

## Research Article

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### TaTME A Single Institution Experience: Short Term Outcomes

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#### Abstract

**Background:** Laparoscopic rectal resection, though it has facilitated the pelvic access through better visualization and use of slim instruments in a quite narrow space, yet it's technically demanding when dealing with low rectal cancer where sphincter preservation comes in face of rectal resection with a satisfactory safety margin. TaTME is a recent minimally invasive approach to do proctectomy that was described to overcome the fore mentioned difficulties at low rectal tumors. In our study, we'll assess our experience with TaTME over two years for low and mid rectal cancers in terms of short term outcomes and oncological safety.

**Aim of Study:** Assessment of short-term oncological outcomes after laparoscopic-assisted Transanal TME for mid and low rectal cancers at Ain Shams University Hospital.

**Patients and Methods:** It's a case series study. Study population were patients who underwent trans-anal TME for low and mid rectal cancer in the period between January 2015 and January 2017, retrieved from patients' data registry of the Colorectal Unit, Ain Shams University, Egypt.

**Results and Conclusion:** The median total operative time was 320 minutes with transanal dissection time ranging 100- 220 minutes. The use of monopolar device was significantly superior to sealing device. Laparoscopic transanal-assisted TME for mid and low rectal cancer resection is a feasible and safe technique with comparable histopathological outcomes and postoperative outcomes as laparoscopic approach. Even if the extent of transanal dissection is not complete, adequate safety margin taken under vision is a worthy benefit.

**Keywords:** Cancer Rectum; Transanal Total Mesorectal Excision

#### Background

Since the description of Total Mesorectal Excision by Heald, in 1982 and it has proven its positive impact on the oncological outcomes on proctectomy for rectal cancer [1]. Total Mesorectal Excision involves dissection through the holy plane resecting out the rectum and surrounding mesorectal envelope [1]. The introduction of laparoscopy had led to a great advance in the technique of colorectal resections in terms of postoperative recovery and comparable oncological outcomes to the open technique [2,3]. Laparoscopic rectal resection, though it has facilitated the pelvic access through better visualization and use of slim instruments in a quite narrow space, yet it's technically demanding when dealing with low rectal cancer where sphincter preservation comes in face of rectal resection with a satisfactory

safety margin, especially when the working space -deep inside the pelvis- is very narrow as in situations like android pelvis and obese patients with bulky mesorectum [4,5]. TaTME is a recent minimally invasive approach to do proctectomy that was described to overcome the fore-mentioned difficulties at low rectal tumors. It's developed as a combination of the concept of bottom-up approach introduced by TATA and the use of minimally invasive instruments in proctectomy as described in TEM and TAMIS [6].

Ain Shams University Hospital is a 600 beds' major tertiary and teaching hospital in Egypt. The Department of General Surgery is divided into 6 main units according to subspecialty in General Surgery. The Colorectal Unit receives annually an average of 76 cases of rectal cancer and over 200 cases of colorectal cancer every year. A multidisciplinary team meeting is held weekly to discuss all cases of colorectal cancer [7]. The use of TATME technique at our institution started in 2015. Before that date, an extremely hard Ultra-low rectal resection that has a high probability to end up by

Abdominoperineal resection was the standard for low rectal cancers. Being familiar with laparoscopic colorectal resections and the use of conventional laparoscopic instruments for TaTME, facilitated the implementation of the new technique at our institution. In our study, we'll assess our experience with TaTME over two years for low and mid rectal cancers in terms of short term outcomes and oncological safety.

## Aim of study

Assessment of short-term oncological outcomes after laparoscopic-assisted Transanal TME for mid and low rectal cancers at Ain Shams University Hospital.

## Methodology

It's a case series study. Study population were patients who underwent trans-anal TME for low and mid rectal cancer in the period between July 2015 and September 2017, retrieved from patients' data registry of the Colorectal Unit, Ain Shams University, Egypt. Data retrieval started in September 2017 for one month. Inclusion criteria were all patients with pathologically proven rectal cancer that's not above 10 cm from anal verge (6 cm from anorectal junction) by digital rectal examination, who underwent trans-anal total mesorectal excision. Patients with other pathology, rectal cancer recurrence or patients with missed data were excluded. Perioperative and operative details were all retrieved from the registry in addition to the follow-up period of at least 12 months.

The preoperative assessment included colonoscopy and histopathological study of colonoscopic biopsy, rectal cancer staging MRI, Triphasic CT abdomen, CT chest and baseline tumor markers; CEA and CA 19.9. Based on decision of Multidisciplinary team meeting, selected patients do abdominal MRI or PET scan. MDT protocol is to commence by Neoadjuvant CRT (long course) for all patients with low rectal cancer or locally advanced mid rectal cancer (T3N+ve or T4 any N). Operation was then scheduled in a period between 6-8 weeks after last session of RT. All operative details were registered including operative time, incident of major bleeding, organ injury; rectum or nearby organs, autonomic nerves identification, conversion to open sealing device was used or monopolar and what areas of dissection needed which of them and finally the technique of colo-anal anastomosis. Postoperative data included the histopathological data of the specimen, postoperative course and follow-up data. Patients were routinely instructed to

attend the outpatient clinic for follow-up, weekly for one month then monthly for 6 months and every 3 months afterwards.

## Surgical technique

Routine bowel preparation was done for all patients for 2 days prior to procedure. IV antibiotics mostly 3<sup>rd</sup> generation cephalosporin and metronidazole were administered to all patients at induction of anesthesia. In the few first cases, we preferred starting by the abdominal phase so as to access pelvis as far as we can to shorten the trans-anal pathway, and to give a guide to trans-anal operating surgeon. In the remaining cases, we started by the trans-anal phase as it's the technically demanding and exhausting phase, followed by the abdominal phase that's done by another freshly scrubbed surgeon. Patients' position was modified Lloyd-Davis during laparoscopic phase and extended lithotomy in the trans-anal phase.

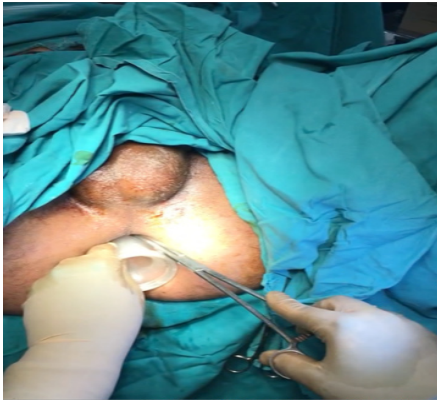
### Abdominal part

Five abdominal ports were used to perform the abdominal phase. A sealing device is used for dissection and bleeding control. We start by division of gastrocolic ligament from mid-transverse colon distally to splenic flexure. The correct plane is marked by visualizing the posterior wall of stomach in the lesser sac. Medial to lateral dissection is done just beneath the 4<sup>th</sup> part of duodenum going laterally between mesocolon and Gerota's fascia (avascular plane) below a tent formed by the hanged up Inferior Mesenteric Vein (IMV), till reaching the lateral abdominal wall. Dissection is continued caudally till obstacle by the Inferior Mesenteric Artery (IMA) that's ligated and divided 2 cm above its origin from Aorta then dissection continued till reaching the sacral promontory. Colonic mobilization is completed by dividing the lateral peritoneal attachment.

### Transanal part

Patient is positioned in Lloyd Davis position. Operating surgeon and assistant sitting between patient's legs. Monitor on right or left side of patient's head.

**Placing of Transanal Platform:** Everting sutures by silk 1/0 are sutured to evert the muco-cutaneous junction of anal verge. Then, the transanal part is grapped by a long clamp that folds its tip to introduce it trans-anally allowing it to unfold after passing the anal sphincters, aided by the lubricated introducer. The port is fixed to skin by silk suture 1/0 (Figures 1,2).

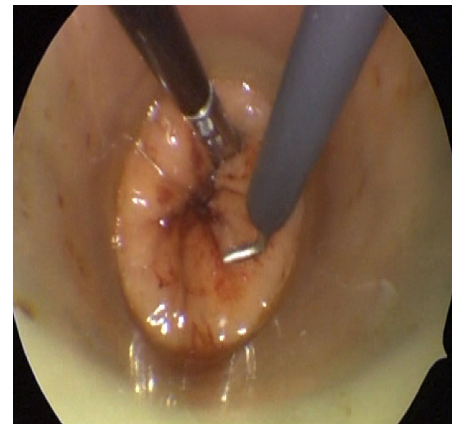


**Figure 1:** Placing the trans-anal part using long clamp to fit it inside anal canal.



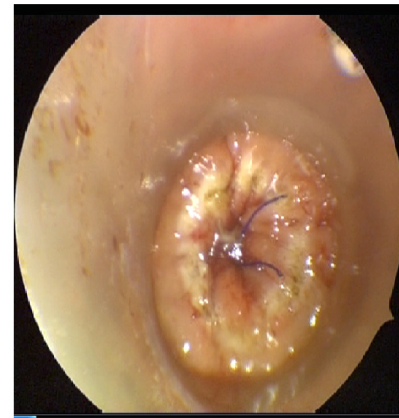
**Figure 2:** The trans-anal part in place with Gel cap on top after placing the three trocars.

**Purse-string:** Anal irrigation with betadine and saline is done to wash out any tumor debris before doing the purse-string and setting the distal resection margin. A purse-string is applied using prolene 1 or 0. The purse-string site is usually done 1 cm below the lowest end of the tumor under vision. If purse-string is loose before or during the procedure, a complementary stitch can be applied. Tight purse-string was mandatory at all our procedures to maintain pressure at the anal canal especially when using the standard insufflator as the case at all our operations (Figure 3).



**Figure 3:** Purse string applied using prolene 0 stitch.

**Bottom-Up Dissection:** Circular marks done by the monopolar hook is done around the knot of purse-string. It guides the operator to start cutting the rectal wall at equal lengths all-around leaving uniform distal rectal cuff suitable for anastomosis with the colonic loop. The site of landmark is usually done at point between distal 2/3 and proximal 1/3 of the space between the knot of purse-string and edge of the anal port (Figure 4).



**Figure 4:** The circle of bottom-up dissection is marked on the mucosa by monopolar diathermy.

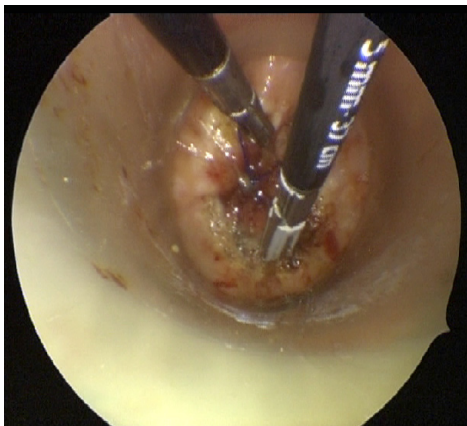
Bottom-Up dissection starts by cutting mucosa then rectal muscle wall all around prior to entry into the avascular Holy plane.



Starting through anterior plane is tried in number of cases and through posterior plane in others. At either situations, the other plane was the following step, then lateral planes come next. The relatively easier dissection at the posterior and anterior planes, facilitates identifying the way of dissection at lateral planes which are relatively harder.

Autonomic nerves are identified at some cases as a “Bow”. The mesorectum is “L” shaped with short and long limbs. These limbs are relatively shorter or longer from case to another. The roadmap was expected through studying the geometry of mesorectum in each case by reviewing the pelvic MRI.

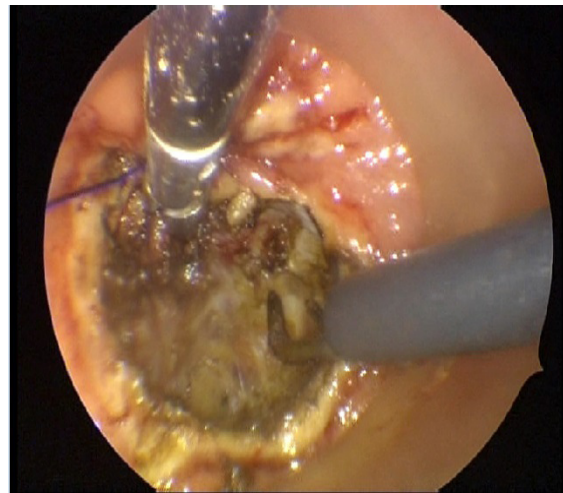
Dissection through the avascular Holy plane is continued as far as the pneumorectum permits safe view and non-irritating working space due to bellowing movement. Peritoneal reflexion is reached at some cases while at other cases, the procedure is aborted and converted to laparoscopic approach (Figures 5-7).



**Figure 5:** Starting posteriorly division of the mucosa.



**Figure 6:** Rectal wall is divided reaching the avascular holy plane posteriorly.



**Figure 7:** Dissection at left lateral plane guided by the posteriorly dissected plane.

**Specimen retrieval and Anastomosis:** At all cases, the specimen was delivered from pfannenstiel incision, followed by reinsufflation and stapled anastomosis by circular stapler 29 which fits through the port.

## Results

Nineteen consecutive patients (12 males) underwent laparoscopic transanal-assisted TME for low and mid rectal cancer in the period between January 2015 and January 2017. The median age was 49 years and median BMI 30.4 Kg/m<sup>2</sup>. All tumors were pathologically proven adenocarcinoma with tumor level ranging 1-5 cm above the ano-rectal junction. The Geometry of mesorectum was studied in all cases prior to surgery by reviewing MRI pelvis and showed L-shaped mesorectum with short limb ranging 4-5 cm and long limb ranging 7- 11 cm. All patients received neo-adjuvant CRT long course followed by surgery at interval between 6-8 weeks after last cycle of radiotherapy. The intraoperative outcomes are shown in (Table 1), the median total operative time was 320 minutes with transanal dissection time ranging 100- 220 minutes. At the first few cases (8), we started by abdominal part till the pelvic peritoneal reflection (pelvic box) and then shifted to the transanal part, this order was reversed at the later cases.

Histopathological assessment of specimens is shown in (Table 2). The median tumor distance from circumferential resection margin was 15 mm and from distal resection margin was 14mm. In first 7 cases, we used a sealing device for transanal dissection, 2 of them were combined with monopolar before shifting to using a monopolar solely with observed better outcomes shown in (Table 3). There was a significant difference (P value=0.0096) in operative time when we started dissection in posterior plane and

go guided by this plane to lateral and anterior planes over starting by the anterior plane. The extent of transanal dissection was also improved (average 81% vs 62% in anterior plane 1<sup>st</sup>) (Table 4).

The average postoperative hospital stay was 7.7 days with 7 cases of short-term (30 days) complications, 2 were local causes and 5 systemic causes with one mortality due to pulmonary embolism at postoperative day 6 (Table 5).

Total operative time	320 min (275- 385min)
TA operative time	136 min (100- 220min)
Order of TA phase	First (57%) Second (43%)
Transanal dissection to peritoneal reflection	42% (8 cases)
Autonomic ns identification	73.6% (14)
Colo-anal anastomosis technique	Stapled (26%), Hand-sewn (74%)
Purse-string dehiscence	26%
Covering ileostomy	100%

**Table 1:** Intraoperative outcomes.

Quality of mesorectum	Complete (90%), Near complete (10%)
Harvested lymph nodes	17 (0-23)
Nodal infiltration	N0 15%, N1 36%, N2 36%
CRM(range) mm	15 (5-30)
DRM(range) mm	14 (4-35)

**Table 2:** Histopathological results of specimens after laparoscopic-assisted transanal TME.

	Sealing device (7)	Monopolar (12)	
TA operative time	169 min(120-195)	116 min (100-130)	0.0069
Transanal dissection up to peritoneal reflection	3 cases	5 cases	0.03
Injuries	71% (5 cases)	8% (1 case)	
Autonomic ns identification	42% (3 cases)	83% (10 cases)	
Good Quality (complete) mesorectum	71% (5)	100% (12)	

**Table 3:** Intraoperative outcomes and quality of mesorectum when sealing device versus monopolar is used for transanal dissection.

	Anterior Plane 1 <sup>st</sup> (8)	Posterior Plane 1 <sup>st</sup> (11)	
TA operative time	174 min	124 mins	0.096
Extent of TA dissection	62%	81%	
Injuries	60% (3)	14% (2)	NS

**Table 4:** Intraoperative outcomes when dissection at transanal part is started by the anterior plane versus when started by the posterior plane.

Local PO complications	2 (10.5%)
Anastomotic dehiscence	1
Pelvic sepsis	1
Systemic PO complications	26% (5)
Mortalities	5.2(1)
Readmission	21% (4)
Reoperation	10.5% (2)
Days of analgesia	4 (3-6)
Day of 1 <sup>st</sup> peristalsis	2(2-3)
Length of hospital stay	7.7 days (7-14)
Follow up period	4 months (2-7)

**Table 5:** Postoperative outcomes for laparoscopic-assisted transanal TME.

## Discussion

Over the last 5 years, many reviews discussed TaTME for rectal cancer and its potentials for performing an oncologically safe low rectal resection, and they showed that the procedure is oncologically safe with comparable short-term outcomes to the conventional laparoscopic and open approaches, yet it offers a better access to low rectal cancers especially with android pelvis and obese patients with bulky mesorectum [8-10]. Though TaTME had a better access to the low rectum, it requires a steep learning curve to master the bottom-up pathway with a new anatomy that isn't familiar with colorectal surgeons [11,12]. At our institution, we had a group of surgeons who had long experience with laparoscopic colorectal resections and advanced transanal procedures including intersphincteric resection and TEM, yet TaTME wasn't tried before. A single surgeon, who had an observer ship at the Colorectal center, Florida Hospital, FL, US who received training and attended a hands-on course for the TaTME. We performed 19 consecutive cases of laparoscopic transanal-assisted TME by 2 groups of surgeons; one for the laparoscopic phase and another group including the trained surgeon for the TaTME phase.

The mean operative time through our study was 320 minutes (275-385), which is comparable to many published series, and much longer time compared to other centers [13,14]. The longer time could be explained by the technical difficulties we had due to lack of the optimum insufflation system with continuous gas flow and automatic smoke evacuation. Instead, we had much difficulty working steadily with non-stopable bellowing movement hindering smooth and confident progression. The extent of transanal dissection was limited at many cases not reaching the peritoneal reflection (11 cases), due to the fore-mentioned technical difficulties as well as our low experience of dealing with that new approach. Despite, we didn't benefit so much from the transanal approach at that 11 cases, but we saved the anal sphincter because of dividing the rectum under vision at a satisfactory safety margin from the tumor, which is a tremendous benefit, we were in need for at all our series, we were aware of the topographic anatomy of the pelvic autonomic nerves encountered during transanal approach. It was first described by Kneist, et al. [15], who performed intraoperative EMG to identify pelvic nerves during the procedure. Atallah, et al. [16], then described the inferior branches of Inferior hypogastric nerve that appear as a "bow" 6-8 cm from anal verge.

We identified the "Bow" of pelvic nerves at 14 cases (73%) with successful preservation, yet at other 5 patients, the nerves were not identified with no evidence of injury. The use of sealing device was not recommended by procedure advocates [17], but we preferred to use it as we were familiar of using the sealing device at laparoscopic colorectal procedures, also we feared from inadvertent bleeding during dissection that's difficult to control by monopolar at that narrow working space. After doing 7 cases, we progressively took confidence to introduce the monopolar at parts of dissection till using it solely at last 8 cases. We noticed a shorter operative time, less breeching of mesorectal envelope and less injuries with better identification of autonomic nerves as seen in (Table 3).

These may be rendered to the fact that; a sealing device obliterates the vision of normal plane which is not present using a monopolar device. Four anastomotic techniques were described following TaTME at many published studies [10,17,18], of which we preferred doing stapled colo-anal anastomosis (5 cases) when applying a cutting stapler distal to a low lying tumor is feasible followed by distal stump purse string and anastomosis with EEA stapler. When applying cutting stapler wasn't feasible, we did hand sewn coloanal anastomosis (14 cases).

## 1. Conclusion

Laparoscopic transanal-assisted TME for mid and low rectal cancer resection is a feasible and safe technique with comparable histopathological outcomes and postoperative outcomes as laparoscopic approach. Even if the extent of transanal dissection is not complete, adequate safety margin taken under vision is a worthy benefit. Monopolar device, despite its limited bleeding

control capabilities, is superior to the sealing device in identifying the correct plane and reaching deeper extent when used in transanal access. Posterior plane is a better guide for dissection at anterior and lateral planes when dissecting through Holy plane in transanal approach.

## Conflict of interests

Both authors declare that, there's no conflict of interests at the time of submission of the article.

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