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Review

TRANSANAL TOTAL MESORECTAL EXCISION (TaTME): A LITERATURE REVIEW

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Summary

Total mesorectal excision (TME) has become the golden standard for treating rectal cancer since Heald introduced it [1]. Transanal total mesorectal excision (taTME) is an innovative surgical method for rectal cancer. A nonsystematic literature review on the articles on taTME in the PubMed and Scopus database was performed. ‘TaTME’ and ‘transanal total mesorectal excision’ keywords were used. The search was restricted to articles in English on more than 25 patients analyzed and followed-up. Fourteen articles were identified, most of them from Europe and China. Of these, eight were original studies, and six were systematic reviews and meta-analyses. TaTME is safe and efficient in experienced hands. It could be superior to laparoscopic total mesorectal excision (laTME) concerning perioperative complications. Its advantages in oncological outcomes over laTME are to be proven in structured randomized clinical trials (RCTs).

Keywords: rectal cancer, laparoscopic surgery, literature review

Introduction

Total mesorectal excision has become the golden standard for treating rectal cancer since Heald introduced it [1]. The laparoscopic approach, when studying the long-term outcomes, has proven to reduce the morbidity compared to open [2]. Transanal total mesorectal excision is an innovative surgical method for rectal cancer. Lacy et al. performed the first transanal total mesorectal excision in 2009. TaTME could potentially help to solve some difficulties in the dissection in the pelvis. The main aim is to dissect the rectum “down-to-up” with laparoscopic instruments. Male patients with ultra-low rectal tumors and high BMI are challenging in open and laparoscopic surgery, and TaTME is designed to overcome some of the limitations. It is a different and challenging procedure and requires a safe implementation to achieve the expected clinical outcomes.

Materials and methods

A nonsystematic literature review on the articles on TaTME in the PubMed and Scopus database was

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performed. ‘TaTME’ and ‘transanal total mesorectal excision’ keywords were used. The search was restricted to articles in English articles that analyzed and followed up more than 25 patients. Original articles, systematic reviews, and meta-analyses were included. Operative time, intra- and perioperative complications, quality of the specimen, and recurrence were taken into consideration.

Results

Fourteen articles were identified, most of them from Europe and China. Of them, eight were original studies, and six were systematic reviews or meta-analyses. The data from original studies are shown in Table 1 [3-10].

Results from the first large prospective single-center case series were published by Lacy et al., and included 140 consecutive patients. They reported no intraoperative complications

or conversions. The macroscopic quality assessment of the specimens was complete and near-complete in 99.2%. The local recurrence rate was 2.3% at 15 months median follow-up [3].

The first 80 cases in Amsterdam also showed good preliminary results – 97% complete and near-complete quality of the specimens, and there were only two patients with positive circumferential resection margin (CRM) [4].

Four anastomotic techniques have been described for colorectal/coloanal anastomosis following TaTME – one hand-sewn, and three types of stapled anastomosis. Surgeons should be familiar with all of them due to their advantages that can be useful in different situations [11]. Few cases of CO₂ embolism in transanal total mesorectal excision have been reported, like in other laparoscopic surgeries. However, one should have certain skills to manage this condition [12].

Table 1. Comparison between original articles with more than 25 patients analyzed and followed-up after TaTME.

Author	Patients (n)	Operative time (mean)	Intraoperative complications	Quality assessment of the specimen ‘complete’ and ‘near-complete’	Local recurrence (median follow-up)	Anastomotic leakage	Positive CRM
Lacy et al. [3]	140	166 min	no	99.3%	2.3% (15months)	8.6%	6.4%
Helbach et al. [4]	80	204 min	6.25% (bleeding and anterior wall perforation)	97%	2.5% (30 months)	Not mentioned	2.5%
Muratore et al. [5]	26	241 min	Not reported	100%	0% (23 months)	7.7%	0%
Tuech et al. [6]	56	Transanal 100 min; transabdominal 170min	no	100%	1.8% (29 months)	10.7%	5.4%
Rouanet et al. [7]	30	34 min	6.7% (urethral injury)	100%	13.3% (21 months)	0%	13%
Fernández-Hevia et al. [8]	37	215 min	0%	97.3%	Not reported	5%	0%
Velthuis et al. [9]	25	Not reported	Not reported	100%	Not reported	Not reported	4%
Penna et al. [10]	720	277 min	2.5% (severe complications)	89.6%	Not reported	6.7%	2.4%

Much work has been done for the safe implementation of TaTME, and the training pathway has been defined. Previous experience and proper education are required for safe implementation, such as experience in TME, TaTME training on cadavers, proctoring, case observation, and mentorship [13]. As far as safe implementation is concerned, studies were published with critical anatomical landmarks and dissection tips, such as O's and triangles [14,15].

The iLappSurgery taTME app was introduced as a modern adjunct to teaching this complicated procedure. It gives additional knowledge about TaTME for surgeons in training [16]. In 2017, a consensus on structured training curriculum for transanal total mesorectal excision was proposed by the International TaTME Educational Collaborative Group, including 52 international experts in the field of TaTME [17].

A few systematic reviews and meta-analyses have been published in the last few years. Although they are well-designed, the data used it is not accurate enough. Ever since laparoscopic total mesorectal excision passed the non-inferiority tests to open TME, taTME has been compared to laTME.

In systematic reviews, TaTME is reported to be a safe and feasible technique for mid- and low rectal cancers [18]. A meta-analysis of Rubinkiewicz et al. found benefits of the TaTME procedure in terms of major postoperative complications. TaTME is not superior to laTME in clinicopathological results [19]. Cheng et al. found that, if compared with laTME, TaTME is a safe and feasible approach for mid- and low rectal cancer patients. Also, TaTME showed a longer CRM, lower risk of positive CRM, higher complete quality rate of TME, and shorter operative time [20].

Ma et al., in their meta-analysis, including 573 patients, found that TaTME seems to achieve comparable perioperative and oncologic outcomes, as compared to laTME [21]. A very recent meta-analysis of nine retrospective cohort studies, including 751 patients, showed that TaTME was associated with shorter operative time, lower blood loss, less conversion, shorter hospital stay, and lower readmission rate. The intraoperative complications were similar. Nevertheless, high-quality clinical studies in the

area are needed [22].

Another recent meta-analysis, including 17 trials and 1346 patients and comparing TaTME with laTME, has shown that TaTME achieves similar surgical outcomes and has its advantages regarding reduced blood loss, safe CRMs, lower conversion and readmission rates, as well as shorter hospital stay and lower postoperative morbidity [23].

However, all studies stressed the need for a large multicenter well-designed, well-structured prospective randomized clinical trial. Such a trial that is ongoing now is the COLOR III trial. It includes 1098 consecutive patients with mid- or low rectal cancer, and all patients will be centrally reviewed. Patients will be randomized in a 2:1 ratio, in favor of the TaTME. Data will be analyzed on an 'intention to treat' basis in case patients are not subjected to the randomized treatment modality. The primary endpoint is the involvement of CRM. The trial aims to demonstrate a reduction in 4 % of involved CRM after TaTME, compared to laTME [24].

The robotic system has also been introduced in both transanal and transabdominal parts of the procedure with promising preliminary results [25-27].

Discussion

TaTME offers a better field of view compared to laTME and could result in more precise dissection in the "holy" plane. A direct view of the tumor could be beneficial in determining the distant margin also. TaTME allows surgeons to better see and preserve nerves from the inferior rectal plexus to the internal anal sphincter. A comparison of data on the long-term functional outcomes will show if this has any benefit for the patients [28].

Like any procedure, TaTME has a learning curve, and it should not be neglected. Case selection is crucial since proper case selection could reduce the risk of complications in the first operations performed by a beginner in the field. The overall colorectal experience of the surgeon is a substantial part in determining the learning curve.

A two-team TaTME could effectively decrease the operative time when performed by experienced teams [3]. However, another

possible advantage of TaTME is more comprehensive CRM [29], which is believed to be one of the most important prognostic factors for local recurrence and disease-free survival [30].

Functional outcome and quality of life (QoL) are to be better understood with well-structured long-term trials. They are also studied in the COLOR III trial. Nevertheless, functional outcome and QoL have a significant impact and could be the reason for choosing one procedure over another.

International TaTME registry is a great collaborative tool that includes many patients and could provide timely information about the development of the procedure [10, 31].

However, as stated by Professor Wexner, „rapid adoption by inadequately trained low-volume surgeons may sadly jeopardize the ultimate achievement“ of TaTME [32]. Therefore, the safe implementation by structured training pathways is essential.

Conclusions

TaTME is safe and efficient in experienced hands. It could be superior to laTME regarding perioperative complications. Its advantages in oncological outcomes over laTME are to be proven in structured RCTs.

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