




Eight Years Experience of Transanal Endoscopic Microsurgery

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Abstract

Introduction Transanal Endoscopic Microsurgery (TEM) is a minimally invasive method for management of different proctologic conditions. Despite widespread use of this method, it is not used widely in Iran. This report is about to describe the application of TEM in managing different proctologic conditions in a tertiary colorectal referral center in Iran regarding methods and complications.

Methods All of the patients' documents such as procedure, method, early postop complications and further operations were actively reviewed and the data were entered in to the database.

Results Since 2012 till the end of 2020 chart review was done and 150 cases of TEM operation were found. The most frequent procedure that was done was resection procedure. Using different energy devices during surgery or suturing versus not suturing the defect were not associated with complication. There was a case of in hospital mortality and one case delayed perianal fistula following TEM. Measurement of lesion distance from anal verge was not significantly different using TEM or colonoscopy. Villous adenomas detected in colonoscopy were mostly associated with malignancy. In evaluated resected lesions most of cases had free base and distance from anal verge or using different energy devices were not associated with obtaining free base.

Conclusion TEM is a safe minimal invasive procedure with acceptable complications that could be helped in managing different proctologic conditions and the results of reviewing our patients revealed the same results that is reported from other colorectal centers.

Keywords

- ▶ transanal endoscopic microsurgery
- ▶ postoperative complications
- ▶ suture techniques
- ▶ cautery
- ▶ fistula
- ▶ colonic polyp

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Introduction

Since the Development of Transanal Endoscopic Microsurgery (TEM) by Gerhard Buess the number of published articles with application of this technique has increased and today there are lots of colorectal centers that use this method. In early 1980s with introduction of TEM it takes time to master the technique but now with development of endoscopic and laparoscopic skills mastering the learning curve is becoming quicker.¹

Comparing with other endoscopic modalities TEM has the advantage of full thickness manipulation of rectum which gives surgeon the ability to handle high risk patients and alleviate the necessity of major trans abdominal operations.² Because of its low complication rate TEM is considered as gold standard modality for local transanal operations and new armaments are added to its capabilities.³

As TEM experience grows colorectal centers publish their experience regarding operation technique,⁴ devices that used,³ efficacy and complications.⁵ although these studies have some suggestions for application of TEM but all of them suggest further studies with larger sample size and longer follow-up period.

In this study the authors describe all of TEM operations in a tertiary colorectal referral center during eight years and follow the patients for possible complication to demonstrate TEM applicability in middle east countries.

Materials and Methods

After approval by the ethical committee, the data gathering was started by reviewing the charts of patients who undergone TEM in our center. Patients who were operated via Transanal rout without using TEM device were excluded.

In our center all of TEM candidates are admitted day before surgery and receive whole bowel preparation and procedure is done under general anesthesia. Prior to TEM setup a rigid rectosigmoidoscopy is performed to determine lesion distance from anal verge and the exact site of lesion to choose patient's position for example in posterior lesions the procedure is done in supine lithotomy position and for anterior lesions the position changed to prone. All patients

received prophylactic antibiotic and liquid diet started after first bowel movement and advanced gradually.

Patients' chief complain, colonoscopic findings and pathology of colonoscopy biopsies were entered as preoperative findings. Intraoperative findings and technical issues such as closing the defect or leaving the defect open or energy devices that used during the operation were also recorded. The postoperative course or events happened during hospital stay also reviewed. After that history of further admissions were checked. After that histopathologic report of patients were extracted from pathology database in order to compare colonoscopy and TEM histopathology report.

The data were entered in to SPSS database and for demonstrating quantitative indices mean with standard deviation were used in order to compare means of variables paired t-test was applied. To compare different prevalence between groups chi-square test used and P value less than 0.05 considered significant.

Results

From 2012 TEM device was setup in our center and with reviewing the archive 150 patients were operated with this device till the end of 2020.

Patients Demographic Profile

Most of patients were male with prevalence of 64%. The mean age of patients was 52.1 ± 16.62 years old. The youngest patient was 18 and the oldest one was 87 years old, the age groups were shown in table one. The most common symptom was rectal bleeding. Table one describe the primary demographic features of patients (►Table 1).

Procedures

As shown in table two the most common procedure that was done with TEM were resectional procedures (97%) followed by Strictureplasty (1%) and endorectal flap (1%). Strictureplasty was performed due to anastomosis stricture following low anterior resection and mucosal defect was closed with PDS 3-0 in one case and left open in the other case and it was based on surgeon decision during the operation. Endorectal flap was done in a case of extra sphincteric fistula and the

Table 1 Basic Demographic Features

Sex	Male(n)	64% (96)		
	Female(n)	36% (54)		
Age Groups	<30 Y/O	12.6% (19)	Mean \pm SD: 52.1 \pm 16.62	
	31-60 Y/O	53.3% (80)		
	>60 Y/O	34% (51)		
Symptom	Rectal Bleeding	64.7% (97)		
	Constipation	11.3% (17)		
	Diarrhea	4% (6)		
	Abdominal Pain	3.3% (5)		
Y/O: Years Old				

Table 2 Procedures done with TEM

Resectional Procedure	146 (97.3%)
Stricturoplasty	2 (1.3%)
Endorectal Flap	2 (1.3%)

flap was sutured with PDS 3-0. This patient was come back with recurrence of fistula six months after initial operation that was manage with seton insertion. Another case of endorectal flap was due to rectovaginal fistula this case was also closed with PDS 3-0 (► **Table 2**).

Follow-up and Complications

The mean duration of patient's follow-up was 31.6 ± 21.7 months although six patients lost the follow-up. Complication following TEM were one case of in hospital mortality, Colon perforation and fistula development. The expired patient was a 71 Y/O female with rectal bleeding that colonoscopy showed a mass in the rectum and biopsy showed villous adenoma with high grade dysplasia that was referred for TEM the mass was found 12 cm above anal verge and it was excised and defect was closed and TEM biopsy revealed well differentiated adenocarcinoma. This patient was expired with the picture of sudden cardiac arrest and family refuse to do autopsy. Following resectional procedures only one case developed with perianal fistula, in this case the defect following excision was closed with PDS 3-0 and Harmonic scalpel was used as energy device. The case of colon perforation was diagnosed during operation and Site of perforation was at rectosigmoid junction that was repaired with laparoscopy and patient discharged without complication.

All of operated patients were continent subjectively so we did not evaluate them for fecal incontinence.

Energy Devices

Regarding the availability of different energy devices in our center surgeons have options to select the device regarding the location and size of lesion. Ligasure is the most frequent energy device that was used with frequency of 75.3%, after that electrocautery was used in 16.7% of cases. Harmonic was the least energy device which was used in 8% of patients. There is no specific correlation between complications and use of energy device however in patient with recurrence after endorectal flap Ligasure was used as energy device.

Suturing

In 7.3% of patients the defect after resection was left open and not sutured it was based on surgeon decision although these all of these lesions were located in lower and mid part of rectum. PDS 3-0 is the most frequent suture material that was used in 81.3% of cases followed by PDS 2-0 that was used in 6% of cases.

One of the cases that develop with fistula after resection of polyp was sutured with PDS 3-0 and there was no complication in patients that the defect was not closed.

Table 3 Distance Measurement Using TEM Versus Colonoscopy

	Distance (cm from anal verge)	Standard Deviation	P value
Colonoscopy	8.06	3.91	0.06
TEM	8.56	3.83	

Correlation between Colonoscopy and TEM

The mean distance of lesion from anal verge measure by colonoscopy versus TEM is described in table three. The difference between two mean is not statistically significant showed by paired t-test (► **Table 3**).

In colonoscopy two cases had pathology of well differentiated adenocarcinoma that were referred for evaluation of tumor remnant following colonoscopic polypectomy and in both of them resection of site of excision with TEM did not revealed remnant malignant pathology. None of them had recurrence after 33- and 53-months follow-up.

Colonoscopic biopsy of patients with TEM proved malignant lesions are showed in table four. As it is shown the most colonoscopy biopsy that is associated with malignancy is villous adenoma even with low grade or high-grade dysplasia (► **Table 4**).

Prevalence of malignancy in premalignant lesions that were detected in colonoscopy were also demonstrated in table five. Adenomatous villous polyps with high grade dysplasia detected in colonoscopy had the highest rate of malignancy (52.63%) and none of the patients with adenomatous tubular polyps with low grade dysplasia had malignancy (► **Table 5**).

Evaluation of Lesion Base

Base evaluation was done only in 77 lesions that were resected with TEM in 29 patients the base was involved and in 48 patients the base was free. Chi square analysis showed no significant effect of specific energy device on base involvement (P value:0.63). The mean distance from anal verge measured during TEM was not also associated with base involvement (P value: 0.27). 62% of patients with involved base had malignant pathology that undergone radical resection. The aim of TEM in this group of patients

Table 4 Prevalence of Colonoscopy Biopsy Result in Patients with Malignant lesion Proved with TEM

Adenomatous Villous Adenoma with High Grade Dysplasia	36%
Adenomatous Villous Adenoma with Low Grade Dysplasia	20%
Adenomatous Tubulo-villous Adenoma with Low Grade Dysplasia	16%
Adenomatous Tubulo-villous Adenoma with High Grade Dysplasia	8%
Adenomatous Tubular Adenoma with High Grade Dysplasia	8%

Table 5 Prevalence of Malignancy in Pre-Malignant Lesions Detected by Colonoscopy

Lesion in Colonoscopy	Prevalence of Malignancy
Villous Polyp with High Grade Dysplasia	52.63%
Villous Polyp with Low Grade Dysplasia	29.41%
Tubulovillous Polyp with Low Grade Dysplasia	22.22%
Tubulovillous Polyp with High Grade Dysplasia	20%
Tubular Polyp with High Grade Dysplasia	15.38%
Tubular Polyp with Low Grade Dysplasia	0%
Tubulovillous Polyp with Moderate Dysplasia	0%

is to obtain adequate excisional biopsy for better histopathologic evaluation. There were six cases of neuroendocrine tumors that all of them resected with free base.

Discussion

This study was conducted to demonstrate the efficacy of TEM and its applicability in management of different proctologic procedure regarding the instruments available in middle eastern hospitals. Like previous reports⁶ most of operation that were done in our center were resectional procedures for management of premalignant lesions. These lesions had grossly malignant features in colonoscopy, but colonoscopy biopsy failed to show malignancy, so TEM was applied in order to have an excisional biopsy of lesion. As shown in Table five and six the prevalence of malignancy in these patients is considerable. We have not started managing malignant lesions or doing palliative resections using TEM. The feasibility of TEM for endorectal flap or Strictureplasty is demonstrated before.^{7,8}

Previous reports showed the 10% rate of complications for TEM. The major complications are bowel perforation, fecal incontinence, and pelvic sepsis. Mortality is also reported in some cases and is mostly related to advanced metastatic disease in patients undergone palliative resections. Comparing with rectal resection this rate of complication and mortality is acceptable.⁶ The rate of complications in our study is similar to universal reports and even lower that might be related to not operating palliative patients or not resecting large malignant lesions in our center. The other explanation for our lower complication rate is the mean age of patients which is 52.1 ± 16.62 years old, and most patients were in 30-60 years old age groups which had acceptable operative risk.

One of the weak points of our study is the lack of standard tool for evaluation of postoperative fecal incontinence although none of the patients had subjective complaint of fecal incontinence. Previous reports showed different incidence of fecal incontinence after TEM from 28.8% to 2.3% and multi variate analyses showed age at the time of operation is single independent risk factor for this complain.⁹

There is a relative contraindication for doing TEM in high anterior lesions because of risk of peritoneal penetration. In a

series of 303 TEM cases 26 patients had peritoneal entry and, in this report, they repair 88% of them with TEM without abdominal operation. They also showed perforation in lateral and even posterior lesions.¹⁰ we had a case of peritoneal entry located anteriorly in rectosigmoid junction because full bowel preparation we performed laparoscopic repair without diverting ostomy and patient discharged without complication.

Currently Electrocautery, Ligasure and Harmonic are available energy devices in Iran. In our patients using these devices were not associated with increased complication and could not help to obtain free margin resection. In the case of fistula recurrence Ligasure was the energy device that was used and regarding previous reports¹¹ lateral thermal injury is higher with Ligasure which was not statistically significant. We used Ligasure in 75% of TEM cases and none of them had serious complication and this recurrence after endorectal flap could be incidental. We also did not find reduced complication with use of harmonic as other studies were found.³

Closing lumen defect above peritoneal reflection is mandatory but It is optional to suture the rectal defect after resection of lesions below the reflection and it is assumed that closing the defect is associated with better hemostasis, improved healing and reduced risk of stricture. Meta-analysis of studies showed that closing the rectal defect is only improve bleeding control and leaving the defect open is not associated with infection, hospital stay or reduced time of surgery.¹² Our data also revealed the same findings and there no significant difference in rate of complication following closing the defect or leaving it open. In case of fistula development after TEM the defect was closed and since it happens in only one case, could not be ascribed to suturing.

Interestingly comparison of TEM and colonoscopic findings showed borderline significant difference between lesion distance measured by colonoscopy and TEM which was previously thought to be shorter with rigid instruments.¹³ This finding might be related to location of lesions which were mostly in the midpart of rectum where loop formation of colonoscope is not happening.

Unlike distance measurement, which was similar in colonoscopy and TEM, pathologic findings of biopsies taken with TEM are different from samples taken with colonoscope. The most relevant explanation for this finding is due to possibility of excision the lesion with TEM while in colonoscopy piece meal techniques usually applied so evaluation of base is not possible. It is advised to perform endoscopic resection when all requirements of complete excision are available to reduce the risk of unsatisfactory incomplete excision.¹⁴ Since it might not be possible to have a complete excision in all colonoscopy facilities TEM should be considered in cases of premalignant lesions which were not excised completely as an excisional biopsy.

One of the weak points of our study is the high number of unevaluated and involved margins which were mostly at the first years of starting TEM in our center and these cases were reduced with increasing the experience of our pathologists and surgeons. This is the first report about TEM experience in

Iran which showed its feasibility for management of different proctologic conditions. It is highly advised to develop multiple tertiary colorectal referral centers with TEM capability in the country.

Conflict of Interest

All authors state that there is no conflict of interest.

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