ORIGINAL RESEARCH PAPER
Volume-6 | Issue-12 | December-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 93.98
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PARTIAL STAPLED VERSUS TOTAL STAPLED ILEOCOLIC ANASTOMOSIS IN RIGHT HEMICOLECTOMY: A RANDOMIZED CONTROL STUDY

Surgery

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ABSTRACT

Introduction: Functional end to end anastomosis (FEAA) is a commonly used anastomotic technique using staplers in right hemicolectomy (RH). It can be done in two ways either partially stapled or totally stapled technique. Our study aims at comparing the outcomes between two techniques of performing FEAA.

Materials & Methods: All patients who were planned for RH during Jan 2011- Dec 2014 were included. After mobilising right colon, they were randomized to either partially stapled (transecting ileum and transverse colon with linear stapler and hand sewn side to side anastomosis) (group A) or a standard totally stapled anastomosis (group B). Outcomes were compared between two groups in terms of operative time, blood loss, resumption of orals, anastomotic leak, surgical site infection and mortality. A p value of <0.05 was considered significant.

Results: 104 patients were randomized. 49 underwent partial and 55 underwent total stapled anastomosis. Demographic characteristics, nutritional status, BMI, pathology, emergency/elective surgery were comparable. Operative time was significantly less in total stapled group (123 vs. 94 mins; $p<0.0001$). Resumption of orals were earlier in total stapled group (4.25 vs. 3.5 days; $p<0.05$). Anastomotic leak, surgical site infection and mortality were similar. Mean Hospital stay was less in total stapled group (7.8 vs. 6.4 days, $p<0.01$).

Conclusion: Functional end to end anastomosis (FEEA) using Total stapled anastomosis is a safe anastomotic technique both in elective and emergency setting with shorter operative time, early oral resumption and reduced hospital stay.

KEYWORDS

Right hemicolectomy; stapled anastomosis; anastomostic leak

INTRODUCTION:

Right hemicolectomy is a commonly performed colorectal surgery where ileocolic anastomosis is done following resection. Several types of ileocolic anastomosis are described in literature. Basically they are classified as hand sewn or stapled anastomosis. Stapled anastomosis has gained popularity due to its simplicity, less time consuming and lesser learning curve [1, 2]. Stapler anastomosis can be either partially stapled or totally stapled. Anastomosis using staplers can be performed either end to side or a side to side anastomosis which is a functional end to end anastomosis (FEEA) [3]. There are many theories explaining the superiority of FEEA over end to side anastomosis and it has gained wider acceptance in stapler anastomosis [4, 5]. FEEA can be done in two ways. One is transecting ileum and transverse colon with linear stapler and then performing hand sewn side to side anastomosis (partial stapled) and the other one is standard technique where simultaneous transection and anastomosis is done using two linear staplers (total stapled). The aim of our study is to compare the outcomes between these two methods of FEEA using staplers.

MATERIALS & METHODS:

It is a randomized controlled study which included all patients who were planned for right hemicolectomy (RH) during the period January 2011- December 2014 at our institute. Study excluded patients who had neoadjuvant chemotherapy and those who did not undergo primary ileocolic anastomosis for various reasons. Demographic profile, nutritional status based on preoperative haemoglobin, BMI and serum albumin were noted. Indication for surgery (either benign or malignant condition) and the timing of surgery (elective or emergency) were noted in all patients. Initially right colon along with hepatic flexure, proximal third of transverse colon and terminal ileum were mobilized and prepared for resection. Before transection, they were randomized by opaque sealed envelope technique into two groups. Group A underwent partial stapled anastomosis and Group B underwent total stapled anastomosis.

In group A, after preparing transverse colon and ileum for transection, they were transected using linear cutting stapler and the specimen removed. The transected ends underwent side to side hand sewn anastomosis in four layers, outer layers with 3-0 polypropelene and inner layers with 3-0 polyglactin suture (Figure 1). Length of anastomosis was 7 cms. In group B, after preparing transverse colon and ileum for transection, enterotomies were made close to the intended transection site onto the specimen side and side to side longitudinal anastomosis is created using transverse linear cutting stapler (TLC 80). Later specimen is transected using another transverse linear cutting stapler distal to the enterotomy site (standard technique). The corners and cross staple line is imbricated with four 3-0 polypropelene sutures. One suture is placed at the distal end of the longitudinal staple line between the ileum and colon which adds strength to this end of the anastomosis. Two sutures are placed to invert each end of the transverse staple line. Finally, one inverting suture is placed at the point where the two staple lines intersect [6]. Hence in this technique simultaneous resection and anastomosis is done using staplers (Figure 2). The gap in the mesentery is closed and peritoneal drain is placed. Intra operative parameters such as duration of surgery and amount of blood loss were recorded in two groups. Postoperative recovery based on resumption of orals and duration of hospital stay was recorded. Postoperative complications such as anastomotic leak, surgical site infection and 30 day mortality in two groups were noted. Data was collected and analyzed using appropriate statistical tests and a p value of <0.05 was considered significant.

Figure 1. Partial stapled anastomosis
a. Transection of ileum and transverse colon using linear staple b. Side to side hand sewn anastomosis

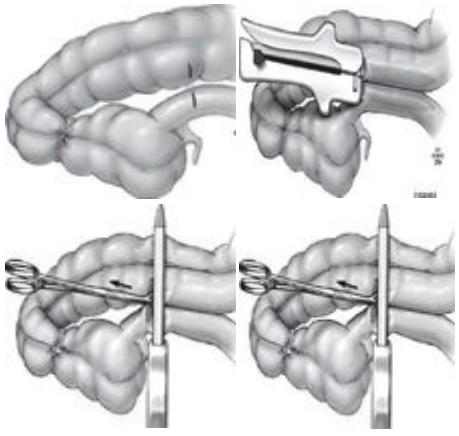

Figure 2. Total stapled anastomosis
a. Enterotomis on ileum and transverse colon b. Longitudinal side to side anastomosis using stapler c. Transection beyond enterotomies using stapler d. Four imbricating sutures to strengthen anastomosis.

RESULTS:
A total of 123 patients were planned for Right hemicolectomy during the study period. 15 patients were excluded as they did not undergo primary reconstruction and 4 excluded as they received neoadjunat Chemotherapy. After exclusion, 104 patients were randomized into two groups. 49 patients underwent partial stapled anastomosis and 55 patients underwent total stapled anastomosis (Figure 3).

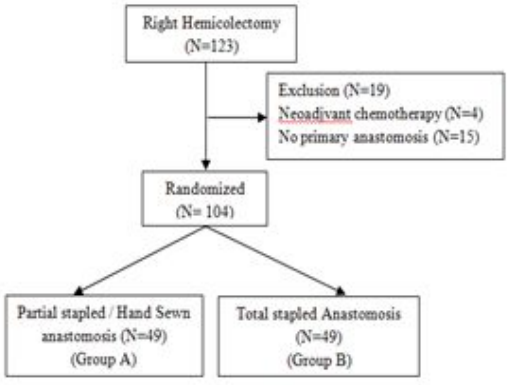

Figure 3. Consort diagram

Patient characteristics: Demographic profile and nutritional status (hemoglobin, BMI, serum albumin) of patients in two groups is shown in table 1. There were no significant differences in demographic characteristics. Nutritionally patients in two groups were comparable. The proportion of patients with benign and malignant etiology was similar. The most common benign etiology in both groups was ileocecal koch's whereas the most common malignant etiology was carcinoma cecum. Both groups had similar number of patients who underwent surgery as emergency. Intra operative parameters and postoperative recovery between two groups are compared in table 2. Operative time was significantly less in total stapled group ($p<0.0001$). Resumption of oral diet was early in total stapled group when compared to partial stapled group ($p=0.05$). Duration of hospital stay was shorter in total stapled group (0.01).

Table 1. Patient characteristics

	Partial Stapled (n=49)	Total Stapled (n=55)	P value
Male: Female	31 : 18	30 : 25	0.42
Age (Yrs)(Mean±SD)	45.35 ± 13.82	48.56 ± 14.38	0.25
BMI (Kg/m2)	21.11 ± 3.5	20.27 ± 3.3	0.21
Haemoglobin (g/dl) (Mean±SD)	10.14 ± 2.47	10.23 ± 2.64	0.86
Albumin (g/dl)	3.39 ± 0.48	3.43 ± 0.51	0.64
Benign : Malignant	16 : 33	16 : 39	0.69
Elective : Emergency	42 : 7	41 : 14	0.22

Table 2. Operative parameters & Postoperative recovery

	Partial Stapled (n=49)	Total Stapled (n=55)	P value
Duration of surgery (minutes)*	123 (110-180)	94 (85-155)	<0.0001
Blood loss (ml)*	127 (70-300)	132 (50-300)	0.67
Resumption of orals (Days)*	4.25 (2 -9)	3.50 (2 -9)	0.05
Length of hospital stay (Days)*	7.86 (5 - 17)	6.47 (4 -15)	0.01

*Mean (Range)

Complications: Post operative complications in two groups are compared in table 3. There were three patients with anastomotic leak in our study group, one in partial stapled group and two in total stapled group. In one patient with leak in total stapled group, the leak was a controlled fistula and the fistula spontaneously closed on conservative management. Two patients, one in each group required reexploration. Leak was found to be from staple site in both cases. In partial stapled group, leak was from the transected staple line of ileum and it was sutured. In total stapled group, leak was noted from the transverse staple line. As the defect was large, the anastomosis was dismantled, transverse colon end closed and ileal end was brought out as end ileostomy. Ileotransverse anastomosis was done after 6 weeks. There was no mortality in either group.

Table 3: Complications

	Partial Stapled (n=49)	Total Stapled (n=55)	P value
Surgical site infection	8 (16.3%)	7 (12.72%)	0.78
Anastomotic leaks	1 (2.04%)	2 (3.63%)	0.54
Mortality	0	0	0.000

DISCUSSION:
Anastomotic complications following colorectal surgeries are associated with increased morbidity and mortality, prolonged hospital stay and also poorer oncological outcomes [7]. Several anastomotic techniques have been developed to overcome this problem. Bowel anastomosis was conventionally performed using a hand sewn technique. Anastomotic techniques are mainly divided into hand sewn and stapled anastomosis. Stapled anastomosis has gained wider acceptance due to its proven safety, simplicity and less time consuming [1,2]. Functional end to end anastomosis (FEEA) is commonly performed anastomotic technique with use of staplers [8]. Studies have shown stapled functional end to end ileocolic anastomosis is associated with fewer leaks than hand sewn anastomosis [9]. Because of its wider diameter and superior blood supply, it reduces intraluminal pressure and proximal ischemia translating into decreased leak rates[10]. Steichen[11] suggested that the FEEA simplifies and hastens creation of the anastomosis and overcomes anastomotic complications. The anastomotic leakage rates following FEEA have been reported to range from 0 to 7.1% [12,13]. In a study by Puleo S[14], FEAA has disadvantage of longer stale line which may lead to higher leak rates and their study showed higher leak rates with FEEA when compared to end to side anastomosis. Another concern of FEEA is that it has two staple lines (longitudinal and transverse) that intersect at a point. Any point where two stapler lines or two suture lines intersect is a point at risk for leak as they are the weakest points in anastomosis [15]. FEAA is technically a side to side anastomosis. An alternate way to perform FEEA is transecting ileum and transverse colon with linear stapler and then performing hand sewn side to side anastomosis (Partial stapled technique). This technique has all advantages of FEAA, avoids intersection of stapler lines but has disadvantage of hand sewn anastomosis which consumes more time. There are no studies comparing these two techniques. Hence we have undertaken a prospective study comparing the operative results and complications between two techniques.

The age, sex, BMI and nutritional status in two groups was comparable. We have included both benign and malignant indications for RH in the study. Even though most of the studies have not included emergency surgeries, we have included both elective and emergency indications for RH as we have to prove its safety even in emergency setting. There were similar proportion of patients with malignancy and those undergoing emergency procedure in both groups. On assessing intra operative parameters, operative time was found to be

significantly less in total stapled group compared to partial stapled group (123 vs. 94 mins; p<0.0001). Postoperative recovery was better in total stapled group. Resumption of orals were earlier in total stapled group (3.50 vs. 4.25 days; p=0.05). Patients in total stapled group had shorter hospital stay compared to total stapled group (6.47 vs. 7.86 days; p=0.01). Postoperative complications were similar in two groups. The overall incidence of anastomotic leak was 2.8%. One anastomotic leak was noted in partial stapled group (2.04%) and two in total stapled group (3.63%). There was no mortality in either group.

In conclusion, the concern of increased anastomostic leak in standard FEEA due to longer stale line and staple line intersection has not reflected in the study. Functional end to end anastomosis using Total stapled anastomosis is a safe anastomotic technique both in elective and emergency setting with shorter operative time, early oral resumption and reduced hospital stay.

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