



Operative risk factors of anastomotic leakage after colorectal cancer surgery

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Abstract

Background: Anastomotic leakage is one of the most feared complications after colorectal surgery. This study aiming at studying the effect of different operative risk factors on incidence of leakage post colorectal cancer surgeries.

Method: This is retrospective study of 340 patients with colorectal cancer who underwent resection anastomosis, at the department of Surgery, South Egypt Cancer Institute, Assiut University between January 2005 till December 2016, and the data were collected from archive and cancer registration data base of surgical oncology department.

Results: Prophylactic stoma done in 82 patients, In (12.6%) of patients :- anastomosis done by stapler, in 7.6% of patients surgeries operated laparoscopically .In (22.4%) contamination of operative field occurred, the most frequent type of anastomosis was colo-anal anastomosis , the most frequent surgery was anterior resection of Dexon.

Conclusion: studying the effect of operative risk factors on incidence of leakage may help in decision making intra operative regarding type of surgery, approaches and techniques used aiming at decrease the leakage.

Keywords: Colorectal cancer, Leakage, prophylactic stoma, laparoscopic

Introduction:

Anastomotic leakage is the leading cause of postoperative death after colorectal surgery, increases the risk of stoma significantly.[1] Although available data on the effect of anastomotic leakage on long-term oncologic outcome is not univocal, most studies report worse oncologic outcome in terms of increased local recurrence and negative association with survival.[1]

Despite many studies investigating risk factors, surgical techniques and prevention of anastomotic leakage over the last three decades, its incidence has not reduced.[2]

There are several risk factors for anastomotic leakage development such as diabetes, smoking, obesity, cardiovascular diseases but facts are still contradictory. [3-5]

Patient who presented by intestinal obstruction consider also risk factor for developing anastomotic leakage.[6]

The IMAGIE (International Multispecialty Anastomotic Leak Global Improvement Exchange) classification 2010 gives a simple clinical categorization of anastomotic leakage.

Type A-with no or minimal clinical involvement, which does not need any active therapeutic intervention.

Type B – which requires active treatment, but not surgical intervention.

Type C- requiring surgical treatment.[7]

This study aiming at identifying the effect of operative risk factors on the incidence of anastomotic leakage following colorectal cancer surgeries aiming to minimize them to achieve the best outcomes possible.

Patients and Methods:

Data Source:

This is retrospective study in which 340 patients with colorectal cancer who underwent surgical resection and restoration of the continuity, with or without post-operative anastomotic leakage at the department of Surgery, South Egypt Cancer Institute, Assiut University in the period between January 2005 till December 2016, the data were collected from archive and cancer registration data base of surgical oncology department.

Statistical analysis:

Numerical data were described with mean and standard deviation and categorical data with number and percentage. Numerical data were tested for normality and parametric t test was used for comparing normally distributed variables and Mann Whitney test for non-normally distributed variables. Chi-square/Fisher exact tests were used for testing proportion independence. P value was always two tailed and significant at 0.05 level. All analysis has been performed using the IBM SPSS statistics version 24 (IBM CO, USA).

Results:

The commonest type of procedure performed was anterior resection of Dexon (25.6%) then right hemicolectomy (24.4 %), followed by left hemicolectomy (21.5 %) and low anterior resection of Dexon (15%) with a few percentage of extended left and extended right hemicolectomy (7.9 % and 5.6 % respectively). And leakage occurred more with low anterior resection of Dexon. (Table 2)

Three hundreds and fourteen patients operated via open surgery and 29 patients operated laparoscopically. The percentage of leakage was nearly equal with both of them. (Table 3)

As regards to the class of surgery, 264 operation were clean contaminated operations, while in 76 operation contamination of the operative field occurred whether by tumor or by fecal matter. The incidence of leakage was comparable with both of them. (Table 4).

After resection of the affected part there were 4 types of anastomosis in our study. Ileo-colic anastomosis was done in 80 patient, colo-colic anastomosis in 87 patients, colorectal anastomosis in 49 patients and colo-anal anastomosis in 124 patients. The incidence of leakage was more with colo anal anastomosis. (Table 5).

The technique of anastomosis was hand sewen in 297 patients done and by stapler in 43 patients.

As regards to prophylactic stoma, it was done in 82 patients in the primary surgery, 3 of them developed leakage and not done in 258 patients in the primary surgery.

Table 1: Operative risk factors

Risk factor	Result	p-value
Type of surgery		
• Right hemi-colectomy	24.4 %	.269
• Extended Right	5.6%	
• Left hemicolectomy	21.5%	
• EXT left	7.9%	
• Anterior resection of Dexon	25.6%	
• Low Anterior resection of Dexon	15%	
Class of surgery		
• Clean	77.6%	.900
• Contaminated	22.4%	
Type of anastomosis		
• Ileo colic	23.5%	.076
• Colo-colic	25.65	
• Colo-rectal	14.4%	
• Colo-anal	36.5%	
Anastomotic technique		
• Hand sewin	87.4 %	.700
• Stapler	12.6 %	
Technique of surgery		
• Open	92.7%	.072
• Laparoscopically	7.3%	
Prophylactic stoma		
• No	76.9%	.023
• Yes	24.1 %	

Table 2:-Relation between type of surgery and leakage

	Group1 No leakage	Group2 Leakage	Total	p-value
Type of surgery				
• Right hemi-colectomy	78 (94%)	5 (6%)	83	.269
• Extended Right	19 (100%)	0	19	
• left hemicolectomy	66 (90%)	7 (9.6%)	73	
• EXT left	24 (88.9%)	3 (11.2%)	27	
• Anterior resection of Dexon	75 (86.2%)	12 (13.8%)	87	
• Low Anterior resection of Dexon	43 (84.3%)	8 (15.7%)	51	
Total	305	35	340	

Table 3: Relation between technique of surgery and leakage

	Group1 No leakage	Group2 Leakage	Total	p-value
Technique of surgery				
• Open	279 (89.9%)	32 (10.1%)	131	.072
• Laparoscopy	26 (89.9%)	3 (11.1%)	29	
Total	305	35	340	

Table 4: Relation between class of surgery and leakage

	Group1 No leakage	Group2 Leakage	Total	p-value
Class of surgery				
• Clean contaminated	237 (89.8%)	27 (10.2%)	264	0.9
• Contaminated	68 (89.5%)	8 (10.5%)	76	
Total	305	35	340	

Table 5: Relation between type of anastomosis and leakage

	Group1 No leakage	Group2 Leakage	Total	p-value
Type of anastomosis				
• Ileo colic	75 (93.8%)	5 (6.3%)	80	0.076
• Colo-colic	78 (89.7%)	9 (10.3%)	87	
• Colo-rectal	47 (95.9%)	2 (4.1%)	49	
• Colo-anal	105 (84.7%)	19 (15.3%)	124	
Total	305	35	340	

Table 6: Relation between anastomotic technique and leakage

	Group1 No leakage	Group2 Leakage	Total	p-value
Anastomotic technique				
• Hand sewen	267 (89.9%)	30 (10.1%)	297	0.700
• Stapler	38 (88.4%)	5 (11.6%)	43	
Total	305	35	340	

Table 7: Relation between prophylactic stoma and leak

	Leak	No leak	Total	p-value
Prophylactic Stoma				
• Yes	3	79	82	0.022
• No	226	32	258	

Discussion:

All colorectal surgeons are faced from time to time with anastomotic leakage after colorectal surgery. This complication has been studied extensively without a significant reduction of incidence over the last 30 years. [2].

Risk scoring enables intra-operative decision-making whether to restore continuity or deviate. Early detection can lead to reduction in delay of diagnosis as long as a standard system is used. For treatment options, no firm evidence is available, but some studies focus on repair and saving of the anastomosis on the one hand or anastomotic breakdown and definitive colostomy on the other hand.[8]

Anastomotic leakage is the leading cause of postoperative death after colorectal surgery.[9]

In our study we analyze different intraoperative technical risk factors which could be related to occurrence of leakage.

Many risk factors were included in our study, first one is , type of resection whether RT hemicolectomy, extended RT hemicolectomy, LT hemi colectomy, anterior resection of Dexon ,leakage occurred more with low anterior resection of Dexon than any other type (15%) followed by Anterior resection of Dexon (13%), but this still statistically insignificant ,and this comparable to the results of many studies [1, 10] . this may be explained by that the rectal or anal stump has less blood supply than the other parts of colon , that may contribute to occurrence of ischemia and lead to dehiscence of the anastomosis , also the long distance between the proximal and distal resected parts that cause traction on anastomotic lines , finally the pelvis is narrow area and the ability to perform the anastomosis in pelvis is less than the wide abdominal area . [1, 10]

Regarding the type of anastomosis (ileo-colic, colo-colic- colo-rectal or colo-anal). It's more with colo-anal anastomosis but with no significant statistical value. (Insignificant p value).and this result matches with results of other studies [11, 12]. And this also can be explained by the more ischemia, tension and poor handling of tissue in pelvic area in addition to the more liability for infection in anastomosis in pelvic region than abdominal region [11, 12] .

Anastomotic leakage incidence is slightly more with open surgery than laparoscopic technique but statistically in significant but to be considered we have few number of cases operated laparoscopically 29 cases 3 of them develop leakage , this may cause the

insignificance in the incidence of leakage between open and laparoscopic surgeries [10].

The technique of anastomosis (hand sewn or stapler) didn't significantly affect incidence of leakage with (P-value 0.7) [10].

We found that class of surgery whether it's contaminated or clean contaminated mildly increase incidence of leakage but statistically insignificant, we have 76 patients in them contamination of field occur 8 from the 76 patient develop leakage (11%) ,this is due to increased incidence of infection and endotoxins and inflammatory response around anastomosis which delay and impair healing of anastomosis but still insignificant [12].

In this study in 258 patients there was no stoma done at first surgery of resection. 32 of them develop leakage, 23 patients develop major leakage with clinical manifestations and need re operation and stoma done, while 9 patients develop minor leakage which need no surgical intervention and receive just conservative management. And stoma done as prophylaxis in 82 patients in the first surgery, 3 of them also develops leakage. (With p value .022). This means that prophylactic stoma doesn't prevent occurrence of leakage at all as some cases developed leakage despite the presence of proximal stoma, but it prevent complications of the leakage, these data is supported by many papers and researches on this issue that found that prophylactic stoma can lead to surgical site infection and abdominal sepsis and other issues that may lead to dehiscence, although this occurred in small number of cases but cannot be neglected. Also ,Creation of prophylactic stoma, significantly reduced the overall incidence of leakage in general (3.7% vs. 12.4% in our study, p-value = 0.022) , further investigation showed it didn't prevent or even decrease the incidence of minor leakage but it has preventive role on the occurrence of major leakage which is associated with major systemic effects and need for redo surgery. This is consistent with many reports in the literature [13-15].

Conclusion:

Operative factors including surgical techniques and type of surgeries, type of anastomosis, type of surgery regarding contamination of operative field and technique of anastomosis in colorectal cancer surgeries can affect the incidence of leakage, so studying the effect of each factor on leakage can help in choosing the best modalities that decreasing the incidence of leak after colorectal cancer surgeries.

No conflict of interest

Authors' contributions

HF, MA, HM and KM conceived the study, participated in data collection, the study design and surgical technique, participated in data collection, sequence alignment and coordination and drafted the manuscript. All authors read and approved the final manuscript

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