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The incidence of fecal fistula after gastrointestinal anastomoses using either single-layer or double – layer anastomoses. A comparative study done in Samarra General Hospital

Rabah Ali Hussein [(1)]; Jameel I Azzawi [(2)]; Anas Ahmed Saleh [(3)]

[(1) (2) (3)] **Department of Surgery, Collage of Medicine, Tikrit University. Tikrit, Iraq**

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ABSTRACT

Post-operative leak from GI anastomoses is common and serious condition that carry a high mortality and morbidity and to it is serous septic complication and fluid and electrolyte disturbance . Also it cause severe fecal feeding problem with malnutrition and its complication, leading to sever complication**.**

.Aim of study:

Is to estimate the incidence of leak (fecal fistula) from the site of gastro-intestinal anastomoses using different technique of bowel anastomoses (single layer vs. double layer bowel anastomoses).

Material & Methods :

100 patients [60♂ (60%)] & [40♀ (40%)] are included in this study, which is conducted in SGH during the period between Jan. 2017- Dec. 2020 .Informed Written consent was taken from all patients prior to enrolling into the study. Only the patients who have small bowel and colonic anastomoses are taken in this study to estimate the incidence of leak after bowel anastomoses using either single layer or double layer anastomoses .The patients are divided into 2 groups:-

Group A : 50 patients with single layer anastomoses .

Group B : 50 patients with double layer anastomoses.

Results : The overall incidence of fecal fistula in this study was 10% (10 patients from the 100 patients in this study). Regarding patients with leak from the anastomoses, 7 patients (70%) had double layer & 3 patients (30%)had single layer anastomoses. The incidence of leak is more in female (60 %) than in male (40 %)and more in large bowel anastomoses(70 %) than small bowel anastomoses (30 %) . The overall morbidity is 30% from the post-op. leak .

Conclusion: Bowel leak from the site of bowel anastomoses is common and carry high mortality and morbidity . Single layer meticulous bowel anastomoses carry lowest rate of leak and complication including narrowing of the bowel lumen prolongation of time of operative .

Corresponding author E mail : Rabah.Ali@tu.edu.iq

Introduction:

Gastrointestinal fistulae are regarded as high serious complication and associated with very high both mortality & morbidity rates. It leads to abnormal movement of bowel contends digestive enzymes, fluid & electrolyte and nutrient from one part of the GIT to the another or to the skin . So it will cause a wide range of pathophysiological events . In addition, GI fistulae can lead to prolongation of hospital study of the patients, with its cost effect on the patients. About 80% of GI fistulae occur after surgery (post-operative GI fistulae).

However spontaneous type of GI fistulae can be found in a variety of cases like inflammatory bowel disease, cancer, TB and radiation enteritis [(1)]. Adequate bowel anastomosis is essential to reduce the risk of leak and development of fecal fistulae from the site of anastomoses . There are many factors which are regarded as essential for safe bowel anastomosis. The factors are divided into local factors & systemic factors .

1 – **Local factors include** :

a-Good blood supply (no tension).

b-Inverting anastomosis with appropriate statues.

c- Accurate apposition and status technique .

d- Avoidance of tissue damage by clamps .

2- **Systemic factors**:

a- Bowel preparation and avoidance of spillage .

b- Antibiotic prophylaxis .

c- Maintenance of good perfusion & tissue oxygenation during anasthesia.

d- Adequate nutritional attention .

e- Adequate re-sectional margin (cancer or inflammatory bowel disease) and avoidance of chemotherapy or radiotherapy [(2)] .

There are two techniques for end-to end or end – to side anastomosis :

1- **Two- layer technique** :- In which the first layer is completed by using

continuous all layer anastomosis . The second layer is a completed by inverting the anastomosis from the first layer by using seromascular interrupted suturing .

The suture material should be of 2/0 or 3/0 size and made of an absorbable polymer and of rounded non – traumatic needle. It is crucial to make sure that only bowel of similar diameter is brought together to form end – end anastomosis by using this technique .

Using this technique for anastomosis of bowel with disparity in the lumen will lead to more narrowing and more risk of leak from the anastomosis .

2- **One–layer technique** :- These anastomoses can be undertaken using open (avoiding the use of occlusion clamps) or closed technique . They are useful in the following circumstances:-

a- When access is not easy as in low anterior resection .

b- When there is disparity in the bowel lumen .

c- When the bowel serosa is lacking .

This technique involve the use of interrupted single-layer extra mucosal suture and is probable the most practiced technique [(2)] .

The anastomosis may be end-to-end, end-to–side or side - to– side anastomoses. It may by created between two segment of bowel or between small bowel and another viscous as stomach, pancreas and bile duct. The general principles of anastomoses is universal, whether the anastomosis is hand – sutured or stapled and whether it is performed at laparotomy or laparoscopy [(3)] .

Post- operative anastomotic leaks and fistulae:-

The management of leaks depend on whether they are early or late leaks and whether they are from small or large bowel and according to its presentation, which can be in one of the following :

1- Generalized peritonitis .

2- Pelvic peritonitis.

3- Sealed localized.

4- Wound fistula.

5- Fistulation into another organs (vagina or urinary bladder) [3] .

The type of fistula has very important clinical effect . If the fistula is lateral or side fistula with preserved continuity of the intestine, this will allow bowel content to progress beyond the fistula site [4] .

This type of fistula is the commonest type to be closed spontaneously [5] . On the other hand, if the fistula is associated with complex loss of bowel continuity, this usually required surgical correction of fistula [6] .

The classification of gastrointestinal fistula is shown in following table No.1 .

Table No.1 The classification of gastrointestinal fistula

Aspect	Classification criteria
1- Anatomical	Internal fistula
	External fistula
2- Volume of out put	Pancreatic [7]*
	Low (< 200 ml / day)
	High (>200 ml / day)
	*Intestinal
	Low (< 500 ml / day)
	High (>500 ml / day)

The clinical methods for diagnosis of enterocutanous fistulas are shown in the table No.2 [10] .

Table No.2 methods for diagnosis of enterocutanous fistulas

1-	Monitoring parameters
	*Fistula output volume
	*Fistula aspect
	*Water – electrolyte balance
	*Biochemical evaluation
	*Infection status
	*Nutritional /metabolic status
2-	GIT endoscopy
3-	Soluble contrast GIT X-ray exam.

4-	Fistula graphy and methylene blue test
5-	Ultra sonographic examination
6-	Contrast abdominal CT-scan
7	MRI examination

Risk factor for development of post-operative GIT fistulae:-

There are many risk factors that increase the incidence of post – operative enterocutaneous GIT fistula formation. The risk factor include:-

1-The site of GIT anastomosis (duodenal or pancreatic).

2-Advanced age of patients.

3-Long-studing jaundice.

4-Shock during operation .

5-Long operation time.

6-Sever blood loss during operation.

7-Maluntrion of the patients.

8-Immunocopromised patients.

9-Sepsis including bacterial peritonitis.

10-Chronic renal failure .

11-Mesentric vascular insufficient.

12- Previous abdominal operations.

13-Bad quality of suture materials.

14-Inadequate surgical training.

15-Emergence operations have more risk than elective .

16-Poor patients bowel preparation before operation[(11)] .

Treatment of enterocutanous fistulae:

The treatment of enterocutanous fistulae can be very challenging in patients with high output fistula. While low output fistula can be expected to heal spontaneously, provided there is no distal obstruction . Reasons for failure of spontaneous healing include:-

1-Presence of mature epithelium between the skin and the gut

2- High output fistula

3- Presence of active disease like carcinoma or chronic disease at site of anastomosis.

4- Presence of complex abscess in association with the fistula.

5- Short and wide fistula tract.

6- Disruption of more than 50% of the circumference of the anastomosis (2)

The abdominal wall should be protected from erosion by fistula discharge content by using of appliances. The patient's should be nil by mouth with support by IV fluid and nutrition's. The skin excoriation is more sever with more proximal small bowel fistulae and more sever with duodenal fistula. High output fistula cause more rapid & severe dehydration & hypo-proteinaemia so adequate fluid replautent & nutritional support is essential.

The drainage of intra-abdominal abscess when present is essential for healing of the fistula. Defunctioning stoma may be used in complex and high output fistula to enhance spontaneous healing (12).

Operative treatment and repair of should only be attempted after trial of conservative treatment. Re-anastomosis should not be done in the presence of continuing intra-abdominal sepsis or when the patient's is hypoproteinaemic.

Octreotides use provide a new hope for the control and spontaneous healing of entero cutaneous fistula (13).

Material & methods

During our study, 100 patients are taken in the study in SGH during the period between Jan. 2017 - Dec. 2020. 60 patients (60%)were male patients and 40 patients (40%) were Female patients.

These patients were divided into 2 groups of patients who have small & large bowel anastomosis only excluding the other site of GIT anastomosis:-

Group A:- 50 patients have single layer bowel anastomosis .

Group B:- 50 patients have soluble layer bowel anastomosis .

Results:-

In our study, we involve 100 patients for small layer bowel

anastomosis using either single layer or double layer bowel anastomosis. The overall incidence of leak from the anastomosis in our study was 10 % (10 patients). Among these 10 patients, 6 patients (60%) were female and 4 patients(40%) were male as shown in the Table No.3.

Table 3. Male / Female ration in anastomotic leak.

Patients with bowel leak	Male	Female
10	6 (60 %)	4 (40 %)

So female patients Higher risk of fecal fistula than male patients in our study. From the 10 patients with leaking anastomosis,7 patients (7%) have double layer bowel anastomosis & 3 patients(3%) have single layer bowel anastomosis, as shown in Table No. 4.

Table No.4 **Rate of leak according to method of anastomosis.**

Type of anastomosis	Incidence of leak
Double layer anastomosis	7 (7 %)
Single layer anastomosis	3 (3%)
Total	10 (10%)

In all cases with anastomotic leak, 3 patients (30%) have small bowel anastomosis and 7 patients (70%) have large bowel anastomosis. So the risk of anastomotic leak higher in large bowel than small bowel anastomosis. Regarding the mortality from bowel anastomotic leak in our study, 3 patients (30%) from the 10 patients with bowel anastomotic leak died and 7 patients (70%) survived from the complications of anastomotic leak. So the overall mortality from the anastomotic leak in our study were 30%.

Regarding the clinical presentation of anastomotic leak among the 10 patients it was as the following:-

1- Five patients presented with fistula discharge from the wound

2- Two patients presented with localized collection in the abdomen.

3- Three patients presented with diffuse peritonitis.

The mortality depend on the clinical present and severity of the leak from the anastomosis and this is shown in the following table No.5.

Table 5. Association of mortality with type of leak state.

Type of clinical presentation of bowel leak	No. of cases	Mortality rate
Discharge from the wound	5 (5 %)	0
Fecal peritonitis	3 (3 %)	3 died (100 %)
Localized collection	2 (2 %)	0

In our study, leaking from anastomosis was more common in emerging (60%) than from elective (40%) operations.

Discussion:-

In our study, 100 patients were taken. These patients have small - small bowel, colonic-colonic or small bowel colonic anastomosis. The study is conducted on both elective and emergency operations that need bowel resection and anastomosis. The patients are divided into two groups, group Aim whom the bowel anastomoses is done by single - layer interrupte Suturing and group B in whom the bowel anastomosis is done by double- layer Suturing. The main aim of our study is to esstimate the incidence of bowel leak from the site of anastomosis using two different methods of bowel anastomosis & comparing between them.

In our study, the incidence of leak from the site of anastomosis was 10 %(10 patients from 100 patients involved in the study). This rate of occurrence of bowel anastomatic leak is nearly the same as that which is mentioned in the most text-books.

Galie k, etal mentioned that the risk of fecal fistula after bowel anastomoses is between 10 - 15 %and this is nearly comparable with our study (14).

In our study, the risk of anastomotic leak is more common

with double - layer than single - layer anastomoses and the incidence was 70% & 30% respectively.

Hill G. et al mentioned that single layer anastomoses is association with lower risk of complications including bowel narrowing and risk of leak and this comparable with our study (15). Female are more common prone to fecal fistula than male & probably this is because we preformed many operations on Female patients with inflammatory bowel disease.

In our study, bowel leak is more common from colonic - colonic anastomosis than small - small bowel anastomosis with rate of 70% & 30% respectively. This fact is mentioned by Redden M. et al who predict that colonic fistula after colonic anastomosis is much more common than that after small bowel anastomoses (16).

In our study, the overall mortality from faecal fistula after bowel anastomoses was 30% (3 patients out of 10 patients who developed faecal fistula died). This is comparable with most of the text books mentioned information and many studies have nearly similar mortality rates. Rabago L & et al mentioned rate of 22 - 28 % after leaking anastomosis in elective Surgery for inflammatory bowel disease, and that the rate of leak is surely more common in emergency situation (17).

Conclusion:-

From our study results and reviewing of other studies with similar objects, we find that bowel leak after bowel anastomosis is common. It carry high mortality and morbidity. So the choose of optimum anastomotic technique is essential to reduce this leaking rate from the anastomoses. Single layer technique is more safe, with both reducing the rate of leak and prevent narrowing of bowel lumen. Also its less time consuming.

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