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A clinical study on identification of factors affecting spontaneous closure of postoperative enterocutaneous fistula

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ABSTRACT

Objectives: To analyze various biochemical and pathological abnormalities in patients presenting with postoperative enterocutaneous fistula. To determine different factors among these which have a negative impact on spontaneous closure of enterocutaneous fistula. To identify the benefit of timely non-operative interventions by improving the modifiable factors in reducing mortality and morbidity.

Material and Methods: This study is a retrospective analysis conducted in the Department of General Surgery at a tertiary care center. The study included a population of 28 patients and spanned a duration of 21 months, from November 2022 to July 2024. Patients with postoperative enterocutaneous fistula at the center were included, while those with inflammatory bowel disease or on high doses of steroids for other causes were excluded. The collected data were tabulated and analyzed using the Chi-square test of independence, with the significance level set at 0.05.

Results: Significant difference is seen that by correcting modifiable factors, success rate is increased in the spontaneous closure of EC fistulas.

Conclusion: We have to note the modifiable and non modifiable factors and timely intervene to attain spontaneous closure of EC fistulas.

Keywords: Enterocutaneous fistulas, Modifiable factors, Nonmodifiable factors, Post operative, Spontaneous closure

INTRODUCTION

Enterocutaneous (EC) fistula is defined as an abnormal communication between the mucosal epithelium of the gastrointestinal tract and the skin surface.¹ Management of these EC fistulas provides a surgeon with multiple challenges; we should consider about the complications - fluid and electrolyte abnormalities, malnutrition, sepsis, abdominal wall and wound abnormalities and other complications.²

MATERIAL AND METHODS

This study is a retrospective analysis conducted in the Department of General Surgery at a tertiary care center. The study included a population of 28 patients and spanned a duration of 21 months, from November 2022 to July 2024. Patients with postoperative enterocutaneous fistula

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at the center were included, while those with inflammatory bowel disease or on high doses of steroids for other causes were excluded. The collected data were tabulated and analyzed using the Chi-square test of independence, with the significance level set at 0.05.

Table 1 illustrates the categorization of host factors into modifiable and non-modifiable factors. Modifiable factors include hemoglobin levels, serum albumin levels, and the presence or absence of sepsis. Non-modifiable factors comprise the age and gender of the patient. The collected data are systematically tabulated and represented in the table.

In Table 2, fistula factors are categorized into modifiable and non-modifiable factors. Modifiable factors include the presence or absence of intra-abdominal collection. Non-modifiable factors include the site of the fistula, the length of the fistula tract, the output of the fistula, and the presence or absence of distal obstruction. The collected data are systematically tabulated and represented.

In Table 3, the results were analyzed using the Chi-square test of independence, with a p-value less than 0.05 considered statistically significant. The achievement of spontaneous closure was taken as the end result, and the corresponding p-values are depicted.

In Table 4, with active interventions targeting modifiable factors, spontaneous closure can be achieved despite the inability to change the most significant non-modifiable factor, which is the site of the fistula. The success percentage results are presented in the table.

Investigations

The investigations conducted included the following: complete blood picture, which assessed hemoglobin levels and total WBC counts; serum total protein and albumin levels; serum electrolytes; arterial blood gas analysis; serum C-reactive protein levels; and culture and sensitivity testing of samples such as blood, urine, pus, or drain collection. Imaging studies included X-ray or CT fistulogram and contrast-enhanced CT (CECT) of the abdomen.

Patients are considered to be in sepsis when a source of infection is present + two/more of the following criteria are met (SIRS):

Temperature > 38°C (100.4°F) OR < 36°C (96.8°F) Heart rate of > 90 beats per minute Respiratory rate of > 20 breaths per minute/PaCO₂ >32 mmHg White blood cell count >12,000 cells/μl or <4,000 cells/μl.

Non Operative Methods Followed

Improving the modifiable factors

Correction of fluid, electrolyte, and acid-base imbalance (hypovolemia, hypokalemia, metabolic acidosis/alkalosis).

Table 1: Statistics: Patient's data (Host Factors).

Factor	Factor	Factor	No. of patients
Non modifiable factors	Age	<60 years	22
		>60 years	6
	Gender	Male	16
		Female	12
Modifiable factors	Hemoglobin levels	<8 g/dl	8
		>8 g/dl	20
	Serum albumin levels	<3.5 g/dl	7
		>3.5 g/dl	21
	Sepsis	Present	6
		Absent	22

Table 2: Statistics: Fistula characteristics.

Factor	Factor	Factor	No. of patients
Non modifiable factors	Site of fistula	Gastric	3
		Duodenal	5
		Ileal	9
		Colonic	11
	Fistula tract	>2 cm	8
		<2 cm	20
	Output of fistula	Low (<200 – 500 ml/day)	24
		High (>500 ml/day)	6
Distal obstruction	Present	2	
	Absent	26	
Modifiable factor	Intraabdominal collection/ abscess	Present	2
		Absent	26

Intravenous antibiotics in patients having sepsis empirically and followed by the culture and sensitivity report.

Blood transfusions in patients having hemoglobin levels <8 g/dl.

Albumin supplementation in patients having serum albumin levels <3.5 g/dl (1.5 g/kg/day in low-output fistula cases and 2.5 g/kg/day in high-output fistula cases).

Monitoring calorie intake: 30–35 kcal/kg/day in low-output fistulas, 50–55 kcal/kg/day in high-output fistula cases.

Total parenteral nutrition (glucose 30–70%, lipids 20–30%, amino acids 5–20%, trace elements) in patients not tolerating enteral feeds, Oral vitamin C, zinc supplementation (twice the RDA).

Percutaneous drainage of intra abdominal collection/abscess under radiological guidance.

Table 3: Results to note the association of factor with the spontaneous closure.

Factor	Factor/ spontaneous closure of EC fistula	Attained spontaneous closure	Not attained spontaneous closure	Chi-square value P-value
Non modifiable factors	Age <60 years	20	2	18.5 0.00002
	Female gender	10	2	1.9886 0.15848
	Long fistula tract	2	6	18.3491 0.00002
	Colonic fistulas	10	1	10.8606 0.00098
	Absence of distal obstruction	20	6	3.9642 0.00047
	Low – moderate output fistula	20	4	29.5907 0.00001
Modifiable factors	Absence of anemia	18	2	22.4424 0.00001
	Absence of hypoalbuminemia	20	1	32.7832 0.00001
	Absence of sepsis	20	1	34.7622 0.00001
	Absence of intraabdominal collection/abscess	21	5	3.9642 0.0464

Bold: Signifies P-value less than 0.05.

Table 4: Success percentage with intervention.

Site of fistula	No. of patients	No. of patients attained spontaneous closure	Success percentage with improving modifiable factors (%)
Gastric	3	2	66
Duodenal	5	3	60
Ileal	9	7	88
Colonic	11	10	90

RESULTS

Out of 28 patients, 22 patients have attained spontaneous closure, and 6 patients have not attained spontaneous closure (4 patients were re-operated on, and 2 patients died even after intervention).

DISCUSSION

The most common site of EC fistulas is the small bowel.³ Distal fistulas (jejunal and colonic) are more likely to close without operative intervention.⁴

In contrast, proximal fistulas (gastric, lateral duodenal) are more likely to require surgical correction.

Ileal fistulas usually take longer durations to heal and may need surgical intervention.

Other anatomical factors decreasing the likelihood of non-operative closure are complete disruption of GI continuity, adjacent abscess, strictured or diseased bowel, foreign bodies, or distal intestinal obstruction.⁵

Limitations

This is a single center study and is having less sample size.

CONCLUSION

Management of postoperative enterocutaneous fistulas involves consideration of various factors, and treatment is comprehensive.

With this study, we have categorized the factors affecting spontaneous closure into modifiable and nonmodifiable ones, host factors, and fistula factors per sepsis. We propose a proactive strategy to identify such factors and effectively manage them by providing ICU care, improving anemia and hypoalbuminemia, correcting fluid and electrolyte imbalances, providing nutritional support, managing sepsis, and timely guided interventions.

This results in qualitative improvement in the outcome of EC fistulas and benefits to the patient.

Ethical approval: Institutional Review Board approval is not required as it is a retrospective study.

Declaration of patient consent: Patient's consent not required as patients identity is not disclosed or compromised.

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