

Intracorporeal Anastomosis for Laparoscopic Right Hemicolectomy: Is it comparable to Extracorporeal Anastomosis?

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ABSTRACT

Background: Intracorporeal anastomosis (ICA) after laparoscopic right hemicolectomy for Rt side colonic cancer has advantages of less traction on mesentery, freedom to choose the extraction site. **Aim of the study:** To evaluate the feasibility of ICA after laparoscopic Rt hemicolectomy for Rt side colonic cancer and to compare short term complications between this technique and extracorporeal anastomosis (ECA). **Patients and methods:** From April 2015 to March 2017, 42 patients with Rt side cancer colon participated in this study. After laparoscopic Rt hemicolectomy was done ileo-coloic anastomosis was done by ICA in 19 patients and by ECA in 23 patients. Short term complications included (bleeding, paralytic ileus, anastomotic leakage and wound infection), time of surgery and sites of specimen extraction were compared in both techniques. **Results:** There were significant differences in the short term complications between both techniques. Time of surgery was significantly longer in ICA (172.54 ± 34.2 min) than ECA (136.26 ± 31.8 min). **Conclusion:** ICA after Rt hemicolectomy for Rt side colonic cancer is feasible and has short term complications similar to ECA, with the advantage of freedom to choose the extraction site of the specimen.

INTRODUCTION

Laparoscopic approach for cancer colon resection had been evidenced by many studies to be equivocal to open approach regarding radicality¹, and superior to the open approach regarding postoperative pain and recovery².

Laparoscopic right hemicolectomy is a standard approach for cancer cecum or ascending colon resection³. However, there's no evidence about the safest technique for ileo-colic anastomosis after resection⁴. The two preferred techniques at many centers are the stapled extracorporeal and intracorporeal anastomoses (ICA).

Intracorporeal anastomosis seems to be more technically demanding requiring long learning curve, however, its defenders seek more advantages; avoiding traction on mesentery while exteriorizing the anastomotic ends, freedom to choose the extraction site and more convenience in obese patients⁵.

Several studies were published, concluding that right colectomy with ICA is a safe and oncologically adequate procedure with benefits in short-term outcomes. ICA may lead to faster intestinal recovery, decreased length of stay and decreased morbidity mainly due to the reduced bowel manipulation and reduced traction on the

mesentery⁶⁻⁸.

At our center, we preferred the extracorporeal anastomosis (ECA) after laparoscopic-assisted right hemicolectomy, as it's more familiar after long experience with the open approach, however, after facing 2 complications due to misalignment of anastomotic ends, we started the intracorporeal technique for anastomosis hypothesizing that it could offer better results.

AIM OF STUDY

The aim of current study is to evaluate the short term outcomes of intracorporeal anastomosis in comparison to extracorporeal anastomosis after laparoscopic right hemicolectomy in cancer of the right colon.

PATIENTS AND METHODS

Data Collection

Patients candidate for laparoscopic right hemicolectomy (LRHC) due to malignancy during the period between April 2015 to March 2017 at the Colorectal Unit, Ain Shams University were randomly distributed between 2 groups; Extracorporeal anastomosis (ECA) and Intracorporeal anastomosis (ICA) groups. Inclusion criteria were patients undergoing LRHC

due to proven cancer cecum, ascending colon or appendix, age ranged between 12 and 65 years. Exclusion criteria were conversion to open due to any reason, patients with special conditions that could impact the anastomosis leakage rate; age over 65 years, HB below 10 gm/dl, uncontrolled DM, chronic liver disease and patients on chronic steroids use.

Preoperative data were collected from all patients including age, sex, co-morbidities, location and extent of the tumor. Postoperative follow-up during hospital stay, follow-up visits every week for one month, then monthly for 3 months. Patients were observed for postoperative leakage, stricture and wound infection.

Surgical Technique

The operation was performed under general anesthesia. Prophylactic antibiotics were given in the form of 3rd generation cephalosporin and parenteral metronidazole.

Patient is placed supine in the Lloyd-Davies position. The main surgeon and Camera-man standing on the left side while the assistant between patient legs. Laparoscopy tower on the right side of patient. Four trocars placed: one at the umbilicus for insertion of the optical telescope and the other three in the left hypochondrium and two iliac fossae to act as working ports.

The ileocolic vessels are dissected and divided at their origin, then retroperitoneal dissection of the right mesocolon from medial to lateral direction to mobilize the right colon and completed by lateral mobilization from the parietal peritoneum. The hepatic flexure and proximal transverse colon were mobilized from the liver and by dividing the gastro-colic ligament.

Intracorporal anastomosis:

A transection of the ileum and colon using an Endo-GIA stapler (figure 1). The cut ends were approximated using a stay suture, then a side to side anastomosis was created by a 45 mm endostapler via two enterotomies at the two ends (figure 2). Then, the two ends were anastomosed to form a single pouch. The enterotomy site is closed by continuous stitch (figure 3). The mesenteric defect was closed by simple stitches (figure 4). The specimen was extracted from a pfannenstiell incision in females with previous caesarian section, or from the right iliac fossa or transverse right lumbar incision.

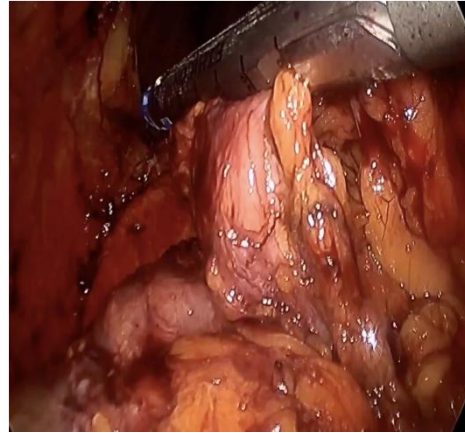


Figure 1: Endostapler used to divide the colonic end of the specimen from transverse colon.

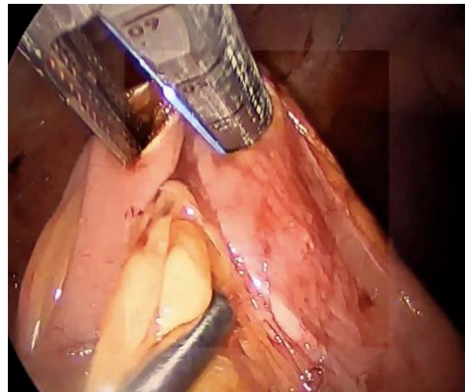


Figure 2: Side to side anastomosis of the 2 ends by endo-GIA stapler 45 mm.

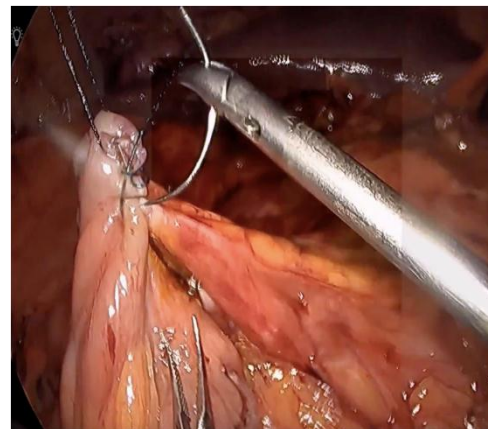


Figure 3: Closure of the enterotomy by continuous stitch.

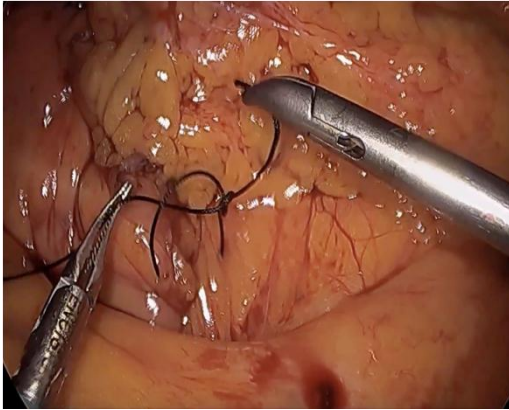


Figure 4: Closure of mesenteric defect by simple stitches.

Extracorporeal anastomosis:

After full mobilization of the right colon, a transverse right lumbar incision was done and the mobilized colon exteriorized. A towel protecting the incision from seedling by the specimen was

always used. A transection of the colon and ileum was done and the cut ends were anastomosed with a linear GIA stapler. Mesenteric defects were closed by interrupted stitches.

RESULTS

Forty-eight patients were candidates for laparoscopic right hemicolectomy for cancer at the period between April 2015 to March 2017 at the Colorectal Unit, Ain Shams University, Egypt. Six patients were excluded due to conversion to open (n=4), age above 65 years (n=1) and chronic liver disease (n=1). The included 42 patients were randomly distributed into 2 groups; Extracorporeal anastomosis (ECA) and Intracorporeal anastomosis (ICA).

Patients' demographics (Table 1)

The 2 groups had no significant difference regarding the mean age, gender and BMI.

Table 1: Patients' demographics

	ECA (n=23)	ICA (n=19)	P value
Mean Age	53.41	48.79	NS
Gender	9 females, 14 males	11 females, 8 males	NS
Mean BMI	23.46	28.82	NS

Operative characteristics (Tables 2-4)

The tumor site was insignificantly different at both groups, and consequently the extent of resection that was tailored according to tumor site showed also no significant difference between both groups. The specimen extraction site was restricted to the transverse right lumbar incision in

case of ECA while it was variable in case of ICA as the specimen was resected intracorporeally and freely delivered from the transverse right lumbar incision (47.36%) or the pfannenstiel incision (21%) in females with previous caesarian section scar or from the right iliac fossa incision (31.57%).

Table 2: Tumor site

Site	ECA	ICA	P value
Cecum	47.82% (n=11)	52.63% (n=10)	NS
Appendix	4.34% (n=1)	0	NS
Proximal Ascending colon	30.43% (n=7)	31.57% (n=6)	NS
Hepatic Flexure	17.39% (n=4)	15.78% (n=3)	NS

NS: Non-Significant difference

Table 3: Extent of resection

	ECA	ICA	P value
Laparoscopic RHC	52.17%(n=12)	52.63%(n=10)	NS
Laparoscopic Extended RHC	47.82%(N=11)	47.36%(n=9)	NS

RHC: Right hemicolectomy

Table 4: Specimen extraction site.

Specimen extraction site	ECA	ICA
Transverse Right Lumbar	23 (100%)	47.36% (n=9)
Right Iliac fossa	0	31.57% (n=6)
Pfannenstiel incision	0	21% (n=4)

Outcomes (Table 5)

The mean operative time was longer in case of ICA by 36 minutes, yet no statistical significance was observed between the 2 means. The overall intraoperative complications; bleeding and organ injury were ECA 17.39%, ICA 15.7% that showed no statistical significance. The most

feared postoperative morbidity which is anastomotic leakage occurred in one case per each technique and wound infection especially at specimen extraction site was slightly higher in ECA as was expected, yet it didn't statistically show inferiority below ICA.

Table 5: Study outcomes.

Variable	ECA	ICA	P value
Mean Operative time (minutes)	136.26±31.8	172.54 ±34.2	Significant
Intra-operative Complications(bleeding, organ injury)	17.39%	15.78%	NS
Anastomotic Leak	4.3% (n=1)	5.2% (n=1)	NS
Wound Infection	13.04%(n=3)	10.52%(n=2)	NS
Paralytic ileus	17.39% (n=4)	17.78% (n=3)	NS
Mean Postoperative hospital stay (days)	8.24	7.56	NS

DISCUSSION

Laparoscopic colectomy has proven by evidence its advantages over open surgery as an effective and feasible alternative with similar oncological outcomes, yet it has more advantages regarding postoperative pain and recovery⁹⁻¹⁴. Two techniques for anastomosis after laparoscopic right hemicolectomy are known; ICA and ECA. The use of each technique is justified by several studies and supported by several privileges claimed by defending surgeons.

Intracorporeal anastomosis has an advantage over extracorporeal regarding more freedom to choose the extraction site of the specimen, however it's more technically demanding and requires a certain point of experience to perform it with no much delay or harm to the patient¹⁵.

In our experience we performed 19 cases of intracorporeal anastomosis after laparoscopic right hemicolectomy with mean operative time 172 mins, actually this mean is significantly lengthier than extracorporeal anastomosis (136 mins) and not in line with the operative times published at many studies, this is due to our team were at the start of the learning curve at the first few cases^{16,17}.

The rate of anastomotic leakage was non-significantly different between intra and extracorporeal anastomosis techniques. This agrees with the dehiscence rates published at many studies^{17,18}. The case of anastomotic leakage after intracorporeal anastomosis presented with toxic signs of anastomotic leakage, patient was explored with bowel diversion.

Regarding the incidence of surgical site infection, there was no significant difference between both techniques (IC 10.52% vs EC

13.04%). Other studies have shown rates up to 10.3 %¹⁹. A recent publication comparing the use of plastic ring wound protector versus not using it finds no differences in preventing the surgical site infection although they claim it can be useful for preventing potential seeding of tumor cells along the extraction site²⁰. In our series, we recorded no cases of tumor implants in the abdominal wall.

The most common postoperative complication was surprisingly paralytic ileus (17.39% ECA and 17.78% ICA) that was resolved by conservative treatment at all cases. This was in line with the results of a study performed by Abrisqueta et al that showed similar postoperative outcomes²¹.

Few studies discussed pfannenstiell incision as an extraction site and showed its benefit to decrease the incidence of incisional hernia¹⁸. We chose pfannenstiell incision as a specimen extraction site after intracorporeal anastomosis at 6 females with pfannenstiell scar after previous caesarian sections, and the reason was a better cosmetic outcome and justified by studies that used that incision to reduce incidence of incisional hernia^{22,23} yet, the short-term follow-up didn't enable the study of incisional hernia incidence.

The study was limited by a pretty small sample size and short term follow-up that hinders the study of oncological outcomes.

CONCLUSION

Intracorporeal anastomosis showed similar short-term results to the extracorporeal anastomosis after laparoscopic right hemicolectomy for cancer of ascending colon with advantage of freedom to choose sites of specimen extraction. Extension of the study period and sample size are recommended.

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