ISSN 1392–0995, ISSN 1648–9942 (online)
DOI: http://dx.doi.org/10.15388/LietChirur.2015.4.9202
http://www.chirurgija.lt
LIETUVOS CHIRURGIJA
*Lithuanian Surgery*
2016, 15 (1), p. 14–19

**Originalūs mokslo tiriamieji darbai**

# Transanal total mesorectal excition (taTME): our first experience

## Transanalinė totalinė mezorektalinė ekscizija (taTME): pirmoji mūsų patirtis

Saulius Mikalauskas[1], Marius Kryžauskas[1], Dignė Jurkevičiūtė[2], Vytautė Pečiulytė[2], Donatas Danys[1], Tomas Poškus[1], Valdemaras Jotautas[1], Eligijus Poškus[1], Virgilijus Beiša[1], Kęstutis Strupas[1]

[1] *Vilnius University, Center of Abdominal Surgery, Santariškių Str. 2, LT-08661 Vilnius, Lithuania*
[2] *Vilnius University, Faculty of Medicine, M. K. Čiurlionio Str. 21, LT-03101 Vilnius, Lithuania*
*E-mail: saulius.mikalauskas@santa.lt*

[1] *Vilniaus universitetas, Pilvo chirurgijos centras, Santariškių g. 2, LT-08661 Vilnius*
[2] *Vilniaus universitetas, Medicinos fakultetas, M. K. Čiurlionio g. 21, LT-03101 Vilnius*
*El. paštas: saulius.mikalauskas@santa.lt*

Transanal total mesorectal excision (taTME) is a new natural orifice translumenal endoscopic surgery modality combined of three rectal surgery techniques. Detailed analysis of the taTME is the object of this article. We submit the report of three taTME procedures for histologically confirmed rectal adenocarcinoma that were performed for the first time in Lithuania, Vilnius University Hospital Santariskiu Klinikos.

**Key words:** taTME, rectal surgery, minimally invasive surgery

Transanalinė totalinė mezorektalinė ekscizija (taTME) yra naujas endoskopinis natūralių angų chirurgijos būdas, susidedantis iš trijų tiesiosios žarnos chirurginių metodų. Šiame straipsnyje detaliai aprašoma taTME chirurginė technika bei pristatomos pirmosios trys taTME procedūros, kurios buvo atliktos Vilniaus universiteto ligoninėje Santariškių klinikose.

**Reikšminiai žodžiai:** taTME, tiesiosios žarnos chirurgija, minimaliai invazinė chirurgija

### Introduction

Laparoscopic assisted transanal total mesorectal excision (taTME) procedures are evolving as a part of minimally invasive surgery, which was firstly performed by Sylla, Rattner, Delgado, and Lacy in 2009 and published in 2010 [1]. TaTME is a new natural orifice translumenal endoscopic surgery modality combined of three rectal surgery techniques – total mesorectal excision (TME), trans-anal trans-abdominal (TATA), and trans-anal endoscopic microsurgery (TEM) [2, 3]. The rectum is dissected transanally using the TME principles and it is called "down-to-up" TME [4]. The procedure potentially solves some difficulties in the pelvic part of the dissection, such as male pelvic outlet, high body mass index (BMI) or a short distance of locally advanced tumour from the anal verge and provides safer exposure

and better visual control for TME [5, 6]. This surgical technique presents wide resection margins, good quality of specimen after TME and may find special application in patients with anatomic constraints that could make laparoscopic TME highly challenging [7, 8].

We report the first three transanal total mesorectal excision procedures for histologically confirmed rectal adenocarcinoma, which were performed in Lithuania, Vilnius University Hospital Santariskiu Klinikos.

## Patients

Patients after colonoscopy with biopsy-proven rectal adenocarcinoma were selected for taTME procedure. The detailed information of the three our patients is described in table 1. All patients had a complete examination of disease outspread before operations. Thorough colonoscopy, pelvic magnetic resonance imaging (MRI), and thoracoabdominal computed tomography scan were performed. After that, multidisciplinary team decision was accepted. According to the preoperative MRI staging, neoadjuvant therapy was not indicated and neither of patients was treated. The taTME procedure was suggested and the patients gave informed consents for this surgical approach.

## Surgical technique

Under the general anaesthesia the patient is placed in the lithotomy position. TaTME is performed concomitantly by two teams. The abdominal and perineal operative fields are prepared for transabdominal and transanal access.

Firstly, a small longitudinal incision is made above the umbilicus and the pneumoperitoneum of 12 mmHg is established using a Veress needle. 10-mm trocar is inserted and the abdominal cavity is explored to evaluate if the disease is not outspread and the case is suitable for laparoscopic assisted taTME procedure. After confirmation, one 12-mm trocar is inserted in the right iliac fossa

**Table 1.** Detailed information of the three patients

| | # 1 | # 2 | # 3 |
|---|---|---|---|
| Gender | female | male | male |
| Age (years) | 66 | 41 | 83 |
| BMI (kg/m$^2$) | 29.94 | 24.93 | 27.92 |
| ASA | 2 | 1 | 3 |
| Comorbidity | BA | No | HBP, CAF, COPD, BPH |
| Location of tumor | 9 cm from AV | 10 cm from AV | 4 cm from AV |
| Diameter of tumor (cm) | 2 × 2 × 1 | 1 × 1 × 1 | 5 × 3 × 2 |
| TNM stage based on MRI | T2N0M0 | T2N0M0 | T2N0M0 |
| Neoadjuvant therapy | No | No | No |
| OT (min) | 285 | 210 | 340 |
| Blood loss (ml) | 10 | 0 | 400 |
| Mobilization of splenic flexure | No | No | No |
| Ileostomy | Yes | Yes | Yes |
| Length of specimen (cm) | 11.5 | 15 | 21 |
| Harvested LN | 10 | 12 | 18 |
| pTNM stage | pT2N0M0 | pT1N0M0 | pT3N0M0 |
| CRM (cm) | 3 | 1.8 | 2 |
| Recover to flatus (days) | 2 | 3 | 6 |
| LOS (days) | 8 | 8 | 18 |

Abbreviations: BMI – body mass index, ASA – American Society of Anesthesiologists, BA – bronchial asthma, HBP – high blood pressure, CAF – chronic atrial fibrillation, COPD – chronic obstructive pulmonary disease, BPH – benign prostatic hyperplasia, AV – anal verge, MRI – magnetic resonance imaging, OT – operative time, LN – lymph nodes, CRM – circumferential margin, LOS – length of hospital stay

region and two other 10-mm trocars – in the right and left paraumbilical regions.

The descending and sigmoid colon are mobilized from the lateral side while the left ureter is identified. In some patients, full mobilization of splenic flexure may be necessary. The high ligation of the inferior mesenteric vein and artery is performed intracorporally.

At the same time, the anus is dilated and the flexible transanal port is inserted by the perineal team. SILS port™ (Covidien, Medtronic, Dublin, Ireland) with 12-mm port for camera and two 5-mm working ports were used for the first two cases and TriPort® (Olympus, Europe Holding GmbH, Hamburg, Germany) was used for the third case. The pneumo-rectum (10–15 mmHg) is established and a purse-string PDS 3/0 suture is placed below the tumour under direct vision and tied securely

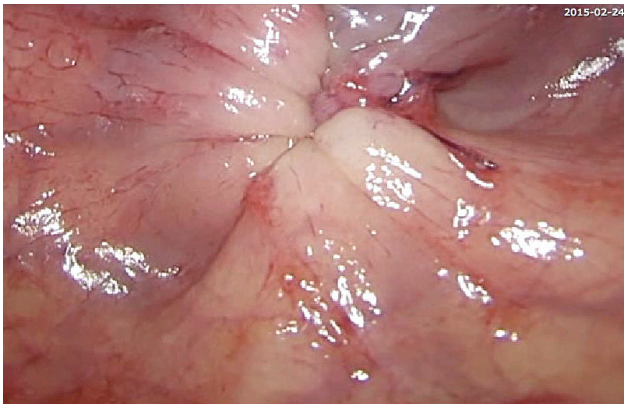


**Figure 1.** A purse-string suture distally to tumor and securely tied

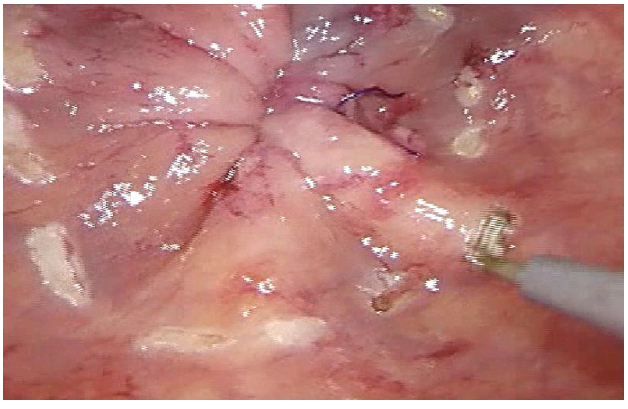

**Figure 2.** A circularly incision of distal mucosa

**Figure 3.** Dissection of mesorectum

**Figure 4.** Extraperitonized bowel through the anus

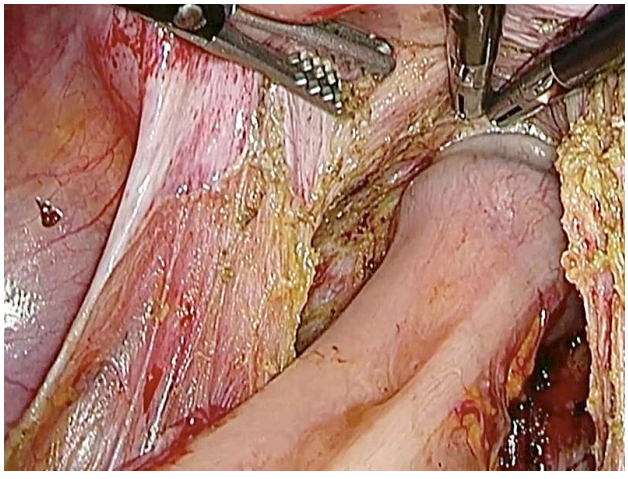

**Figure 5.** End-to-end anastomosis formed laparoscopically

(Figure 1). Then, the distal mucosa is initially marked circularly using diathermy hook (Figure 2). After that, the dissection is performed using ultrasonic scalpel (Ultracision ACE$^{TM}$, Ethicon Endo-Surgery, Cincinnati, OH, USA) starting inferiorly to superiorly (Figure 3). Posterior dissection is performed in front of the presacral fascia to preserve the mesorectal envelope. Anterior dissection is started when entering the rectovaginal septum for females and rectoprostatic plane for males. Lateral dissection connects the anterior and posterior planes bilaterally until the peritoneum is completely opened.

After that, transanal device is removed. The transversal 5 cm minilaparotomy above the pubic symphysis is performed and the rectum with sigmoid colon is extraperitonised (case no. 1 and case no. 3). In one case, we extraperitonised the proximal part of the colon through the anus (case no. 2) (Figure 4). Bowel resection is performed extracorporeally and the anvil of the stapler is inserted into the proximal colon. The purse-string suture is placed on the anvil for end-to-end stapler anastomosis and the bowel is reinserted into the abdominal cavity. The transanal port is reinserted and pneumoperitoneum is restored. A purse-string suture is placed in the distal rectum stump through the transanal device and tied fully closing it. The shaft of a 31-mm AutoSuture CEEA® circular stapler (Covidien, Medtronic, Dublin, Ireland) is inserted through the anus and the end-to-end stapler anastomosis is formed under laparoscopical visualisation (Figure 5). An intraoperative anastomotic water-air testing is performed and the drain is left intraabdominally. The preventative ileostomy is formed in the right paraumbilical port place.

## Results

The laparoscopic assisted taTME operations were performed successfully (the operative technique is described above). A temporary diverting loop ileostomy was performed for all patients. There were no intra-operative or postoperative complications recorded for the first two patients. The third patient had no intraoperative complications, but early postoperative period was eventful. Two days after the operation, the symptoms of intestinal obstruction appeared and the blood test revealed inflammatory activity, therefore, the conservative treatment was indicated. Moreover, the urine retention due to benign prostate hyperplasia was observed and the percutaneous suprapubic cystostomy was performed. No further interventions were needed. The conservative treatment was successful and the patient was discharged on day 18 after the taTME procedure. The adjuvant therapy was not indicated for all patients. Recto-sigmoidoscopies and preventative ileostomies reversals were performed after 3 months. There was no evidence of local recurrences detected.

## Discussion

TME is the "gold standard" of surgical treatment for rectal cancer, firstly reported by Heald and Ryall [9]. Nevertheless, operating middle and lower third rectal tumours in open and laparoscopic TME, the positive circumferential resection margin (+CRM) remains high and is presented 10% in both groups in the COLLOR II trial [10]. 2 mm or less involvement of CRM is related with local recurrence risk of 16% compared with 5.8% in patients without involvement of CRM ($p < 0.0001$) [11]. The similar results are presented by Quirke et al. with local recurrence risk of 6% of negative CRM vs. 17% of positive CRM [12]. Moreover, macroscopically incomplete specimen resections are similar and accounts for 3% in open or laparoscopic rectal surgery [10].

Knowing these relevant problems, a new technique was necessary to overcome such difficulties. TaTME is a novel minimally invasive surgery technique for middle and lower rectal cancers. The procedure, described above, is challenging which requires pelvic anatomy knowledge, surgical practice in open and laparoscopic TME, and transanal endoscopic surgery skills [13]. The factors that suggest taTME as a preferable approach are: a) male gender, b) middle and lower rectal cancer, c) narrow and/or deep pelvis, d) high BMI, e) benign prostatic hyperplasia, f) tumour diameter >4 cm, g) deformed tissues due to neoadjuvant radiotherapy, h) low tumour requiring careful placement of the distal resection margin (DRM) [14].

Recently, Simmilis et al. presented a systematic review of 510 taTME cases and calculated 5% CRM involvement and 0.3% DRM positivity [15]. Moreover, there are other large studies after this systematic review with similar results. Helbach et al. introduced 80 patients with 2.5% CRM involvement and 0% DRM involve-

ment after taTME [16]. Lacy et al. published the largest prospective study with 140 patients who underwent taTME. The 9 patients (6.4%) had involved CRM, which were diagnosed preoperatively correctly with MRI and had a complete mesorectal specimen after the operation [17]. Burke et al. showed a 4% CRM positivity and 2% DRM positivity of 50 patients' study [18]. We think these results are promising.

Moreover, taTME was developed to overcome technical difficulties associated with open and laparoscopic TME [2]. The most common technical problems, as mentioned above, are a large tumour, located in the lower third rectum, obesity or narrow pelvis. During taTME, it is better to visualize the presacral and perirectal planes as an unobstructed view [5, 6]. Simillis et al. reported two full studies comparing taTME vs. laparoscopic TME [15]. Complete mesorectum (96% vs. 72%, $p < 0.05$), surgical time (215 ± 60 minutes vs. 252 ± 50 minutes, $p < 0.01$), coloanal anastomosis rate (43% vs. 16%, $p = 0.01$), 30-day postoperative complication rate (32% vs. 51%, $p = 0.16$), early readmissions (6% vs. 22%, $p = 0.03$) were better in taTME comparing to traditional laparoscopic TME [19, 20]. The first results demonstrate comparable short-term results for taTME and traditional laparoscopic TME. To improve promising results, the ongoing COLLOR III randomized trial compares taTME and laparoscopic TME for mid and low rectal carcinomas [21].

Our experience is three patients with successful taTME procedures and postoperative treatment. However, patients' number for further significant conclusions is too small. Successful experience and promising results encourages us to continue the started work in taTME surgery.

## Conclusions

TaTME is a feasible approach with promising results, especially for obese, male patients with middle and lower third rectal carcinomas.

**REFERENCES**

1. Sylla P, Rattner DW, Delgado S, Lacy AM. NOTES transanal rectal cancer resection using transanal endoscopic microsurgery and laparoscopic assistance. Surg Endosc. 2010; 24(5): 1205–10.

2. Araujo SE, Crawshaw B, Mendes CR, Delaney CP, Transanal total mesorectal excision: a systematic review of the experimental and clinical evidence. Tech Coloproctol. 2015; 19(2): 69–82.

3. Motson RW, Whiteford MH, Hompes R, Albert M, Miles WF; Expert Group. Current status of trans-anal total mesorectal excision (TaTME) following the Second International Consensus Conference. Colorectal Dis. 2016; 18(1): 13–8.

4. Zorron R, Phillips HN, Wynn G, Neto MPG, Coelho D, Vassallo RC. "Down-to-Up" transanal NOTES Total mesorectal excision for rectal cancer: Preliminary series of 9 patients. J Minim Access Surg. 2014; 10(3): 144–50.

5. Rasulov AO, Mamedli ZZ, Gordeyev SS, Kozlov NA, Dzhumabaev HE, Short-term outcomes after transanal and laparoscopic total mesorectal excision for rectal cancer. Tech Coloproctol. 2016 Jan 21. [Epub ahead of print]

6. Atallah S, Albert M, DeBeche-Adams T, Nassif G, Polavarapu H, Larach S. Transanal minimally invasive surgery for total mesorectal excision (TAMIS-TME): a stepwise description of the surgical technique with video demonstration. Tech Coloproctol. 2013; 17(3): 321–5.

7. de'Angelis N, Portigliotti L, Azoulay D, Brunetti F. Transanal total mesorectal excision for rectal cancer: a single center experience and systematic review of the literature. Langenbecks Arch Surg. 2015; 400(8): 945–59.

8. Muratore A, Mellano A, Marsanic P, De Simone M. Transanal total mesorectal excision (taTME) for cancer located in the lower rectum: short- and mid-term results. Eur J Surg Oncol. 2015; 41(4): 478–83.

9. Heald RJ, Ryall RD (1986) Recurrence and survival after total mesorectal excision for rectal cancer. Lancet 1: 1479–82

10. van der Pas MH, Haglind E, Cuesta MA, Fürst A, Lacy AM, Hop WC, Bonjer HJ; Colorectal Cancer Laparoscopic or Open Resection II (COLOR II) Study Group. Laparoscopic versus open surgery for rectal cancer (COLOR II): short-term outcomes of a randomised, phase 3 trial. Lancet Oncol. 2013; 14(3): 210–8.

11. Nagtegaal D, Marijnen CA, Kranenbarg EK, van de Velde CJ, van Krieken JH. Circumferential margin involvement is still an important predictor of local recurrence in rectal carcinoma: not one millimeter but two millimeters is the limit. Am J Surg Pathol. 2002; 26(3): 350–7.

12. Quirke P, Steele R, Monson J, Grieve R, Khanna S, Couture J, O'Callaghan C, Myint AS, Bessell E, Thompson LC, Parmar M, Stephens RJ, Sebag-Montefiore D; MRC CR07/NCIC-CTG CO16 Trial Investigators; NCRI Colorectal Cancer Study Group. Effect of the plane of surgery achieved on local

recurrence in patients with operable rectal cancer: a prospective study using data from the MRC CR07 and NCIC-CTG CO16 randomised clinical trial. Lancet. 2009; 373(9666): 821–8.

13. McLemore EC, Harnsberger CR, Broderick RC, Leland H, Sylla P, Coker AM, Fuchs HF, Jacobsen GR, Sandler B, Attaluri V, Tsay AT, Wexner SD, Talamini MA, Horgan S. Transanal total mesorectal excision (taTME) for rectal cancer: a training pathway. Surg Endosc. 2015 Dec 10. [Epub ahead of print]

14. Motson RW, Whiteford MH, Hompes R, Albert M, Miles WF; Expert Group. Current status of transanal total mesorectal excision (TaTME) following the Second International Consensus Conference. Colorectal Dis. 2016; 18(1): 13–8.

15. Simillis C, Hompes R, Penna M, Rasheed S, Tekkis PP. A systematic review of transanal total mesorectal excision: is this the future of rectal cancer surgery? Colorectal Dis. 2016; 18(1): 19–36.

16. Veltcamp Helbach M, Deijen CL, Velthuis S, Bonjer HJ, Tuynman JB, Sietses C. Transanal total mesorectal excision for rectal carcinoma: short-term outcomes and experience after 80 cases. Surg Endosc. 2016; 30(2): 464–70.

17. Lacy AM, Tasende MM, Delgado S, Fernandez-Hevia M, Jimenez M, De Lacy B, Castells A, Bravo R, Wexner SD, Heald RJ. Transanal total mesorectal excision for rectal cancer: outcomes after 140 patients. J Am Coll Surg. 2015; 221(2): 415–23.

18. Burke JP, Martin-Perez B, Khan A, Nassif G, deBeche-Adams T, Larach SW, Albert MR, Atallah S. Transanal total mesorectal excision for rectal cancer: early outcomes in 50 consecutive patients. Colorectal Dis. 2016 Jan 8. [Epub ahead of print]

19. Velthuis S, Nieuwenhuis DH, Ruijter TE, Cuesta MA, Bonjer HJ, Sietses C. Transanal versus traditional laparoscopic total mesorectal excision for rectal carcinoma. Surg Endosc. 2014; 28(12): 3494–9.

20. Fernández-Hevia M, Delgado S, Castells A, Tasende M, Momblan D, Díaz del Gobbo G, DeLacy B, Balust J, Lacy AM. Transanal total mesorectal excision in rectal cancer: short-term outcomes in comparison with laparoscopic surgery. Ann Surg. 2015; 261(2): 221–7.

21. Deijen CL, Velthuis S, Tsai A, Mavroveli S, de Lange-de Klerk ES, Sietses C, Tuynman JB, Lacy AM, Hanna GB, Bonjer HJ. COLOR III: a multicentre randomised clinical trial comparing transanal TME versus laparoscopic TME for mid and low rectal cancer. Surg Endosc. 2015 Nov 4. [Epub ahead of print].