

Double Stapling Technique for Low Anterior Resection

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A report is given on 26 patients (18 men and 8 women) undergoing low anterior resection for carcinoma of the rectum, using both the TA 55 and EEA staplers. The average age was 65 years (range, 45 to 92 years). The preoperative level of the lesion from the anal verge averaged 9.8 cm (range, 4 to 17 cm). All had well-differentiated or moderately well-differentiated lesions. All lesions were removed using the following technique. The TA 55 stapler was placed across the lower rectum at the distal resection margin. The EEA stapler was introduced into the rectum with the anvil removed. The shaft was then passed through the rectum stump either through or immediately adjacent to the staple line. The anvil was refitted and the anastomosis completed between the more proximal colon and the rectal stump. A defunctioning colostomy was employed in only one patient. There has been no mortality. Follow-up has been 2 to 16 months, and there has been no early recurrence. The postoperative level of the anastomosis averaged 5.5 cm (range, 2 to 11 cm). Stapler-related complications occurred in three patients. One of these patients developed a postoperative anastomotic leak, which necessitated a defunctioning colostomy. Two anastomotic strictures occurred following either an anastomotic leak or postoperative radiation therapy. Early incontinence to gas, night-time anal soilage, and urgency occurred in eight patients (30 per cent). These symptoms improved or disappeared within three months following operation. The authors' preliminary experience has shown the double stapling technique to have definite advantages. It obviates the use of lower purse-string suture and permits a lower and easier anastomosis. It avoids the problem of disparity of sizes of the two ends of the bowel. The rectum is not opened and fecal spillage is minimized. To date, results have been good without excessive complications. [Key words: Low anterior resection; TA 55 stapler; EEA stapler; Carcinoma of rectum]

IN 1980, NIGHT AND GRIFFEN¹ reported an improved technique for low anterior resection of the rectum, utilizing both the TA 55 and EEA Autosuture Stapling Instruments (United States Surgical Corporation, Norwalk, Connecticut). They stated that the use of this technique offered certain advantages, which permitted

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low rectal anastomoses to be done with greater ease and, perhaps, greater safety than either by hand sewing or by using the EEA instrument alone.

Because our own initial experience with the EEA instrument alone for low anterior resection was somewhat discouraging, we have used this newer double stapling technique as our procedure of choice, particularly for middle rectal carcinomas when resection is feasible. The following is a report of our early experience with this technique.

Material and Methods

Patients: There were 18 men and 8 women, ranging in age from 45 to 92 years (mean age, 65 years). All had well-differentiated or moderately well-differentiated adenocarcinoma of the rectum. The preoperative level of the carcinoma ranged from 4 to 16 cm (mean, 9.7 cm). None of the patients received preoperative radiation. However, two received postoperative radiation therapy.

Surgical Technique: All patients had their rectal carcinomas removed using the following surgical technique.

The patient is positioned in the Trendelenberg-lithotomy position, using Lloyd-Davies stirrups for simultaneous access to both the abdomen and perineum. Our preference is for a midline lower abdominal incision. Abdominal exploration is then performed. The rectum and lower sigmoid are fully mobilized, and a decision is made as to whether the rectal tumor can be safely resected, allowing for adequate margins. It is important to stress that this operation should not be performed as a curative procedure if the "cancer operation" is compromised by inadequate margins, particularly distal to the tumor.

If the procedure is deemed feasible, a right-angled clamp is placed at the lowermost limits of the resection. The rectal segment distal to this is irrigated with distilled water to clear residual fecal content and to remove any desquamated neoplastic cells. The TA 55 stapler is then placed distal to the right angled clamp and fired (Fig. 1).

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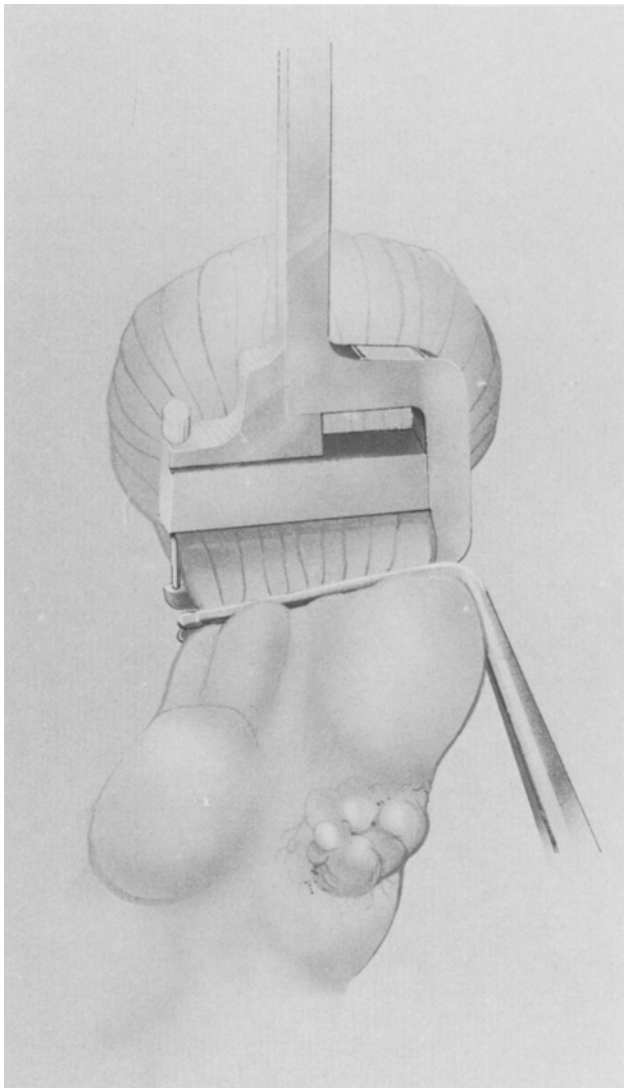


FIG. 1. The TA 55 stapler and the right-angled clamp are placed well below the tumor to ensure adequacy of resection. Transection of the bowel occurs between the two instruments.

A suitable point on the proximal sigmoid or distal descending colon is selected, and an Autosuture® purse-string instrument is positioned. A purse-string suture (No. 2-0 prolene) is then placed through the purse-string instrument. The specimen is removed by incising against the proximal side of the TA 55 instrument and the distal side of the purse-string instrument. The rectal stump is once again irrigated to check the horizontally placed TA 55 suture line.

After proper cartridge selection, the EEA stapler is introduced into the rectal segment with the anvil removed (Fig. 2). The shaft is centered in the rectal segment and passed through the rectal wall immediately adjacent and either anterior or posterior to the TA 55 staple line (Fig. 3a). The cartridge of the EEA instrument impinges on the

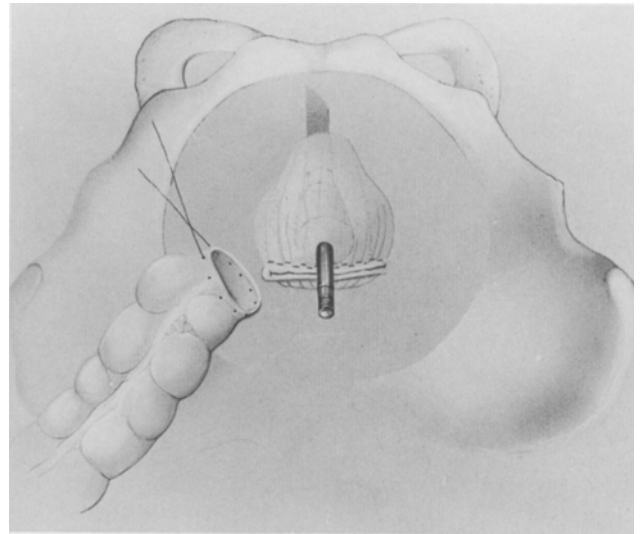


FIG. 2. The shaft of the EEA stapler is passed through the rectal wall at its middle point just anterior to the TA 55 horizontal staple line.

rectal stump staple line. The shaft of the instrument is fully extended and the anvil refitted (Fig. 3b). The proximal colon is placed over the anvil and the purse-string suture is tied securely around the shaft and cut (Fig. 3c).

The EEA instrument is closed and fired (Fig. 4). The instrument is then opened, disengaged from the anastomosis and removed. A circular end-to-end inverting anastomosis is created (Fig. 5). At times, the EEA instrument will cut through, incorporate, and remove staples placed by the TA 55 stapler (Fig. 5). A non-crushing clamp is then applied proximal to the anastomosis, and the rectum is once again irrigated to check the integrity of both the horizontal TA 55 and the circular EEA staple lines (Fig. 6). The surgery is completed by wrapping the greater omentum around the anastomosis and draining the presacral space with a closed suction system.

Twenty-three patients (88 per cent) underwent curative resections. Three had palliative resections.

Results

Patients: Follow-up has been 2 to 16 months (mean, 10 months). All patients are alive and there have been no early local recurrences or new distant metastases. The postoperative level of the anastomosis has ranged from 2 to 11 cm (mean, 5.5 cm).

Complications: *Stapler-related.* The stapler-related intraoperative complications are summarized in Table 1. In one patient, an incomplete tissue ring was found. When the anastomosis was tested, a leak was found and repaired. Inadvertent perforation of the rectum occurred in one patient, as the shaft of the EEA instrument was introduced. This site was used for the anastomosis. In the

FIG. 3. (A) The shaft of the EEA stapler is extended. (B) The anvil is refitted. (C) The proximal colon is fitted over the anvil and the purse-string suture is tied around the shaft of the instrument and cut.

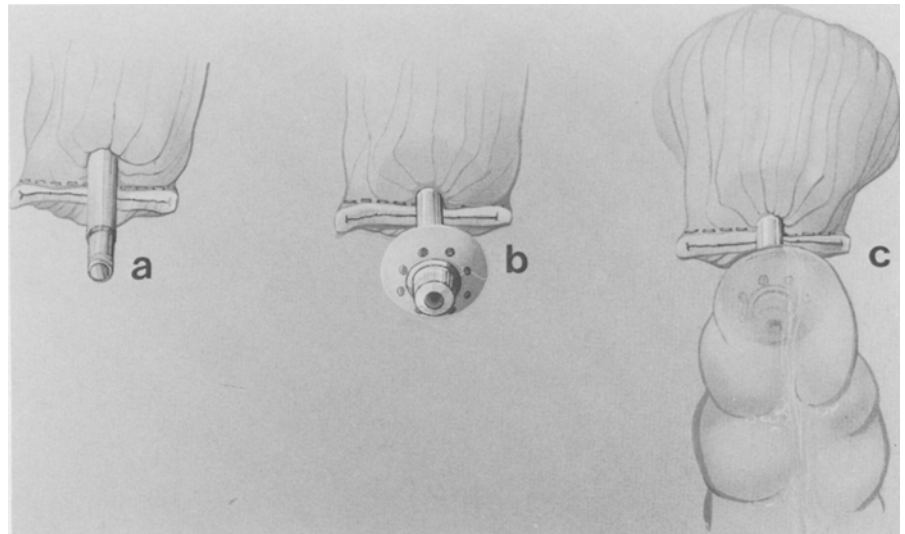
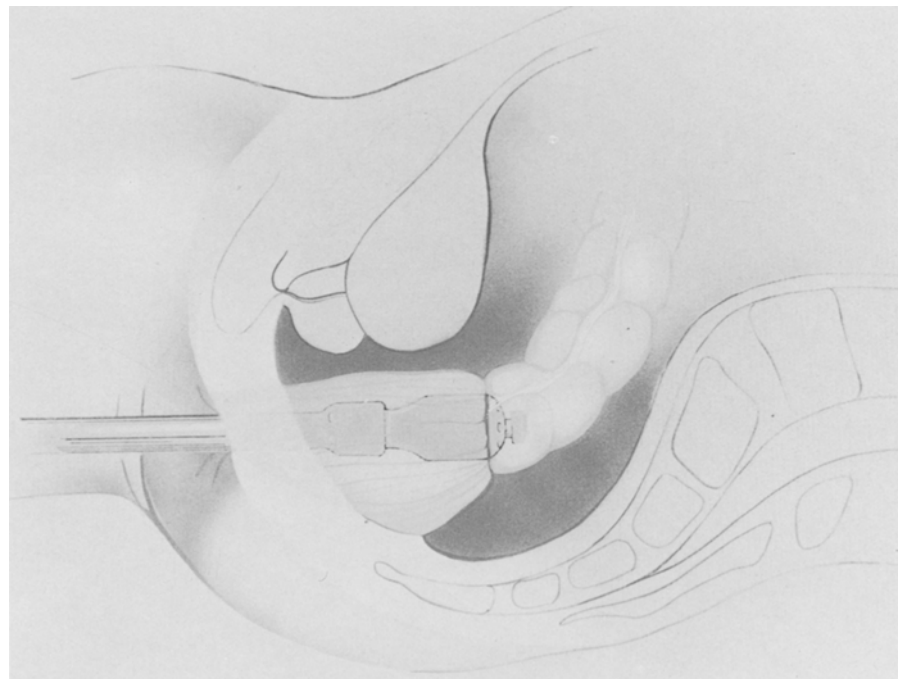


FIG. 4. The ends of the bowel are brought together by closing the EEA instrument. The stapler is then fired, disengaged from the anastomosis, and removed.



same patient, a split was made in the sigmoid colon during introduction of the "sizing" instrument. The defect was not discovered until the rectum was irrigated following completion of the anastomosis. A repair was performed with interrupted 3-0 silk sutures, and this patient had an uneventful postoperative course.

The rectal tissue ring was found to be absent from the EEA instrument in one patient. It was subsequently found by intraoperative sigmoidoscopy to be intact and attached to one of the cut-through ends of a TA 55 staple. This patient had no postoperative complications.

Other: There was one wound infection. One patient developed a postoperative anastomotic leak which required a defunctioning colostomy. This was the same patient who had an incomplete rectal tissue ring intraoperatively. Two patients in this series had postoperative radiation; in one, an anastomotic stricture developed. This has required dilatation under anesthesia on one occasion.

Functional Results: These results are summarized in Table 2. Twenty of 26 patients were completely continent. None were completely incontinent. Six patients expe-

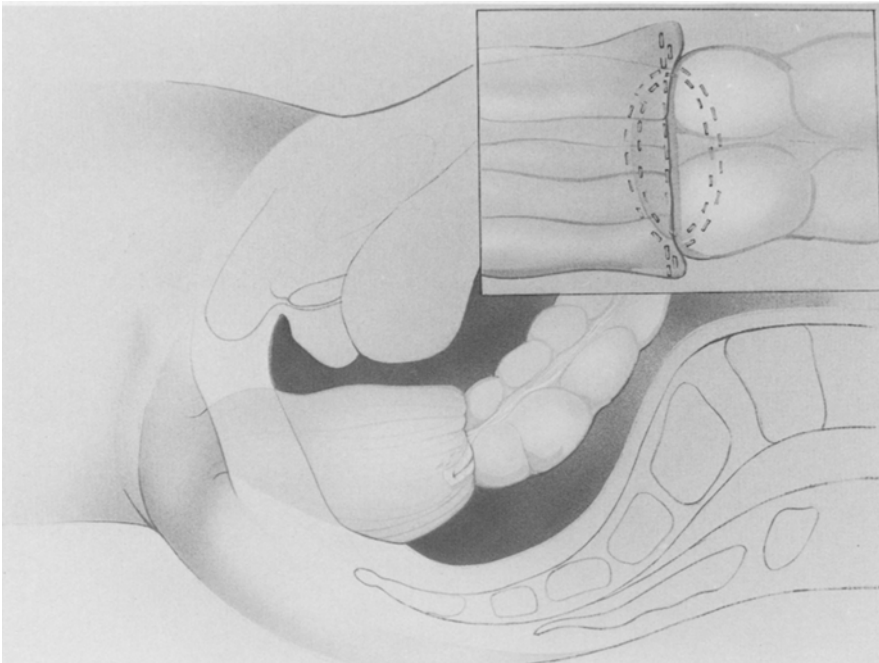


FIG. 5. An inverting end-to-end anastomosis is created. The insert shows the circular staple line of the EEA instrument, superimposed on the horizontal staple line of the TA 55 instrument.

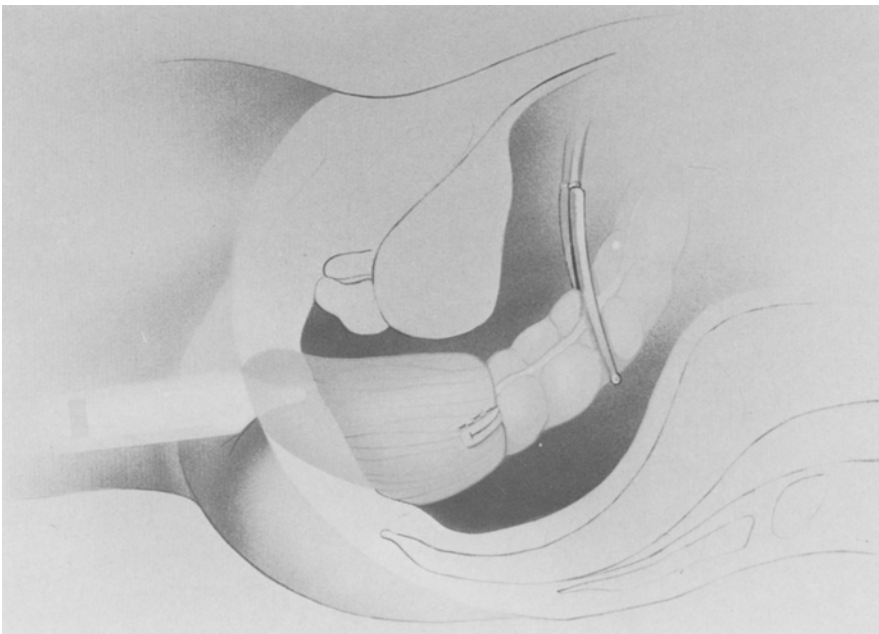


FIG. 6. After completion of the anastomosis, the rectum is irrigated with distilled water under pressure to check for any leaks. If found, they are repaired under direct vision.

rienced some night time anal soilage and occasional incontinence to gas. Also, urgency and occasional pelvic pain occurred in eight patients. These symptoms of incontinence to gas, night time anal soilage, and urgency disappeared or improved significantly within three months following surgery.

Discussion

There is general consensus that colorectal anastomosis using stapling instruments is as safe and reliable (and

sometimes superior to) handsewn anastomoses.²⁻⁵ Beart and Kelly⁶ compared stapled and handsewn anastomoses for lesions at similar levels in the rectum and distal sigmoid colon. They concluded that the complication rate was similar, but approximately eight minutes of operating time was saved with the EEA stapled anastomosis. More importantly, there was a group of patients in their series whose lesions could only be removed safely using the EEA stapler. There is little doubt that the EEA stapler allows for a lower anastomosis than could safely be done

TABLE 1. Stapler-related Intraoperative Complications

Complication	Number of Patients
Incomplete rectal tissue ring	1
Perforation of rectum	1
Split of sigmoid colon	1
Rectal tissue ring absent	1

TABLE 2. Early Functional Results*

Complete continence	20
Complete incontinence	0
Occasional incontinence	6
Urgency	8

* n = 26.

by a handsewn technique from an abdominal approach.⁵⁻⁶ This fact was confirmed by our own experience. However, a significant incidence of complications did arise, particularly when very low anterior resections were attempted. We felt that most of the complications were related to placement of the distal purse-string suture and to the fact that bowel ends of varying sizes were being anastomosed.

The double stapling technique herein described has definite advantages. It obviates the use of a distal purse-string suture by placing a double row of TA 55 staples across the lowermost resection margin. This instrument can be placed very low in the pelvis without difficulty and, in our experience, is easier to place than a purse-string suture inserted from the abdominal or anal⁷ approach. Two of our patients had their resection margin at the level of the levators. Only the original nondisposable TA 55 instrument has been used.

When the shaft of the EEA instrument is inserted into the rectal stump, extreme care must be taken. The shaft must be guided by an abdominal operator and directed into the middle of the remaining rectal stump. This will avoid inadvertent perforation of the rectum, which occurred in one of our patients.

The anastomosis created using this technique is exact. There is no disparity of sizes of the two ends of bowel, which one is attempting to anastomose. The circular anastomosis created usually cuts through previously placed TA 55 staples. There has been no difficulty cutting through this staple line using the nondisposable EEA stapler. We have not attempted to use the disposable EEA stapler for this procedure. A theoretical criticism of this procedure could be related to the actual site of the circular staple line. If it does not cut through the TA 55 staple line, then it might create an acute angle or a small space (which has a poor vascular supply) between the two staple lines. Although we have had the circular staple line in various positions with regard to the horizontal staple line, we have not had complications related to blood supply. The one patient who developed an anastomotic leak did so because of intraoperative difficulties related to

an incomplete tissue ring. A significant anastomotic stricture also occurred in only one patient and was probably related to postoperative irradiation or to the small cartridge size (25 mm) used in this case.

We have attempted to use 31-mm cartridges in all cases. However, in some, this was not possible and necessitated using the 28-mm cartridge in seven patients and the 25-mm cartridge in one patient. Use of the sizing instrument led to splitting of the sigmoid colon in one patient. This complication was not recognized until the rectal segment was irrigated after completion of the anastomosis. We have not performed sigmoidoscopy routinely after completion of the anastomosis, but we would strongly recommend that the integrity of the anastomosis be tested in some way. Our preference is for irrigation of the rectal segment with water after gentle pressure.

Another advantage of the double stapling technique is that the rectal segment is not opened, thus minimizing contamination. Sepsis has not been a major problem, with only one patient developing a minor wound infection.

Functional results have been excellent. For these very low anastomoses, occasional incontinence to gas, night time anal soilage and urgency, and pelvic pressure, associated with defecation, have been transient findings. Almost all of these symptoms disappeared within the first three months following surgery.

Although we have not yet seen any local recurrences, it must be stressed that our experience is still preliminary. It is important to reiterate that any form of sphincter-saving operation should not compromise in any way a curative resection for a mid or low rectal carcinoma.

In summary, the double stapling technique has allowed, in our hands, a lower and safer anastomosis than could be performed by hand or with the EEA stapler alone. To date, the results have been good and the complication rate low.

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