



Robotic Right Hemicolectomy, Medial-to-Lateral Approach

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5.1 Background

There is growing evidence in favor of robotic assistance in performing minimally invasive right colectomy [1]. Despite the lack of robust, high-level data on the topic, potential benefits in terms of conversion rate, proportion of reconstruction with intracorporeal anastomosis, and postoperative length of hospital stay have been reported in association with robotic surgery as compared to the more widespread technique of the “conventional” laparoscopic procedure [1–3]. Herein we report the details of our technique of a fully robotic radical right colectomy with intracorporeal anastomosis using a fourth-generation four-arm surgical robot (da Vinci Xi, Intuitive Surgical, Sunnyvale, CA).

5.2 Equipment, Patient Positioning and Operating Room Setup

Recommended main equipment:

- 30° endoscope
- fenestrated bipolar forceps

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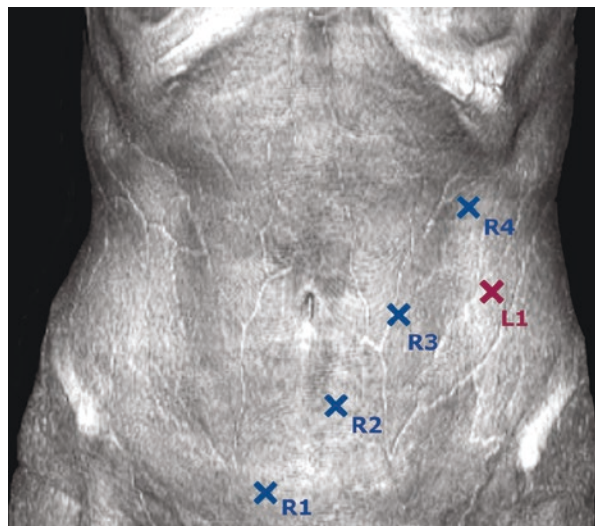
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- monopolar scissors
- large needle-driver
- VesselSealer (optional)
- robot-integrated (SureForm) or laparoscopic linear stapler.

The patient is placed in the supine position. A 10–15° Trendelenburg position is given, with a left lateral tilt (10–15°). The bedside surgeon(s) is on the left of the patient. Pneumoperitoneum is obtained using the Veress needle in the left hypochondrium. A standard laparoscopic 10–12-mm port (L1), and four robotic 8-mm ports (R1–R4) are placed as illustrated in Fig. 5.1. Robotic accesses are generally placed along an oblique line, which may vary according to the conformation of the abdomen, as well as to intra-abdominal anatomy. A general laparoscopic inspection of the peritoneal cavity is undertaken to confirm the preoperative diagnosis (i.e., identification of tumor location) and rule out signs of extra-organ disease. The terminal ileum and the ascending colon are exposed, while the small bowel is moved away from the mesenteric root and placed towards the left quadrants. The greater omentum and transverse colon are lifted cranially and to the left, so that the junction of the descending and horizontal segments of the duodenum becomes visible in most patients through the thin anterior visceral peritoneum of the pancreaticoduodenal bloc.

The robot is docked from the right side of the patient. Typically, R4 is used for monopolar scissors, which we favor for all dissections. The bipolar fenestrated forceps and the tip-up grasper are employed on R2 and R1, respectively. The 30° endoscope is installed in R3 throughout the surgery. The bedside surgeon utilizes the laparoscopic access to introduce gauzes and threads, and deliver irrigation and suction, as needed.

Fig. 5.1 Port setting. When a robot-integrated endostapler is used, a dedicated 15-mm robotic port is installed in R4



5.3 Technique/Procedure

By using the tip-up grasper the ileocecal junction is put under traction to place the ileocecal vascular pedicle on tension. An inframesocolic window is next opened by dividing the medial peritoneal fold. The genitourinary Gerota's fascia should be carefully preserved inferiorly, and the plane of dissection along the Toldt's fascia developed from medially to laterally. Identifying these embryological planes allows for a neat and precise mobilization of the right colon and mesocolon off the retroperitoneal structures. This dissection continues until the duodenum is revealed and care should be taken to maintain the dissection plane anteriorly. The ileocecal pedicle is thus prepared and the superior mesenteric venous axis is exposed. The ileocecal artery is divided proximally between hem-o-lok clips. The ileocecal vein as well as the superior mesenteric vein are thus dissected free to allow for a complete mesocolic excision. The ileocecal vein is then divided at its origin between hem-o-lok clips (Video 5.1).

The medial-to-lateral dissection is advanced to the lateral attachments of the paracolic gutter, while the mesocolic window is lifted superiorly by gentle and progressive traction by the tip-up grasper. Proceeding caudally, the ileal mesentery is divided and the terminal ileum transected using the 60-mm endostapler with white cartridge. During the dissection of the ileal mesentery, a small ileal branch of the ileocolic vascular pedicle is generally encountered and divided between hem-o-lok clips.

The dissection continues cranially through the fusion fascia of Fredet, exposing and preserving the inferior duodenal flexure and the head of the pancreas. This dissection is typically blunt, or accomplished sharply with minimal energy, to avoid thermal injury. When present, the right colic pedicle is thus prepared, doubly clipped, and divided. While the right colic artery is often found crossing anteriorly, the right colic vein is generally encountered as the only structure branching at a right angle from the lateral aspect of the superior mesenteric vein axis or emerging obliquely from the gastrocolic trunk of Henle (Video 5.1). At this point the medial-to-lateral dissection can be continued to take down the hepatic flexure. However, in most cases this is most easily accomplished from cranially. The transverse mesocolon is now tractioned caudally and the gastrocolic ligament is divided in its right portion to enter the lesser sac. Typically, the bedside surgeon aids with grasping the transverse colon while the tip-up grasper provides countertraction by retracting the greater epiploon cephalad. Once the right gastroepiploic arcade is identified to be preserved, R2 grasps the proximal transverse colon caudally and R4 dissects the transverse mesocolon from the mesogastrium from medial to lateral. Proceeding laterally, the hepatocolic ligament is similarly divided, conjoining the previous inframesocolic dissection plane and releasing the hepatic flexure. Once the mesocolic mobilization is achieved, the right branch of the middle colic vascular pedicle is identified and prepared. For this purpose, both an inframesocolic and supramesocolic approach can be employed, depending on the case. Our preference is to identify the middle colic axis from the lesser sac and divide its right branch with better visualization of the entire mesocolon and inferior border of the pancreas. The artery

and vein are typically clipped and divided selectively. The remainder of the transverse mesocolon is divided and the relative greater omentum is partitioned to include its right portion in the resection. The transverse mesocolon is next transected using the 60-mm endostapler with blue cartridge.

Lateral mobilization follows releasing the lateral attachments of the ileocecal junction and the right paracolic gutter, until the specimen is completely detached. The specimen is thus placed above the liver for later retrieval.

Our standard technique of reconstruction entails an isoperistaltic semi-mechanical side-to-side anastomosis accomplished using a 60-mm stapler and manual closure of the common enterotomy. To do so, the ileal and colonic ends are first approximated by placing a 3–0 stay suture in the lateral aspect of the anastomosis, with care taken to ensure that no torsions exist. This suture is then put under gentle traction by the third arm to aid in alignment of the two anastomotic ends, as illustrated in Video 5.2. A small enterotomy is thus created on the antimesenteric aspect of both bowel ends, using the monopolar scissors. An endostapler with a 60-mm blue cartridge is introduced through the enterotomies and fired. The stapler is gently removed and the anastomotic line is checked for hemostasis. The common enterotomy is now closed with an inner layer of a continuous Lembert suture, typically using a 3–0 barbed thread (Video 5.2). The final step includes an outer layer of some 3–0 interrupted Lembert sutures, which approximate the serosal layer and bolster the anastomotic line. The greater omentum is placed over the anastomosis and through the mesenteric defect, to provide protection against internal hernias and anastomotic leakage. The specimen is thus extracted through a mini-Pfannenstiel incision using a plastic wound retractor. Finally, the abdominal cavity is checked for adequate hemostasis, and generously irrigated with saline. We do not routinely use drains, which are placed only in the case of infection or abscess. The abdomen is carefully desufflated and the port accesses are closed.

With reference to the standard course of patients receiving a robotic right colectomy, ambulation is solicited immediately after surgery. On the first postoperative day the bladder catheter is removed and a semi-solid diet is started and advanced as tolerated. Typically, the patient is discharged home on postoperative day 3 or 4.

References

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