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Complications of colostomy closure

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Abstract
Background: colostomy and colostomy closure are common procedures frequently performed by surgeons during war.
Objectives: To recognize the complications following the closure of each type of colostomy and to determine which type of colostomy has least complications after closure.
Method: fifty patients with different types of colostomy due to injuries of colon by shells or bullets had been underwent closure of these colostomies by 2 layers inner continuous by absorbable suture (3-0 cat gut) and outer interrupted non-absorbable suture (3-0 silk).
Result: The total numbers of patients who developed complications after colostomy closure were 10 patients which represent 20% of all patients. The complications were wound infection 10 (20%), fecal fistula 5 patients (10%), prolonged paralytic ileus 2 patients (4%) and 8 patients (16%) develop incisional hernia after 5 months of operation. The study shows that loop colostomies had the least complications rate after closure.
Conclusion: Closure of colostomy requires the same standards of surgical care as any anastomosis of the large intestine. The closure of loop colostomy types show lower rate of complications and show early recovery sign in comparison with other types of colostomies.

Keywords: colostomy, colostomy closure, loop colostomy, end colostomy

Introduction
The colon is the second most frequent organ injured in penetrating abdominal trauma after the small bowel [1]. Pilore, a French surgeon performed the first colostomy surgery in 1776, by bringing out the caecum onto the skin [2]. The surgical literature from the 17th century show that colostomy first arouse as a result of clinical observation from spontaneous external fistula resulting from penetrating wounds to the abdomen, dismal results in general were observed with penetrating abdominal injury when spontaneous fistula did not occur [3]. The treatment of colon injuries has been profoundly influenced by military experience [1]. During World War I, the management of colonic injuries was primary repair, but the mortality remained high, approaching 60-75% [4]. While during World War II, the exteriorization of the injured colon or repair of colonic injury with proximal diversion were considered as the treatments of choice for colon injuries [5, 6]. Mortality rates decreased to 30% at the end of World War II, this is possibly due to changes in the management of injured colon including the improved antibiotics, advances in surgical techniques and instruments, and improved evacuation times [1, 7]. Colostomy, antibiotics, fluid replacement, electrolytes monitoring and improved evacuation technique reduced the mortality rate to 12% during both the Korean and Vietnamese conflicts. However, 16-30% of patients during the war in Iraq and Afghanistan who were managed initially with primary repair or anastomosis experienced leaks, which were subsequently managed with colostomy [8, 9]. The civilian trauma to the colon with small colonic wound without significant contamination can be safely treated with primary repair while patients with complex colon injuries are more appropriately treated by colostomy [10, 11, 12]. Complications associated with colostomies are both early and late; the Closure of temporary colostomies may be associated with significant complications [1]. The morbidity after subsequent colostomy closure varies widely; there are risk factors responsible for a high complication rate which may result from colostomy closure they found that adequate preoperative bowel preparation, secondary suture of the wound and especially delaying of colostomy closure for 2-3 months after initial procedure may be beneficial in reducing the high morbidity [13, 14]. So closure of colostomy is not a minor procedure and it requires the same standards of surgical care as any anastomosis of the large intestine [15].

Material and method

A Study of fifty patients who were injured by bullets or shells from January 1995 till January 2002 who were operated on in Ana general hospital with different types of colostomy which were done by same surgeon and return back within 2-4months for colostomy closure. Table.1.

Table 1: types of colostomies

Types of colostomy	Number	Percentage
Loop colostomy	35	70%
end-colostomy with Hartman's procedure	10	20%
End-colostomy with mucus fistula	5	10%
Total	50	

All the patients were prepared 3 days before operation, in the first two days the patient was kept on clear oral fluid diet then at preoperative day the patient admit to hospital, purgative was given orally till they pass clear fluid bowel motion and repeated enema through the anus, nothing by mouth with Intravenous fluid in preoperative day, Metronidazole 500mg vial two time /day gentamycin 80mg two time/day and ampiclox 1000mg four time /day Intravenously and continue three days after operation. The time from initial operation (colostomy) till its closure varied from 2-4 months depending on associated injuries and fitness of the patient. The operations of closure colostomy were done by the same surgical team. Barium studies were done in some cases to see if there is any colonic deformity resulting from previous injuries or operations.

Surgical technique was excision of the edges of colostomy after freeing dissection of stoma from surrounding tissue and skin, and complete mobilization of stoma then simple anterior wall closure extra-peritonealy (in loop colostomy) or end-to-end anastomosis intra-peritonealy (end-colostomy through re-laparotomy) with two layers inner continuous absorbable suture (3-0 cat gut) and outer interrupted non-absorbable suture (3-0 silk), then setting the colon intra-peritoneal followed by closure of abdominal wall in layers, we always used intra-peritoneal tube drain for at least 48 hours and subcutaneous corrugated drain for 72 hours. Post-operatively the patients were put on Intravenous fluid till the passage of flatus and to start oral fluid at that time. All patients closely followed up for ten days post-operatively while the patients were in hospital and for 6-8 months after discharge from hospital.

Result

Fifty patients with different types of colostomy underwent operation for closure. In this study the passage of flatus is considered the positive recovery sign Table.2.

Table 2: Time of recovery sign

Type of colostomy	1st day		2nd day		3rd day		4th day		7th day	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Loop colostomy	5	14.29	10	28.57	15	42.86	5	14.29		
End-colostomy Hartman			2	20	1	10	6	60	1	10
End-colostomy mucus fistula			1	20	1	20	2	40	1	20
Total	5	10	13	26	17	34	13	26	2	4

The passage of flatus in anterior wall closure in loop colostomies mainly occurred at third day postoperative (15 patients representing 42.86%), while in end-to-end anastomosis (end-colostomy) the passage of flatus occurred mainly at 4th day postoperatively (9 patients representing 60%) only two patients (4%), those with end colostomies, the passage of flatus was delayed to the 7th day postoperatively. The overall complications rates following colostomy closure are shown in Table.3

Table 3: Complications of colostomy closure

Type of colostomies	Total No.	complications		Wound infection		Fecal fistula		Prolonged paralytic ileus		Incisional hernia	
		No.	%	No.	%	No.	%	No.	%	No.	%
Loop colostomy	35	5	14.29	5	14.29	1	2.86			2	5.71
End-colostomy Hartman	10	3	30	3	30	2	20	1	10	3	30
End-colostomy mucus fistula	5	3	60	3	60	2	40	1	20	3	60
Total	50	11	22	11	22	5	10	2	4	8	16

The total numbers of patients who developed complications after colostomy closure were 11 patients which represent 22% of all patients. The incidence of wound infection was less in closure of loop colostomy in Comparison with closure of end-colostomy treated by drainage of the wound then twice daily dressing and oral antibiotics with metronidazole. Fecal fistula occurred in 5 patients (10%), one in loop colostomy and four in end-colostomies [end to end anastomosis]. All patients who developed fecal fistula respond well to conservative treatment within two weeks. Prolonged paralytic ileus was occurred in two patients (4%) only in end-colostomy closure and they treated conservatively. Incisional hernia occurred in 8 patients (16%) was less in loop colostomy closure (only two cases) while it was occurred in six patients with end-colostomy closure after five months of closure, all of them were treated by repair of defect using prosthetic meshes after six months of the closure operation.

Discussion

Ostomy is a purposeful anastomosis between a segment of the gastrointestinal tract and the skin of the anterior abdominal wall [4]. For diversion of the fecal stream, the most common

ostomies involving the distal small intestine (e.g. ileostomy) and large intestine (i.e. colostomy), Temporary or permanent colostomy may be needed to manage a variety of pathological conditions, including congenital anomalies, colon obstruction, inflammatory bowel disease, traumatic disruption of colon or rectum, or gastrointestinal malignancy [14]. *Colostomy* is an artificial opening made into large bowel in order to divert faeces and flatus to exterior where they may be collected in an adhesive bag [16]. In penetrating injuries of colon and rectum and in some form of blunt trauma the temporary colostomies are an essential method for management [3, 13]. Colostomy has always been used to divert the fecal stream in order to prevent or to avoid fecal contamination of the peritoneal cavity as part of trauma care [3]. In this study fifty cases of colostomies closure were included in Ana general hospital and all patients were fit for general anesthesia and their injuries were either due to bullets or shell fragments and were operated as emergencies in same hospital with different types of colostomies according to the site of colonic injuries. The time from initial operation till the operation of closure varied from 2-4 months. Postoperatively ten days study were done while the patients were in the hospital and 6-8 months follow up of all patients who show complications seen in Table.3. The overall morbidity in our study was 22% which is comparable to international literature (5%-40%) [17]. Study done at 1996 show overall complications occurred in 24% in 46 patients underwent closure colostomy [18]. Study done on patients from 1993-2001 the overall stoma closure–related complications rate was 20%, Wound infections (9%) and anastomotic leakage (5%) [19], and also a Study done on patients with different types of colostomy who were underwent closure of these colostomies between 2001 and 2004, the overall morbidity rate was 38%. Wound complications were 5%; Anastomotic leakage was 4% [20]. Recent study was done on patients underwent colostomy reversal from January 2003 to December 2011, show the most common complications were wound infection (19.8%) followed by incisional hernia (15.6%) [21]. Most of the studies (including this study) show that loop colostomies appear to have fewer complications at the time of closure than that of divided stomas as well as loop colostomy showed earlier positive recovery sign (passage of flatus) in comparison with end-colostomy type.

Conclusion

Closure of colostomy needs meticulous surgical technique and expert surgeon to do it. It also needs good pre-operative preparations and good post-operative care.

In this study:

1. The loop colostomy is the commonly used operative procedure in management of injured colon.
2. The closure of loop colostomy shows lower rate of complications and shows early recovery sign in comparison with other types of colostomies.

Recommendations

1. The preparations of patient with any type of colostomies for closure must be done by well-trained nurses.
2. Closure colostomy is not a simple operation so it is better to be done by experienced surgeon or under his direct supervision.
3. Post-operatively the patients must be observed carefully and start oral water and simple fluid only when the recovery sign is positive and not take solid food until pass motion.

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