



Surgical Technique and Considerations about Transanal Transection and Single-Stapled (TTSS) Anastomosis: The Search for a Perfect Anastomosis

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Abstract

The evaluation of preventive measures and risk factors for anastomotic leakage has been a constant concern among colorectal surgeons. In this context, the description of a new way to perform a colorectal, coloanal or ileoanal anastomosis, known as transanal transection and single-stapled (TTSS) anastomosis, deserves an appreciation of its qualities, and a discussion about its properties and technical details. In the present paper, the authors review the most recent efforts aiming to reduce anastomotic dehiscence, and describe the TTSS technique in a patient submitted to laparoscopic total proctocolectomy with ileal pouch-anal anastomosis for familial adenomatous polyposis. Surgical perception raises important advantages such as distal rectal transection under visualization, elimination of double-stapling lines (with cost-effectiveness and potential protection against suture dehiscence), elimination of dog ears, and the opportunity to be accomplished via a transanal approach after open, laparoscopic, or robotic colorectal resections. Future studies to confirm these supposed advantages are needed.

Keywords

- ▶ colorectal anastomosis
- ▶ rectal resection
- ▶ single-stapled
- ▶ transanal
- ▶ transection

Introduction

One of the most feared complications after colorectal resections is the development of anastomotic dehiscence and its consequences, such as sepsis, reoperations, prolonged hospital stay, and the need for a stoma.^{1,2} Furthermore, leakage may affect the risk of recurrence, reduce survival, and delay adjuvant chemotherapy in oncological patients.³

The definition of anastomotic leakage is a controversial issue, and this complication has variable incidence rates. The

risk factors are usually associated with location, clinical (age, clinical status, emergency setting, smoking, obesity, malnutrition, use of steroids, preoperative radiotherapy) and technical features (type of suture, surgeon experience).⁴ This complication has been documented in 8.1%, 6.4%, and 11% of the cases after right colectomy, colonic cancer surgery, and rectal cancer surgery respectively^{5–7}.

Thus, the performance of a safe anastomosis turns to be a major concern in colorectal surgery, the reason why the prevention of anastomotic leakage has been the topic of

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several investigations. Different strategies of administration of oral and intravenous antibiotics (with or without antero-grade bowel cleansing) have gained great attention in the recent literature. On the other hand, the indication of intra-abdominal drains or mechanical bowel preparation have raised lots of discussion. Especially for low rectal anastomosis, prevention and attenuation of pelvic sepsis with the use of fecal diversion is highly advisable and effective.⁸ More recently, the changing of resection margins using fluorescence angiography has been extensively evaluated to obtain a sound anastomosis.⁹

Issues related to the performance of anastomosis have also been a matter of concern. In this sense, the choice of number of suture planes, configuration (end-to-end, lateral-to-end, latero-lateral), and suture type (hand-sewn versus mechanical) may have specific advantages in different clinical settings, although the rates of leakage do not differ significantly. For example, although the lateral-to-end anastomosis may provide better short-term function, an end-to-end anastomosis may lead to less severe complications and reinterventions in the management of distal rectal tumors.¹⁰ The decision process concerning the type of anastomosis usually considers the surgeon's choice and experience.

It is widely recognized that the advent of mechanical staplers enabled the performance of safe low pelvic anastomosis, decreasing surgical length and enabling sphincter preservation. Performance of a low anterior resection is the main indication for the double-stapled technique (DST). The use of both linear and circular staplers brings the advantage of not requiring the placement of a purse-string suture deep on the distal rectum, a maneuver sometimes considered difficult when the pelvis is too narrow, in obese patients, or in the presence of large tumors. Moreover, the DST also leads to lower levels of local intraoperative contamination (as the rectal lumen is not exposed), and reduces the time and bleeding.¹¹

However, the introduction of the linear stapler and its adaptation to transect the rectum may be eventually difficult, leading to oblique or multiple transverse firings (cartridges) necessary for rectal division. There is great evidence that the number of cartridges used is implicated in the occurrence of anastomotic dehiscence.^{12–16}

Despite providing an easy and safe anastomosis, the DST creates critical points regarding the risk of disruption. One of them is the crossing of two stapling lines. More importantly, it creates lateral deformities at the extremes of the suture line, the so called "dog ears"¹⁷. These protrusions are regarded as a problem, as they are considered potential ischemic areas in the intersection of lateral stapling lines.^{14,18} For this reason, the invagination of this area and its inclusion in the circular stapler have been suggested.¹⁹ Whether or not this can reduce leaks remains to be established.

TTSS: Technical Details

Transanal transection and single-stapled anastomosis was first described by Spinelli et al.,²⁰ and it may be applied after total mesorectal excision with colorectal/coloanal anastomosis or after total proctocolectomy with ileal-pouch anal anastomosis (IPAA) for benign diseases. It takes the efficacy and reliability of total mesorectal excision (TME), and the combination of transanal transection (TT) with a single-stapled (SS) anastomosis from transanal TME (TaTME).

After the completion of the abdominal part of the dissection down to the pelvis, the perineal surgeon exposes the distal rectum with the aid of a Lone-Star retractor and/or a cylindrical anoscope, thus facilitating the recognition of the lesion and the demarcation of the distal margin.

Subsequently, a circular purse-string suture at the level chosen for rectal transection is performed (→Fig. 1, left to right). Once the rectum is closed, a circular full-thickness transection of the rectum wall is performed using electrocautery until it reaches the previous TME in the deep pelvis.

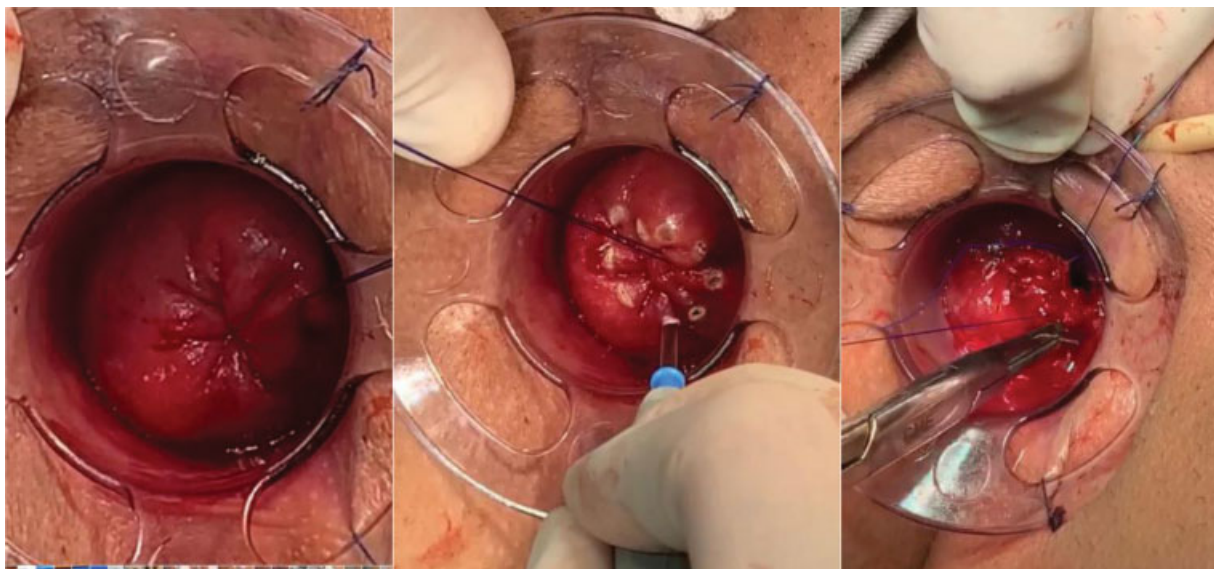


Fig. 1 Introduction of a rectal dilator and rectal suture (left), demarcation for the rectal section with electrocautery (middle), and a purse-string suture around the rectal cuff (right).



Fig. 2 (From left to right) Insertion and fixation of an anvil with a plastic tube passing through the opened rectal cuff (left), stapler coupling (middle), and single suture circular anastomosis (right).

After that, the colorectal specimen is pulled and retrieved through the perineum or through a Pfannenstiel incision (preferably with the presence of a wound protector). Transanal transection and single-stapled anastomosis enables the performance of rectal transection under visual control, avoiding multiple staple firings, which have been identified as risks factors for leakage. Another great advantage is the possibility to verify the distal margin and transect the rectum precisely. After that, a purse-string suture is made in the rectal cuff with a 2-0 prolene suture thread. After the definition of the proximal margin and its transection, the anvil of the circular stapler that is secured with a 2-0 suture (either in a lateral or terminal position) is placed, and a nasogastric tube is inserted in the tip of the anvil so the proximal colon can be externalized through the anal canal and the purse-string suture of the rectal cuff can be tight. The circular stapler is inserted and connected to the anvil, enabling the performance of a single-stapled anastomosis followed by air-leak test or a rectal examination (→ Fig. 2, left to right). The SS anastomosis avoids cross-stapling and dog ears. Whether or not this can reduce leaks remains to be seen.

Discussion

Besides the continuous development in technology and the technical advances in rectal cancer surgery, performance of a safe anastomosis still presents many challenges regarding the distal dissection of the lower segment, the definition of the appropriate distal margin, and the avoidance of technical errors. The present report raises the main technical aspects involved in TTSS, a novel and interesting alternative to perform a low colorectal, coloanal, or ileoanal anastomoses.

This technique may be accomplished via a transanal approach after open, laparoscopic, or robotic colorectal resections. Development of the transanal approach aimed to surpass the limitations associated with minimally-invasive techniques to treat rectal cancer.^{21,22} Thus, it provides full visualization of the distal rectum, helping the surgeon to

establish a correct distal resection margin and the precise transection level.²² The advantages of complete visual control have been recently recognized and emphasized during the learning phase of TaTME, raising the importance of performing a safe transection, especially in difficult cases (large tumors, obese patients, male pelvis).

Nowadays, patients with ulcerative colitis or familial adenomatous polyposis are preferably managed with double-stapled IPAA, as it is easier than the hand-sewn procedure, and provides better functional outcomes. However, there is a higher risk that residual mucosa may affect the postoperative symptoms and outcomes.^{23,24} In this context, these patients may also benefit from this technique, as it enables a more adequate evaluation of a potentially-diseased distal rectal mucosa.²⁵

Moreover, TTSS is more cost-effective, as the use of another stapler to perform the transverse rectal transection (eventually requiring two or three firings) is dispensable. By avoiding the necessity of more than 2 transecting sutures, TTSS can also have a role in preventing leaks associated with this fact. Furthermore, its single-stapled configuration avoids the formation of dog ears.

Thus, if we consider that anastomotic dehiscence may occur due to stapler crossing or dog ears, TTSS turns out to be a promising strategy when colorectal, coloanal or ileoanal anastomoses are required. Simultaneously, it offers the key features of TaTME without the potential risks described during bottom-up dissections.

According to Spinelli,²² the main promising advantages of TTSS can be summarized as follows:

- It enables rectal transection under precise visual control;
- It may be performed after any surgical approach;
- Avoidance of tumor-cell dissemination;
- Cost-effectiveness in minimally-invasive surgery (as it eliminates transverse rectal transection); and
- It relies on established skills of the surgeon (the learning curve is not a problem).

Conflict of Interests

The authors have no conflict of interests to declare.

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