Introduction

Natural orifice transluminal endoscopic surgery (NOTES) is the integration of laparoscopic minimally invasive surgery techniques with flexible endoscopy technology. It has emerged as a promising new alternative to conventional minimal invasive surgery such as laparoscopic or robotic surgery. NOTES initially focused on a transgastric approach, but the technique remains experimental because of injuries to adjacent organs and gastrotomy closure. These limitations, however, have been overcome when transanal NOTES is used for colorectal surgery, such as transanal total mesorectal excision, often referred to as a “bottom-up approach”. Transanal approaches in the form of transrectal or transcolonic NOTES appear to be alternatives for treating both colorectal and other abdominal diseases. Traditionally, benign rectal tumor and early rectal cancers located in the rectum were treated with transanal excision using a conventional anal retractor.

Preservation of the anatomical integrity of the mesorectum for rectal cancer surgery is a major factor in long-term survival and rate of local recurrence after total mesorectal excision (TME). Now, TME is considered the standard of care for rectal cancer. In TME, the rectum and mesorectum are excised through sharp dissection under direct vision of the avascular white plane between the visceral and parietal pelvic fascia, separating the mesorectal fat from the pelvic structures. The introduction of TME surgery reduced local recurrence rates from 20 to 45% to about 10%. The other important predictor of local recurrence is the involvement of the circumferential resection margin (CRM). A CRM of less than 2 mm is shown to be a strong predictor of local recurrence. Moreover, the challenge in doubling stapling technique for the rectal anastomosis in a narrow pelvis and efforts to preserve the anal sphincter in very low tumors could lead to major morbidity, including anastomotic failure and pelvic nerve injury. NOTES transanal approach to TME have been reported in order to overcome these risks in patients with rectal cancer. Advantages of the down-to-up approach include closer assessment of the possibility of preservation of the anal sphincter, better definition and preservation of the integrity of the distal mesorectum and clearer identification of the sacral nerves.

Surgical procedure

Patients were placed in the lithotomy position with the arms parallel to the body. In several reports, multiple transanal platforms were used for NOTES TME procedure (rigid vs. soft platforms). Originally, Dr. Sylla used a rigid metallic proctoscope which provides platform stability. Other groups used flexible single-incision platforms, noting excellent maneuverability and triangulation of instruments. Transanal procedures were as follows. Purse-string occlusion of the rectum was carried out at the start of the transanal dissection, it was done after full-thickness circumferential rectal resection. Usually, a Scott retractor facilitated the full-thickness circumferential transection. the rectal stump was closed with a full-thickness purse-string suture to prevent spillage of tumour cells and bacteria. Monopolar or bipolar energy was used for the transanal mesorectal dissection. A pneumorectum was created with carbon dioxide at a pres-
sure of 12-14 mmHg. According to TME principles, the plane of dissection was first extended posteriorly, then anteriorly, and then laterally. After circumferential mobilization of the rectum, the peritoneal reflection was exposed and opened, thereby entering the peritoneal cavity. The laparoscopic part of the procedure was performed with a second SILS Port introduced at the future ileostomy site in the right lower abdomen. The descending colon and sigmoid were mobilized from medial to lateral using the single-incision laparoscopic surgery technique or using conventional laparoscopic technique. The splenic flexure was partially or fully mobilized in selective patients. Coloanal anastomoses were either handsewn or stapled with a circular stapler. An ileostomy was created in selective patients.

Outcome

In 2009, Dr. Sylla reported the first clinical case of rectosigmoid resection for rectal cancer using transanal NOTES with laparoscopic assistance. The patient was a 76-year-old woman with a preoperatively staged T2N2 tumor located 8 cm from the anal verge and treated with preoperative chemoradiation. After operation, the mesorectal specimen was intact, with negative margins and 23 negative lymph nodes. Since this first case, several clinical series of TME for rectal cancer using a transanal NOTES approach with laparoscopic assistance have been published. In these reports, tumor location was 2-15 cm from the anal verge. Neoadjuvant treatment was also given to half of patients for locally advanced tumors. Operative time was about 120-460 min. The overall intraoperative complication rate was not much than that of conventional laparoscopic surgery, and also the incidence of conversion to open surgery was about 2%. Most TME specimens were complete or nearly complete with negative margins. Rouanet et al. reported four patients with positive CRM in their experiences; one had a tumor that was adherent to surrounding tissues, two had aggressive tumors with microscopic invasion, and one had regional recurrence located across the sacral plane. In this high-risk patient study, Rouanet et al. achieved negative margins in 87% of cases. Until now, most clinical series reported only short-term oncological outcomes. In the Rouanet series of high-risk patients, 43% had no recurrence after a median follow up of 21 months, 40% were treated for local or distant recurrence, and 13% died of cancer-related causes. Even in this high-risk population, these results are comparable to short-term oncological outcomes after standard TME. While promising, the current short-term oncological outcomes highlight the need for careful patient selection for transanal NOTES TME. In several case series, various intraoperative and postoperative complications were reported - urethral injuries, pneumatosis of the small bowel mesentery, air embolism, urinary dysfunction, postoperative ileus, anastomotic leakage, anastomotic fistula and pneumonia, et al. Although the rate of complication was not much than that of conventional laparoscopic surgery, we still concern about the unexpected critical complication related to new surgical approach.

Conclusions

Transanal rectal resection with TME is a promising new approach in the treatment of rectal cancer in patients, especially with a poorly accessible pelvis for traditional laparoscopic TME. Currently, short-term outcomes of small clinical series suggest that transanal endoscopic TME is not only feasible but safe in carefully selected patients when carried out by trained surgeons. We expect this new approach has developed continuously and expanded to the clinical applications of pure NOTES.

References


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