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Case report

Transanal minimally invasive surgery – initial experience

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1. Introduction

The use of minimally invasive surgery for the rectal lesions has increased continually in recent times. With the advantage of smaller incisions, lesser postoperative pain and morbidity, greater patient satisfaction, and shorter hospital stay, without affecting the clinical results minimally invasive surgery has evolved over a period from laparoscopic, robotic to transanal endoscopic microsurgery (TEM) and transanal minimally invasive surgery (TAMIS). TAMIS is more of a NOTES (Natrual Orifice Transluminal Endoscopic Surgery). Transanal enoscopic surgery started with TEM and /was first introduced by Buess in 1983 in Eberhard Karls University, Germany. Soon it was adopted by many centers worldwide. It is indicated in benign and T1 carcinoma. TEM requires use of a complex operative system which is specially designed for the same; it allows surgical resection and suturing inside the rectal cavity without going into the abdominal cavity up to a height of 20 cm from the dentate line.[1–3] TEM has become accepted as a procedure for benign adenomas and for early carcinomas of the rectum. Definitive treatment of T2 or T3 rectal lesions with TEM is not recommended because of the very high recurrence rate.[4–6] It has also been used in the management of rectovaginal fistulas and anastomotic dehiscence.[7] The problem with TEM is that it requires specialized instruments which are not easily available and are expensive. To overcome this problem, Atallah et al. in 2010 developed a new technique, which he named TAMIS (Trans Anal Minimally Invasive Surgery). TAMIS provides several benefits over TEM. It does not require special setup. It requires conventional laparoscopic instruments, hence resulting in cost benefits over TEM which requires specially designed instrumental setup. Since its inception, its use has increased in the resent past and it has been adopted by many centers all over the world.[8]

2. Procedural planning

We present our inital experience of 8 patients which were operated form Dec 2016 to Dec 2018. All patients with rectal lesions were properly evaluated by endoscopic biopsy, computed tomography of abdomen, pelvis and chest and magnetic resonance imaging (MRI) for tissue diagnosis and to assess tumor depth and lymph nodal status. Patient with T2 and T3 lesions were excluded from the procedure.

All the patients were given preoperative bowel preparation, antibiotic prophylaxis to avoid sepsis, and DVT (Deep Venous Thrombosis) prophylaxis to avoid the chances of DVT.

2.1. Positioning

The patient was placed in lithotomy position with legs elevated. The operating surgeon and assistant stood in between the patient's legs (Fig. 1).

2.2. Instruments

We used conventional laparoscopic instruments such as a monopolar hook cautery, Maryland dissector, 5-mm 30° endoscopic camera, bowel grasper, needle holder, pair of endo scissors, endoscopic suction pump, and SILS (Single Incision Laparoscopic Surgery) port (Covedien/Medtronic) with two 5-mm trocars and one 10-mm trocar (Fig. 2).

2.3. Steps

The procedure for all cases was performed under general anesthesia. The SILS port is inserted in the anorectum and fixed

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Fig. 1. Position and port placement.

anteriorly and posteriorly using No. 1 silk sutures. The pneumorectum is created with a constant pressure of 15 mmHg. Two 5-mm trocars and one 10-mm trocar, which can be used for holding the endoscopic camera, dissection, and holding the tissue during operation, was used. In all the benign and malignant lesions, full-thickness excision of the lesion including all the layers of the rectum with surrounding 1 cm of healthy tissue margin was performed. The lesion was first scored with hook electrocautry and then dissection was carried along this scored dotted line. The defect that presents after the resection was closed by 3-0 V-loc continuous suturing (Fig. 3).

2.4. Postoperative protocol

All patients were discharged and were given the normal diet on the same day of the operation. Biopsy reports of the patients were obtained.

Fig. 2. Instrument trolley.

Fig. 3. Whole setup.

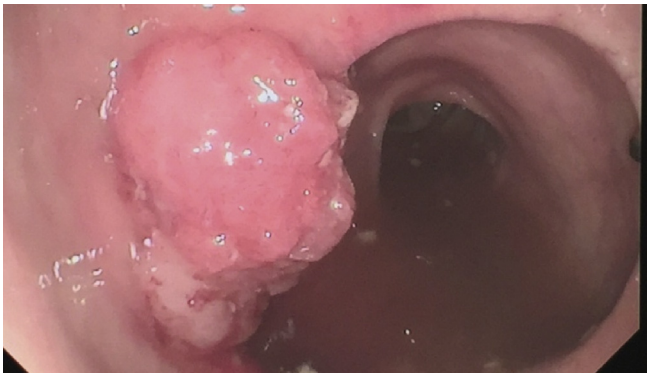

Fig. 4. Polyp on the right lateral wall of the midrectum at anastomotic site.

3. Case reports

Case 1 was a 50-year-old woman with a large rectal polyp of size around 6 cm with 2-cm stalk. It was 6 cm from the anal verge. Preoperative biopsy reported a benign polyp. It was not amenable to perform an endoscopic procedure. She underwent TAMIS. Complete removal of the polyp was done with closure of the defect by continuous suturing. She was discharged on the same day. Her final biopsy reported a benign polyp. She was regularly followed up and evaluated for recurrence. No recurrence found till 36 months of follow up.

Case 2 was a 60-year-old man with a history of left hemicolectomy and lower anterior resection (LAR) performed one year back for the carcinoma rectum in another hospital. He was evaluated for straining during defecation associated with bleeding per rectum, and colonoscopy showed anastomotic growth. Biopsy of the same showed villous adenoma. MRI pelvis and contrast-enhanced computed tomography (CECT) abdomen showed localized lesion within rectal wall. He underwent TEM with full-thickness resection of the lesion, with healthy margins around the lesion and the defect was closed. Final biopsy reported villous adenoma. After 24 months of follow-up, no recurrence was noted.

Case 3 was a 45-year-old man with a history of hemicolectomy and LAR performed in 2015 for left colon carcinoma and rectal adenoma in an outside hospital. Preoperative biopsy report was inconclusive (? villous adenoma/adenocarcinoma). CECT abdomen and MRI pelvis showed no metastatic lesion. He underwent TAMIS, and the final biopsy report showed villous adenoma with no

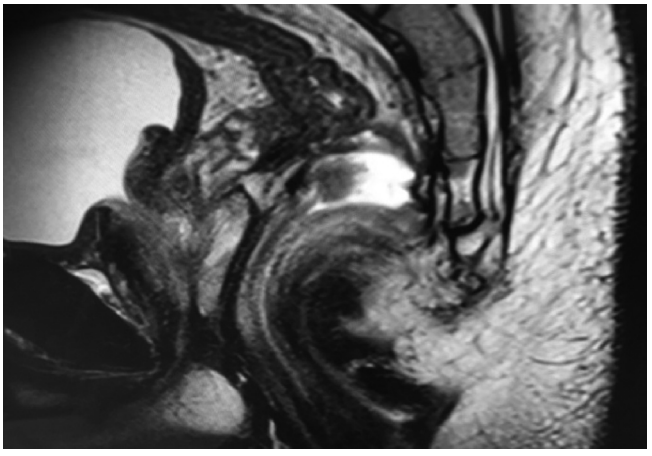

Fig. 5. MRI picture of the rectal adenoma.

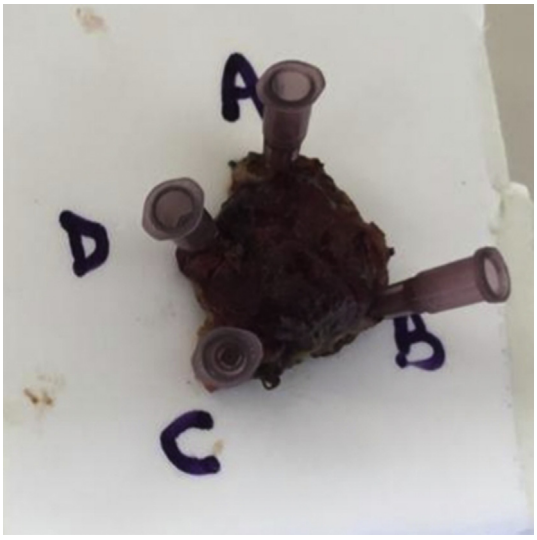

Fig. 6. Intact non-fragmented specimen.

evidence of cancer (Figs. 4–6). After 18 months of follow-up, no recurrence was noted.

Case 4 was a 34-year-old woman with about 6-cm villous lesion present at around 8 cm from the anal verge. The preoperative biopsy was suggestive of villous adenoma. She underwent TAMIS. The final biopsy report showed focal areas of mitosis at the stalk of the lesion (Tis). To rule out locally advanced disease, MRI pelvis was performed which showed subcentimeter lymph nodes in the mesorectum with no evidence of tumor in the wall of the rectum. She underwent LAR for the same. The final biopsy showed no evidence of cancer. At six-month follow-up, the patient was doing well.

Case 5 is a 56-year-old woman with a history of recurrent rectal bleeding, for which colonoscopy was performed which showed solitary rectal ulcer syndrome. She was managed conservatively for the same, but her Hb level dropped continuously and bleeding per rectum did not improve. She was given a choice of LAR with coloanal pull through and TAMIS . She choose TAMIS. She underwent TAMIS with full-thickness excision with closure of the defect. The biopsy reported benign ulcer. Bleeding subsided, and the patient's Hb increased over a period of time. After 16 months, the patient remained asymptomatic. She had occasional bleeding but not severe enough to need transfusion.

Case 6 was a patient with rectal stricture about 7 cm from the anal verge. This stricture was a result of an operation for his hemorrhoidal prolapse. He underwent TAMIS with Heineke-Mikulicz–type stricturplasty. The biopsy report showed no evidence of the cancer, and the patient was discharged on the same day. The patient improved symptomatically with no recurrence of the symptoms after a follow-up period of 18 months. He was dilated twice after the surgery.

Case 7 was a A 45-year-old man with a history of recurrent rectal prolapse underwent transanal total mesorectal excision (TaTME). He improved symptomatically. No recurrence of prolapse was noted in follow-up.

Case 8 was of a 16-year-old boy with bleeding per rectum. Colonoscopy showed a polyp with bleeding in the lower rectum. It was not amenable for endoscopic resection, and bleeding was not controlled. He underwent TAMIS with resection of the polyp and removal of the healthy margin around the lesion. The defect was closed. The patient was under regular follow-up since then. After 4 months of follow-up, no bleeding after operation was observed (Table 1).

4. Discussion

Transanal minimally invasive procedures (TEM/TAMIS) for the resection of the rectal tumor have been performed in many centers worldwide. To our knowledge this is the first case series published from India. The indications for the TEM and TAMIS are the same, i.e., benign lesion of 5–8 cm (ideally should be less than 3 cm), mobile lesion, polypoidal lesion, Tis and TIN0 rectal cancer, lesion occupying less than one-third of bowel circumference, and lesion with favorable histology such as well differentiation adenocarcinoma with no lymphovascular involvement. It can also be used for repair of a rectourethral fistula, removal of rectal and sigmoid foreign bodies, control of rectal bleeding, complete proctectomy, excision of Dieulafoy's lesion, etc.[7,9,10]

It should not be performed in case of the carcinoma rectum involving muscularis propria and unfavorable histologies such as lymphovascular invasion, perineural invasion, poorly differentiated adenocarcinoma, or signet cell carcinoma.[11]

Surgical outcomes of TEM are same as compared with TAMIS. A comparison study between TEM and TAMIS published in 2016 has found similar outcomes in terms of tumor characteristics, operative variables, margin status, and postoperative complications.[12]

Only one of our patients with villous adenoma at the

Table 1

Age/ sex	Diagnosis	Size of the lesion	Number of cases	Operation	Complications	Final histopathology report	Reoperation required	Follow-up
50/f	Villous adenoma		1	TAMIS	No	Benign polyp	No	36 months
60/m	Rectal polyp		1	TEM	No	Villous adenoma	No	24 months
45/m	Villous adenoma		1	TAMIS	No	Villous adenoma	No	18 months
34/f	Rectal carcinoma in situ		1	TAMIS	No	Tis	Ultralow LAR with colonic J-pouch	6 months
56/f	Solitary rectal ulcer syndrome		1	TAMIS	No	Benign ulcer	No	16 months
40/m	Rectal stricture		1	TAMIS	No	No malignancy	No	18 months
45/m	Recurrent rectal prolapse		1	TaTME	No	–	No	6 months
16/m	Cap polyp		1	TAMIS	No	Benign polyp	No	4 months
	Total		8					

TEM, transanal endoscopic microsurgery; TAMIS, transanal minimally invasive surgery; TaTME, transanal total mesorectal excision; LAR, low anterior resection.

anastomosis of previous anterior resection underwent TEM, with full-thickness resection of the lesion with removal of healthy margins around. Although technically difficult, the result was good in terms of morbidity and clinical outcome.

Since its introduction in 2010, TAMIS has been adopted as an alternative to TEM for lower and middle rectal pathologies. The published literature studies establish the feasibility and accessibility of TAMIS for various rectal lesions, avoiding the morbidity and complication related with conventional transanal excision. Use of the SILS port with three trocars has been found to be very effective and also reduce the cost of operation with the same advantage as with TEM. The specimen that is obtained is nonfragmented and intact for proper labeling. There is no need to change the position of the patient as required in TEM. TAMIS can be performed in lateral or lithotomy position, and the mobile setup of the instrument allows for flexibility while operating.[13,14]

There are some problems that can be encountered such as fogging caused by the use of electric monopolar cauteries that may obscure the field of vision. Loss of pneumorectum is the other problem that can be encountered. Proper relaxation of the patient and increasing the pressure of the pneumorectum may be helpful in overcoming this problem. Another annoying problem encountered is billowing of rectum during surgery. This is due to the pulsatile delivery of CO_2 from conventional laparoscopic insufflator. This can be overcome by use of continuous airflow with commercially airseal available devices.

Various ports have been designed to perform TAMIS. Specially designed TAMIS ports are also available. We have used the SILS port for TAMIS in addition to routine laparoscopic instruments. Although at the time of publication of this series we have acquired proper TAMIS platform(Applied Medical). This provides better ergonomics and ease of guaze introduction if needed and easy specimen rmoval without disengaging the whole platform.

Proper patient selection and screening are very important. Prior tissue diagnosis by endoscopic biopsy is required. All patients who underwent TAMIS should be closely followed up, especially in case of early rectal malignancies to look for recurrence.

Several studies have been published establishing TAMIS as a safe and effective surgical option for early rectal malignancies. The complications related with TAMIS are very less and encountered in very few patients. A study published by McLemore et al. [15] of 32 patients with benign and malignant lesions of the rectum found it very effective with minimal complications such as urinary tract infection, diarrhea, rectal stenosis, and rectal bleeding. Another large study by Hahnloser et al. [16] studied perioperative complications and outcomes in 75 patients, whether to close the rectal defect or not. They reported minimal complications in 8% of the patients. No difference was found in outcomes of the patient, whether rectal defect closed or not.[16]

In all our 8 cases, we closed the rectal defect by beaded 3-0 V-Loc continuous suture. No complications were seen in our patients. All patients were discharged on the same day of the operation. No difference in terms of outcomes and complication have been noted, whether defect is closed or not, in the literature in case of extraperitoneal defects. Peritoneal defects should be closed so as to avoid bowel or omentum herniating into rectum. Quality of life of the patient after TAMIS is minimally affected as compared with transanal and laparoscopic procedures. Postoperative recovery is very fast, and the patients return to daily normal routine activity quickly. It does not affect the anorectal function of the patient much.[17–19]

In our study, zero percent conversion rate was observed. One patient required ultralow LAR.

Use of TAMIS for rectal lesions, especially in the lower and middle rectum, is a very effective and feasible option in the hands of a trained colorectal surgeon. The technical difficulties such as difficulty in dissection and suturing in such a small place can be overcome by acquiring advanced laparoscopic skills and practicing suturing in a confined space. There are specialized training courses available which should be attended before emabarking on TAMIS.

5. Conclusion

TAMIS is a safe and feasible operation for benign and early malignant lesions of the rectum. It is also a useful option in the treatment of rectal stricture and rectal bleeding. It reduces the morbidity of the patient as well as the cost of the operation.

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Declaration of Competing Interest

None of the authors have received any grants from any company. The authors declare that they have no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cmrp.2019.09.002.

References

1. Buess G, Hutterer F, Theiss J, et al. A system for a transanal endoscopic rectum operation [in German]. *Chirurg*. 1984;55:677–680.
2. Buess G. Review: transanal endoscopic microsurgery (TEM). *J R Coll Surg Edinb*. 1993 Aug;38(4):239–245.
3. Raestrup H1, Manncke K, Mentges B, Buess G, Becker HD. Indications and technique for TEM (transanal endoscopicmicrosurgery). *Endosc Surg Allied Technol*. 1994 Oct;2(5):241–246.
4. Saclarides TJ. Transanal endoscopic microsurgery. *SurgClin North Am*. 1997 Feb;77(1):229–239.
5. Demartines N, von Flüe MO, Harder FH. Transanal endoscopic microsurgical excision of rectal tumors: indications and results. *World J Surg*. 2001 Jul;25(7):870–875.
6. Lezoche E, Guerrieri M, Paganini A, Feliciotti F, Di Pietrantonj F. Is transanal endoscopic microsurgery (TEM) a valid treatment for rectal tumors? *Surg Endosc*. 1996 Jul;10(7):736–741.
7. Arezzo A. To TEM or not to TEM: past, present and probable future perspectives of the transanal endoscopic microsurgery platform. *Tech Coloproctol*. 2016 May;20(5):271–272.
8. Atallah S, Albert M, Larach S. Transanal minimally invasive surgery: a giant leap forward. *Surg Endosc*. 2010 Sep;24(9):2200–2205.
9. Khoury R, Duek SD, Issa N, Khoury W. Transanal endoscopic microsurgery for large benign rectal tumors; where are the limits? *Int J Surg*. 2016 May;29:128–131.
10. Atallah S, Albert M, Debeche-Adams T, et al. Transanal minimally invasive surgery (TAMIS): applications beyond local excision. *Tech Coloproctol*. 2013;17(2):239–243.
11. Floyd ND, Saclarides TJ. Transanal endoscopic microsurgical resection of pT1 rectal tumors. *Dis Colon Rectum*. 2006 Feb;49(2):164–168.
12. Melin AA, Kalaskar S, Taylor L, et al. Trans anal endoscopic microsurgery and trans anal minimally invasive surgery: is one technique superior? *Am J Surg*. 2016;212(6):1063–1067.
13. Seva-Pereira G, Trombeta VL, CapochimRomagnolo LG. Transanal minimally invasive surgery (TAMIS) using a new disposable device: our initial experience. *Tech Coloproctol*. 2014;18(4):393–397.
14. Alvesfilho EF, Costa PFO, Guerra JC. Transanal minimally invasive surgery with single-port (TAMIS) for the management of rectal neoplasms: a pilot study. *J Coloproctol*. 2012;32(4):402–406.
15. McLemore EC, Weston LA, Coker AM, et al. Transanal minimally invasive surgery for benign and malignant rectal neoplasia. *Am J Surg*. 2014;208:372–381.

16. Hahnloser D, Cantero R, Salgado G, Dindo D, Rega D, DelrioP. Transanal minimal invasive surgery for rectal lesions: should the defect be closed? *Colorectal Dis*. 2015;17:397–402.
17. Haugvik SP, Groven S, Bondi J, Vågan T, Brynhildsvoll SO, Olsen OC. A critical appraisal of transanal minimally invasive surgery (TAMIS) in the treatment of rectal adenoma: a 4-year experience with 51 cases. *Scand J Gastroenterol*. 2016;51:855–859.
18. Sumrien H, Dadnam C, Hewitt J, McCarthy K. Feasibility of transanal minimally invasive surgery (TAMIS) for rectal tumours and its impact on quality of life: the Bristol Series. *Anticancer Res*. 2016;36:2005–2009.
19. Verseveld M, Barendse RM, Gosselink MP, Verhoef C, de Graaf EJ, Doornebosch PG. Transanal minimally invasive surgery: impact on quality of life and functional outcome. *Surg Endosc*. 2016;30:1184–1187.