

Original Article

Modified Transanal Endoscopic Microsurgery Using Concept of Laparoscopic Single-Port Access

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Key Words

Transanal endoscopic microsurgery;
Laparoscopic;
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Background. Transanal endoscopic microsurgery is a feasible technique for benign rectal tumor and early rectal cancer. However, the original technique demands high-cost instrumentations. We adopted the concept of laparoscopic single port technique for transanal excision. The purpose of this study was to evaluate if transanal excision using laparoscopic single-port access is safe and efficacious.

Patients and Methods. We collected patients operated with modified transanal endoscopic microsurgery using laparoscopic single-port access between January 2012 and December 2014. We analyzed the demography, tumor location, pathologic information, and surgical complication.

Results. Twelve patients were operated using modified transanal endoscopic microsurgery using laparoscopic single-port access during the study period. The patients included 5 men and 7 women, with a median age of 72 years (range: 55-85 years). The median distance of the tumor from the anal verge was 9.8 cm (range: 7-15 cm). The median operative time was 55 min (range: 40-135 min). The mean size of tumor was 3.2 cm (range: 2.7-4.5 cm). The mean hospital stay was 2.5 days (range: 1-5 days). None of the patients had any perioperative complications. The pathological examinations revealed that 1 patient had carcinoid tumor, 3 patients had tubulovillous adenomas, 3 had villous adenomas, 3 had tubulovillous adenomas with focal high-grade dysplasia, and 2 had pT₁ rectal cancers (both adenocarcinoma, arising from tubulovillous adenoma). After a year follow-up, none of the patients had local recurrence.

Conclusions. Modified transanal endoscopic microsurgery using laparoscopic single-port access is feasible in benign rectal tumor and early rectal cancer.

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Transanal endoscopic microsurgery (TEM) was developed by Professor Gerhard Buess 30 years ago.¹ TEM is a feasible, minimally invasive procedure for large benign adenomas and early carcinomas of the

rectum. TEM allows the excision of lesions located in the middle and upper rectum, which are beyond the reach of conventional transanal excision.² TEM also allows full-thickness excision, and closure of the de-

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fect with sutures. It has also been applied in the local excision of early rectal cancers with low risk factors.³⁻⁵

However, the high cost associated with TEM, which requires the use of specialized and expensive instruments, has become a barrier to its widespread application. Robert published a case report about the transanal excision of a rectal adenoma using a single-access laparoscopic port in 2010.⁶ We modified the procedure with the laparoscopic single-port access technique and standard laparoscopic instruments to perform local transanal excision of the middle and upper rectum.

Compared to conventional TEM, our modified procedure is inexpensive, and may allow more surgeons to perform difficult transanal rectal tumor excisions.

Patients and Methods

We collected and analyzed data from patients who underwent modified TEM using laparoscopic single-port access between January 2012 and December 2014. These patients were diagnosed by colonoscopy with rectal polyps or tumors that were difficult to resect colonoscopically. The tumor locations in all patients were confirmed by rigid proctoscopy. If the tumor could not be identified by rigid proctoscopy, laparoscopic bowel resection was preferred. We analyzed the demography, tumor location, pathology, and surgical information of the patients.

Surgical method

The surgery was performed under general anesthesia. The patient was placed in the lithotomy position. A single-port device composed of a wound retractor (Alexis, small size), glove (size 8.0), and 3 trocars (one 5 mm and two 10 mm) was inserted into the anus without anal dilatation (Fig. 1). This port allowed for the insertion of 2 laparoscopic instruments and a telescope. The colon was inflated with CO₂ under a pressure of 12 mm Hg. After the inflation of the colon, a 10 mm, 30-degree telescope was inserted through a

trocars, and was used to identify the target lesion. The rectal tumor/polyp was excised using a harmonic scalpel under telescopic guidance (Fig. 2). If necessary, the mucosal defect was repaired using the laparoscopic suture technique with V-Loc 3-0 (Covidien, USA).

Results

Twelve patients were operated using modified TEM with laparoscopic single-port access between January 2012 and December 2014. The patients in-



Fig. 1. A single-port device.

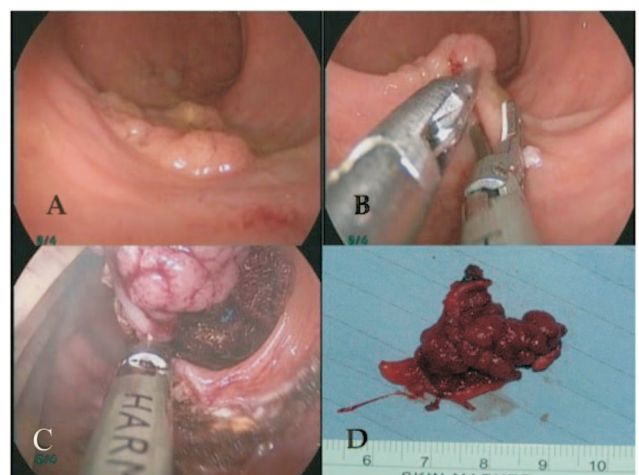


Fig. 2. A. Wide-base polyp under the telescope; B-C. Elevate the polyp with grasper, and resect the polyp with a harmonic scalpel; D. Resected specimen. Size: 3.5 cm × 3 cm.

cluded 5 men and 7 women with a median age of 72 years (range: 55-85 years). The median distance of the tumor from the anal verge was 9.8 cm (range: 7-15 cm) (Table 1).

The median operative time was 55 min (40-135 min). The mean hospital stay was 2.5 days (range: 1-5 days). None of the patients had any perioperative complications, and none required conversion to bowel resection.

All tumors were wide-base, and the mean tumor size was 3.2 cm (range: 2.7-4.5 cm). Pathological examinations revealed that 1 patient had carcinoid tumor, 3 patients had tubulovillous adenomas, 3 had villous adenomas, 3 had tubulovillous adenomas with focal high-grade dysplasia, and 2 had pT1 rectal cancers (both with adenocarcinoma, arising from tubulovillous adenoma) (Table 2). All patients had free surgical margins. After a 1-year follow up, none of the patients had local recurrence in these patients.

Discussion

The modified TEM technique provides a magnified view and allows for precise resection under laparoscopic guidance. Modified TEM, however, has some limitations. Compared to traditional TEM, modified TEM does not provide stereoscopic visualization, but it is not a stumbling block for experienced laparoscopic surgeons. Another limitation of modified TEM is that it does not allow for the excision of tumors beyond the recto-sigmoid junction. In our patients, the median distance from the anal verge was 9.8 cm (range: 7-15 cm). However, conventional TEM can be used to treat lesions at a distance of 20-25 cm distance from the anal verge. Moreover, clash of instruments frequently occurs because of the limitation of

Table 1. Demography of patients

Gender	
Male	5
Female	7
Age (years)	72 (55-85)
Location ⁺ (cm)	9.8 (7-15)

⁺ Distance from the anal verge.

the laparoscopic instrumentation at a narrow angle.^{7,8}

Casadesus published a review of TEM, in which he found that TEM was associated with a higher rate of fecal incontinence in long-term follow-up.⁹ The modified method has the same indication as TEM. However, it does not require the dilatation of the anal sphincter up to a diameter of 4 cm, and the wound retractor fixed by the anal sphincter can be easily inserted into the anus. Therefore, modified TEM can avoid fecal incontinence.¹⁰

Unlike conventional TEM, the new technique uses an elastic wound retractor, therefore, it can be easily removed when retracting the surgical specimen. Modified TEM also shares the same instruments as conventional laparoscopic surgery, thereby allowing surgeons to resect lesions in the middle and upper rectum without the use of expensive instrumentation of required in conventional TEM.

Conventional TEM uses clips as knots, whereas modified TEM uses running sutures and intracorporeal knots applied with a laparoscopic suturing device.

Furthermore, some of the commercial products used in single-incision laparoscopic surgery (SILS), may be used in modified TEM as well. Madhu published an article on transanal endoscopic excision using a disposable SILS Port (Covidien). The SILS Port can be applied easily with a low incidence of air leakage, but it is more expensive than a hand-made single-port access.⁷

According to the 2015 National Comprehensive Cancer Network guidelines, the criteria for local excision of pT1 rectal cancers are as follows: < 30% cir-

Table 2. Perioperative information

Operative time (mins) median (range)	55 (40-135)
Hospital stay (days) median (range)	2.5 (1-5)
Complications	0
Tumor size (cm) mean (range)	3.2 (2.7-4.5)
Pathology	
Carcinoid	1
Villous adenoma	3
Tubulovillous adenoma	3
Tubulovillous adenoma with focal high grade dysplasia	3
Adenocarcinoma, arising from tubulovillous adenoma	2

cumference of the bowel, < 3 cm in size, nonfixed tumor, no lymphovascular or perineural invasion, and well-to-moderately differentiated adenocarcinoma.¹¹ Historically, the long-term oncological outcomes of local excision for early rectal cancers (T1 or T2) has been poorer than those of radical resection. However, in selective pT1 rectal cancers with low risk factors, local excision is an alternative option to radical surgery with low morbidity and acceptable outcome.¹² Kanehira performed TEM in 302 patients in Japan, including 115 patients with T0 and 38 with T1 lesions. He reported the the 5-year disease-free survival rate was 93.7%, and that TEM resulted in excellent outcomes in patients with T0 and T1 lesions.¹³

In our series, we used modified TEM in 12 patients, and all patients had free surgical margins. There were no perioperative complications either. Three of the patients had tubulovillous adenomas with focal high-grade dysplasia (pT0). Two of the patients had early rectal cancers (pT1). Their preoperative colonoscopic biopsy examinations had revealed tubulovillous adenomas. We performed standard cancer-staging workup for these patients, and observed neither no lymph node involvement nor distant metastasis. Both of these patients were regularly followed up at our clinic, and subsequent colonoscopy revealed no local recurrence 1 year later. Although we only had 3 T0 and 2 T1 lesions, we believe that the outcomes of modified TEM are as good as those of conventional TEM.

One of the patients had received previous traditional transanal resection, and had involved surgical margin. Three months later, follow-up colonoscopy revealed a 4-cm polypoid lesion at the previous surgical site. We performed modified TEM on this patient, and a full-thickness excision was conducted because of scarring tissue. The defect was repaired directly using the laparoscopic suture method.

Conclusion

Transanal excision using single-port access is a feasible, less invasive, and less sphincter-injury-in-

ducing procedure. Modified TEM can achieve good short-term results in early rectal cancer with low risk factors.

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原 著

利用腹腔鏡單孔手術方式來進行 經肛門內視鏡顯微手術

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背景 對於直腸良性腫瘤或是早期癌症，經肛門內視鏡顯微手術是一種可行的方式。但是它需要昂貴的器械。我們把單孔腹腔鏡的概念應用到經肛門直腸腫瘤切除上，而本篇研究便是在探討它的可行性。

病患和方法 本研究採用台北國泰綜合醫院，於 2012 年 1 月至 2014 年 12 月期間，所有利用腹腔鏡單孔手術方式來進行經肛門內視鏡顯微手術的病人。我們分析這些病人的基本資料、腫瘤位置、病理報告及手術相關資料來進行分析。

結果 總共有 12 個病人利用腹腔鏡單孔手術方式來進行經肛門內視鏡顯微手術。其中七個是女生，五個是男生，平均年齡為 72 歲。腫瘤距離肛門的平均值約為 9.8 公分。腫瘤平均大小為 3.2 公分。平均手術時間為 55 分鐘，術後病人約住院 2.5 天，並沒有任何相關的手術併發症。其中有一人為類癌，三人為管狀絨毛線瘤，三人為絨毛線瘤，三人為管狀絨毛線瘤併高度異化，還有二人為早期直腸癌。

結論 利用腹腔鏡單孔手術方式來進行經肛門內視鏡顯微手術，對於良性直腸腫瘤及早期無危險因子的直腸癌是可行的。

關鍵詞 經肛門內視鏡顯微手術、腹腔鏡、單孔。