Editorial Commentary

Transanal minimally invasive surgery

Dakshitha Wickramasinghe[1,2], **Janindra Warusavitrane**[2]

[1]Department of Surgery, Faculty of Medicine, University of Colombo, Sri Lanka; [2]Department of Surgery, St. Mark's Hospital, London, UK

Correspondence to: Dakshitha Wickramasinghe, MBBS, DM. Department of Surgery, St. Mark's Hospital, London, UK. Email: dakshithaw@srg.cmb.ac.lk.

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Trans-anal minimally invasive surgery (TAMIS) includes a group of techniques which allows access to the lower rectum and anus. Compared to traditional trans-anal excision, they provide better access, exposure and visualisation of the operative field while providing all the benefits of minimally invasive surgery like quicker recovery and morbidity. This broad group of surgical techniques include trans-anal endoscopic microsurgery (TEM), TAMIS, trans-anal total mesorectal excision (TaTME) and trans-anal submucosal endoscopic resection (TaSER) (1).

TEM is a technique used primarily for excision of rectal cancer in the mid and lower rectum. First introduced in the 1980s (2), TEM uses a rigid operating platform (operating proctoscope) and modified laparoscopic instruments. The proctoscope is held in place by an arm which mounts on to the operating table. The proctoscope approximates closely against the anal canal to maintain an air-tight seal (3). The instruments are modifications of standard laparoscopic instruments with a bend in the shaft to reduce fencing in the narrow operative field. The narrow field also necessitates more rotational movements than straight or levering movements (3). TEM was the first trans-anal minimally invasive technique to be popularised. However, the challenging surgical technique, cost of the equipment and limited indications resulted in a steep learning curve (4,5). This, however, is similar to other minimal access surgery like laparoscopic colorectal resections (6) or cholecystectomy (7). After the learning curve, the average procedure takes 45 to 113 minutes and offers significant time savings compared to radical resections by as much as 140 minutes (8-10). The advantages of minimal access surgery like shorter hospital stay and reduction of morbidity translate to cost savings in excess of 25,000 USD per patient (11). Although the anal dilation due to the proctoscope results in a transient reduction of the squeeze pressure and impaired continence in the first few months after surgery, they recover by the first year after surgery (10,12,13). Other researchers have not seen any change in sphincter function or continence (5,14,15).

When TEM has been used in the treatment of adenomas, it has a local recurrence ranges of 2–16% (3,10) while providing a higher rate of margin-negative resections and recurrence than trans-anal excision (3). The size of the adenoma is believed to be the primary factor affecting complete resection and recurrence (3). About 8% of patients will experience a minor complication postoperatively (e.g., minor bleed) while 1% will have major complications (e.g., recto-vaginal fistula) (3). When used for early adenocarcinomas, however, there is a high recurrence and poor overall survival when compared to radical resections (3), with patients with larger lesions having particularly poor outcomes. TEM does, however, provide better outcomes than trans-anal excision (3,16). TEM following neo-adjuvant therapy has been shown to provide similar local and distant recurrence as well as disease-free survival when compared to laparoscopic total mesorectal excision (9). In patients with advanced cancer where a curative resection is unlikely, TEM can be used for palliation (16). TEM has also been proposed as an adjunct to natural orifice transluminal surgery (NOTES) but has not progressed beyond feasibility studies.

TAMIS was introduced in 2010 to overcome the high cost and steep learning curve of TEM (17) through a fusion of single incision laparoscopic surgery (SILS) and TEM (18). The main attraction was the easy availability of the port and the instruments and the familiarity of the surgery to SILS. Other advantages include shorter set-up time, full circumferential views (*vs.* 220° in TEM) and lithotomy positioning (18). The anal canal is gently dilated, and the flexible port is inserted. It is secured to the perineal skin with sutures to prevent dislodgement. Similar to the

TEM port, the port maintains the seal by applying snugly inside the anal canal. Dissection is performed with standard laparoscopic instruments and closure of the defect is performed with laparoscopic suturing techniques.

Adenomas may be removed by dissection in the submucosal plane, which provides an added advantage of not requiring sutured closure (18). Malignant lesions, however, need to be removed full-thickness and with a margin of 1cm for optimal oncological clearance. The pressure of the CO_2 within the lumen facilitates the dissection by separating the tissue planes. Closure of the defect for full-thickness resections is performed transversely to prevent luminal narrowing and may be performed with either interrupted or continuous sutures (18).

When used for malignant lesions, TAMIS has shown good oncological results with a 6% microscopic margin positivity and a 2% recurrence rate (19). The best outcomes are seen in T1 lesions with favourable histological features and a low risk of nodal metastasis (18). Similar to TEM, larger lesions may be excised using TAMIS if the disease extent or patient comorbidities preclude more radical surgery with curative intent. There is growing interest in using TAMIS after neo-adjuvant chemo-radiotherapy for rectal cancer, especially if the radiological and clinical complete response. TAMIS allows confirmation of pathologically complete response and these lesions have been identified to have predictably low occult nodal metastasis (20). Other indications of TAMIS include repairing recto-urethral fistula, treatment of rectal bleeding, removal of foreign bodies and management of anastomotic leaks (18).

Complex rectal polyps pose a challenge for endoscopist due to their size, location or arrangement. A major limitation of the standard endoscopic submucosal dissection (ESD) technique is the lack of traction-countertraction used in surgery. The use of a trans-anal SILS port similar to TAMIS, in combination with an endoscope, is known as TASER (1). First introduced in 2015, this technique allows the endoscopist to perform an ESD with the assistance of the surgeon who provides traction on the lesion using laparoscopic instruments.

Initial reports indicate that TASER can provide complete resection in the first attempt in 94% with no perforations. The mean duration of the procedure was 185 min (range, 65–480 min) (1). The majority of patients were discharged on the same day. The disadvantages of TaSER include the need of 2 operators, which pose logistical and financial challenges (1).

TaTME allows surgery for both benign (e.g., ileal-pouch creation) and malignant (e.g. low anterior resection) conditions. A recent editorial evaluated this (21), and we direct you to the original article for further information.

Trans-anal minimally invasive surgery provides better outcomes when compared with trans-anal procedures without a platform while enabling better post-operative recovery and morbidity. Refinement of existing techniques has enabled the development of newer procedures with improved outcomes.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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