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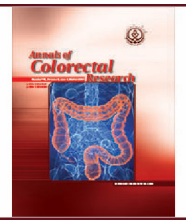

Comparison of Transanal Versus Laparoscopic Total Mesorectal Excision in Low Rectal Cancer

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Abstract

Background: Transanal Total Mesorectal Excision (TaTME) presented in recent years as a novel technique to achieve better outcome in circumferential margin (CRM) and distal margin (DRM) in lower rectal cancer operation. The current study aimed to assess the perioperative and pathological characteristics of TaTME in comparison with laparoscopic total mesorectal excision (LaTME) in patients with mid- and low-rectal cancer.
Methods: From January 2016 to December 2018, we enrolled all consecutive patients with rectal cancer, who underwent TaTME and LaTME. Primary endpoints like circumferential rectal margin (CRM) status, distal rectal margin (DRM) status, and pathological outcomes, as well as secondary endpoints including perioperative outcomes (total blood loss, duration of hospitalization, anastomosis leakage, as well as 30-day mortality) were evaluated and compared statistically (α=0.05).
Results: 11 patients with distal rectal adenocarcinoma which was biopsy-proven, underwent TaTME, and 19 patients operated on using LaTME. Both groups were similar in the baseline characteristics. Also, the perioperative outcomes were similar in both groups. Regarding pathological outcomes, no patients with CRM<1mm were found in the LaTME group compared to 1 patient in TaTME group. Involvement of DRM was observed in only one patient in both groups.
Conclusion: TaTME is a reasonable procedure in patients with low rectal cancer. But no remarkable superiority was observed in this method compared to laparoscopy with respect to the pathological outcomes.

Keywords: Cancer, Rectum, Laparoscopy, Colorectal surgery

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Introduction

Technique of surgery in rectal cancer play an important role in treatment outcomes, up to now the best surgical method to obtain successful oncologic result remain controversial (1). In recent years by developing new techniques of surgery, local recurrence rate, prognosis and rectal cancer's survival improved (2).

Rectal cancer is operated by laparoscopy, open

and local resection techniques (3). Laparoscopic surgery has reached a similar efficacy compared to open operation(4), and achieved maximum level of efficacy in mid and distal part of the rectum operation with less wound infection, reduced time to return to normal diet, less pain, and reduced hospitalization (5). However, there was some technical difficulty in laparoscopic total mesorectal excision (LaTME) method particularly in lower rectal cancer, which was associated with more comorbidities (6).

To overcome the insufficiency of laparoscopic surgery particularly in obese patients, transanal total mesorectal excision (TaTME), was introduced and has become an important issue in rectal cancer surgery studies (3). In 1982 Heald et al. suggested the total mesorectal excision (TME) (7), which was initially an open procedure. Advance medical technology has resulted in open surgery to be gradually replaced by minimal invasive techniques. For mid and lower rectal cancer, the first TaTME with laparoscopy was reported in 2010 (8). In TaTME method, dissection of the rectum conducted from the lower edge of the tumor by direct vision with lower risk of perforation and conversion rate (9). This approach seems more feasible in a contracted pelvis, obese patients and male patients with prostatic hyperplasia (10), accompanied by safe and complete removal of the tumor while the nerve tissue preservation around the rectum (11). Also, this method permitting the surgeon to perform deep pelvic dissection that might result in better oncological outcome (12). The current study attempted to compare the perioperative and pathologic characteristics of TaTME in comparison with LaTME in patients with cancer of mid- and low-rectal.

Material and Methods

All 30 patients (January 2016-December 2018) with distal rectal adenocarcinoma, who underwent surgery in 2 tertiary referral hospitals (Shahid Faghihi and Madar-and-Koodak), affiliated by Shiraz University of Medical Sciences, were enrolled. The inclusion criteria were patients with rectal adenocarcinoma within 10 cm from anal verge and a preoperative clinical staging of I-III (T0-3, N0-1, M0). All patients with metastatic cancer (cT4 or Type II-III according to Rullier's classification) (13), history of previous rectal surgery, patients admitted for abdominoperineal resection and end colostomy, as well as patients with complete remission after neoadjuvant therapy were excluded. The method of neoadjuvant therapy was the same in two groups. Perioperatively, all patients were treated based on the Enhanced Recovery after Surgery (ERAS) protocol (14). The data gathering form included age, gender, and body mass index (BMI).

Operative Technique

Transabdominal and transanal operation was performed simultaneously using two team approach. All surgeons in this study were experienced and expertise in laparoscopy and colorectal surgery procedure.

In LaTME for managing low rectal cancer, mesorectum is released laparoscopically and distal part of rectum down to the anal canal dissected and divided by stapler. Then, colo-anal anastomosis is performed by circular stapler. In TaTME, the dissection of distal part of rectum is done through direct vision (15). It is worthy to say that performing frozen analysis of the distal resection margin was not a routine procedure. The specimen is extracted trans-anally. Reconstruction included either a j-pouch or latero-terminal hand-sewn colo-anal anastomosis; then, an anastomosis of straight colo-anal is implemented. Performing a loop-ileostomy is also a routine procedure.

Pathologic Evaluation

Staging of rectal cancers were performed according to (TNM) classification (16). Circumferential rectal margin (CRM) and distal rectal margin (DRM) involvement were identified as a distance of less than one mm between the deepest cancer invasion sites to the inked surface of the specimen. This included invasion of direct cancer and a metastatic lymph node of the mesorectum. Complete mesorectal excision is described as no defect in mesorectal fascia. The same experienced pathologist evaluated all specimens.

Statistical Analysis

All analyses were performed by SPSS (version 16.0) for Windows, through independent *t* test for the means, and Chi-square and Fisher's exact tests for proportions. For continuous variables, results were presented as mean±standard deviation (SD) and for categorical ones, they were summarized in number (percentage). Two-sided P-value <0.05 with 95% confidence interval (CI) considered as statistically significant.

Ethical Consideration

The current study was approved by the vice-chancellor of research and technology, as well as the local ethics committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1396.S246). To consider ethical issue, the gathered data were secured. Also, every patient signed a written informed consent.

Results

Totally, 30 patients with lower rectal cancer were investigated, 19 (63%) of them treated with LaTME and 11(36%) with TaTME procedure. There was no difference in terms of age, gender, clinical staging, and BMI, between the two groups (Table 1). Tumor distance from anal verge was lower in the TaTME group in comparison to LaTME (5.0±2.19 vs. 7.37±2.24), P=0.171.

Table 1: Demographic characteristics

Variables	TaTME n=11	LaTME n=19	P-value
Gender, n (%)			0.470
Male	9 (30.0)	13 (43)	
Female	2 (6.7)	6 (20.0)	
Age (Years), mean±SD	47.69±15.64	54.95±16.30	0.268
BMI (Kg/m2), mean±SD	23.10±3.41	22.92±3.93	0.832
Tumor distance from anal verge (Cm), mean±SD	5.0±2.19	7.37±2.24	0.171
Neoadjuvant therapy (Yes), n (%)	14 (46.7)	11 (36.7)	0.082

BMI, body mass index; LaTME, laparoscopic total mesorectal excision; SD, standard deviation; TaTME, transanal total mesorectal excision

Table 2: Patients' perioperative characteristics

Variables	TaTME n=11	LaTME n=19	P-value
Blood loss (mL), n (%)			0.687
≤300	7 (63.0)	14 (73.0)	
>300	4 (36.0)	5 (26.0)	
Surgery duration (minutes), mean±SD	202±21	234±13	<0.0001*
Postoperative hospital stay (day), mean±SD	5.18±1.32	4.63±1.67	0.185
Conversion, n (%)	0 (0)	1 (5.0)	
Complication: Anastomotic leakage, n (%)	0 (0)	1 (5.0)	0.633
Mortality (postoperative 30 days), n (%)	0 (0)	0 (0)	-

* Statistically significant; LaTME, laparoscopic total mesorectal excision; SD, standard deviation; TaTME, transanal total mesorectal excision

Table 3: Patients' pathologic characteristics

Variables	TaTME n=11	LaTME n=19	P-value
Involved distal resected margin, n (%)	1 (9.0)	1 (5.0)	0.999
Involved circumferential resected margin, n (%)	1 (9.0)	0 (0)	0.733
Harvested lymph node, mean±SD	9±6.46	5.45±9.48	0.077
Clinical staging, n (%)			0.748
T1 N0 M0	3 (27.7)	7 (36.8)	
T2 N0 M0	2 (18.1)	4 (21.05)	
T3 N0 M0	1 (9.0)	3 (15.7)	
T1-3 N1-2 M0	5 (45.4)	5 (26.3)	

LaTME, laparoscopic total mesorectal excision; SD, standard deviation; TaTME, transanal total mesorectal excision

TaTME was performed by two expert colorectal surgeon groups simultaneously, resulting in shorter operation time compared to LaTME ((202±21 vs. 234±13, P <0.0001). There was no significant difference in amount of blood loss (P=0.687), as well as postoperative hospital stay (P=0.185) in both groups. The rate of conversion was one patient (5.0%) in the LaTME group due to severe adhesion bands, which was related to previous operation, leading to poor vision and difficult dissection. Only 1 patient (5.0%) in LaTME group develop leakage of anastomosis that was resolved by total parenteral nutrition. Perioperative mortality rate was negative in the two groups (Table 2).

As shown in table 3, DRM involvement was observed in only one patient (9.0%) in TaTME and one patient (5.0%) in group of LaTME (P=0.999). One patient (9.0%) in TaTME group had CRM involvement (P=0.733). Both groups were similar in postoperative pathological tumor staging (P=0.748).

Discussion

The current study attempted to compare the perioperative and pathologic results of TaTME in comparison with LaTME in patients with low rectal cancer. We assessed margin of mesorectal excision, the number of lymph node harvest, as well as DRM and CRM involvement. It was found that these two methods were not different regarding to pathological outcomes. But time of surgery and complications (e.g. leakage of anastomosis) as well as conversion rate was lower in TaTME group

One of the most important obstacle of laparoscopic technique is the quality of mesorectal excision particularly in tumors of lower part of rectum (4). Current large RTCs (ACOSOG Z6051 and the COLOR II trial) revealed that laparoscopic

approaches in comparing with an open approach failed to demonstrate the criteria of non-inferiority for laparoscopic surgery (17, 18).

The CRM and DRM involvement rates is attributed to local recurrence and disease-free survival rate. These margins might be compromised in difficult rectal tumors due to poor vision (19). Funahashi et al. (2008) suggested a down-to-up rather than an up-to-down approach in patients with rectal cancer with a narrow pelvic cavity or a large bulky features (20). The dissection from the lower edge of the tumor is very close to the anus and make a new surgical field of view that conventional laparoscopic surgery cannot achieved previously. CRM effects postoperative outcomes and determines the patient's need for postoperative adjuvant therapy (21).

Sohn DK et al. showed advantages of the transanal approach including simple handling of laparoscopic instruments, avoidance of the movements restriction caused by pelvic bone, as well as better surgical view, which might lead to all tumors removal even in patients with a threatened mesorectal fascia. Also, with this method, it is possible to find the proper dissection plane in patients with obesity or bulky tumors (22). A meta-analysis showed that TaTME could reduce positive CRM rate, also it be able to improve the long-term survival in patients with mid- and low-rectal cancer (23). In another study conducted by Jiang et al (2018), more benefits of TaTME on pathological outcomes remained undetected (24). Also, another meta-analysis (2019) revealed comparable outcomes in excision of mesorectum, oncological and pathological outcomes, and the short term surgical complication, without superiority of none of these two methods (25). In the present study, all patients in the LaTME group had free CRM, but there was 1 patient (9.0%) with involved CRM in the TaTME group. Veltcamp et al. after multivariate analysis, stated only method of surgery is an important risk factor for residual tumor, whereas factors such as BMI, sex and tumor height are not significant. Besides, they detected residual mesorectum more frequently after laparoscopic approach in comparison to transanal on postoperative magnetic resonance imaging (MRI) (26). But this study do not reveal superiority of the TaTME method in pathological outcomes even with no significant difference in these factors.

DRM could be determined by surgeon during the operation in TaTME method but in tumors located in near proximity to the anal verge, it might be extremely difficult to obtained an adequate distal margin. Beside, TaTME might pushes the surgeon to achieve wider margins, better specimen quality, and more harvested lymph node leading to various complications such as nerve injuries or injury to surrounding organs (27). Chang et al. stated that there was no difference in DRM involvement in TaTME compared to LaTME (28). The results of the current study also showed that both groups were similar in positive DRM. Also, the average number of harvested lymph node were similar in both groups. It revealed that despite poor vision in laparoscopic method, the quality of specimen could be equal in both method in experienced and equipped condition.

In our study by comparing the postoperative complication, there was only one case of anastomosis leakage in LaTME group. Distal anastomosis in TaTME group is performed without stapler devices. As a result no complications related to multifiring of the stapler, with potential financial benefits was achieved (29). Beside, TaTME can be performed easily in patients without the need for dissection from abdominal cavity and prevent complications such as bowel perforation (30).

Time of surgery has effect on the post-operative short-term outcomes, and by reducing operation time, surgeons would overcome the technical problems (31). In this study, in TaTME method trans-abdominal and trans-anal approach was performed by two teams simultaneously with a shorter duration of surgery, despite time consuming hand sewn anastomosis conduction. It is notable that this approach requires more staff and equipment which might be a limiting factor in some centers. Moreover, none of the TaTME procedures led to open surgery, and 1 patient in the LaTME group underwent conversion due to adhesion bands in abdominopelvic cavity as a result of previous operation. Conversion rate in our study was not different to other studies. (11, 22, 32). In our study, the postoperative length of stay was not different in both groups. The outcomes determining factors of minimally invasive surgery are the experience of a surgeon, location and stage of tumor as well as the patients' general condition. And one of the important benefits of them is shorter hospitalization time.

One limitation of this study was small number of patients. Also, we did not investigate long-term quality of life in our participants. Patients in the LaTME group were operated on by one surgeon, whereas those in the TaTME group underwent operation by two surgical teams with various experience, which might influenced the results.

Conclusion

In this study, we revealed that TaTME as a novel method in low rectal cancer surgery is not superior to LaTME method regarding overall perioperative and pathologic characteristics. Further study in the future for bulky tumor and difficult pelvic condition might revealed more benefit of the TaTME approach.

Conflicts of interests: None declared.

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