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Review Article

Transanal Endoscopic Microsurgery (TEMS) for Early Rectal Cancer Treatment

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Abstract

Introduction and Background: TEMS is a minimally invasive procedure for local excision of rectal lesions via a trans-anal approach. TEMS is suitable in benign lesions and in well selected early rectal cancers. It is associated with less operating times and morbidity compared to conventional TME. We examined the effectiveness, safety, and complications of TEMS on carefully selected patients with early rectal cancer.

Methods: We reviewed the medical records of 39 patients who underwent TEMS procedure for treatment of rectal cancer by a single surgeon within a single colorectal unit between 2016 and early 2024.

Results: 39 patients underwent TEMS for malignant disease between 2016 and 2024. Median age 71.5 and 74% were male. 100% full thickness dissection of the rectum was done for pre-op histology confirming cancer. 91.4% of patients were discharged in 24 hours.

9 patients required further intervention and 8 of these had Abdominoperineal Excision of the rectum (APER) but the final histology showed no residual disease in 7 patients. 1 had radiotherapy as was unfit for major surgery. Only 5.1% had complications (bleeding requiring transfusion). Half had intra-operative bleeding and the other half had post-op PR bleeding that required readmission, and no further intervention. 2.6% patients had recurrence.

Conclusion: TEMS offers a safe and viable option for treatment of early rectal cancer associated with less morbidity especially for patients whose fitness for major surgery is uncertain. It has economic advantages due to shorter hospital stay, low recurrence rate and majority of patients not requiring major resection.

Keywords: Rectal cancer; TEMS; Trans-anal Endoscopic microsurgery

Background

Early Rectal Cancer (ERC) is defined as TNM classification of T1 or T2, N0 and M0 (National Comprehensive Cancer Network 2010) by MR scan or ERUS [1]. ERC has been treated with Total Mesorectal Excision (TME) in the form of anterior resection or Abdominoperineal resection, but less invasive approaches have emerged with less morbidity and mortality and provide organ sparing surgical excision options. One such minimally invasive options is Transanal Endoscopic Microsurgery (TEMS) that can be used after careful patient selection. Advantages of TEMS include no bowel resection, no external scar, no stoma, better functional results, and short hospital stay. Also, a full thickness excision can be performed. Disadvantages include requirement for general anaesthesia, may require conversion to intra-abdominal surgery, risks of postoperative complications like pelvic sepsis, rectal

perforation, and incontinence. It also does not provide lymph node staging. During TEMS a specialised equipment that offers access to the rectal lumen is used to visualise and excise lesions in the rectum below the peritoneal reflection.

The objectives for this study were

1. To assess the usefulness of TEMS for ERC
2. To assess recurrence after excision of ERC using TEMS
3. To assess complications following TEMS

The use of TEMS for rectal cancer has been reported in literature. TEMS has been shown to be a safe modality for treatment of rectal lesions with minimal morbidity and no procedure related mortality. Maslekar et al. found total recurrence rate of 4.5% in benign lesions, 6% in T1 cancers, 14% in T2 and 20% in T3 cancers [2]. A retrospective study utilising the Norwegian National registry data showed no additional risk to overall survival, disease free survival, local recurrence or distant recurrence with completion resection following TEMS and TAMIS compared to primary TME resection for early T1-T2 cancers without high risk histopathological features [3]. TEMS has been used in patients who had previous endoscopic excision of lesions with incidental finding of malignancy or incomplete excision [4]. In a study, Ortenzi et al. reported accidental entry into the peritoneum with subsequent suture closure in 2.6% with no significant consequences and avoidance of major surgery. Following TEMS post endoscopic excision, complete excision of lesions was confirmed [4]. Histology showed 1 pT1sm1, 9 pT2 (10.4%) and 1 pT3 Adenocarcinomas. All patients in this series had full thickness excision at TEMS and closure of the defect with absorbable sutures. Ortenzi et al. [4] found that large rectal polyps may be more appropriately treated with TEMS rather than endoscopic excision due to possibility of incidental malignancy and higher recurrence rates, as it provides better diagnostic and therapeutic results. TEMS has been used to treat rectal lesions including GIST after neoadjuvant Imatinib to reduce tumour size, with low local recurrence (7%) and distant metastasis of 2.3% [5]. Neoadjuvant therapy provided an opportunity for locoregional control of lesions with excellent survival and organ preservation in addition to avoiding major surgery. In a retrospective review, González et al. [6] reported good outcomes with TEMS after Chemoradiotherapy in the treatment of Rectal Cancer in terms of morbidity (13%), local recurrence (2.4%), distant metastasis (7.3%) and short duration of hospital stay (1 day). In their series, TEMS was performed on patients with T1- T3/ N0 Disease 8-12 weeks post Chemoradiotherapy, finding that TEMS is a viable organ preserving treatment option even for T2-3 N0 lesions.

Reintervention rate was 3.8% with minor and major complications rates of 7.7% and 5.8% respectively. In a large national study from the Danish Colorectal cancer group database, it has been demonstrated that there is no difference in outcomes between Completion Total Mesorectal excision after TEMS and primary TME in terms of risk of incomplete mesorectal fascia resection and increasing the rate of APER [7]. TAMIS (Trans-anal Minimally invasive Surgery) is another procedure offered for local excision of early cancer. In a single centre retrospective study, TAMIS was utilised in treating both benign lesions and early (T1) cancer of the rectum with a 30 day mortality of 0, a reoperation rate of 2.39%, a positive margin rate of 4.76% and recurrence rate of 26.91% [8]. Although TEMS carries a low risk of complications, it has been reported that neoadjuvant chemoradiotherapy increases the risk of post intervention morbidity and function.[9] Following a retrospective study from a single centre to compare outcomes following TEMS alone and TEMS after chemoradiotherapy, Rizzo et al. found a total complication rate of 23% which was lower in patients without neoadjuvant chemoradiotherapy and at 1 year, those without neoadjuvant therapy had lower incidence of soiling (0 vs 7.7%) [10]. Also, suture breakdown was more common among patients with prior chemoradiotherapy. Majority (27 of 33) of their patients who had early cancer had pT1 disease or less while 6 of 33 had Above pT1. In patients with ypT0-1, better continence function is achieved with TEMS than with TME with comparable oncological results and less morbidity [10]. A systematic review including 10 trials that compared TEMS with more invasive surgical resection for treatment of T1-T2 rectal cancer showed higher risk of overall recurrence with TEMS but had comparable risks of distant recurrence, overall survival and mortality, and better operating times and complications [11].

Methods

A retrospective Review of all patients who underwent TEMS between 2016 and early 2024 in the colorectal unit of the Royal Oldham Hospital of the Northern care Alliance NHS Trust was carried out. Those who had the procedure for benign pathology were excluded. Inclusion criteria include T1/T2 N0 M0 lesion, within 15 from anal verge below the peritoneal reflection, less than 3 cm in size if known malignancy and fit for GA (General Anaesthetic). One patient with MRI staging of N1 disease was included on the recommendation of the colorectal MDT as the patient was considered not fit for major resection. In addition, all patients were discussed in the colorectal MDT and listed for TEMS subsequently. Pre-operative investigations include endoscopy and biopsy of lesion, MRI scan of the pelvis, CT scan of the Chest, abdomen and pelvis and routine haematological and biochemical blood tests. The electronic records of 39 patients were reviewed and analysed. The procedure was carried out by a single TEMS-trained surgeon in the large colorectal surgical unit. All patients had a pre-operative clinic review where the options of management of identified lesions were discussed including conservative,

TEMS and conventional resection and the pros and cons of all. Informed consent is then taken subsequently and confirmed on the day of the procedure. Data was collected and analysed using excel spreadsheet. This includes demographic data, endoscopic histology, radiologic staging, operative details, post-operative histology and staging, length of hospital stay and follow-up data.

Results

Demographics are presented in Table 1 below along with details of the procedure and hospital stay. During TEMS, only one patient had the defect closed following excision of the lesion.

Demographics	
Total of 39 patients included	
Parameter	Result
Age	Median 71.5 (43-90yrs)
Gender	74% Male (29 of 39)
Procedure	
Position of lesion (anterior, posterior, right, left quadrant)	No significant difference
Thickness of dissection	100% (19) full thickness for preop histology showing cancer.
Defect closure	97.4% (38) no closure
Hospital stay	92% (36) 24hrs [0 to 2 days]
Mean size of lesion	25.8mm (5-55mm)

Table 1: Demographics.

There was a total of 39 patients. 15.4% of patients were discharged on the day of their procedure and a further 76% were discharged the next day (24hrs). Only 7% stayed in hospital more than 24 hours.

Preoperative Staging

All patients had preoperative diagnostic investigations in the form CT scans of Thorax, Abdomen and Pelvis as well as MRI scans of the pelvis. Endoscopy (colonoscopy or Flexible sigmoidoscopy) and biopsies were also performed. All patients were discussed at the Colorectal Multidisciplinary Team (MDT) meeting. Preoperative MRI scans are depicted in the table below. All patients had N0 disease except one, who had N1 disease but was quite co-morbid, considered unfit for major resection and MDT advised for a TEMS. Table 2 below shows the MRI staging.

Stage	%(n)
T1/2N0	38.0 (15)
T2N0	35.9 (14)
TxN0	10.3 (4)
T2NX	2.6 (1)
T1/2N1	2.6 (1)
T3bN0	2.6 (1)
NA	2.6 (1)
T1N0	2.6 (1)
T2/3N0	2.6 (1)

Table 2: Radiological (MRI) Pre-op staging

The distribution of preoperative endoscopic biopsies shows majority (41.0%) to be adenocarcinoma. Table 3 below shows distribution of diagnostic histology (Pre-TEMS).

Histology	%(n)
Hyperplastic/ metaplastic polyp	2.6 (1)
Adenoma + LG dysplasia	25.6 (10)
Adenoma + HG dysplasia	23.1 (9)
Adenocarcinoma	41.0 (16)
NET (Carcinoid)	2.6 (1)
Polyp cancer	5.1 (2)

Table 3: Pre-op (Endoscopic) Histology

Post operative (TEMS) histology confirmed malignancy and indicates if there was adequate clearance at the margins of the excised tissue as well as the T-stage of the disease which is shown in the Table 4 below.

T stage	% (n)
T1	51.3 (20)
T2	33.3 (13)
T3	2.6 (1)
Kikuchi SM1	2.6 (1)
Kikuchi SM2	2.6(1)
Granulation tissue	2.6 (1)
Grade 1 NET	2.6 (1)
Adenocarcinoma no stage	2.6 (1)

Table 4: post-TEMS histology

Postoperative histology determined the need for further intervention. For patients who had margin involvement following

TEMS, further treatment was offered. 23.1% (9) patients required further intervention and 20.5% (8) of all patients had surgery in the form of Abdominoperineal Excision of the rectum (APER). Of those who had APER (8 patients), the final histology showed no residual disease in 87% (7 patients). 2.6% (1 patient) had radiotherapy as was deemed unfit for major resection surgery therefore the MDT offered Radiotherapy (this patient was suspected to have disease progression 8 years after initial TEMS). The breakdown of Margin involvement is presented in the Table 5.

Indication for APER from histology	n
<1mm clearance margins	3
LVI/ EMVI	1
Involved margins	1
One LN with capsular disruption at margin	1
Clear margins but pT2SM2	1
T1 (SM3) with positive lymphovascular invasion	1

Table 5: Histological indication for further surgery

Only 5.1% (2 of 39) patients had complications (bleeding) from the TEMS procedure. 2.6% (1patient) had intra-operative bleeding requiring blood transfusion and the second patient had significant post-op PR bleeding that required transfusion, readmission, and no further intervention. Only 5.1% (2 patients) had incontinence and only 1 of these had persistence of symptoms. However, information about incontinence was not available for all patients. No cases of perforation or mortality were recorded. On up-to-date follow-up, 2.6% (1) patients had recurrence. This patient had recurrence of disease at 31 months from TEMS. Routine follow up investigations at 3 months were normal. The patient was subsequently referred to the colorectal team by primary care for PR bleeding and was found to have a recurrence. The follow up timeline within our practice is shown in the Table 6 below.

	Time (months)											
	3	6	9	12	18	24	30	36	42	48	54	60
	CEA	CEA	CEA	CEA	CEA	CEA	CEA	CEA		CEA		CEA
	MRI	MRI	MRI	MRI	MRI	MRI	MRI	MRI		MRI		MRI
	F Sig	F Sig	F Sig	Colon	F Sig	F Sig	F Sig	F Sig		Colon		F Sig
				CT TAP		CT TAP		CT TAP				CT TAP

Table 6: Surveillance schedule

Conclusion

TEMS is a safe option for the treatment of carefully selected patients with early rectal cancer. A multidisciplinary team approach is essential in this patient selection. It is associated with low complications, provides minimal morbidity compared to conventional TME approach and in addition, is an organ (rectal) sparing intervention. For treatment of ERC, TEMS has shown low rate of recurrence (2.6%) from our series. For those with inadequate clearance at the tumour margins, further treatment can be offered. 23.1% (9) patients required further intervention further intervention due to incomplete clearance, but histology revealed no residual disease in the histology for most of these patients. There are also economic advantages related to short hospital stay and the cost associated with it.

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