Incidence of Anastomotic Leak in Primary Repair in Colorectal Emergencies. Our Experience

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Abstract: Background: In the first half of the twentieth century the general concept between surgeons to treat Colorectal emergencies which include: traumatic, obstructive and inflammatory was stomal diversion and this concept started to be challenged by primary repair in the second half of that century**.** Several recent reviews analyzed the role of primary repair in treatment of colon injuries and pointed out that in conditions of similar intensity of general and local trauma, and similar intraoperative findings, primary repair had better results regarding complications, deaths and final outcome than diversion. **Aim of the work**: determine the role of primary repair and to investigate the possibility of expanding indications for primary repair of the colon in colorectal emergencies conditions. **Patients and Methods:** This retrospective study was conducted in Ain shams university hospitals from April 2014 to January 2016. Forty patients were involved in this study, all patients presented in ER department with any of colorectal emergencies where they were examined, resuscitated and managed. **Results:** the anastomotic leaks present in four patients (10%) and no anastomotic leaks in thirty six patients (90%). **Conclusion.** Primary repair of the colon in colorectal emergent conditions was recommended especially in case of traumatic injuries and benign obstruction.

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Key words: Anastomotic Leak, Colorectal Emergencies, Repair

1. Introduction

Colorectal emergencies are common conditions which all surgeons face in the ER and the surgeon must be aware of colorectal anatomy and different modalities of the managements of these conditions to give the patients the best care (1-3). Stoma formation was the main concept in treating colonic injury since world war II, but this concept start to discussed and analytic after the war and many develops criteria to perform primary repair, these criteria decreased by time due to developing in the antibiotic and ICU care (4,5). According to American Association for the Surgery of Trauma (AAST) results of prospective multicenter trial they stressed that the main indications for performing two stage procedure are: severe colon edema (whatever the cause), advananced pertonitis and questionable colon blood supply **(6-9).** Surgeons should be more liberal in primary repair of the colon in cases of trauma and benign obstruction, care must be taken when perform that option in cases of malignancy and non traumatic colonic perforation (10,11). Many factors influence the decision taking such as type of pathology, time lag, degree of peritoneal contamination and the most important factor is the patient's general condition (12,13). Many prospective and retrospective studies showed show no significant change in septic complications between 1ry repair versus diversion whatever the mechanism, site, extent of injury, number of associated intraabdominal or extra abdominal injuries and physiological status of patients at admission (14 -16). Even though there are more authors whome more liberal thought that the previous recommendations that primary repair should not be done in cases with major blood loss, soiling left sided colonic injuries and injuries to more than two other viscera have also become obsolete **(17-20). Aim of the work** This study try to clear the option of management of these emergent conditions, also it tries to show different factors to take the suitable decision and its relation to the outcomes and to determine the role of primary repair and to investigate the possibility of expanding indications for primary repair of the colon in colorectal emergencies conditions.

2. Patients and Methods

This retrospective study was conducted after received approval from the local ethics committee in Ainshams university hospitals from April 2014 to January 2016. Fourty patients were involved in this study with mean age of 31.2±20.1 years. The number of male patients were (28 patients) which represent 70% of cases and the females were 12 patients which represent 30% of cases, who presented in ER department with any of colorectal emergencies included Trauma (penetrating, gunshot & blunt), obstruction (malignant & non-malignant) and acute abdomen due to perforation. The patients underwent history, clinical examination, investigations, resuscitation then emergent laparotomy. All patients were carefully assessed by history taking,

examination, recording comorbid diseases, scored according to American Society of Anesthesiologists ASA grade, resuscitated first by (I.V fluids, blood transfusions, antibiotics prophylaxis, etc), lap. & /or imaging investigations were done according to necessity.

Operatively:

Anesthesia classification of patients according to ASA grading: there were 29 patients (72.5%) of grade II,9 patients (22.5%) of grade III and 2(5%) patients of grade IV. Exploratory laparotomy was done and Operative data were studied including the operative diagnosis, the procedure which was done, the condition of gut wall, faecal contamination (minimal: when contamination limited to the site of colonic pathology, moderate: when contamination limited to the affected quadrent of the abdomen or, sever: when contamination is affected more than one quadrant), associated injuries, operative time, and intraoperative complications. There were multiple techniques used according to the need.

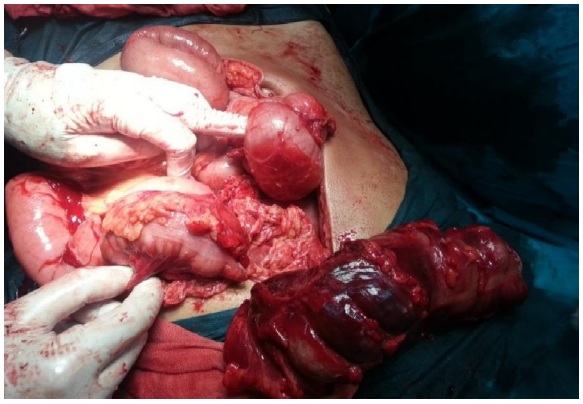

Fig (1) transverse colectomy for crush injury

Fig (2) stappler side to side anastomosis

Fig (3) volvuls of transverse colon

1. Primary repair without resection-anastomosis: The repair was done in double-layer repair with inner layer all layers continuous suturing and the outer interrupted sero-muscular Lembert sutures.

2. Primary resection-anastomosis which may involve one of these.

A) Segmental resection .

B) Formal and limited right hemicolectomy with ilio-colic anastomosis.

C) formal and limited left hemicolectomy with colo-colic or colo-rectal anastomosis. All cases which used GIA staplers side to side anastomosis. Assessment of post operative hospital stay and post operative complications as anastomotic leak (low output fistula, when the output is less than 200cc/day or high output, when the output is more than 200cc/day), peritoneal sepsis, and mortality.

Data management:

Results were collected, tabulated and statistically analyzed by an IBM compatible personal computer with SPSS statistical package version 20.

3. Results:

Forty patients were classified according to age into 3 groups (11 patients <18 years, 23 patients between 18-59 years and 6 patients > 60 years). They were classified according to cause of emergency (24 patients had abdominal truma, 5 patients had benign obstruction,5 patients had malignant obstruction, and lastly 6 patients had acute abdomen). Patients were classified according to comorbid condition (32 patients had no comorbid condition, 1 patient had IHD and HTN, 1 patient had HTN and DM, 1 patient had IHD,2 patients were diabetic and 3 patients were hypertensive). They were Classified according to lag time (24 patients early < 8 hours,4 patients average (9-24hours) and 12 patients were late >24 hours. The patients were classified according to site of pathology (20 patients in right colon, 10 patients in transverse colon, 6 patients in left colon and 4 patients in recto sigmoid. The patients were classified according to

type of operation which was done into 19 patients under went repair, 4 patients underwent left hemicolectomy, 9 patients underwent right hemicolectomy, 6 patients underwent transverse colectomy and 2 patients underwent rectosigmoidectomy). They were classified according to peritoneal contamination (34 patients suffer from mild contamination and 6 patients suffer from moderate contamination). There were 4 patients discovered had anastomotic leak and 36 patients had no leak. Table (2) shows comparison between group of anastomotic leak and other group when there was no leak. There was no leak in age group <18 years, leak in 1 patient out of 24 patients (4.3%) in age group (18-59) and there was leak in 3 patients out of 6 patients (50%) with statistical difference as P value 0.0012. In comparison between 2 groups in case of presence of comorbid conditions 3 patients (37.5%) suffer from leak in comparison to 1 patient (3.1%) in group of patients with no comorbid conditions with statistical difference as P value 0.004. while as regard relation of anastomotic leak to ASA grading, there was no leak in group of patients classified as ASA II while 2 patients (22.2%) in group of patients classified as ASA III and 2 patients (100%) in group of patients classified as ASA IV with clear statistical difference as P value <0.001. As regard effect of time lag on anastomotic leak, if early time lag,1 patient (4.3%) with anastomotic leak and if late time lag 3 patients (76.9%) with anastomotic leak with statistical difference ad p value <0.0154. As regard peritoneal contamination, 1 patient (2.9%) with mild contamination in peritoneum suffered from anastomotic leak in comparison with 3 patients (50%) with sever peritoneal contamination had anastomotic leak with statistical difference as P value <0.001. In relation to type of operation which was done, there was no anastomotic leak in case of repair of injury or sigmoidectomy but there was 2 patients (50%) in case of left hemicolectomy,1 patient (11.1%) in right hemicolectomy and 1 patient (16.7%) in transverse colectomy had anastomotic leak with statistical difference as P value <0.045. In case of cause of colorectal emergency either truma or bengin, malignant and acute no statistical difference between causes.

The 4 cases of anastomotic leaks were 2 cases of low output fistula (below than 200 cc /day) and appears after the first week postoperative and managed conservatively even the patient was on oral feeding and the fistula closed sponteniosly. While for the other 2 cases they were of high output fistula (more than 200cc/day) and one of them start to leak after 12 days postoperative as a low output increasing by time and the decision for laparotomy was at 15th days postoperatively where we found the main fecal collection was at the upper abdomen due to perforation in the jujenum while the low colonic anastomosis was apparently intact in its posterior wall while the anterior wasn't satisfactory intact so decision was to repair the jujenal perforation and colostomy, the patient died in the 21th day. The other case appears to leak in the 4th post. Operative day as allow output fistula increasing by the 5th day but the patient deteriorated very rapidly and ventilated and died by the end of the 5th day.

Mortality:

There were 2 cases of mortality which represent 5% of cases. Table (3) shows the relation of the mortality (2 cases) and the different items of this study.

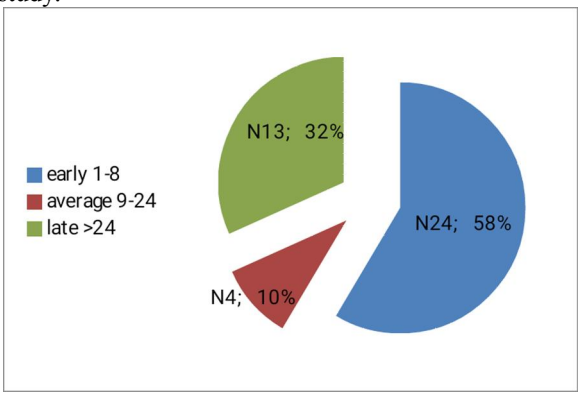

Fig (4) show time lag distribution

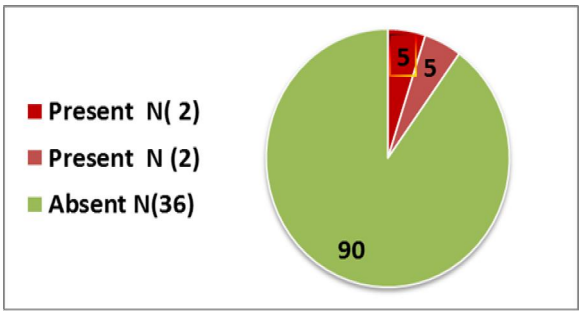

Fig (5) show anastomotic leaks distribution

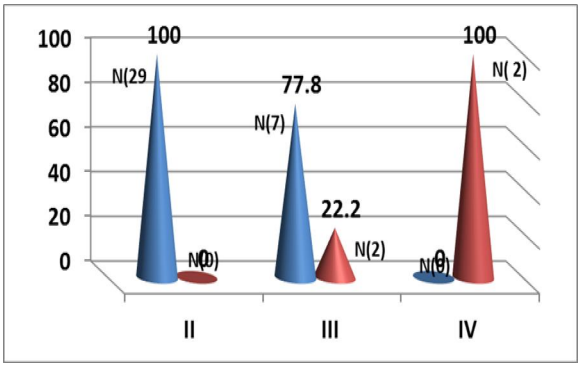

Fig (6) shows the relation between different grades of ASA classification and the leak

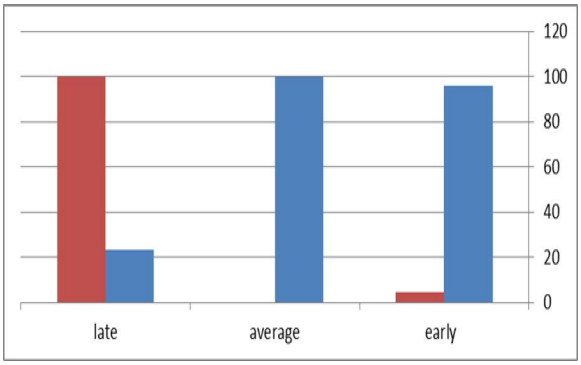

Fig (7) shows the relation between different grades of time lag and the leak

Table (1) shows number and percentage of patients in different circumstances

	NO	%
Age		
<18 years	**11**	**27.5%**
18-59	**23**	**57.5%**
≥60 years	**6**	**15%**
Diagnosis		
Trauma	**24**	**60%**
Benign obstruction	**5**	**12.5%**
Malignant obstruction	**5**	**12.5%**
Acute abdomen	**6**	**15%**
Comorbid diseases		
Negative	**32**	**80%**
DM	**2**	**5%**
HTN	**3**	**7.5%**
HTN & DM	**1**	**2.5%**
HTN & IHD	**1**	**2.5%**
IHD	**1**	**2.5%**
Time lag		
Early (0-8hrs)	**24**	**60%**
Average (9-24hrs)	**4**	**10%**
Late (>24hrs)	**12**	**30%**
Site of pathology		
Rt colon	**20**	**50%**
Lt colon	**6**	**15%**
Rectosigmoid	**4**	**10%**
Transverse colon	**10**	**25%**
Operation		
Repair	**19**	**47.5%**
Lt hemicolectomy	**4**	**10%**
Rt hemicolectomy	**9**	**22.5%**
segmoidectomy	**2**	**5%**
Transverse colectomy	**6**	**15%**
Intraperitoneal contamination		
Mild	**34**	**85%**
Moderate	**6**	**15%**
Anastomotic leak		
Present	**4 36**	**10%**
Absent		**90%**

Table (2) shows relation between anastomotic leak and different circumstances

	NO LEAK		LEAK			
	N (36)	%	N (4)	%	X^2	P- value
Age						
<18	11	100	0	0		
18-59	22	95.7	1	4.3		
>60	3	50	3	50	**12.7**	**0.0012**
Comorbid diseases						
Absent	31	96.9	1	3.1		
Present	5	62.5	3	37.5	**8.4**	**0.004**
TIME LAG						
early	22	95.7	1	4.3		
average	4	100	0	0	**4.9**	**0.0154**
late	10	23.1	3	76.9		
ASA						
II	29	100	0	0		
III	7	77.8	2	22.2	**22.7**	**<0.001**
IV	0	0	2	100		
Contamination						
Mild	33	97.1	1	2.9	**12.5**	**<0.001**
Moderate	3	50	3	50		
Operation						
Repair	19	100	0	0		
Lt hemicolectomy	2	50	2	50		
Rt hemicolectomy	8	88.9	1	11.1	**9,75**	**0.045**
segmoidectomy	2	100	0	0		
Transverse colectomy	5	83.3	1	16.7		
Diagnosis Trauma	23	93.3	1	6.7		
Benign obstruction	5	100	0	0		
Malignant obstruction	3	60	2	40	**6.76**	**0.079**
Acute abdomen	5	83.3	1	16.7		

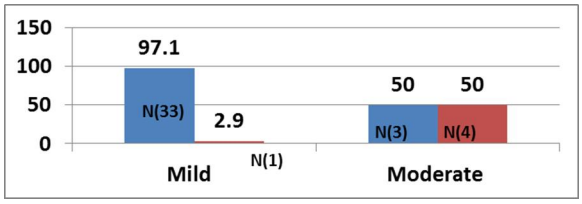

Fig (8) shows the relation between the different degree of peritoneal contamination and the leak

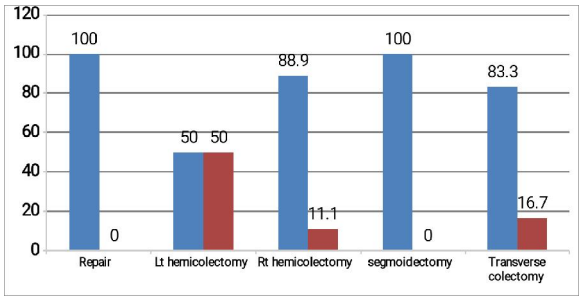

Fig (9) shows the relation between the type of operations and the leak

Table (3) shows the relation of the mortality (2 cases) and the different items of this study

	Mortality (n=2)	%
Age >60 years	2	33.3
Sex Female	2	16.7%
Diagnosis Malignant obstruction	2	40%
Comorbid +ve	2	25
ASA IV	2	100
Site Lt colon Rectosigmoid	1 1	16.7 25
Contamination Mild Moderate	1 1	2.9 16.7
Operation Lt hemicolectomy	2	66.7
Lag time late	2	15.4
Leak +ve	2	33.3

4. Disscusion

Symptomatic anastomotic leakage is the most important surgical complication after colorectal surgery and can cause morbidity and mortality **(21-23).** This study was done to evaluate the role of primary colonic repair in different colorectal emergencies, and find the factors which encourage the surgeon and also the factors which restrict him when facing such situations. The mean age in our study was 31.2±20.1years old and the males represent 70% of the patients which not far from the same age group and gender distribution in other study as the most of our cases were due to trauma and the middle ages males almost the most affected group (7,19). The main etiology was the traumatic perforation of the colon (60%) then colonic obstruction either benign or malignant (25%) then the non-traumatic perforation (15%), which is different from Ajay V.'s study (7) where non-traumatic perforation was the most common indication for exploratory laparotomy (61%) in the study group, followed by sub-acute intestinal obstruction (19%), traumatic perforation (15%) and sigmoid volvulus (5%) (7). In our study the most common operation was repair without resection-anastomosis (47.5) then Rt. Hemicolectomy (22%) transverse colectomy (15%) Lt. hemicolectomy (10%) and, sigmodectomy (5%) which differ from Ajay V.'s study (7) where primary repair was done in 60% patients and the rest 40% patients underwent resection anastomosis **(7).** In our study the peritoneal contamination was average from minimal (85%) to moderate (15%) while we faced no sever contamination nor significant colonic wall odema which were important contraindication factors for primary colonic repair in other studies which found that High volume, feculent intraperitoneal collection and bowel wall oedema are unfavourable factors for holding sutures and such cases are better managed by exteriorisation. (24-25). The results of our study are comparable to Gupta S et al. who analysed numerous studies on perforation peritonitis in the subcontinent and reported that bowel oedema warranted exteriorisation. Other authors have advocated stoma surgery in patients having intraperitoneal collections more than 1000 ml **(24).** In our study the leak was (10%) where 2 cases (5%) of low output fistula which closed sponteniously without re-exploration and the other two (5%) were of high output fistula and died even one was re-explored. Comparing to (8%) leak rate in Ajay V. study (7) where also, mortality in leak patients was high with three of the four patients dying inspite of re- exploration. The one patient who survived was reexplored and exteriorisation of the leak segment was performed **(7)**, (11%) leak rate in Jain BK.'s study **(25)** and (6%) leak rate in Agaba AE's study following colorectal anastomosis **(26-28)**. Mortality rate in our study were (5%) comparing to (6%) in other study **(7)**. The rate of leakage is low and very close to results of many researches in cases of colonic injury **(29-37)**. This results are supported and goes strongly with Demetriades (1) and Gonzalez (38) who had undertaken a multi-center prospective study, concluded that all colon injuries could be managed without fecal diversion without influencing morbidity or mortality (1) (38)**.** Almost all colonic injuries can be repaired without fecal diversion. The sole exception would be for severe injuries requiring major resection, where the patient requires multiple blood transfusions, is in shock or has massive contamination (39).

Sigmoid resection and primary anastomosis without bowel preparation may be advised as the emergency operation for gangrenous or irreducible sigmoid volvulus **(39)**. In our study there were strong relation between the type of the operation and the rate of anastomotic leak where the P-value was (<0.001) which are against other study which reported that mortality and anastomotic leak were basically equivalent comparing right and left-sided lesions which gone through emergent primary colonic repair (40,41). Similar papers advocating primary repair in emergency surgery of the left colon using intra-operative colonic irrigation (42,43). Clearly surgeons are using these techniques with reasonable rates of anastomotic leak and death (40,41)**.** This conflict between our study and others due to the small number of left colonic primary anastomosis (4 cases of left colon and 2 cases of rectosigmoid). In our study there were significant relation between the degree of peritoneal contamination and anastomotic leak of P-value (<0.001) and this relation is very obvious with case of sever contamination. also the 2 cases of mortality was associated of sever contamination. These result goes with other study which give big consideration for primary anastomosis in sever contamination especially massive purent or feculent **(24,25).** Other studies found that same result in morbidity and mortality in these severly contaminated situation between primary repair and stoma formation. Type of surgery seems no longer significantly related with postoperative mortality, although many recent studies favor primary anastomosis (PA), with or without loop ileostomy, instead of Hurtman procedure (HP) in purulent of fecal peritonitis due to perforated diverticulum. These statements were confirmed by a systematic review by Salem and Flum in which mortality rates after HP and PA of 19% and 10% respectively, were reported **(42-44) (3)**. Peritoneal contamination (purulent or feculent) is a., wound sepsis and mortality. In our study there were strong relation between advanced age (>60yrs) and the rate of anastomotic leak where P-value is (0.034) which goes with same result in other studies (7) (44). while in our study there were no relation of such complication and the sex. where there were relation to female gender to such complication in the same previous study. In our study we find a relation between the presence of comorbid diseases and the out come post operatively for anastomotic leak. the relation of P-value (0.046) if we consider that comorbid disease will affect the ASA score. that will be discussed in the next item. In our study there were strong relation between the patients' general condition preoperatively which we use ASA score to asses and the rate of Anastomotic leak, which were of P-value (<0.001). this relation is increasing with icreasing the value of ASA score. This result go with the same of other studies **(4) (12) (8) (45-49).** In our study there were a strong relation between the time lag till surgical interference and out comes of anastomotic leak where were of P-value (0.0154). our findings that the shorter the lag period the better the outcomes goes with result of other studies (4) (7) (45). In our study there were no relation between the site of colonic pathology which cause emergent surgical intervention and the Anastomotic leak,. our study show P-value of (0.6) so from the results of our study we concluded that whatever site of colon affected, the primary repair can done safely with or without intraoperative colonic lavage. so the old concept that left colon must be exteriorized can be reviewed. The same conclusion presents in other studies. **Trillo, (46)** reported 43 cases without mortality **(38),** reported 45 patients with acute obstructive or perforated diverticulitis treated with resection and primary anastomosis. There were three deaths from anastomotic leaks-all in sigmoid obstructed patients. They cautioned its use in these cases **(38) De, (47)** reported on 197 patients who all had resection and primary anastomosis in left colon without preoperative or intra-operative bowel preparation. There were only 2 leaks and 2 deaths, a remarkable result **(47) (39)** reported on 57 patients half of whom had gangrenous left colons with similar results **(39)**. Study done by Biondo et al (8), shows that about half of the patients admitted with distal large bowel peritonitis may benefit from a one-stage procedure with low morbidity and mortality rates when selected **(8).**

Conclusion

Main indicator for the primary repair is the patient's general condition. Primary repair of the colon in colorectal emergent conditions was recommended especially in case of traumatic injuries and benign obstruction. Care must be taken when performing primary repair in cases of malignant obstruction and non traumatic colonic perforation.

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