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HOW I DO IT

Intracorporeal Stapled Ileocolic Anastomosis with Mechanical Closure of the Enterotomy After Minimally Invasive Right Colectomy for Cancer: Introduction of a New Technique

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Introduction

Laparoscopic colectomy for colon cancer is worldwide well consolidated nowadays. Since the 1980s, the use of stapling devices has changed the practice of colorectal surgery particularly for left colectomies and anterior rectal resections. For right colectomies and transverse colon resections, the optimal type of anastomosis is less codified. Many authors have investigated the differences between minimally invasive extra- and intracorporeal anastomosis after right colon resections reporting that intracorporeal anastomosis is associated with a better cosmesis and earlier recovery of postoperative bowel function without significant differences of intraoperative and postoperative complications.[1,2] However, intracorporeal anastomosis is a more demanding procedure, particularly as concerns the closure of the enterotomy, as compared with extracorporeal technique.[3] For this reason, to date, the majority of surgeons prefer minimally invasive hand-sewn closure of the enterotomy.

A new technique of intracorporeal closure of the enterotomy is clearly described below in a step-by-step fashion.

Description of the Technique

During laparoscopic approach, the patient is placed in dorsal lithotomy position with the surgeon standing to the patient's left, and 5 ports are consecutively placed. A 10-mm optical port is placed off midline 1 cm caudal to the umbilicus, and further four working ports are placed under direct vision in the left middle (12-mm port) and upper quadrant (5-mm port), in the right upper quadrant (5-mm port) and in the suprapubic position (5-mm port) (Fig. 1a) The patient is placed in Trendelenburg position and in a left-lateral tilt of 30°. A medial to lateral dissection is routinely performed.

During robot-assisted approach, the trocars for robotic arms are usually placed on a conventional diagonal line from the pubic symphysis to the left subcostal mid-clavear line (Fig. 1b). Few authors employed a trocar placement on an unconventional horizontal line 3–4 cm above the pubic symphysis, separated by 6–8 cm each other depending on the size of the patient. There are no differences in operative technique between laparoscopic and robotic procedures.

After right-colonic resection, an isoperistaltic side-to-side ileocolic stapled anastomosis is performed with the application of a 60-mm linear stapler. A linear stapler with tri-staple technology is usually preferred (Fig. 2). Further four 3–0 standing stiches of absorbable or unabsorbable material are applied all along the enterotomy to uniformly lift up its edges. Particular attention is paid when placing the first two stitches in the two corners of the wide-open enterotomy (Fig. 3). A second 60-mm linear tri-stapler is then employed to mechanically close the enterotomy (Fig. 4). Finally, a few more hand-sewn stitches are placed to sink and reinforce both the anastomosis and the enterotomy suture. The first stitch is put in the lower corner of this suture, to bring the ileal stump and the transverse colon closer. Then, the enterotomy suture is reinforced with a couple of further stitches. Another stitch is then put where the two stapled sutures (the anastomosis and the enterotomy closure) are crossing each other. The final stitch is then placed in the upper corner of the anastomosis to decrease the risk of any eventual traction and to bring the colonic stump and the ileal loop closer (Fig. 5). Usually the mesocolon and

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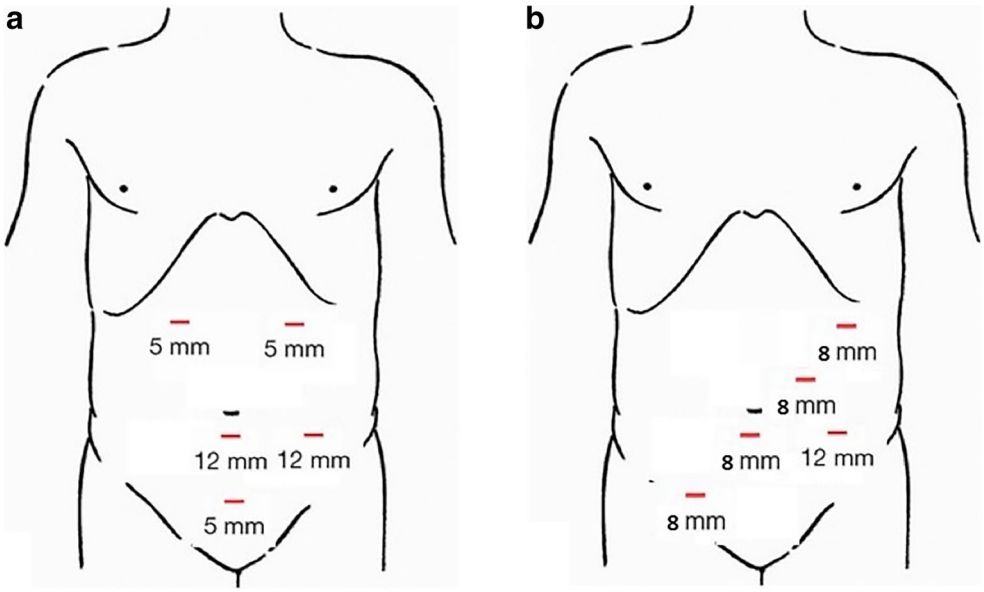

Fig. 1 Trocars placement for laparoscopic (**a**) and robot-assisted (**b**) right colectomy

the mesentery lying below the anastomosis are not brought and kept together by sutures (video in supplementary electronic material).

Results

From November 2016 to December 2019, 80 totally intracorporeal stapled ileocolic anastomoses were performed at the San Luigi University Hospital (Surgical Oncology and Digestive Surgery Unit, Orbassano, Turin, Italy) after 78 right colectomies (49 standard hemicolectomies and 29 right colectomies with complete mesocolic excision, CME, and central vascular ligation, CVL) and 2 ileocecal resections. We operated on 46 male and 34 female patients. Their average age was 71 ± 9.03. All these procedures were carried out with minimally invasive (MI) approach (74 patients with laparoscopic and 6 with robot-assisted technique). Consistent with data from worldwide referral centers, the conversion rate was very low (2.5%). The mean operative time was 195.12 ± 52.83 (220.72 ± 39.06 for CME + CVL patients and 181,00 ± 55.24 for nonCME patients). The mean operative time to fashion the anastomosis was 12.25 min (9.75 ± 13.90). No intraoperative complications were registered in this study population. A

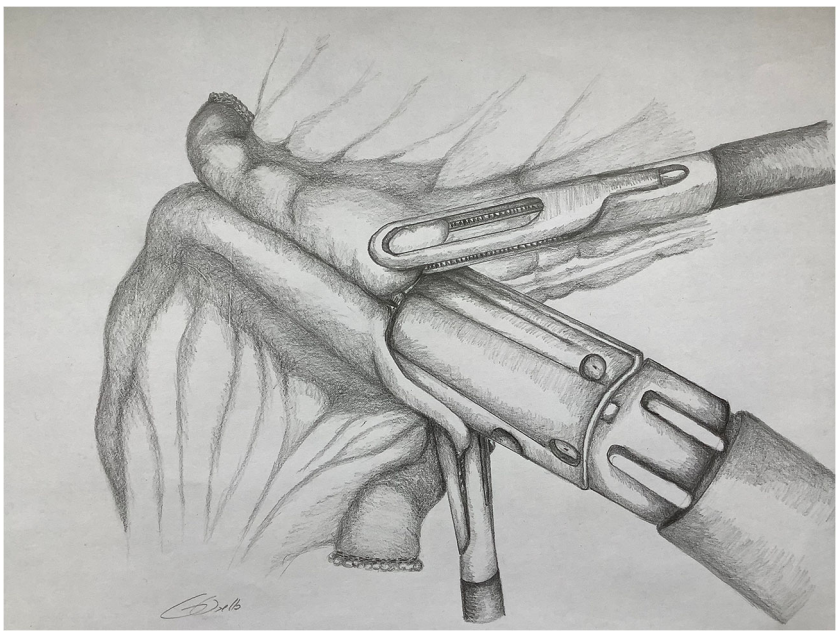

Fig. 2 Fashioning isoperistaltic side-to-side ileocolic stapled anastomosis with the application of a 60-mm linear stapler. A linear stapler with tri-staple technology is usually preferred

Fig. 3 Further four 3–0 standing stiches are applied all along the enterotomy to uniformly lift up its edges with the aid of grasping forceps

Clavien-Dindo IIIb postoperative complication was documented in 2 of these 80 patients (2.5%). One of them showed an anastomotic leak (1.25%), and the remnant had a bowel obstruction. Both of them required a second operation.

Discussion

Recently, early outcomes of intraoperative ileocolic anastomosis after minimally invasive right-sided colectomy have been reported in literature (1, 3). In these multicenter retrospective observations, the duration of surgery to fashion the anastomosis is documented as variable from 18 (15–25) to 19.30 ± 5.79 for totally hand-sewn anastomosis or mechanical anastomosis with hand-sewn closure of the enterotomy, respectively. Bleeding from the anastomosis is reported in 4.0 to 8.5% of patients. Anastomosis leaks are documented in 4.5% to 8.6% of procedures. As knotless tissue control devices (i.e., V-loc or Stratafix technologies) have a cost ranging from 30 to 45$ for each thread while the additional reload cost ranges from 100 to 200$ (according to the brand and to the different financial agreement between the providing company

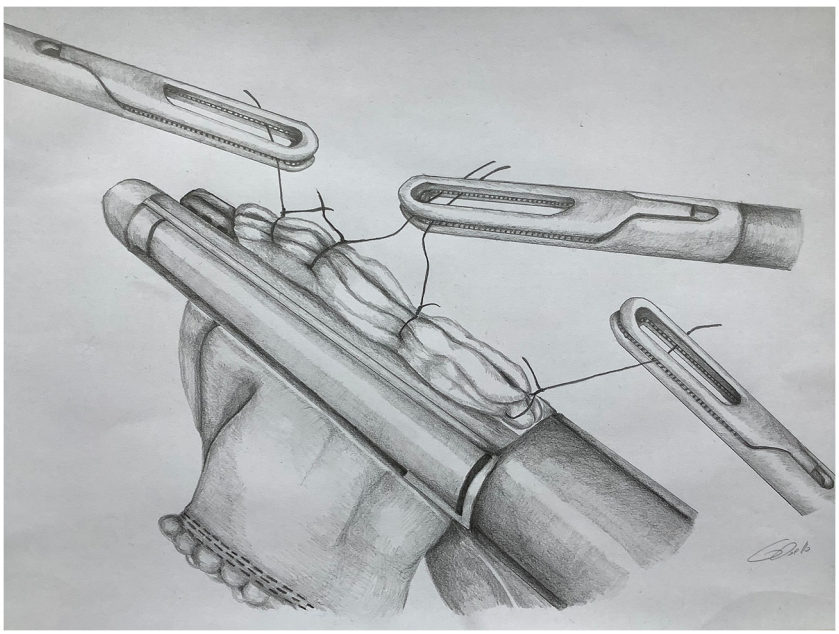

Fig. 4 A second 60-mm linear tristapler is then employed to mechanically close the enterotomy

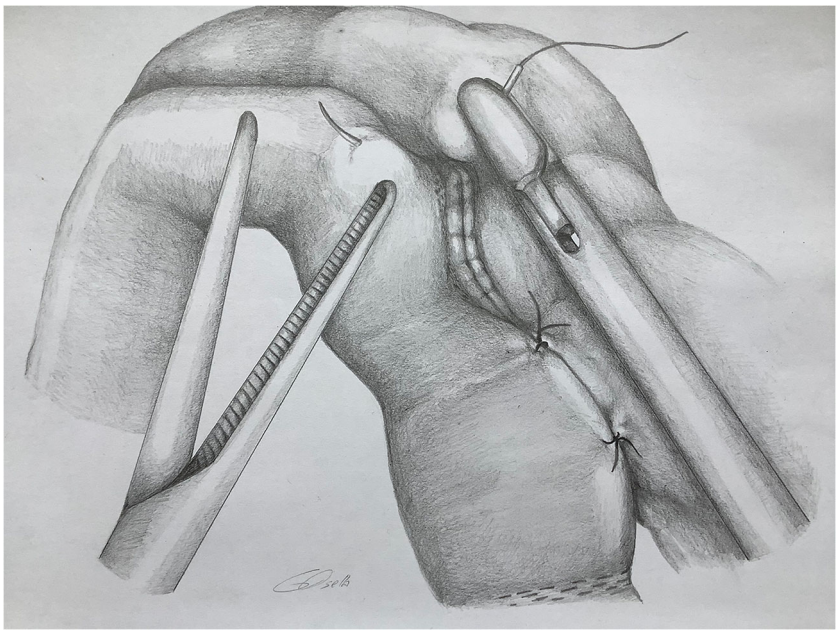

Fig. 5 A few more hand-sewn stitches are placed to sink and reinforce both the enterotomy and the anastomosis. The enterotomy suture is reinforced with 3–4 stitches. Another stitch is put where the two stapled sutures (the anastomosis and the enterotomy closure) are crossing each other. The final stitch is then placed in the upper corner of the anastomosis to decrease the risk of any eventual traction and to bring the colonic stump and the ileal loop closer

and each hospital administration), a cost difference of about 50 to 150$ should be calculated when applying this novel technique. However, when considering a large sample size, this cost difference could be positively balanced by a substantial decrease of anastomotic leak rate and therefore of total postoperative care costs.

In the present series, the adoption of a mechanical closure of the enterotomy with the application of a linear tri-stapler with the aid of 4 standing stiches applied all along the enterotomy to uniformly lift up its edges has decreased the mean time to fashion the anastomosis and significantly lowered the anastomosis leak rate.

Conclusion

This totally intracorporeal stapled side-to-side ileocolic anastomosis with mechanical closure of the enterotomy after minimally invasive right colectomy appears safe and feasible in this personal series of patients. Short-term operative outcomes (duration of surgery, intraoperative and postoperative complications, anastomotic leak, reoperation rate) are consistent with the best outcomes from worldwide referral centers for colorectal surgery.

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Authors' Contribution RR gave substantial contributions to the conception or design of the work, participated to the drafting of the work, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

AR gave substantial contributions to the conception or design of the work, participated to the drafting of the work, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

MD gave substantial contributions to the conception or design of the work, drafted the work and revised it critically for important intellectual content, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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