



Uptake of transanal total mesorectal excision (TaTME)

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Total mesorectal excision (TME) is the gold standard for rectal cancer surgery since Heald standardised the technique, which required sharp dissection within the mesorectal plane to remove the primary tumour and the associated lymph nodes. This was shown to improve the oncological outcomes and allow preservation of the sphincter, with resultant good quality of life (1). In addition, a distance of 2 cm from the surgical margins was shown to be oncologically safe (2). This has allowed more sphincter saving operations to be performed for rectal cancer with less compromise of oncological outcomes.

With the advent and popularity of minimally invasive surgery, TME has been achieved by means of laparoscopy and robotic assistance. More recently several studies have described that laparoscopic TME may be inferior to open TME (3,4). Several reasons including access to the narrow male pelvis have been purported as the reasons for this. It is possible that issues such as training could have contributed to these outcomes. Nonetheless, those who criticise laparoscopic surgery often argue that access to the pelvis and low stapling are the main difficulties associated with the procedure. On this basis, the Transanal Total Mesorectal Excision (TaTME) was introduced. Major advantages of this technique include easier access to the pelvis and the ability to control and divide the rectum very low in the pelvis.

The first TaTME was performed in combination with laparoscopic surgery in 2010 in Barcelona for a T1 lower rectal cancer (5). The patient had an uneventful recovery and discharged home within four days after surgery. Although TaTME can help to improve the quality of the specimen, especially in the more challenging narrow pelvis,

it has not been widely adopted by colorectal surgeons. Some of the reasons include the lack of training opportunities and courses as well as the perceived long learning curve required to master the technique (6). At the same time complications specific to the procedure that have not been observed with open or laparoscopic techniques, such as urethral injuries, have added on the surgeons' reluctance to take on the technique (7).

In an effort to increase the surgeons' understanding and operative skills relevant to the procedure, and help to minimise the related morbidity, various training programmes have been introduced. The study by Atallah *et al.* (8) describes a 12-month programme that took place in North America between 2014 and 2015. This programme was designed to train colorectal surgeons in TaTME and included a total of 81 experienced minimally invasive rectal cancer surgeons. The programme consisted of eight 2-day courses that combined didactic and hands-on male cadaveric sessions with optional live TaTME surgery observership. All 81 surgeons successfully completed the course including the three-hour cadaveric session. All of the surgeons competently used the TaTME approach to dissect the anterior, posterior, and lateral mesorectal planes and successfully performed a stapled anastomosis.

The commonest error among the delegates was the entry into the wrong plane, which was noted in 9.1% of their cases. At the early stages, 1 in 5 surgeons incorrectly mobilised the prostate, without any urethral injuries. The rate was reduced to 3.3% as the didactic and teaching sessions were adjusted to emphasise the more relevant anatomical landmarks and familiarity with the inverse views.

Rectal perforation was observed in 4.5% of the cases. The majority of the surgeons found the course useful, with almost 95% of them planning to use TaTME for low rectal cancers following the completion of the course. However, there was clearly a concern about the risk of urethral injury, especially during the early stages of the learning curve, something that is a rarity with other approaches to TME. In addition, delegates did not feel that the course was adequate to achieve independence and suggested that additional learning and mentorship might be necessary to ensure safe implementation of the technique and minimise the morbidity.

Similarly, in the United Kingdom, the Association of Coloproctology of Great Britain and Ireland (ACPGBI) has introduced a comparable training programme that is currently in its pilot phase. The programme invited teams with 2 surgeons from individual units to train together. There was an initially 2-day workshop followed by a 12-month period of training and assessments. The UK programme includes the use of training modules of the iLapp surgery TATME teaching tool, attendance at cadaveric workshops, clinical mentorships through the initial cases, inclusion of assessment data and clinical outcomes in the TATME registry and finally an objective assessment and sign off for each colorectal team (<https://www.acpgbi.org.uk/education/tatme/>). The ACPGBI emphasizes that the patients should be made aware that this is a new procedure and that the participating surgeons should submit their data to the international TaTME registry.

Both programmes have similarities, though the British one is more recent and still evolving. Both programmes involve 2-day workshops that combine didactic and cadaveric sessions. Close supervision and mentorship are crucial elements and present in both programmes during the initial cases. Feedback from the North American Programme is very encouraging. However, there were still concerns about the high risk of urethral injuries even at the completion of the programme. Therefore programmes need to work ways to optimise training and recognition of key anatomical landmarks to avoid these injuries. It will be interesting to see whether the feedback from the British training programme will share the same concerns.

It is important to understand that in both programmes all the included surgeons were fully trained in minimally invasive surgery for rectal cancer with independent practice. Even at this level, the learning curve was high, suggestive of the complexity of the technique that mainly relies on

the unfamiliarity of the surgeons with the inverse view of the anatomy. Studies have suggested the learning curve can be between 30 and 50 patients (6,9,10) though this may be reduced to a lower number with structured training and close proctorship at the initial cases (11).

The initial programmes were designed to address the concerns of rectal surgeons, enhance their training, minimising the related to the technique morbidity and therefore enhance the oncological outcomes. With more knowledge and experience, the programmes have further evolved and now aim to reduce the learning curve down to 10 cases from 50 cases initially and help to develop the local infrastructure for safe implementation of the technique with appropriate mentorship and evaluation tools. With the help of these programmes, the interest in TaTME has gradually started to grow with more surgeons adopting it, not only for low rectal cancer cases but also for benign diseases.

The International TaTME Collaborative group has recently published a consensus on a structured training curriculum to TaTME (11). The group recommended the prerequisites of the surgeon before undertaking training in TaTME. They should have completed their training and accreditation in laparoscopic colorectal surgery performing at least 30 laparoscopic TME cases, 5 transanal cases (TEMS/TAMIS) and work in a centre with at least 2 surgeons trained in TaTME. The training should include self-learning modules, cadaver workshops, proctorship at the initial cases with feedback and audit of the outcomes when the surgeon continues to perform the procedure independently. Online tests and Global Assessment Score (GAS) forms have been suggested to monitor the surgeons' progress and highlight areas of improvement during the initial cases.

Patient selection can also have a fundamental role in determining the outcomes of the technique. There is no clear evidence at the moment as to which patients will benefit the most from TaTME. Male patients with narrow pelvis, high BMI and low rectal cancers may be the more suitable candidates for the technique. When the margins are threatened or the tumour is T4, the patients should not be considered for TaTME until there is more evidence to support it in this group of patients. The International TaTME Collaborative group suggested that TaTME should be offered in both males and females and should not be restricted in cancer patients only (11). This was also supported by the St Gallen Colorectal Consensus Expert Group (12).

At present, TaTME has been shown to be reproducible with data suggesting that the overall urethral injuries are not as high as initially thought to be. Results from the international TaTME registry have shown that the rate of urethral injuries was less than 1% (7). This may persuade the remaining rectal surgeons to consider the technique as a supplement to the traditional techniques of TME, especially in the challenging male pelvis, and undertake the appropriate training to learn it. When safely performed, TaTME can provide better views of the lower rectum and therefore improve the quality of the resected specimen and the oncological outcome.

The introduction of structured training programmes will enable the development of a universal infrastructure, facilitate and promote safe training and implementation of the TaTMe. It will allow the standardisation of the technique and its reproducibility among surgeons. The addition of appropriate assessment tools will help to certify the surgeons' proficiency in the technique, establishing TaTME as a safe and valuable tool in the management of low rectal cancers and benign diseases.

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