

## Evaluation of Transverse Coloplasty Anastomosis (TC) after Low Anterior Resection in Mid and Low Rectal Cancer

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### ABSTRACT

**Background:** transverse coloplasty pouch is technically simple and represents an ideal procedure between straight coloanal anastomosis and colonic J pouch anastomosis after total mesorectal excision for mid and low rectal cancer. **Objective:** to compare early complication and functional outcome in patients underwent straight coloanal anastomosis with those who underwent reconstruction using transverse coloplasty pouch for management of mid and low rectal cancer. **Methods:** 40 patients underwent low anterior resection with total mesorectal excision for mid and low rectal cancer, they are divided randomly into 2 equal groups each 20 patients, reconstruction done in group A with straight coloanal anastomosis (SA), in group B with transverse coloplasty pouch (TC). Early postoperative complications, mortality were recorded in both groups. Functional outcome of the neorectum is regards motion frequency, sensation of complete evacuation, need of regular antidiarrhea medication and composites incontinence score are compared in both groups 10 days, 3 months and 6 months postoperatively. **Results:** no significant difference between both groups as regard early postoperative complications but patients in group with transverse coloplasty pouch shows better significant functional outcome as regard defecation frequency. 94% of patients in group of transverse coloplasty achieved perfect continent after 6 months postoperatively which was only in 15.8% in group with straight anastomosis ( $P$  value  $> 0.001$ ). **Conclusion:** Transverse coloplasty pouch (TC) coloanal anastomosis after low anterior section with total mesorectum excision for mid and low rectal cancer is feasible, with better functional outcome than straight coloanal anastomosis.

### INTRODUCTION

The advance of techniques of management of mid and low rectal cancer using stapling devices and pull through procedures, reduce the number of abdominoperineal resection<sup>(1)</sup> but the concept of total mesorectal excision in combination with smaller tumor free distal margin with rectal excision lead to what is called low anterior resection syndrome<sup>(1,2)</sup>. Low anterior resection syndrome consists of groups of symptoms including incontinence, frequency, urgency or feeling of incomplete evacuation especially in the 1<sup>st</sup> year postoperatively, resulting in significant negative impact of patient quality of life, in the way that many patients opting for a permanent colostomy<sup>(3)</sup>.

So nowadays although adequate oncologic clearance in mid and low rectal cancer is the 1<sup>st</sup> priority, postoperative functional outcome and patient quality of life should be a main concern<sup>(1,4)</sup>. In low anterior resection and when anastomosis is less than 4 cm proximal to anal verge, the symptoms of low anterior syndrome become more evident and the reconstruction of

neorectal reservoir by colonic pouch significantly improves these symptoms<sup>(5)</sup>.

In 1986, Lazorthes et al.<sup>(6)</sup>, and Parc et al.<sup>(7)</sup> constructed a neorectal reservoir through colonic J. pouch, However, 10-30 % of patients suffered from symptoms related to delayed evacuation and incomplete defecation that required regular use of laxative<sup>(8)</sup>.

These drawbacks and disadvantages of colonic J-pouch anastomosis, made its modification necessary in the size from long 10-12 cm to short 5-6 cm but still, construction of the pouch is not always feasible especially in narrow male pelvis<sup>(7,9)</sup>.

In 1999 Maurer et al.<sup>(10)</sup>, and Z'Graggen et al.<sup>(11,12)</sup> introduced another simple pouch technique, the transverse coloplasty pouch and initially tested for its safety and outcome in an animals model and was compared to both straight and J pouch coloanal anastomosis<sup>(10)</sup>.

Transverse coloplasty pouch is technically simpler than colonic J-pouch, can be done in a narrow pelvis and in presence of short or thick mesocolon with ease, it is also more

physiologically as regard peristaltic movement during defecation<sup>(11,12)</sup>.

This study aim to compare functional outcomes among patient underwent straight coloanal anastomosis with those who underwent reconstruction using transverse coloplasty pouch for management of mid and low rectal cancer.

## PATIENTS AND METHODS

This is prospective study, from January 2014 to August 2016. 40 patients with mid and low rectal cancer participated in the study, in Ain Shams University hospitals.

### Inclusion criteria:

- Age more than 18 years.
- The tumor  $\leq 12$  cm above the anocutaneous line and  $\geq 5$  cm.
- Local curative resection
- The tumour not related to inflammatory bowel diseases.
- Continent anal sphincter complex.

### Exclusion criteria:

- Patients with rectal cancer of proximal rectum  $> 12$  cm or  $< 5$  cm from anocutaneous line.
- Obstructed lesions

An informed consent for temporary or permanent stoma. Also advantages and disadvantages of coloplasty pouch were explained to all patients.

Randomized division of the patients, Into 2 equal group (20 patients per each):

- **Group (A):** Underwent straight coloanal anastomosis (SA)
- **Group (B):** Underwent reconstruction using transverse coloplasty pouch (TC)

The patients were diagnosed on the basis of clinical, endoscopic and histopathological criteria. CT, MRI and transrectal ultrasonography for staging and operability assessment.

Surgery is postponed at least 8 weeks interval after last neoadjuvant radiotherapy session if received.

### Surgical technique

The standard low anterior resection with complete mesorectal excision after mobilization of left colonic flexure and proximal ligation of both inferior mesenteric artery and vein. The anastomosis was performed after complete rectal resection and upper anal canal in low rectal cancer with minimal distal tumor free margin of 2 cm.

Stapling devices were used, articulating linear stapler to remove the rectum and upper anal canal with the specimen, the colonal anastomosis was performed with 31 mm or 33 mm circular stapler. Prophylactic diverting ileostomy was decided individually not done in all cases. In case of misfire of stapling device, handswen coloanal anastomosis with diverting ileostomy was done.

In group B where transverse coloplasty pouch (TC) was planned, 8 cm longitudinal anterior colostomy about 5 cm from the cut end of the colon (Fig. 1), lateral traction by two stay sutures (Fig. 2) and the colostomy closed by 2.0 vicryl in double layers as in done in pyloroplasty (Fig. 3).



**Fig. (1):** Longitudinal anterior colostomy



**Fig. (2):** Lateral traction by two stay sutures.



**Fig. (3):** Construction of transverse coloplasty.

Patients were discharged 10-15 days postoperatively. Follow up 3 months, 6 months postoperatively.

Demographic data (age and sex), tumor location, Duke's classification are compared in both groups.

Postoperative complications both surgical and medical and mortality during hospital stay and in the follow up period were recorded.

Functional outcomes (frequency of bowel movement/24, ability to defer defecation for more than 20 minutes, incontinence score, regular use of antidiarrhea medication, sensation of incomplete evacuation) were recorded at 10 days, 3 months and 6 months postoperatively and were compared in both groups.

In patients with diverting ileostomy assessment was postponed after their ostomies were closed (8-10 wks, postoperatively).

## RESULTS

Mean age in group A (SA) was 52.2 (31-68) year mean age in group B (TC) was 48.2 (22-65) year.

- Male: female ratio was 1.6:1 in group A (SA) and 1.8:1 in group B (TC)
- The mean distance of the tumor from anal verge was 7.9 (5-12) cm in group A (SA) and 8.1 (6-12) cm in group B (TC).

Table (1) showed the clinical data of both groups.

**Table (1):** Clinical data of both groups.

	<b>Group (SA) N= 20</b>	<b>Group B (TC) N=20</b>	<b>P</b>
Mean age (year)	52.2 (31-68)	48.2(22-65)	NS
Male:female	1.6:1	1.8:1	NS
Tumor location (mean distance from anal verge in cm)	7.9(5-12)	8.1(6-12)	NS
Duck's stage (number of patients)			
A	7(35%)	6(30%)	NS
B	4(20%)	5(25%)	
C1	8(40%)	7(35%)	
C2	1(5%)	2(10%)	

- Complete oncological clearance (RO) was achieved in 16(80%) patients in group A (SA), and in 17(85%) patients of group B (TC).
- Diverting ileostomy was done in 2 patients in group A (SA) and in 3 patients in group B (TC)
- One case mortality in the 9<sup>th</sup> day postoperatively in group B (TC) due to pulmonary embolism.

**Table (2):** Showed early postoperative complications in both groups.

Complication	Group A (SA) N = 20	Group B (TC) N = 20	P
Anastomatic leakage	1(5%)	2(10%)	NS
Wound infection	3(15%)	4(20%)	NS
Chest infection	2(10%)	2(10%)	NS
Intestinal obstruction	0(0%)	0(0%)	NS
D.V.T + pulmonary embolism	0(0%)	1(5%)	NS

- One patient from group A (SA) died in the 4th month postoperatively due to tumor recurrence.
- One patient from group B (TC) died in 5th month postoperatively due tumor recurrence.

Frequency of bowel movement every 24 hours in both groups at 10 days, 4<sup>th</sup> month and 6<sup>th</sup> months postoperatively in table (3).

**Table (3):** Frequency of bowel movement in both groups.

Time postoperatively	Group A (SA)	Group B (TC)	P
<b>10 days</b>	N=18	N=16	0.201 NS
≤2	14(77.7%)	12(75%)	
>2	4(12.3%)	4(25%)	
Median	2(1-3)	2(1-4)	
<b>3<sup>rd</sup> months</b>	N=20	N=18	0.9 NS
≤2	1(5%)	2(11.2%)	
>2	19(95%)	16(88.8%)	
Median	7(5-12)	4(3-19)	
<b>6<sup>th</sup> months</b>	N=19	N=17	0.001 (S)
≤2	0	14(82.3%)	
>2	19(100%)	3(17.7%)	
Median	6(4-7)	2(1-5)	

No statistically significant difference between both groups as regard frequency per 24 in 10 days and 3<sup>rd</sup> months postoperatively but there is significant decrease in frequency of bowel movement in group B (TC) at 6 months postoperatively.

**Table (4):** Number of patients who can defer defecation for 20 minutes in both groups.

Time postoperatively	Group A (SA)	Group B (TC)	P
<b>10 days</b>	0(0%)	0(0%)	NS
<b>3<sup>rd</sup> months</b>	3(15%)	8(44.4%)	0.002 S
<b>6<sup>th</sup> months</b>	2(10.5%)	13(76.4%)	0.000 S

The ability to defer defecation for more than 20 minutes was statistically significant in group B (TC) at both 3<sup>rd</sup> and 6<sup>th</sup> months postoperatively in comparison to group A (SA).

**Table (5):** Number of patients in need for regular antidiarrhetic medication in both groups.

Time postoperatively	Group A (SA)	Group B (TC)	P
<b>10 days</b>	0(0%)	0(0%)	NS
<b>3<sup>rd</sup> months</b>	12(60%)	7(38.8%)	0.003 S
<b>6<sup>th</sup> months</b>	10(52.6%)	3(17.6%)	0.000 S

The number of patients in need for regular antidiarrhetic medications was statistically significant in group A (SA) in comparison to group B (TC) at 3<sup>rd</sup>, 6<sup>th</sup> months postoperatively.

**Table (6):** Number of patients with sensation of incomplete evacuation in both groups.

Time postoperatively	Group A (SA)	Group B (TC)	P
10 days	0(0%)	0(0%)	NS
3 <sup>rd</sup> months	1(5%)	2(11.1%)	NS
6 <sup>th</sup> months	1(5.2%)	1(5.8%)	NS

No statistically significant difference between both groups as regard sensation of incomplete evacuation at time of follow up.

**Table (7):** Composite incontinence score between patients of both groups.

Time postoperatively	Group A (SA)	Group B (TC)	P
<b>10 days</b>	0	0	0.006
Nil	1(5.6%)	2(12.5%)	NS
Mild	16(88.8%)	14(87.5%)	
Moderate	1(5.6%)	0(0)	
Severe			
<b>3<sup>rd</sup> months</b>	3(15%)	16(88.8%)	0.000
Nil	5(25%)	2(11.2%)	S
Mild	12(60%)	0(0%)	
Moderate	0(0)	0(0)	
Severe			
<b>6<sup>th</sup> months</b>	3(15.8%)	16(94.1%)	0.000
Nil	14(73.6%)	1(5.9%)	S
Mild	2(10.6%)	0(0)	
Moderate	0(0)	0(0)	
Severe			

94.1% of patients in group B (TC) achieved perfect continent after 6 months postoperatively which was statistical significant in comparison to group A (SA) only 15.8%.

#### Discussion:

In lower rectal cancer, not only adequate oncologic clearance is the goal but also functional outcome, quality of life postoperatively of great importance <sup>(1,4,11)</sup>.

The ideal and proper management of rectal cancer combined of optimal total mesorectum excision, preservation of nerves, bladder and genital functions with a reconstruction on a way with least negative impact of neorectum functional outcome <sup>(5,13)</sup>.

Various methods and procedures appeared to avoid the symptoms of low anterior resection syndrome and improved neorectum functional outcome postoperatively, by construction of colonic J pouch, transverse colectomy pouch and colonic side to end anastomosis <sup>(14,15)</sup>.

Maximizing the neorectal compliance and volume by forming double barreled configuration with limb size up to 15 cm, was the aim of J

pouch reconstruction after low anterior resection for rectal cancer <sup>(15-18)</sup>.

Many trials compared this 15 cm colonic J pouch to straight coloanal anastomosis and confirmed improvement of stool frequency, rectal volume (reservoir capacity) and rectal compliance but there was evacuation problems which required returning to toilet at least once within 15 minutes of defecation <sup>(8,17,19,20)</sup>.

Minimal evacuation problems have been reported with smaller 5 to 6 cm J pouch <sup>(8,21)</sup>.

Failure to construct a colonic J pouch was reported in several studies, with incidence up to 25% in obese, narrow pelvis, long narrow anal canal or bulky sphincter <sup>(4,22,23)</sup>.

In 1999, Z'Graggen et al. <sup>(11)</sup> introduced a technically simpler transverse colectomy pouch with significantly smaller capacity than J pouch, augments the neorectum volume by 40%, avoiding low anterior resection syndrome and less evacuation problems than colonic J pouch <sup>(24)</sup>.

This study to compare the complications and functional outcome in patients who underwent straight colorectal/coloanal versus anastomosis by

transverse colectomy in mid and low rectal cancer.

Complete oncological clearance (RO) was achieved in 16(80%) patients in group A (SA) and in 17 (85%) patients in group B (TC).

There was no statistically significant difference between both groups as regard clinical data (Table 1) or early postoperative complications (Table 2) (anastomotic leakage wound infection, chest infection, intestinal obstruction, DVT).

In this study, anastomotic leakage incidence after transverse colectomy pouch was 10%, other comparative studies have reported a clinical anastomotic leakage rate ranging from 0% to 4.9% (25,26).

Yik-Hong et al. (2002)<sup>(27)</sup> reported fewer anastomotic leakage in the J pouch patients than colectomy pouch and explained this lower incidence due to better proximal anastomotic blood supply, where J pouch being anastomosed side to end to the anal canal compared to end to end in straight and transverse colectomy pouch anastomosis.

Others studies (22,27,28) reported reduction from 13.8 to 9.2% in favour of J pouch anastomosis in relation to straight anastomosis but this difference did not reach statistical significance (P=0.069).

In this study, if there was any doubt about the strength and efficiency of anastomosis, diverting ileostomy was done (2 in group A (SA) and 3 in group B (TC)).

In group B (TC), there was significant reduction in defecation frequency number per 24 hours in comparison to group A (SA) in 6<sup>th</sup> months postoperatively with mean of 2(1-5) versus 6(4-7) for both group respectively (P value 0.001). This could be due to disruption of colonic propulsion (breaking of the propulsive wave but retention of enough propulsion to allow complete evacuation as a result of construction of colectomy on the antimesenteric surface<sup>(29)</sup>).

Fazl et al. (2014)<sup>(30)</sup> study found also that transverse colectomy pouch reduced the frequency of bowel movement when compared to straight colonic anastomosis after staged 42 patients with mid and low rectal cancer.

Kasper et al. (2001)<sup>(31)</sup> found that frequency of bowel movement is similar in both colectomy pouch and colonic J pouch after low anterior resection for rectal cancer 8 months postoperatively.

The ability to defer defecation for more than 20 minutes was significantly better in group B (TC) than group A (SA), this comes in line with Fazl et al.<sup>(30)</sup> study in which the ability to defer defecation for more than 30 minutes was significantly better in transverse colectomy group at 7<sup>th</sup> day, 2 months and 6 months postoperatively.

As a result of decrease defecation frequency in patients with transverse colectomy (TC) anastomosis, the need of regular antidiarrhetic medication was significantly lower than those at straight anastomosis (SA) group 17.6% vs 58.8% respectively (P value 0.001).

Yik-Hong et al. (2002)<sup>(27)</sup>, Fazl et al. (2002),<sup>(30)</sup> and Heriot et al. (2006)<sup>(32)</sup> studies showed also that the need of regular antidiarrhetic medication is significant decrease in patients after colectomy pouch anastomosis, also Yik Hong et al. (2002)<sup>(27)</sup> found no significant difference between colectomy and colonic J Pouch patients as regard need of antidiarrhetic drugs.

The construction of colonic pouch techniques resulted in early difference of bowel function, less stool fragmentation and sensation of incomplete evacuation and the patient required returning to the toilet at least once within 15 minutes of defecation, this problem appear in large 15 cm colonic J pouch.

This evacuation problem can jeopardize the other functional benefit of colonic J pouch even in smaller limb length 5 cm especially in elder patient<sup>(24,32,33)</sup>.

In this study, no significant difference between both group as regard sensation of incomplete evacuation at any time of the follow up.

In this study and according to the composite incontinence scoring and by comparison of both group, we found that patients in group B (TC) was significantly more continent in 3<sup>rd</sup>, 6<sup>th</sup> months postoperatively than patients in group A (SA), 82.2%, 94.6% of patients of group B (TC) were in Nil score of composite incontinence versus 17.6%, 17.6% of patients of group A (SA) in 3<sup>rd</sup>, 6<sup>th</sup> months postoperatively respectively.

Fazl et al. (2002)<sup>(30)</sup> found also that transverse colectomy group was more continent to gases, liquid and solids as compared to straight anastomosis group at 2<sup>nd</sup>, 6<sup>th</sup> months postoperatively.

According to our results and others studies, transverse colectomy pouch represents an ideal

compromise between straight coloanal anastomosis (avoiding low anterior syndrome symptoms) and short colonic J pouch (avoiding its evacuation problems).

## CONCLUSION

Transverse coloplasty pouch reconstruction after total mesorectal excision in mid and low rectal cancer is feasible with good functional outcome in comparison to straight anastomosis.

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