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Trans-Anal Total Mesorectal Excision (TaTME): present and future

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Abstract

The management of rectal cancer has improved over the years. Recently Trans-anal Total Mesorectal Excision (TaTME) was introduced, with the aim to address the limitations created by the bony confines of the pelvis, bulky tumours, and fatty mesorectum, particularly for low rectal cancers. However, guidance is required to ensure safety in the implementation of the technique in order to avoid the pitfalls and potential major morbidity encountered by the early adopters of TaTME.

Introduction

The management of rectal cancer has improved over the years with several options available not only to surgeons but more in general to physicians taking care of rectal cancer patients. This includes refined staging techniques, with particular reference to Magnetic Resonance Imaging (RMI) and Endoscopic Ultra-Sound (EUS), as well as neoadjuvant and adjuvant therapies that altogether increased over the years the indication to trans-anal local excision with curative intent. Among the newly developed surgical approaches to rectal cancer, Trans-anal Total Mesorectal Excision (TaTME) offers to address the difficulties of this demanding surgery. Anatomical limitations of the narrow pelvis and bulky tumors may benefit from a different approach other that trans-abdominal. Indeed, performing a total mesorectal excision through the anus may confer significant benefits. A different viewpoint, a facilitated excision of the lower third of the mesorectum, the help of a pneumatic dissection in a very small surgical field, a better visualization of the structures during dissection open a new scenario. The first live case was performed in 2009, inspiring a growing number of new centres [1,2]. Since then, a broad dissemination of the technique is taking place. The adoption and practice of TaTME are documented by a large international registry documents, with thousands of procedures included from tens of different countries and more than a hundred active centres so far [3]. Moreover, two large randomised controlled trials (the COLOR-III [4] and the GRECCAR-11 [5] studies) involving a consistent number of investigators recently started, comparing TaTME with standard laparoscopic Total Mesorectal Excision (TME). While their results will help in defining the true role and value of TaTME, guidance is required to ensure safe implementation of TaTME, avoiding the pitfalls and intra-operative complications.

Patient selection and surgical indications

Although the female pelvis tends to be broader and therefore allows for an easier transabdominal mesorectal excision, both genders can be operated on by a combined trans-abdominal and trans-anal approach. Particularly obesity, and especially visceral obesity and a fatty mesorectum, may represent an important limitation for a standard laparoscopic trans-abdominal approach, although no exact cut-off of the body mass index (BMI) indicates that TaTME should be preferred to open/laparoscopic/ robotic TME. But the clearest indication consists of bulky tumours of the mid and low rectum that are very usually challenging also in female patients. Here, a TaTME might be technically easier than an abdominal TME.

In males, a possible injury of the prostatic urethra as well as in females, a possible injury of the vagina, during the dissection, may occur especially when the pelvis has been irradiated. In both cases, if recognised, this lesion can be directly repaired with simple sutures, even in an irradiated pelvis. Increased complexity but not contraindication are represented by prior pelvic surgeries as for trans-abdominal, also for trans-anal approach. This is particularly true in patients who already underwent prostatectomy, especially in case of an anterior rectal cancer close to the mesorectal fascia, so with a limited circumferential resection margin (CRM). On the contrary, previous hysterectomy does not usually represent limitation.

Although TaTME has its key indication in lower rectal resections, it can be proposed aldo for partial mesorectal excision. Here the benefit is limited to cancer of the upper third of the rectum, especially bulky tumours or in case of severe obesity, but still an advantage compared to a laparoscopic approach may exist. It is very important to keep in mind that caution should be taken not to perform unnecessary total mesorectal excision for the well-known post-operative complications and sindrome, that afflict any anterior resection, but particularly TME. When applied to rectal cancers, it should be noted that a minimum disease free distal margin of at least 1 cm should be assured. This is also a good reason to prefer a trans-anal approach that allows direct vision of the lesion when transecting the rectal wall. TaTME offers the chance of an exact transection point of the rectum assuring correct assessment of the distal margin. This is less important for middle third cancers where a distal margin up to 5 cm may be guaranteed, and even more for cancers of the upper third of the rectum. A TME is required only for cancers of the mid and lower third.

A partial or total intersphincteric TME can also be performed in combination with an endoscopic trans-anal approach, this way preserving at least some of the sphincter function. This requires, however, a colo-anal handsewn anastomosis which requires further surgical expertise. This should be coupled with either a colonic pouch or a colonic transverse plasty as for standard TME.

Apart from the more common indication for rectal surgery, i.e. neoplastic disease, TaTME has an indication also in inflammatory bowel disease. In this case either a proctectomy alone or a proctocolectomy may be indicated. Both can be performed entirely or partially through a TaTME technique, and either with or without an ileal pouch anal anastomosis. Even in this case, it has been observed that a total mesorectal excision is useful to prevent reduction of the inflammatory tissue and probably through this mechanism, a reduction in post-surgical complications, especially when a pouch reconstruction is considered.

Finally, in cases of chronic anastomotic leak or fistula, the dissection and removal of the neorectum are extremely complex procedures, but can be performed trans-anally in an easier way. The more complex is the indication, the more an appropriate technical and surgical expertise is mandatory as underlying disease, local inflammation, and dissection through scar tissue and obscured planes may be challenging.

Perioperative management

Mechanical bowel preparation is recommended in all patients in whom a TME is planned, no matter if trans-abdominal or trans-anal, irrespective of the use of a diverting ostomy [6,7]. This does not have only the aim to reduce anastomotic complications, but also to allow an easier endoscopic or trans-anal surgical management. As for trans-abdominal TME, these include the use of endoscopic clipping, powders for stopping bleeding and EndoVAC therapy.
A urinary catheter is placed before surgery but may be removed on post-operative day 1 if no injury to the urethra is experienced. Although no evidence exists that the use of a routine pelvic drain after TaTME is necessary, this is recommended. As for standard TME, a perioperative short-course antibiotic prophylaxis is mandatory and follows institutional guidelines.
The preferred position is the lithotomy one (or modified Lloyds-Davies position), as it allows a good exposition for both the abdominal and perineal teams, even if and when working at the same time.
TaTME can be performed either by one or by two teams. Both solutions have advantages and disadvantages [8]. The two-team approach requires more personnel, both surgeons and scrub nurse, but on the other side it saves consistent operative time. Moreover, the two different teams operating at a time, in case of difficult dissection, allow a better visualization and should be preferred whenever possible. To do this, a good cooperation between the teams and an integrated operative theatre are mandatory. In a one-team approach, the extent and quality of the pneumatic distension of pelvis are not burdened by initiating the pelvic dissection from above, but the trans-anal dissection first may also be preferred. Both in case of a two-teams approach and in case of a single team approach with trans-anal dissection first, it is very important of course to swiftly secure an air-tight purse-string internally. This avoids stool contamination, cancer cell spillage, and bowel dilatation.

Trans-anal access platforms

A stable trans-anal access platform is required to ensure a pneumorectum and insertion of three ports. Most experts use a GelPOINT Path access platform (Applied Medical, Rancho Santa Margarita, CA, USA) inserted trans-anally [9]. Nevertheless, some experts support TEO (Karl Storz Endoskope, Tuttlingen, Germany) which allows dissection down from the anal verge under endoscopic stabile conditions. In fact, this avoids the need of a conventional initial trans-anal dissection through a Lone-Star retractor (CooperSurgical, Trumbull, CT, USA), due to the shape of the GelPOINT platform overtaking the anal canal into the distal rectum. Lone-Star retractor is anyway necessary when performing the anastomosis, both handsewn or mechanical.
Trans-anal CO2 insufflation should ensure a stable pneumorectum first, and pneumopelvis after. Continuous smoke evacuation is mandatory as the trans-anal dissection occurs close to the scope in an extremely narrow surgical space [10]. Most experts use the Airseal system (CONMED, Utica, NY, USA) for this purpose, while for the abdominal part of the procedure a standard insufflator for laparoscopy is sufficient. It is important to occlude the rectal lumen with any means until the pursestring is completed and the rectal dissection is started.
Standard laparoscopic instruments are used for the trans-anal dissection. Monopolar cautery is used most frequently; alternatively, an energy device can be used but there is no evidence of benefit. Trans-anal extraction of the specimen using a wound protector is advisable, especially in case of a bulky specimen. However, the advantage of avoiding an abdominal incision for specimen extraction should be waived compared to the risk of damaging both the sphincter complex and, mostly, the specimen in case of trans-anal extraction.

Surgical technique step by step

In the abdominal phase, the sigmoid and the splenic flexure are mobilised by standard laparoscopy, identifying the left ureter and clipping and dissecting the inferior mesenteric artery at the origin, in order to allow an oncologically correct node dissection. The trans-anal phase starts either with an anal retractor if using a GelPOINT platform or directly under surgical endoscopic conditions if a TEO set is used. In both cases, for distal tumours, if required, an intersphincteric dissection may be performed at the beginning of the trans-anal procedure. Then, the rectum is closed with a tight purse-string suture. This prevents spillage of fecal content and tumour cells as well as further rectal and proximal bowel distension.
If the tumour is located >5 cm from the anal verge, any trans-anal platform may be used. In this case, first the rectal stump is closed with a tight pursestring suture with a recommended minimum distance of at least 1 cm from the distal end of the cancer. In any case a pneumorectum is created with a CO2 pressure of 10-14 mmHg and maximum flow to allow easy air evacuation and the best possible visualization at the same time. Dissection starts by marking the distal resection level with the diathermy hook. Then a circumferential full thickness incision of the rectal wall is achieved. The posterior plane is dissected first using monopolar cautery along the mesorectal fascia, which is kept intact. The anterior dissection is approached afterward, taking into special attention not to enter the vagina and to preserve the prostatic urethra. The lateral dissection comes last in order to minimize the risk of damaging neurovascular structures. Finally, the peritoneum is opened anteriorly, in order to maintain a pneumopelvis as long as possible.
Whenever bowel continuity is restored, a diversion ileostomy to minimize the risk of anastomotic leak and to protect against it, should be considered [11,12]. A low anastomosis after TaTME may be performed using different techniques. When an intersphincteric dissection is performed, a handsewn coloanal anastomosis should be preferred and it is sometimes mandatory. When there is enough distal rectum to perform a pursestring, a stapled anastomosis should be preferred [13]. The technique of reconstruction depends on the surgeon's preference and the patient's anatomy (end-to-end or side-to-end anastomosis, or colonic J pouch).

Discussion

As any new surgical technique, TaTME needs deep and rigorous evaluation to assess its safety. Since the introduction of TME major improvements in local recurrence and survival rates in rectal cancer have been achieved. Nevertheless, particular anatomical situations such as narrow pelvis, visceral obesity and bulky tumours are risk factors for poor anatomical specimens especially in cases of distal rectal cancers. Anteriorly the mesorectum is very thin and lays over the urethra, as well as important nerves run close to the prostate. Extreme surgical precision is required here.
The introduction of a new technique must occur in a safe and controlled manner to protect both the patient and the surgeon. Selecting easier cases at the earlier stages of the learning curve is recommended. The adoption of TaTME is object today of an exponential growth worldwide. The largest cohort to date includes recently published results from the International TaTME registry, suggesting an oncologically safe and effective technique with acceptable short-term clinical outcomes [14]. However, it is reported that surgeons did experience significant intra-operative equipment and technical difficulties, as high as in 40% of cases. These consist of incorrect plane dissection, pelvic bleeding, unstable pneumopelvis and visceral injuries such as urethral division or vaginal injury.

Guidance from surgeons experienced in TaTME may help new adopters of the

technique is recommended. This should avoid mistakes made in the past and should offer a chance for a quicker progress at an efficient pace. At the same time a more appropriate and specialised equipment becoming widely available will help improving the adoption of the technique in a safe way.
Several reports have shown benefits of a trans-anal approach even beyond cancer [15-19]. About 10% of the cases reported in the TaTME registry [14] are affected by benign conditions. The majority of benign procedures were proctectomies with ileal-pouch reconstruction, performed for inflammatory bowel disease. No matter the indication, a trans-anal approach facilitates proctectomy, especially in obese patients with a narrow pelvis. Also, it allows an exact transection of the rectum at the top of the anal canal, leaving no rectal mucosa behind. Moreover, it avoids multiple stapler firings and cross-stapling. Further benign indications include complex fistulae [20,21], anastomotic complications (stenosis, leaks or fistulae) [22-24], completion proctectomy [25-27], deep pelvic endometriosis [28], and reversal of Hartmann [29].
While clear results of large randomized controlled trials are awaited to verify eventual advantages of the technique, the relative ease of application will continue to contribute to a mass diffusion of the technique. Possible subgroups will be determined, in which TaTME might perform significantly better than standard TME and should therefore be preferred.
In the meanwhile, as TaTME represents an important addition to the contemporary treatment of rectal diseases, with the potential to improve the outcomes in rectal cancer surgery, we should overlook interim results and offer tutoring. In fact, the safe and successful introduction and development of TaTME requires adequate training. Participation in dedicated courses, performed both on phantoms as hands-on or on cadaveric courses, taking part in a mentoring and proctoring program, and performing initial TaTME cases under supervision are crucial steps in the safe learning and implementation of TaTME

References

1. Sylla P, Rattner DW, Delgado S, Lacy AM (2010) NOTES trans-anal rectal cancer resection using trans-anal endoscopic microsurgery and laparoscopic assistance. Surg Endosc 24(5):1205–1210

2. Lacy AM, Tasende MM, Delgado S, Fernandez-Hevia M, Jimenez M, De Lacy B, Castells A, Bravo R, Wexner SD, Heald RJ (2015) Trans-anal total mesorectal excision for rectal cancer: outcomes after 140 patients. J Am Coll Surg 221(2):415–423

3. Hompes R, Arnold S, Warusavitarne J (2014) Towards the safe introduction of trans-anal total mesorectal excision: the role of a clinical registry. Colorectal Dis 16:498–501

4. Deijen CL, Velthuis S, Tsai A, Mavroveli S, de Lange-de Klerk ES, Sietses C, Tuynman JB, Lacy AM, Hanna GB, Bonjer HJ (2016) COLOR III: a multicentre randomised clinical trial comparing trans-anal TME versus laparoscopic TME for mid and low rectal cancer. Surg Endosc 30(8):3210–3215

5. Evaluate Efficacy, Morbidity and Functional Outcome of Endoscopic Trans-anal Proctectomy vs Standard Transabdominal Laparoscopic Proctectomy for Rectal Cancer (ETAP). GRECCAR 11. ClinicalTrials.gov Identifier: NCT02584985. Online website: https://clinicaltrials.gov/ct2/show/NCT02584985. Accessed: 30th August 2017

6. Bretagnol F, Panis Y, Rullier E, Rouanet P, Berdah S, Dousset B, Portier G, Benoist S, Chipponi J, Vicaut E; French Research Group of Rectal Cancer Surgery (GRECCAR) (2010) Rectal cancer surgery with or without bowel preparation: the French GRECCAR III multicenter single-blinded randomized trial. Ann Surg 252(5):863–886

7. Holubar SD, Hedrick T, Gupta R, Kellum J, Hamilton M, Gan TJ et al.; Perioperative Quality Initiative (POQI) I Workgroup (2017) American Society for Enhanced Recovery (ASER) and Perioperative Quality Initiative (POQI) joint consensus statement on prevention of postoperative infection within an enhanced recovery pathway for elective colorectal surgery. Perioper Med (Lond) 6:4. https://doi-org.offcampus.dam.unito.it/10.1186/s13741-017-0059-2. [eCollection 2017]

8. Arroyave MC, DeLacy FB, Lacy AM (2017) Trans-anal total mesorectal excision (TaTME) for rectal cancer: Step by step description of the surgical technique for a two-teams approach. Eur J Surg Oncol 43(2):502–505

9. Kim MJ, Park JW, Ha HK, Jeon BG, Shin R, Ryoo SB, Choi SJ, Park BK, Park KJ, Jeong SY (2016) Initial experience of trans-anal total mesorectal excision with rigid or flexible trans-anal platforms in cadavers. Surg Endosc 30(4):1640–1647

10. Nicholson G, Knol J, Houben B, Cunningham C, Ashraf S, Hompes R (2015) Optimal dissection for trans-anal total mesorectal excision using modified CO2 insufflation and smoke extraction. Colorectal Dis 17(11):O265–O267

11. Mrak K, Uranitsch S, Pedross F, Heuberger A, Klingler A, Jagoditsch M, Weihs D, Eberl T, Tschmelitsch J (2016) Diverting ileostomy versus no diversion after low anterior resection for rectal cancer: a prospective, randomized, multicenter trial. Surgery 159(4):1129–1139

12. Shiomi A, Ito M, Maeda K, Kinugasa Y, Ota M, Yamaue H, Shiozawa M, Horie H, Kuriu Y, Saito N (2015) Effects of a diverting stoma on symptomatic anastomotic leakage after low anterior resection for rectal cancer: a propensity score matching analysis of 1,014 consecutive patients. J Am Coll Surg 220(2):186–194

13. Penna M, Knol JJ, Tuynman JB, Tekkis PP, Mortensen NJ, Hompes R (2016) Four anastomotic techniques following trans-anal total mesorectal excision (TaTME). Tech Coloproctol 20(3):185–191

14. Penna M, Hompes R, Arnold S, Wynn G, Austin R, Warusavitarne J, Moran B, Hanna GB, Mortensen NJ, Tekkis PP; TaTME Registry Collaborative (2017) Trans-anal total mesorectal excision: international registry results of the first 720 cases. Ann Surg 266(1):111–117

15. Hanke LI, Bartsch F, Försch S, Heid F, Lang H, Kneist W (2017) Trans-anal total mesorectal excision for restorative coloproctectomy in an obese high-risk patient with colitis-associated carcinoma. Minim Invasive Ther Allied Technol 26(3):188–191

16. Coffrey JC, Dillon MF, O'Driscoll JS, Faul E (2016) Trans-anal total mesocolic excision (taTME) as part of ileoanal pouch formation in ulcerative colitis—first report of a case. Int J Colorectal Dis 31:735–736

17. De Buck can Overstraeten A, Wolthuis AM, D'Hoore A (2016) Trans-anal completion proctectomy after total colectomy and ileal pouch-anal anastomosis for ulcerative colitis: a modified single stapled technique. Colorectal Dis 18:O141–O144

18. Leo CA, Samaranayake S, Perry-Woodford ZL, Vitone L, Faiz O, Hodgkinson JD, Shaikh I, Warusavitarne J (2016) Initial experience of restorative proctocolectomy for ulcerative colitis by

trans-anal total mesorectal rectal excision and single-incision abdominal laparoscopic surgery. Colorectal Dis 18(12):1162–1166

19. Tasende MM, Delgado S, Jimenez M, Del Gobbo GD, Fernandez-Hevia M, DeLacy B, Balust J, Lacy AM (2015) Minimal invasive surgery: NOSE and NOTES in ulcerative colitis. Surg Endosc 29(11):3313–3318

20. Chen W, Chen X, Lin G, Qui H (2016) Successful repair of recurrect rectovaginal fistula by stratified suture using trans-anal endoscopic microsurgery: A CARE-compliant case report. Medicine 95(36):e4600

21. Nicita G, Villari D, Caroassai Grisanti S, Marzocco M, Li Marzi V, Martini A (2017) Minimally invasive trans-anal repair of rectourethral fistulas. Eur Urol 71(1):133–138

22. Bortslap WA, Harran N, Tanis PJ, Bemelman WA (2016) Feasibility of the TAMIS technique for redo pelvic surgery. Surg Endosc 30(12):5364–5371

23. Dapri G, Guta D, Grozdev K, Antolino L, Bachir N, Jottard K, Cadière GB (2016) Colorectal anastomotic leakage corrected by trans-anal laparoscopic. Colorectal Dis 18(6):O210–O213

24. Van Vledder MG, Doornebosch PG, de Graaf EJ (2016) Trans-anal endoscopic surgery for complications of prior rectal surgery. Surg Endosc 30(12):5356–5363

25. De Nes LC, Montorsi M, Spinelli A (2016) Double single-port procedure for trans-anal intersphincteric proctectomy and abdominal ileorectal anastomosis—a video vignette. Colorectal Dis 18(2):217–218

26. Liyanage C, Ramwell A, Harris GJ, Levy BF, Simson JN (2013) Trans-anal endoscopic microsurgery: a new technique for completion proctectomy. Colorectal Dis 15:e542–e547

27. Bremers AJ, van Laarhoven KJ, van der Kolk BM, de Wilt JH, van Goor H (2013) Trans-anal endoscopic microsurgery approach for rectal stump resection as an alternative to transperitoneal stump resection. Br J Surg 100(4):568–567

28. Vlek SL, Lier MC, Koedam TW, Melgers I, Dekker JJ, Bonjer JH, Mijatovic V, Tuynman JB (2017) Trans-anal minimally invasive rectal resection for deep endometriosis; a promising technique. Colorectal Dis 19(6):576–581

29. Bravo R, Fernández-Hevia M, Jiménez-Toscano M, Flores LF, de Lacy B, Quaresima S, Lacy AM (2016) Trans-anal Hartmann reversal: a new technique. Surg Endosc 30(6):2628–2631