumours, and up to 20% for pT3 tumours.⁴ In our experience, two patients with a pT2 tumour and one with a pT3 tumour underwent conventional surgery because of preoperative understaging by ultrasonography. All these patients had a negative lymph node status (pN0). During follow-up of our series of patients, there was no indication of local recurrence from the mesorectum or lymph nodes. The need for accurate endo-anal ultrasonography is thus very important in the preoperative staging.

We had difficulty in recruiting cases in the beginning. Experienced gastro-enterologists would prefer to perform endoscopic snaring with prior adrenaline saline submucosal injection. However, this approach often resulted in piecemeal tumour removal, which would lead to difficult staging if a carcinoma was found. Traditionally, surgeons prefer using Park's peranal approach. For tumours located within 4 to 5 cm from the anal verge, we would agree that peranal excision is the procedure of choice. However, we were quite frequently faced with carpet-like rectal villous adenomas with extensive involvement, or tumours high up in the mid-to-upper rectum. Lack of good exposure may lead to lack of precision of resection, piecemeal removal, and hence high recurrence rate.

As clinicians became increasingly aware of the new technique, we received more referrals and regarded it necessary to establish a registry of patients undergoing TEM. This would allow us to identify related morbidities—particularly because the Chinese population has a smaller build than the Caucasian population. When tumours were documented, we recorded their size, distance from anal verge, and position, as well as the percentage of the involved circumference of the lumen. The latter would have a considerable impact on the feasibility of the resection.

Different depths of resection were used and submucosal excision resulted in less morbidity. However, when we were dealing with carcinomas, the pathologist preferred to perform a full-thickness excision for a proper tumour staging because this would affect the subsequent adjuvant therapy offered. For all carcinomas of various T-stages in our series, we applied full-thickness excision for proper pathological staging.

Technically, we found that there was less smoke when we used the 5-mm curved-tip Harmonic Scalpel⁵ (Johnson & Johnson, Cincinnati, US) than when we used the high-frequency needle-knife. Furthermore, after full-thickness excision, patients typically had a 2-day fever, which subsided spontaneously. We suspected that this effect was

a reflection of the inflammatory response in healing. As for complications, there were only two cases of flatus incontinence; subsequent endo-anal ultrasonography revealed no structural sphincter damage. Both patients in these cases were fully continent within 1 week. We have recently started anorectal physiology studies and we have yet to see how our results compared with those in the western literature.⁶

We were the sole centre regularly performing TEM in Hong Kong. Technical difficulties can surely be overcome with appropriate training. The cost-effectiveness of having the TEM machine would be another issue. Gasless TEM⁷ and new models of the rectoscope⁸ are being investigated. With the extension of indications for local excision with adjuvant therapy and also utilisation of more popular laparoscopic instruments, we hope to see an increase in the use of TEM in our locality.

Conclusion

Transanal endoscopic microsurgery is a relatively new surgical technique and provides an option for the local treatment of rectal tumours; it is the treatment of choice for complete removal of rectal villous adenoma. Preoperative staging by endorectal ultrasonography is important. The method has the advantages of minimal-access surgery, avoids abdominal incisions and the creation of a stoma, and it may result in less postoperative pain and shorter hospital stay than low anterior resection or abdominoperineal excision of the rectum.

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