Intracorporeal vs extracorporeal ileocolic anastomosis in laparoscopic right hemicolectomy

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ABSTRACT

Introduction: Anastomotic leak after ileocolic anastomosis influences morbidity and mortality of a patient. Therefore, protection of ileocolic anastomosis is of paramount importance in laparoscopic right hemicolectomy.

Methods: A retrospective study of seventy-nine patients who belong to American Society of Anaesthesiologists physical status classification class 1 and 2 who had undergone laparoscopic right hemicolectomy due to caecal or ascending colonic pathologies were selected for the study. A comparison between the two groups of patients who had undergone intracorporeal vs extracorporeal ileocolic anastomosis was done with regards to occurrence of anaestomotic leaks, paralytic ileus, duration of hospital stay and duration taken to tolerate a soft tissue.

All patients were managed in high dependency units with optimum facilities under fast-track category. Every patient was under patient-controlled analgesia for pain control.

Results: Of the 79 patients studied, 40 had intracorporeal anastomosis (ICA) whereas 39 had extracorporeal anastomosis (ECA). Age range of the patients was 40 - 75 years. Out of the 40 patients who had ICA, only one patient developed anastomotic leak and out of those who had ECA, 3 patients had anastomotic leaks (p=0.36). Two out of 3 patients who had anaestomotic leaks following the ECA, underwent lower midline laparotomies to rectify the leak. Four (4/40, 40%) patients in ICA group and 6 (6/39, 60%) patients in the ECA group had developed post op paralytic ileus (p=0.52). Average durations of hospital stay were 4 and 5 respectively for ICA and ECA groups and both groups were able to tolerate a soft diet on post operative day 2.

Conclusions: ICA has improved the outcome of ileocolic anastomosis in the studied group of patients compare to ECA, although the observed differences between the two groups were not statistically significant.

Keywords: *Extracorporeal, intracorporeal, ileocolic anastomosis, laparoscopic, right hemicolectomy.*

Introduction

Intracorporeal ileocolic anastomosis (ICA) and extracorporeal ileocolic anastomosis (ECA) are two well established techniques for restoration of bowel continuity after laparoscopic right hemicolectomy (LRH) In intracorporeal anastomosis, end to side anastomosis is done with endo-GIA staplers.

However, in extracorporeal anastomosis, end to side anastomosis is done with linear cutters. Most of the patients who underwent LRH had insufficient mesenteric blood supply as a result of ongoing atherosclerotic disease, increasing the risk of bowel ischaemia and anastomotic leak (1).

Anastomotic leak following LRH for caecal and ascending colonic pathologies influences morbidity and mortality of the patient (2). In addition, prolonged intensive care unit stay results in drainage of hospital resources. Therefore, protection of ileocolic anastomosis is of paramount importance in LRH. Though both ICA and ECA techniques are used, benefits of ICA over ECA are well identified. Further, ECA is commonly used worldwide due to convenience (3). This study was designed to test the hypothesis ICA minimises the anastomotic leak following LRH (4).

Methods

A total of 89 patients with caecal and ascending colonic cancers underwent LRH at Diana Princess of Wales Hospital in United Kingdom, from November 2017 to September 2019. Out of them, 79 patients with the age range of 40 -70 years belonging to American Society of Anaesthesiologists Physical Status classification (ASAPS) class 1 and 2 were selected and retrospectively analysed in this study (ASA 1: A normal healthy patient example: fit, non-obese (BMI under 30), a nonsmoking patient with good exercise tolerance, ASA 2: A patient with mild systemic disease, example: patient with no functional limitations and a well-controlled disease (e.g., treated hypertension, obesity with BMI under 35, frequent social drinker, or cigarette smoker) (5).Ten patients were excluded due to poorly controlled comorbidities. Data were collected from the colorectal cancer registry of the hospital. When compared to 40 patients who had ICA, 39 patients had ECA during LRH. All patients were operated by an experienced colorectal surgical team including two colorectal surgeons and their registrars.

Open Hasson's technique was used to enter into the peritoneal cavity. In this technique, peritoneal access is taken under direct vision. Therefore a 10 mm supraumbilical port, a 5 mm suprapubic port, 12 mm left upper quadrant port and a 5 mm left lower quadrant port were inserted. Medial to lateral mobilization of terminal ileum, caecum, ascending colon and right half of the transverse colon was done. Ileocolic vessels were clipped with *Hem-o-lok*™ system (polymer looking ligation system) at the origin of superior mesenteric artery and were divided. Haemostasis was achieved with *LigaSure*™. Hemicolectomy specimens were delivered through 6cm submidline incision with the support of wound protector. Forty patients who underwent ICA with endovascular gastrointestinal anastamosis were followed by intracorporeal suturing with 3/0 polyglactin 910. Thirty-nine patients underwent ECA with linear cutters. All patients were managed in high dependency units with optimum facilities under fast-track category. Furthermore, everyone was under patient-controlled analgesia for pain control. Oral fluids were started on first postoperative day. Thereafter, duration of hospital stay, time taken to tolerate a soft diet, postoperative complications such as anastomotic leak and paralytic ileus were compared between the two groups.

Ethical approval for the study was obtained from the Diana Princess of Wales Hospital, Grimsby, United Kingdom.

Results

All operative procedures were uneventful. None of the laparoscopic procedures were converted to laparotomy at the initial stage. Out of the 79 patients included in the study, 40 and 39 patients had undergone ICA and ECA respectively.

The demographic details of patients are as follows (Figures 1, 2 and 3).

Out of the 40 patients who had ICA, only one (2.5%) patient developed anastomotic leak. It was managed conservatively and the patient was discharged on postoperative day 9. Out of those who had ECA, 3 (7.69%) patients had anastomotic leaks.There was no significant difference between ICA and ECA groups with regards to anastomotic leaks *(p*=0.36 *Fisher Exact test). Two (5.12%) out of 3 patients underwent lower midline laparotomies to rectify the leak. Unfortunately, 1 (2.56%) patient died due to irreversible septic shock.

Four (4/40, 40%) patients in ICA group had developed post op paralytic ileus when compared to 6 (6/39, 60%) patients with the same post-operative complication in the ECA group and the difference was not statistically significant between the two groups (*p*=0.52 *Fisher Exact Test) (Figure 4).

Patients with ICA had an average hospital stay of 4 days in comparison to an average hospital stay of 5 days in ECA group. Both ECA and ICA groups tolerated a soft diet from post-operative day 2.

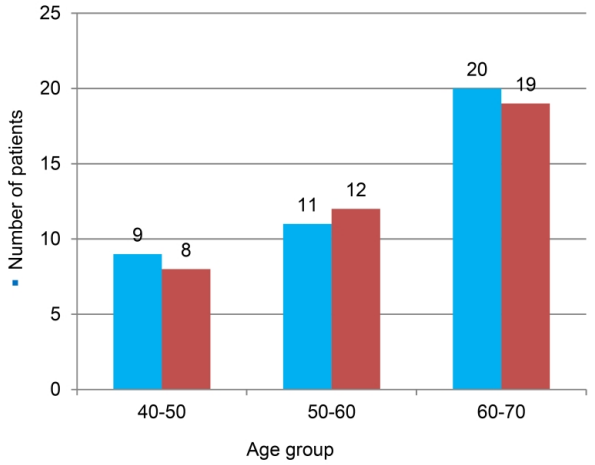

Figure 1: Age distribution in ICA and ECA groups

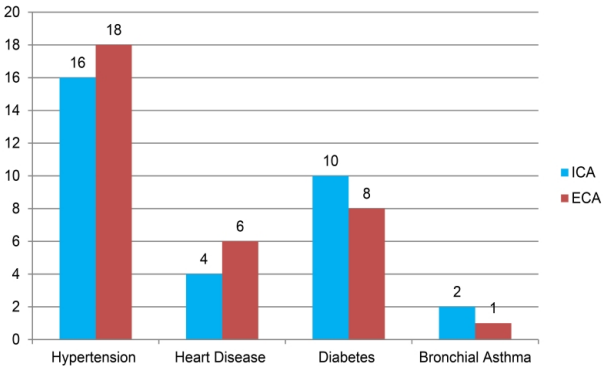

Figure 2: Gender composition ICA and ECA groups

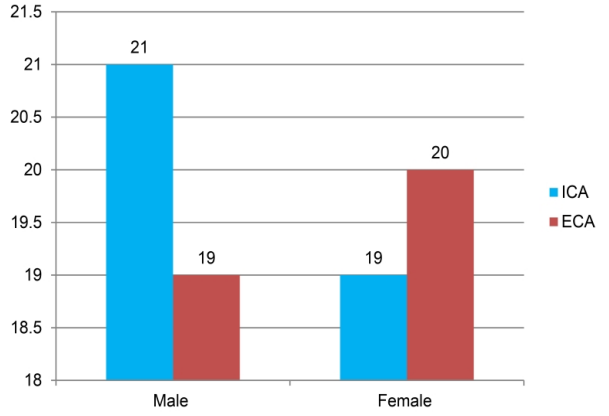

Figure 3: Co-morbidities comparison between ECA and ICA groups

Figure 4: Paralytic ileus comparison between ICA and ECA groups

Discussion

Ostendorp, *et al.,* (2017) did a systematic review on studies comparing the intracorporeal versus the extracorporeal performed anastomosis in laparoscopic right hemicolectomy. Primary outcomes were mortality, short-term morbidity and length of stay. In favour for the current study the short-term morbidity decreased significantly in ICA patients (6) and the length of stay decreased, but with serious risk of heterogeneity (7). Subgroup analysis shows evident even a larger decrease in short term morbidity and length of post-operative hospital stay.

In our study, the average duration of hospital stay is less in ICA group compared to ECA group though the numbers of patients compared were less.

Another study done on differences of outcomes among intracorporeal and extracorporeal anastomosis for minimally invasive right colectomy; a multi-center propensity score-matched comparison of outcomes, showed the minimally invasive intracorporeal anastomosis group had lower conversion to open rate, shorter hospital length of stay and lower complication rate from after discharge to 30-days than the extracorporeal anastomosis group. But as an adverse event showed a significantly longer operative time (7). In our study too, a similar picture was observed with lesser numbers of anastomotic leaks and post operative paralytic ileus in ICA group compared to ECA group though the differences observed were not significant.

An updated meta-analysis of randomised controlled trials on the comparison of the ICA and ECA in laparoscopic right colectomy was performed by

Zhang, *et al* in 2021. This analysis showed that there were no statistically significant differences between the two groups in duration of hospital stay, operative time, number of lymph nodes harvested, anastomotic leak, postoperative ileus, bleeding, bowel obstruction, reoperation, readmission within 30 days and death which was controversial to the present study.

Limitations

Though all the operations were done by experienced surgeons, different surgeons had different durations of experience in ileocolic anastomosis. Furthermore, they have used different laparoscopic instruments of different brands. Therefore, there are differences in individual maneuverability. The smaller number of patients involved might be the reason for inability generate statistically significant differences.

Conclusions

In the studied group of laparoscopic right hemicolectomy patients, though a higher number of anastomotic leaks and paralytic ileus were observed in ECA group compared to ICA group, the difference were not statistically significant. Prolonged duration of hospital stay were less common among patients with ICA in comparison to ECA. The time taken to tolerate a soft diet was equal between the two study groups. According to the findings of the current study, ICA has improved the outcomes of laparoscopic right hemicolectomy at the studied setting though the differences observed were not statistically significant.

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