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Original Research Article **Colorectal Surgery**

Comparison of Functional Outcome of Straight Anastomosis and Transverse Colonic Pouch Anastomosis after Low Anastomosis after Low Anterior Resection for Low Rectal Cancer

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Abstract

Background: Functional results after low anterior resection for rectal cancer are an issue of increasing attention among colorectal surgeons and others interested in this subject. The aim of the study to compare the nocturnal bowel movement and frequency of bowel movement between TCP & SA groups after low anterior resection. This study also compare the urgency of bowel movement between two groups and the incontinence of flatus & loose stool between two groups. ***Methods:*** This prospective observational study was carried out in the Department of Surgery Bangabandhu Sheikh Mujib Medical University Shahbag, Dhaka, during 1st January 2016 to 30lh June 2017. For this purpose, a total of 40 patients with low rectal cancer undergoing low anterior or ultra-low anterior resection with TCP or straight anastomosis in the above mentioned hospital were both male & female patients and age group (18-75 years) were enrolled in this study. Data was expressed as mean with standard deviation (Mean±SD). Collected Data were statically analyzed applying student't' test and chi-square test using SPSS-24. P value of <0.05 was considered statically significant. ***Results:*** The mean age was 45.9±13.29 years in group-I and 47.55±10.86 years in group-II. Male female ratio was 1.2:1 in TCP group and 1.5:1 in SA group. Anal tone on 3rd month 1(5.0%) in group-I and 10(50.0%) in group-II. Anal tone was significantly ($p<0.05$) improve in group I at 3rd month. Finger grip on 3rd month 18(90.0%) in group-I and 19(95.0%) in group-II. Finger grip was almost alike between two group, no statistical significant ($p>0.05$) was found between two groups. ***Conclusion:*** Most of the patients were in 5th and above decade and male predominant. Transverse coloplasty pouch anastomosis provided not only better functional results than straight anastomosis, but also improved quality of life, thus may be the better choice.

Keywords: Straight Anastomosis, Transverse Colonic Pouch Anastomosis, Low Anastomosis Resection, Low Rectal Cancer.

INTRODUCTION

Low anterior resection syndrome is a constellation of symptoms, such as fecal incontinence or urgency, frequent or fragmented bowel movements, emptying difficulties, and increased intestinal gas, that occur after a sphincter-sparing resection (ie, anterior resection) of the rectum Colon and rectal cancer incidence was negligible before 1900. The incidence of co lorecta I cancer rose dramatically following economic development and industrialization. Currently, colorectal cancer is the third most common cancer and the third leading cause of cancer deaths in both males and females in the United States [1]. Adenocarcinomas comprise the vast majority (98%) of colon and rectal cancers. Other rare rectal cancers, including carcinoid 0.4%, lymphoma 1.3%, and sarcoma 0.3%, are not discussed in this article. Squamous cell carcinomas may develop in the transition area from the reetum to the anal verge and are considered anal carcinomas. Very

rare cases of squamous cell carcinoma of the rectum have been reported [2]. Approximately 20% of colon cancers develop in the cecum, another 20% in the rectum, and an additional 10% in the rectosigmoid junction. Approximately 25% of colon cancers develop in the sigmoid colon [1]. The incidence epidemiology, etiology, pathogenesis, and screening recommendations are common to both colon cancer and rectal cancer.

Currently, adults born circa 1990 have quadruple the risk of rectal cancer compared with those born circa 1950 [3]. Although the incidence of colon and rectal cancer varies considerably by country, an estimated 944,717 cases were identified worldwide in 2000. High incidences of colon and rectal cancer cases are identified in the US, Canada, Japan, parts of Europe, New Zealand, Israel, and Australia. Low colorectal cancer rates are identified in Algeria and India. The majority of colorectal cancers still occur in industrialized countries. Recent rises in colorectal cancer incidence have been observed in many parts of the Japan, China (Shanghai) and in several Eastern European countries [4]. The etiology of colorectal cancel' is unknown, but colorectal cancer appears to be multifactorial in origin and includes environmental factors and a genetic component. Diet may have an etiologic role, especially diet with high fat content. Risk is especially high in overweight and obese men and, paradoxically, in lean women. Risk was also increased in men and women who do not drink alcohol [5]. Smoking, particularly when started at a young age, increases the risk of colorectal cancer [6]. Possible mechanisms for tumor development include the production of toxic polycyclic aromatic amines and the induction of angiogenic mechanisms due to tobacco smoke. Approximately 75% of colorectal cancers are sporadic and develop in people with no specific risk factors. The remaining 25% of cases occur in people with significant risk factors most commonly, a family history or personal history of colorectal cancer or polyps, which are present in 15-20% of all cases. Other significant risk factors are certain genetic predispositions, such as hereditary nonpolyposis colorectal cancer (HNPCC; 4-7% of all cases) and familial adenomatous polyposis (FAP, 1%); and inflammatory bowel disease (IBD*;* 1% of all cases) [7].

The stapler is carefully removed, and the anastomotic "doughnut" is examined to ensure a good circular staple all around the anastomosis [8]. As mentioned previously, much of the background for LAR syndrome came from concern for pathophysiology of compliance and capacity of the SCAA. As the oldest and rust technique for low rectal anastomosis, subsequent studies of neorectal reconstruction techniques have focused on comparisons to SCAA. In practice, SCAA is used when length limitations on the proximal bowel exist or the pelvis is too narrow and not accepting of a J-pouch, coloplasty, or side-to-end anastomosis [8].

The TCP neoreservoir was first described ill 1999 by a Swiss colorectal group as an alternative to the SCAA and CJPAA. In a pig model, the study observed less volume with TCP as compared with CJPAA, and TCP was easier to perform and took less time, and qualitative observations on postoperative bowel function of TCP pigs claimed improved consistency and decreased urgency compared with SCAA and less incomplete evacuation compared with CJPAA [9]. The same Swiss group first described the technique of constructing a TCP in humans. The specimen is resected in typical rash ion, and the distal end of the remaining colon is used to make the eoloplasty. The distal end of the colon is attached to the anvil of an intraluminal stapler in a purse-string manner. Then, a 7- to 9-cm longitudinal incision is made on the antimesenteric side of the distal colon, starting at least 2 cm from the rim of the anvil (many studies quote 3-4 cm from the stapled edge). The antimesenteric incision is then closed transversely with a single layer of seromuscular absorbable sutures. The intraluminal stapler is inserted into the anus, the pouch is placed in the pelvis, and the stapler fired in the usual fashion [9].

Short-term follow-up of patients undergoing TCP by the Swiss group demonstrated the safety of TCP with a 7% anastomotic leak rate, and similar 6- and 8-month follow-up bowel dysfunction, though this was not directly compared with SCAA, SEAA, or CJPAA. [10] During follow-up, TCP patients exhibited better deferral of bowel movements and less nocturnal leakage, but more stool fragmentation at 4 months, but no differences in bowel function among 12 parameters were observed at 1 year. Quality of life scoring was also performed and showed no difference between the groups [11]. It is claimed that TCP, similar to pyloroplasty or stricturoplasty, gives an improvement in early functional outcome and decrease in late evacuation problems. The transverse coloplasty pouch (TCP) is technically simpler than J-punch and can be performed in presence of short or thick mesocolon or narrow male pelvis. We undertake this study to compare the functional outcome in impact on overall quality of life in patients subjected to a straight colorectal or coloanal anastomosis with those subjected to a transverse coloplasty pouch neorectum reconstruction.

METHODS

This prospective observational study was carried out in the Department of Surgery Bangabandhu Sheikh Mujib Medical University Shahbag, Dhaka, during 1st January 2016 to 30lh June 2017. For this purpose, a total of 40 patients with low rectal cancer undergoing low anterior or ultra-low anterior resection with TCP or straight anastomosis in the above mentioned hospital were included in this study. Patients with low rectal cancer (lower & middle 3rd) undergoing LAR/ULAR either by hand sewn or stapled

anastomosis and both male & female patients and age group (18-75 years) were enrolled in this study. Patients with carcinoma rectum in the upper 3rd rectum and rectosigmoid junction and patients with inflammatory bowel disease (IBD) were excluded from the study. The following observations and results were obtained in this study. The samples were subsequently sent to BSMMU colorectal surgery Department. After rigorously checking and rechecking the data, the student's unpaired't' test or the chi-square test was used for statistical analysis using SPSS-24. The P value for significance was chosen at 0.05.

RESULTS

The mean age was 45.9±13.29 years in group-I and 47.55±10.86 years in group-II. Male female ratio was 1.2: I in TCP group and 1.5: I in SA group. The difference was not statistically significant (p>0.05) between two groups. The mean distance of growth from anal verse was 5.59± 1.71 em in group-I and 6.89:1:2.47 ern in group-TI. The difference was statistically not significant (p>0.05) between two groups. The difference was statistically not significant (p>0.05) between two groups. Nearly two third (60.0%) patients underwent LAR operation in group-I and 17(85.0%) in group II which were almost alike between two groups. Eighty percent (80.0%) patients had stapler operation in group-I and 17(85.0%) in group-II- The difference was statistically not significant (p>0.05) between two groups. About the frequency of bowel, movement/24 hours after 3rd month 85.0% patients had <5 times bowel movem,ot in group-I and 25.0% in group-II. The frequency of bowel movement /24 hours were significantly (p<0.05) less (5times) in group I. Urgency on 3rd month 4(20.0%) in group-I and 14(70.0%) in group-II. Urgency was significantly (p<0.05) improve in group I at 3rd month. Nocturnal bowel movement on 3rd month none found 18(90.0%) in group-I and 11(55.0%) in group-II. Nocturnal bowel movement was significantly (p<0.05) improve in group I at 3rd month. Flatus incontinence on 3rd month 2(10.0%) in group-II and 8(40.0%) in group-II. Flatus incontinence was significantly (P<0.05) improve in group I at 3rd month. Loose stool incontinence on 1st month 7(35.0%) in group-l and 9(45.0%) in group II. On 3rd month 3(15.0%) in group-I and 8(40.0%) in group-II. Loose stool incontinence was improve more in group 1 at 3rd month, but the difference was not statistically significant (p>O.OS). Clustering on 3rd month 2(10.0%) in group-l and 8(40.0%) in group-It. Clustering was significantly (p<0.05) more improve in group 1 at 3rd month follow-up. Perianal soiling on 3rd month 1(5.0%) in group-I and 6(30.0%) in group-l1. Perianal soiling was significantly (p<O.OS) improve in group I at 3rd month. Anal tone on 3rd month 1(5.0%) in group-I and 10(50.0%) in group-II. Anal tone was significantly (p<0.05) improve in group I at 3rd month. Finger grip on 3rd month 18(90.0%) in group-I and 19(95.0%) in group-II. Finger grip was almost alike between two group, no statistical significant (p>O.OS) was found between two groups.

Table I: Distribution of the study patients by demographic variable (n=40)

Age Distribution	Group I		Group II		P Value
	n=20	%	n=20	%	
≤30	2	10.0	3	15.0	0.669
31-40	7	35.0	4	20.0	
41-50	3	15.0	6	30.0	
51-60	6	30.0	4	20.0	
>60	2	10.0	3	15.0	

Table II: Distribution of the study patients by demographic variable (n=40)

Sex Distribution	Group I		Group II		P Value
	n=20	%	n=20	%	0.749
Male	11	55.0	12	60.0	
Female	9	45.0	8	40.0	

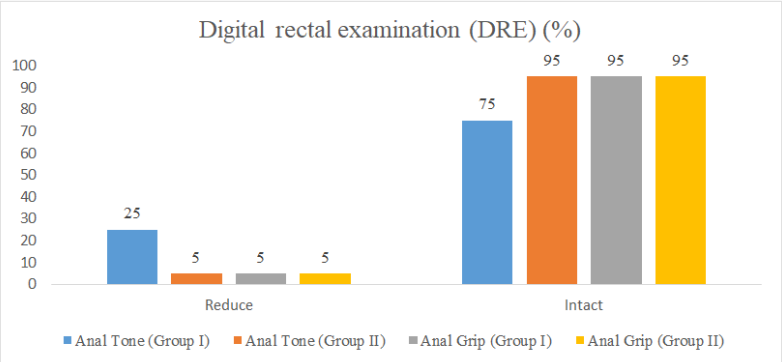

Figure I: Distribution of the study patients by Digital rectal examination (DRE) (N=40)

Table III: Distribution of the study patients by Distance of growth from anal verse (N=40)

Distance of growth from anal verse (cm)	Group I		Group II		P value
	n=20	%	n=20	%	
4	7	33.4	6	27.7	0.060
5	2	11.1	0	0.0	
6	2	11.1	5	22.2	
7	7	33.3	2	11.1	
8	0	0.0	3	16.7	
9	2	11.1	0	0.0	
10	0	0.0	3	16.7	
12	0	0.0	1	5.6	

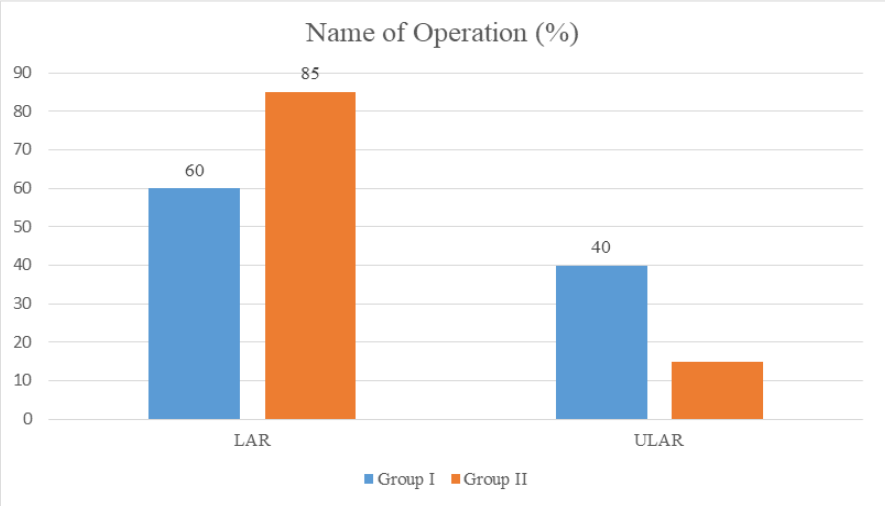

Figure II: Distribution of the study patients by name of operation (N=40)

Table IV: Distribution of the study patients by method of operation (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	0.677
Stapler	16	80.0	17	85.0	
Hand Sewing	4	20.0	3	15.0	

Table V: Distribution of the study patients by HPR with staging (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	0.311
Early rectal cancer	12	60.0	15	75.0	
Locally advanced	8	40.0	5	25.0	

Table VI: Distribution of the study patients by adjuvant chemo/radio therapy (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	0.212
Yes	18	90.0	15	75.0	
No	2	10.0	5	25.0	

Table VII: Distribution of the study patients by frequency of bowel movement/24hours (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7^{th} POD					
>10	7	35.0	13	65.0	0.042
5-9	4	20.0	5	25.0	
<5	9	45.0	2	10.0	
1^{st} Month					
>10	5	25.0	10	50.0	0.004
5-9	3	15.0	8	40.0	

<5	**12**	**60.0**	**2**	**10.0**	
3rd Month					
>10	**1**	**5.0**	**5**	**25.0**	**0.001**
5-9	**2**	**10.0**	**10**	**50.0**	
<5	**17**	**85.0**	**5**	**25.0**	

Table VIII: Distribution of the study patients by urgency (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7th POD					
Present	**8**	**40.0**	**18**	**90.0**	**0.010**
Absent	**12**	**60.0**	**2**	**10.0**	
1st Month					
Present	**6**	**30.0**	**17**	**85.0**	**0.001**
Absent	**14**	**70.0**	**3**	**15.0**	
3rd Month					
Present	**4**	**20.0**	**14**	**70.0**	**0.001**
Absent	**16**	**80.0**	**6**	**30.0**	

Table IX: Distribution of the study patients by urgency (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7th POD					
3 times	**12**	**60.0**	**18**	**90.0**	**0.029**
2 times	**8**	**40.0**	**2**	**10.0**	
1st Month					
2 times	**10**	**50.0**	**15**	**75.0**	**0.103**
1 times	**10**	**50.0**	**5**	**25.0**	
3rd Month					
1 times	**2**	**10.0**	**9**	**45.0**	**0.013**
None	**18**	**90.0**	**11**	**55.0**	

Table X: Distribution of the study patients by flatus incontinence (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7th POD					
Present	**12**	**60.0**	**15**	**75.0**	**0.312**
Absent	**8**	**40.0**	**5**	**25.0**	
1st Month					
Present	**7**	**35.0**	**12**	**60.0**	**0.113**
Absent	**13**	**65.0**	**8**	**40.0**	
3rd Month					
Present	**2**	**10.0**	**8**	**40.0**	**0.028**
Absent	**18**	**90.0**	**12**	**60.0**	

Table XI: Distribution of the study patients by loose stool incontinence (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7th POD					
Present	**12**	**60.0**	**15**	**75.0**	**0.312**
Absent	**8**	**40.0**	**5**	**25.0**	
1st Month					
Present	**7**	**35.0**	**9**	**45.0**	**0.518**
Absent	**13**	**65.0**	**11**	**55.0**	
3rd Month					
Present	**3**	**15.0**	**8**	**40.0**	**0.076**
Absent	**17**	**85.0**	**12**	**60.0**	

Table XII: Distribution of the study patients by clustering (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7th POD					
Present	12	60.0	16	80.0	0.165
Absent	8	40.0	4	20.0	
1st Month					
Present	9	45.0	13	65.0	0.203
Absent	11	55.0	7	35.0	
3rd Month					
Present	2	10.0	8	40.0	0.028
Absent	18	90.0	12	60.0	

Table XIII: Distribution of the study patients by perianal soiling (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7th POD					
Present	8	40.0	15	75.0	0.025
Absent	12	60.0	5	25.0	
1st Month					
Present	8	40.0	13	65.0	0.113
Absent	12	60.0	7	35.0	
3rd Month					
Present	1	5	6	30.0	0.031
Absent	19	95.0	14	70.0	

Table XIV: Distribution of the study patients by anal tone (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7th POD					
Intact	8	40.0	14	70.0	0.056
Reduced	12	60.0	6	30.0	
1st Month					
Intact	15	75.0	12	60.0	0.311
Reduced	5	30.0	8	35.0	
3rd Month					
Intact	16	80.0	10	50.0	0.047
Reduced	4	20.0	10	50.0	

Table XV: Distribution of the study patients by finger grip (n=40)

	Group I		Group II		P Value
	n=20	%	n=20	%	
7th POD					
Present	15	75.0	17	85.0	0.429
Absent	5	25.0	3	15.0	
1st Month					
Present	16	80.0	18	90.0	0.376
Absent	4	20.0	2	10.0	
3rd Month					
Present	18	90.0	19	95.0	0.548
Absent	2	10.0	1	5.0	

DISCUSSION

Rectal cancer is a common disease worldwide with an increasing incidence. During the last few decades, development of new treatment strategies has resulted in markedly increased survival (JCOL). The surgical treatment of tumors of middle and distal rectum is low or ultra-low anterior resection with a straight colorectal or coloanal anastomosis is commonly accompanied by poor bowel function. Although a low or ultra-low anterior resection with restoration of bowel continuity is the surgical procedure of choice for low rectal cancer. However, performing a straight colorectal

or coloanal anatomosis for restoring the bowel continuity may be complicated by anterior resection syndrome. This syndrome resulting from loss of rectal reservoir may affect up to 90% of patients with straight colorectal or coloanal anastomosis and may worsen the quality of life in about 39% of patients [12].

In this present study, it was observed that 35.0%.zo patients with low rectal cancer belonged to age 31-40 years in group-I and 20.0% patients in group-H. The mean age was 45.9±13.29 years in group-J and 47.55±10.86 years in group-II. The difference was statistically not significant (P>0.05) between two groups. Parray et al showed the mean age was 53.6 years in TCP group and 49.59 years in SA group, which is comparable with the Current study. On the other hand Mehrvarz *et al*., found higher mean age in patients having low rectal cancer, where they found mean age was 62.3±13.29 years varied from 40 - 85 years in group-I and 63.1±11.9 years varied from 41 - 82 years in group-II. The difference was statistically not significant (p>0.05) between two groups [13, 14]. The higher mean age and age range obtained by above author maybe due to geographical variations, racial, ethnic differences, and genetic causes may have significant influence on low rectal cancer in their study subjects.

In this current study, it was observed that 55.0% patients were male in group-I and 60.0% in group-II, which indicates that the low rectal cancer was more common in male subject in this study. Male female ratio was 1.2: 1 in TCP group and 1.5: 1 in SA group. The difference was not statistically significant (p>0.05) between two groups. Similarly, Parray et al found male female ratio was 1.4:1 in TCP group and 1.2: 1 in SA group. Mehrvarz *et al.*, found 61.7% and 58.S% patients were male in group I and group n respectively [13, 14]. The above findings are closely resembled with the present study In this present study, it was observed that 75.0% patient's anal tone had intact in group-I and 95.0% in group-no 95.0% patient's anal grip had intact in group-I and group-II respectively. The difference was statistically not significant (p>0.05) between two groups.

In this current study, it was observed that 33.3% patients belong to distance of growth from anal verse 7cm in group-I and 27.8% patients belong to 6cm in group-II. The mean distance of growth from anal verse was 5.59±1.71 cm varied from 4-9 cm in group-l and 6.89±2.47 cm varied from 4 - 12 cm in group-II. The different was statistically not significant (p>0.05) between two groups. Parray *et al*., enrolled 42 patients with low rectal cancer varied from 4 to 12 cm from anal verge and the mean distance in cm from anal verge was 7.6 in TCP group and 7.3 in SA group.

In this present study, it was observed that 60.0% patients had clustering on 7th POD in group-I and 80.0% in group-II. On 1st month 45.0% in group-I and 65.0% in group-II. On 3rd months 10.0% in group-I and 40.0% in group-II. Clustering absent was significantly (p<0.05) higher in group 1 at 3rd month follow-up. Bryant et al study had investigated evacuation difficulties, clustering and incomplete emptying, showing prevalence ranging from 2-74% [15]. In another study Emmertsen et al study showed that urgency and clustering had a much higher impact on QoL than incontinence [16]. These results suggest that although incontinence occurs frequently alter LAR, this symptom does not affect the patient's life to the same degree as urgency and fragmentation [16].

In this present study, it was observed that 40.0% patients had Perianal soiling on 7th POD in group-I and 75.0% in group-II. On 1st month 40.0% in group-I and 65.0% in group-II. On 3rd months 5.0% in group I and 30.0% in group-II. Perianal soiling was significantly (p<0.05) improve in group-I at 3rd months. In this currenl study, it was observed that 60.0% patients had intact anal tone on 7" POD in group-I and 30.0% in group-II. On 1st month 30.0% in group-I and 40.0% in group-II. On 3rd months 5.0% in group-I and 50.0% in group-II. Anal tone was significantly (P<0.05) improve in at 3rd months. Finger grip was almost alike between two group, no statically significant (p>0.05) was found between two groups.

Limitations of the Study

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study.

CONCLUSION

This study was undertaken to compare the functional outcome of transverse coloplasty pouch anastomosIs and straight anastomosis in low anterior resection/ ULAR low rectal cancer. Most of the patients were in 5th and above decade and male predominant. Frequency or bowel movementJ24 hours, urgency, nocturnal bowel movement, flatus incontinence, loose stool incontinence, clustering, perianal soiling and anal tone were significantly better functional results in transverse coloplasty pouch anastomosis. Transverse coloplasty pouch anastomosis provided not only better functional results than straight anastomosis, but also improved quality of life, thus may be the better choice.

RECOMMENDATION

This study can serve as a pilot to a much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

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The wide range of disciplines involved in Comparison of Functional Outcome of Straight Anastomosis and Transverse Colonic Pouch Anastomosis after Low Anastomosis after Low Anterior Resection for Low Rectal Cancer research means that an Editors needs much assistance from referees in the evaluation of papers submitted for publication. I am very grateful to many colleagues for their thorough, helpful and usually prompt response to requests for their opinion and advice.

DECLARATION

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Conflict of interest: None declared.

Ethical approval: The study was approved by the ethical committee of BSMMU, Dhaka, Bangladesh

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