

**COLOSTOMY VERSUS NON COLOSTOMY WITH PRIMARY REPAIR IN  
COLORECTAL EMERGENCIES****Mohamed L. Ahmed (MD)<sup>1</sup>, Asem F. Moustafa (MD)<sup>1</sup> and Abd El-Gwad F. Baker (MBBCH)<sup>\*2</sup>**<sup>1</sup>Department of General Surgery, Faculty of Medicine, Menofia University, Shibin El Kom, El Menofia, Egypt.<sup>2</sup>Resident of General Surgery, El Salam Specialized Hospital, Cairo, Egypt.**\*Corresponding Author: Dr. Abd El-Gwad F. Baker**

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**ABSTRACT**

**Objectives:** To compare both techniques (colostomy versus non colostomy with primary repair in colorectal emergencies) as a modern operative management regarding post-operative complications and outcome to expand the possibility of primary repair of colonic injuries. **Background:** Colonic emergencies may be repaired with fecal diversion through cutaneous stoma. However primary repair without fecal diversion may be better suited for some types of colonic injuries. **Methods:** This study is a prospective, comparative, and descriptive study of 40 patients with colorectal emergencies. Patients were managed either by repair alone or repair with proximal diversion based on estimation of risk factors. **Results:** Using primary repair without colostomy for colorectal emergencies is associated with more incidences of fistulas and longer time to remove the drain. However there are no differences regarding post-operative infection, time to recovery and mortality. **Conclusion:** Primary repair is better suited for colon injuries of lower grades, mild or no fecal contamination, absence of shock or significant associated injuries. Primary repair with proximal colostomy is better suited for destructive colon injuries, severe fecal contamination, presence of shock and significant associated injuries.

**KEYWORDS:** Colorectal injury, colostomy, fistula, proximal diversion, repair.**INTRODUCTION**

Abdominal trauma is one of the complications of civilization, the incidence of colon injuries is about 5% of all cases with blunt abdominal trauma, the morbidity and the mortality are 35% and 5% respectively.<sup>[1]</sup>

Colon injuries can be repaired with fecal diversion, in a two stage process or with primary repair without fecal diversion. The two stage procedure remained standard treatment for the era following the second world war without adequate scientific evidence.<sup>[2]</sup> Later on, the first prospective randomized controlled trial using primary repair for colonic injuries has been conducted in selected cases. This study defined exclusion criteria for primary repair of colonic injuries.<sup>[3]</sup> These criteria have been criticized by Flint and his colleagues, when primary repair gained more popularity, based on improvements of supportive measures like intensive care as well as scientific evidence driven from, randomized controlled trials.<sup>[4]</sup> In 1999, it was found that nearly half of the cases of civilian colon injuries have been managed by primary repair.<sup>[2]</sup> Exclusion criteria have been refined based on the assumptions that the majority of previous reports concerning risk factors were largely dependent on surgeons estimations with their inherent subjectivity.<sup>[5],[6]</sup> Comparative studies of primary repair versus repair with fecal diversion found that primary repair is associated

with similar or even lesser mortality and morbidity with the conclusion that only Penetrating Abdominal Trauma Index (PATI) > 25 can predict for more complications. This conclusion was that strong that primary repair has been recommended for management of all civilian injuries.<sup>[5]</sup> Some observational and retrospective studies found better results of primary repair compared to fecal diversion procedure.<sup>[7],[8],[9]</sup> The problem of extensive colon injuries and the criteria for the method of repair remains controversial.<sup>[5],[10]</sup>

This study aims to compare both techniques (colostomy versus non colostomy with primary repair in colorectal emergencies) as a modern operative management regarding post operative complications and outcome to expand the possibility of primary repair of colonic injuries.

**PATIENT AND METHODS**

This is a prospective study done on 40 patients with colonic injuries admitted to El-Menofia University Hospital from January 2013 to January 2017. Patients were managed either by repair alone or repair with proximal diversion guided by estimation of risk factors.

Inclusion criteria involve history of trauma diagnosed with acute abdomen, age group between 7 and 65 years old and haemodynamical stability.

Exclusion criteria involve rectal injuries and major medical illness as chronic liver failure, chronic renal failure, chronic heart failure, pulmonary insufficiency, and cancer.

Informed consents were obtained from all patients included in the study which were approved by the local ethics committee of general surgery department of faculty of medicine Menofia University.

All the patients included in this study were subjected to meticulous history taking with special emphasis on personal data, history of the present illness, medical history, and previous operations.

Clinical examination was done for all patients including vital signs assessment, general and local examinations.

Laboratory and radiological investigations included complete blood count, liver profile, renal function tests, X ray abdomen in erect position and abdominal ultrasound.

All patients had been assessed Intra-operatively for the site and grade of colonic injury, presence of fecal contamination and assessment of other visceral injuries. Postoperative assessment entails time to remove drain, wound infection and fistula formation.

Results had been collected, evaluated, calculated, tabulated and statistically analyzed using a computer

statistical package SPSS (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY, USA: IBM Corp.) With a significant P value  $\leq 0.05\%$ . A chi-square test is used to assess whether the distribution of categorical variables is significantly different between two or more groups. Fisher's exact test was done for 2x2 tables. Odds ratio with a 95% confidence interval was used as a risk estimate. Non-parametric Mann Whitney U test was used for non-normally distributed continuous variables.

## RESULTS

Colostomy was done more frequently in cases with shock at presentation ( $P < 0.001$ ), fecal contamination ( $P = 0.010$ ), high grade of colonic injury ( $P = 0.002$ ) and left sided colonic injury ( $P = 0.005$ ). [Table 1]

Occurrence of fistula is statistically significantly correlated to primary repair without colostomy ( $P = 0.020$ ). Mean time to remove drain was shorter in cases operated with colostomy (3.3 days) compared to cases operated without colostomy (5.5 days) ( $P < 0.001$ ), however mean time to recovery, post-operative infection and mortality were not statistically different between both groups. [Table 2]

Within group of patients who were managed with primary repair without colostomy, the occurrence of fistula was statistically significantly correlated to presence of fecal contamination at presentation ( $P < 0.001$ ) and injury to extra-abdominal organs ( $P = 0.023$ ). Fistula occurred more frequently with higher colonic injury with a trend to statistical significance ( $P = 0.061$ ). Correlations of history and clinical data to the occurrence of fistula are summarized in [Table 3].

**Table (1): Correlation of operative technique to history and clinical factors.**

		Operative technique				$\chi^2$ / Fisher's exact test	P-value
		With colostomy		Without colostomy			
		No	(%)	No	(%)		
Sex	Male	14	70.0	11	55.0	0.96	0.514
	Female	6	30.0	9	45.0		
Comorbidities	No	15	75.0	15	75.0	4.66	0.198
	DM	0	0.0	1	5.0		
	HTN	3	15.0	0	0.0		
	DM&HTN	2	10.0	4	20.0		
Etiology	Trauma	14	70.0	9	45.0	8.56	<b>0.036</b>
	IO	4	20.0	3	15.0		
	Iatrogenic	0	0.0	7	35.0		
	Peritonitis	2	10.0	1	5.0		
Time to presentation (hours)	$\leq 6$ h.	8	40.0	13	65.0	5.62	0.060
	$> 6 \& \leq 24$ h.	10	50.0	3	15.0		
	$> 24$ h.	2	10.0	4	20.0		
Shock at presentation	No	4	20.0	19	95.0	23.01	<b>&lt; 0.001</b>
	Yes	16	80.0	1	5.0		
Fecal contamination	No	5	25.0	14	70.0	8.12	<b>0.010</b>
	Yes	15	75.0	6	30.0		
Grade of colonic injury	Grade I	1	5.0	4	20.0	15.2	<b>0.002</b>
	Grade II	2	10.0	10	50.0		

Side of colon	Grade III	4	20.0	4	20.0	10.75	<b>0.005</b>
	Grade IV	13	65.0	2	10.0		
	Right colon	1	5.0	9	45.0		
	Transverse	5	25.0	6	30.0		
Injury to abdominal structures	Left colon	14	70.0	5	25.0	6.60	0.25
	No	13	65.0	18	90.0		
	Liver	0	0.0	1	5.0		
	Spleen	1	5.0	0	0.0		
	Stomach	4	20.0	1	5.0		
	Kidney	1	5.0	0	0.0		
Injury to extra-abdominal structures	Small bowel	1	5.0	0	0.0	1.55	0.212
	No	15	75.0	18	90.0		
	Yes (chest)	5	25.0	2	10.0		

DM: diabetesmellitus

HTN: hypertension

IO: intestinalobstruction

h. hours

 $\chi^2$ :chi square

Table (2): Risk estimates &amp; Correlation of operative technique to different post-operative complications.

	Operative technique				$\chi^2$ / Fisher's exact test	P-value	OR	95% CI
	With colostomy		Without colostomy					
	No	(%)	No	(%)				
<b>Post-operative infection</b>								
No	5	25.0	9	45.0	1.75	0.320	0.40	0.10-1.55
Yes	15	75.0	11	55.0				
<b>Occurrence of fistula</b>								
No	20	100.0	14	70.0	7.05	<b>0.020</b>	0.41	0.27-0.61
Yes	0	0.0	6	30.0				
<b>IO</b>								
No	18	90.0	20	100.0	2.10	0.48	0.47	0.33-0.66
Yes	2	10.0	0	0.0				
<b>Death</b>								
No	15	75.0	18	90.0	1.55	0.407	0.33	0.05-1.97
Yes	5	25.0	2	10.0				
<b>Non-parametric Mann Whitney U test</b>								
<b>Time to remove drain (days)</b>								
Range	3-5		4-7					
Mean SD	3.35 ±0.58		5.55 ±0.78					
P-value	<b>&lt; 0.001</b>							
<b>Time to recovery (days)</b>								
Range	7-50		6-60					
Mean SD	18.53 ±13.07		20.56 ±19.26					
P-value	0.405							

 $\chi^2$ :chi square

OR: odds ratio

CI: confidence interval

IO: intestinal obstruction SD: standard deviation

Table (3): Correlations of history and clinical data to occurrence of fistula.

		Occurrence of fistula				$\chi^2$ / Fisher's exact test	P-value
		No		Yes			
		No	(%)	No	(%)		
Sex	Male	6	42.9	5	83.3	2.78	0.119
	Female	8	57.1	1	16.7		
Etiology	Trauma	5	35.7	4	66.7	5.33	0.149
	IO	3	21.4	0	0.0		
	Iatrogenic	6	42.9	1	16.7		
	Peritonitis	0	0.0	1	16.7		
Comorbidities	None	11	78.6	4	66.7	1.27	0.530
	DM	1	7.1	0	0.0		
	HTN	2	14.3	2	33.3		
shock at	No	14	100.0	5	83.3	2.45	0.300

presentation	Yes	0	0.0	1	16.7	20.0	< 0.001
	No	14	100	0	0.0		
Grade of colonic injury	Yes	0	0.0	6	100	7.38	0.061
	Grade I	3	21.4	1	16.7		
	Grade II	9	64.3	1	16.7		
	Grade III	2	14.3	2	33.3		
Side of colon	Grade IV	0	0.0	2	33.3	1.64	0.440
	Right colon	7	50.0	2	33.3		
	Transverse	3	21.4	3	50.0		
Injury to abdominal organs	Left colon	4	28.6	1	16.7	2.80	0.246
	No	13	92.9	5	83.3		
	Liver	1	7.1	0	0.0		
Injury to extra-abdominal organs	Spleen	0	0.0	1	16.7	5.18	0.023
	No	14	100	4	66.7		
	Yes (chest)	0	0.0	2	33.3		

$\chi^2$ : chi square **IO**: intestinal obstruction **DM**: diabetes mellitus **HTN**: hypertension

## DISCUSSION

This study revealed that the time interval between injury and admission to hospital was one of the factors directing the choice of operative technique, with more trend to do colostomies in patients with delayed presentations. This is in agreement with what was reported by Lazovic, et al that there were significant differences in the mean time between injury and admission to surgery with a shorter time in the primary repair group.<sup>[5]</sup>

The presence of fecal contamination at presentation favors significantly operations with colostomy, it was evident in 70% of patients managed with colostomy and in only 30% of patients managed with primary repair without colostomy. The rationale for fecal diversion is the theoretical risk of necrotizing para-rectal soft tissue infection with or without abscess formation by contamination of these planes by the fecal steam. This is a popular view, and it is supported by studies which demonstrate a low incidence of septic complications with fecal diversion and an acceptable morbidity associated with stoma closure.<sup>[11]</sup>

In this study, all except one patient with shock at presentation were operated with primary repair with colostomy. Govender and Madibastated that patients with compromised physiological status which leads to hypo-perfusion of splanchnic tissues resulting in local tissue hypoxia are more likely to fail primary repair.<sup>[12]</sup> So patients who cannot be successfully resuscitated pre-operatively as well as those developing hemodynamic instability in the operating theatre should be treated by damage control techniques with restoration of continuity of the bowel at re-look laparotomy once the physiological insult has been corrected.<sup>[13]</sup>

In this study, the higher the degree of colonic injury, the more likely to be managed with colostomy. Govender & Madiba stated that that colostomy should be considered in destructive colonic injuries with delayed presentation.<sup>[12]</sup> Also Cleary., et al reported that the management of injuries involving less than 50% of colon

wall is primary repair in all regions of the colon, whereas lacerations of more than 50% of the colon wall or devascularisation of the bowel segment should undergo resection and primary anastomosis.<sup>[14]</sup>

Papadopoulos., et al stated that surgeon's decision in the operating room should be based on specific evidence like time elapsed from the injury, presence of severe peritonitis, patient's age, concurrent injuries, hemodynamic status, need for transfusion in combination with personal experience and clinical judgment on the given patient.<sup>[15]</sup> Indications of diversion versus primary repair have been discussed by DuBose. He stated that the location of injury, once believed to be an important issue in this decision, is now known to be of little significance. The mechanism of injury has also been proven to be of lesser importance. Other proposed risk factors have included transfusion requirements, physiologic condition of the patient, and antibiotic utilization.<sup>[16]</sup> Of all the proposed considerations in surgical management, however, the degree of colon injury has been among the most widely discussed.<sup>[17]</sup> Based on available level I evidence, routine primary repair should be attempted in the initial surgical management of all traumatic colon injuries, irrespective of associated risk factors. Diversion of colonic injuries should only be considered if the colon tissue itself is deemed inappropriate for repair, as in the setting of severe edema or questionable ischemia after damage control procedures. Primary repair of all intraperitoneal rectal injuries should also be attempted, with proximal diversion utilized only for that are deemed tenuous. The role of diversion in the management of unrepaired extraperitoneal rectal injuries is presently an accepted standard of care, although this practice is being actively investigated.<sup>[18]</sup>

Regarding post-operative complications, in this study post-operative infection occurred more in patients managed by colostomy, however this was statistically insignificant. This was in agreement with what was reported by Alhamdani., et al who reported much more postoperative infection in patients managed with

colostomy.<sup>[19]</sup>

Papadopoulos., et al stated that the use of primary repair compared to diversion was associated with a significant decrease in overall complication rate, total infectious complications, abdominal infections including dehiscence and wound complications excluding dehiscence.<sup>[15]</sup>

In this study, fistula occurred in patients who were managed with primary repair. This is in agreement with what was reported by Alhamdani., et al study in which 3.7% of cases managed without colostomy had developed fistula compared to none in cohort of patients who underwent colostomy.<sup>[19]</sup>

In this study, mean time to remove the drain was statistically significantly shorter in the cases managed with colostomy compared to cases managed with primary repair. Johnson and Steele concluded that drainage may be of limited value in cases of fecal diversion.<sup>[20]</sup>

Also Govender & Madiba concluded that the surgical method of colon management after resection for trauma does not affect the incidence of abdominal complications irrespective of associated risk factors and that death results from the events set in motion by the severity of the original injury rather than the choice of colonic management.<sup>[12]</sup>

Weaknesses of this study include the relatively small sample size as well as the little variabilities in the etiology of colonic emergencies, as majority of cases were of traumatic etiology.

## CONCLUSION

Primary repair is better suited for colon injuries of lower grades (Grade II, III), mild or no fecal contamination, absence of shock or significant associated injuries. However, proximal colostomy is better suited for destructive colon injuries, severe fecal contamination, presence of shock and significant associated injuries.

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