Chapter 3

Transanal Surgery: A Review

Miguel Leon Arellano[1*] and Ramon Cantero-Cid[1]

[1]Department of Surgery, Hospital La Paz, Spain

[*]**Corresponding Author:** Miguel Leon Arellano, Department of Surgery, Hospital La Paz, Madrid, Spain, Email: miguel.leon.arellano@gmail.com

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Recent Advances in Rectal Cancer

Abstract

The standard treatment for rectal cancer is radical surgery, including total mesorectal excision (TME). The management of early stage rectal cancer is based on finding the right balance betweenoptimal oncologic outcomes and acceptable adverse effects for the patient. Trying to minimize the morbidity associated with radical surgery, alternative approaches have been created, including transanal endoscopic microsurgery (TEM) transanal endoscopic operation (TEO) and transanal minimally invasive surgery (TAMIS). Transanal minimally invasive surgery is a safe and effective technique for the resection of lesions located in the middle and upper third of the anus, benign and neoplasic lesions T1N0 stage. The use of thistechnique in T2 lesions, today is controversial, and requires individual assessment of each case. The correct patient selection allows transanal resections having similar oncological long-term outcomes compared to conventional surgery, with a significant reduction in complications. In recent years, these techniques have been widespread which has allowed them to be applied in conservative rectal procedures for both benign diseases and selected cases of rectal cancer. Compared to the gold standard of radical surgery, local procedures for strictly selected early rectal cancers should lead to identical oncological results and even better outcomes regarding morbidity, mortality, and life quality.

Introduction

Colorectal cancer (CRC) is the fourth cancer most frequent worldwide. The screening programs have decreased the incidence of rectal cancer, in the last decade, 1.5% in patients between 50 and 64 years and 4.3% over 65 years old, with a 5 year survival rate around 66.5%[1,2]. Furthermore, routine colonoscopies diagnose adenocarcinomasat earlier stages and facilitate the identification of premalignant lesions. Actually, the rate of patients with an early stage diagnose of colorectal cancer (CRC) is around 40%, this group associate a better survival rate [6]. Early stage of CRC includes lesions localized in submucosa (T1) o muscularis mucosae (T2) or without lymphatic affection (N0).

Within this, new and different therapeutic options had emerged, allowing us a complete resection or the tumor, with good survival rates and with less morbidity compared to conventional surgery. In 1984, Dr. Buess, developed TEM "Transanal Endoscopic Microsurgery", as an alternative in patients with rectal cancer [3]. This technique, was a real change in surgery, it could achieve complete excision of rectal endoluminal lesions located between 4 and 20 cms from anus, using a rigid sigmoidoscope. Despite all advantages, implementation of this technique was less than expected, due to the important learning curve and the high cost of the materials.

Transanal Encoscopic Microsurgery (TEM), approach involves a technique for lesions located at upper an medium third of the rectum using a rigid sigmoidoscope designed by Wolf (Tuttlingen, Germany) [3]. 4 cms diameter and length between 12 and 20 cms, associated to a CO2 insufflation system. This equipment is connected to a binocular vision system that allows the surgeon a three-dimensional view with an optical magnification of up to 6, connected to a camcorder and three working channels. Before intervention, a rectoscopy is mandatory [4,9], so that the patient should be positioned such that the lesion to be removed will be at the bottom of the rectoscope. Rectal distension, complete excision of rectal wall thickness is achieved, usually using ultrasonic scalpel for a better hemostasis. Because the material used is rigid, this technique has limited application in patients with rectal stricture or those with higher-level concavity of the sacrum [10].

TEM and TEO "Transanal Endoscopic Operation" system uses the same equipment, differing only that TEO use a laparoscopic optic as a display system.

The outcomes of new technology in the last decade, and the acquisition of skills in minimally invasive surgery by colorectal surgeons, have developed a novel therapeutic approach, TAMIS "Transanal Minimal Invasive Surgery". It employs standard laparoscopic instruments, preserving principles describes by Buess, through the creation of pneumorectum, across a transanal single port and the same principles of TEM. This technique, first described

in 2010, had allowed the reduction of the learning curve in colorectal surgeons, and the decrease in instrumental costs.

Figure 1: TEM equipment.

Figure 2: TEO.

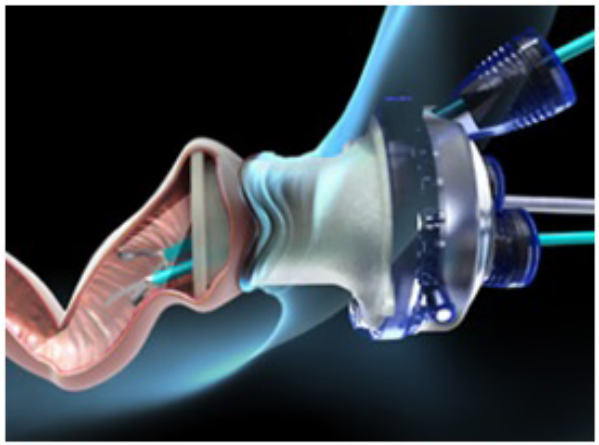

Figure 3: TAMIS.

Indications

TEM and TAMIS allow us resection of large benign lesions and early stages rectal adenocarcinoma. It is used mostly in T1N0 lesions. The indication in T2 lesions is controversial. Although it is technically possible, the discussion appears regarding cancer outcomes due to the lack of mesorectal resection. We must consider that between 0-12% of T1 stage patients present lymph node metastasis, and 10 to 22% of those with T2 stage.

The accurate tumor staging and the lymph vascular invasion are clue factors for transanal surgery indication. From our point of view the adequate preoperative patient assessment by endoscopic ultrasound, abdominopelvic MRI as well as CT scan and adequate patient selection

are crucial. The best method for clinical staging of rectal cancer remains a controversial topic among health care providers. Preoperative identification of tumor depth of invasion (T stage) in the rectal wall and lymph nodes (N stage) can be a challenge. Both modern imaging modalities of endorectal ultrasound (ERUS) and magnetic resonance imaging (MRI) have been used to detect depth of tumor invasion and lymph nodes metastases in rectal cancer [7,8].

The reported sensitivity and specificity of ERUS for depth of tumor invasion, perirectal tissue invasion and lymph node involvement is from 78% to 94% [9]. The major disadvantage of ERUS is the variability in the interpretation of the study due to its dependence on one individual to perform and read the study accurately. MRI has a sensitivity and specificity for T staging ranging from 85% to 100%. MRI is also superior at mesorectal lymph node staging with similar sensitivity and specificity as T staging [10]. Both imaging modalities will not determine the absence of occult nodal metastases with complete certainty, and some authors suggest that both modalities can be used in combination to increase the likelihood of accurate local staging.

We must know the lesion size and location as well as the presence of lymphovascular invasion [8,11,12].

Currently, patients with a clinical stage ≥T2 rectal adenocarcinoma should undergo radical surgery. Patients

with a diagnosis of more advanced rectal cancer who are not candidates for radical surgery due to high operative risk or those who refuse to undergo radical surgery may be considered for neoadjuvant therapy followed by local excision of residual disease [13].

In experienced centers oncological results are similar to conventional surgery, within tumor recurrence between 5 and 7% in T1N0 stage patients in which a complete tumor excision with free resection margins was performed [14,15].

Technique

Mechanical bowel preparation, antibiotic and antithrombotic prophylaxis are recommended. Anesthesia may be general or spinal. In TEM the surgeon works with the tumor visible in the lower part of the rectoscope at all times, so the positioning of the patient depends on the location of the rectal tumor. In TAMIS the majority of lesions can be excised in a lithotomy position. However, the recommendation is to turn the patient for large anterior lesions, especially if the distance from the anal verge is in a range where there might be a risk of opening the peritoneum. The pneumorectum is maintained at a constant pressure. Rectal distension created in this way exposes the tumor and the rectal wall. Right-angle camera cords can improve ergonomics and decrease instrument collision [16]. The use of a flexible endoscope with a SILS port can add some benefits as, less clashing of surgical materials,

retroversion offers a better visual control of the upper limit of the lesion, pneumorectum is more constant, lavage and suction and possibility of using "extra" endoscopic instruments [25]. Care must be taken to avoid entering the abdominal cavity. The dissection starts making a scar around the lesion using the monopolar scalpel, and then the full-thickness excision of the rectal wall reaches the mesorectal fat using an ultrasound scalpelor other excision system, allowing a good hemostasis. Conventional laparoscopic instruments are suitable for TAMIS, but advanced laparoscopic instruments can be employed, like linear staplers, vessel-sealing systems or articulating instruments.

The defect is sutured transversally to avoid stenosis of the rectal lumen and postoperative bleeding. Suturing in this area is sometimes difficult for technical reasons as the working space is limited. Regarding closure of the defect after resection, there is no consensus in the literature. Closure can be performed by continuous or interrupted suture, with intracorporeal or extracorporeal knotting. The most important study of literature includes 75 operated patients, of which 53% closure was performed. There are no statistically significant differences in the postoperative period in both groups concerning long-term continence [17]. On the other hand, defect closure is time consuming (an average of 38 minutes in the hands of expert surgeons). What is undeniable is that in patients with an abdominal inlet cavity, it is mandatory the rectal closure, either via transanalor laparoscopy combined.

Figure 4: Scar around lesion.

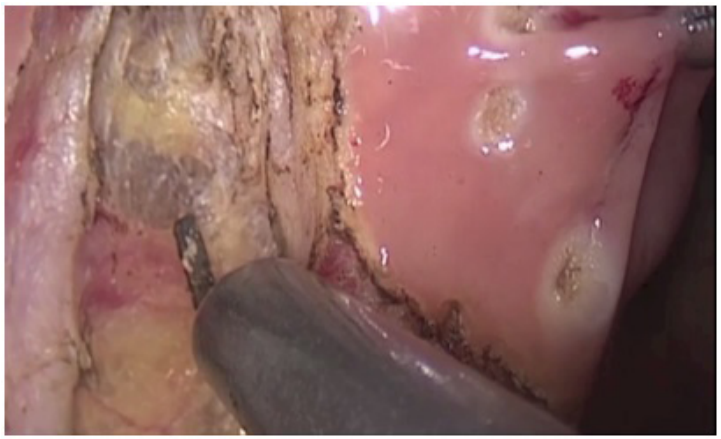

Figure 5: Excision of rectal wall.

This technique can be done also with a robotic approach. Atallah. et al. described a robotic transanal total mesorectal excision with intersphincteric dissection for distal rectal cancer, it was performed using the da Vinci Si Surgical System (Intuitive Surgical, Sunnyvale, CA, USA) and a two-team approach with laparoscopy from above was used to complete the resection [27].

Complications

Morbidity and mortality is lower than radical surgery. Operative mortality is less than 0.5% and morbidity ranges from 4% to 30% in large series, depending on the inclusion of minor complications. The most frequent complication include acute urinary retention (0%-11%), bleeding requiring re-operation (0.7%-9%), entry into the peritoneum (6%-20%) and recto-vaginal fistula (0.3%-1.4%) [18]. Tumor size was associated with risk of bleeding and anterior and lateral location was associated with risk of peritoneal violation and acute urinary retention [19].

Complications correlate with tumor localization (lateral and more than 8 cm from the anal verge). Overall surgical complications did not correlate with the number of TEM procedures performed, suggesting a short learning curve for the procedure in surgeons with previous experience in minimally invasive surgery.

Oncologic Outcomes

The goal for better outcomes involves oncologic prognosis and good quality of life.

This has been the reason for the development of newer surgical methods which are less invasive. Colorectal surgery is one of the leading specialties in minimally invasive and robotic surgery techniques and the desire to expand the role of local excision follows naturally. Interest in developing newer procedures for local excision of rectal tumors was driven by the findings of high recurrence rates seen after classic transanal resection of benign and malignant lesions.

Baatrup et al. examined his series of 143 consecutive TEM resections for rectal cancer. Of the patients that were pathological stage T1 tumors, the local recurrence rate was 12% [20]. He also found that the significant predictors for survival in his group of patients were tumor size and patient age. He strongly urged that tumors greater than 3 cm should not be removed by Local Excision. In a similar study by Lezoche. et al. 135 patients were followed who underwent TEM [21]. There were no local recurrences noted in patients with pathological stage T1 tumors and the overall survival rate was 86% at 193 months. When comparing the results of Local Excision to radical surgery, local recurrence rates tend to be higher for both T1 (8.2-23%) and T2 adenocarcinomas (13-30%) undergo-

ing Local Excision when compared to radical surgery for T1-T2 disease (3-7.2%) [22,23]. However, in the studies evaluating Local Excision there has not been a significant difference in Disease free survival rate when compared to radical surgery.

The inability to demonstrate improved survival following radical surgery may be due to the retrospective analysis that occurred in many of these studies and the lack of adequate follow up. Only recently has there been an emphasis on appropriate follow up following Local excision [24].

Whether Local Excision compromises the oncological outcome with the risk of recurrence and local failure remains unknown. Lymph node metastasis occurs in 0-12% in T1 and 10-22% in T2 rectal cancer, however, as local lymph nodes are not sampled using TEM, it is reliant on preoperative staging and histopathological features of the tumor to direct further adjuvant treatment [7].

Finally, we can say that both techniques are important tools for other rectal diseases.It is useful for resection of rectal adenoma, tumors of neuroendocrine line or anal warts [26]. It can also be used to close the defect in rectal iatrogenic perforations. Also, it is a useful tool in treating complex rectal fistulas, especially those with high location, such as the urinary fistulas, with good outcomes and low morbidity.

Conclusion

Historically, oncological outcomes from the use of Local Excision for the treatment of early rectal cancer have been disappointing. However, in carefully selected patients with early (T1) rectal cancer, Local Excision by means of the newer methods of TEM and TAMIS is a promising alternative to radical surgery with minimal morbidity and acceptable oncological outcomes. Currently, there are minimal studies evaluating combined use of neoadjuvant therapy and LE for ≥ T2 lesions which limits its generalizability.

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