

A Comparative Study on Early Enteral Feeding Vs Delayed Enteral Feeding in Postoperative Enterocutaneous FistulaJyotirmaya Nayak¹, Gorachand Murmu², Subhashree Mishra³¹Assistant Professor, Department of General Surgery, SCB Medical College, Cuttack²Assistant Professor, Department of General Surgery, SCB Medical College, Cuttack³Assistant Professor, Department of Anaesthesiology, SJMCH, Puri

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Abstract:

Introduction: A fistula is a link between two epithelialized tissues that is aberrant. An enterocutaneous fistula is a fistulous tract that connects the intestinal lumen to the abdominal wall, allowing the lumen's contents to pour out via the tract. Even though enterocutaneous fistulas are uncommon, they are often linked with significant morbidity and death.

Aim & Objective: To study the role of early enteral feeding in early closure of enterocutaneous fistula in post-operative patients and its comparison with delayed enteral feeding.

Results: In 28 of these cases the initial surgery was an emergency procedure whereas in 2 patients the procedure was elective. Early feeding showed spontaneous closure of fistula in 64.29% patients whereas late feeding showed non closure in 61.54% patients.

Conclusion: Enteric fistulas, whether they arise spontaneously or because of surgery, provide a substantial challenge in terms of care. These fistulas may lead to prolonged periods of illness, causing morbidity, and in some cases, even death for the affected patient. This study showed, early enteral feeding favours the improvement of general condition of the patients and thereby early closure of entero-cutaneous fistula.

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Introduction

A fistula is a link between two epithelialized tissues that is aberrant. An enterocutaneous fistula is a fistulous tract that connects the intestinal lumen to the abdominal wall, allowing the lumen's contents to pour out via the tract. Even though enterocutaneous fistulas are uncommon, they are often linked with significant morbidity and death. However, during the last half-century, mortality from gastrointestinal fistulas has fallen from 40% to 60% to 15% to 20% of patients. This decrease in mortality and morbidity may be attributed to several advances in the treatment of sepsis, electrolyte imbalances, acid-base imbalances, and nutritional supplements. [2]

Primary or secondary enterocutaneous fistulas may occur. Primary fistulas develop as a result of underlying intestinal illness, such as Crohn's disease or cancer. Other causes include post-radiation treatment for cancer, distal blockage, iatrogenic or spontaneous intestinal damage, complex intra-abdominal infections such TB, amoebiasis, and typhoid, and diverticular disease). Secondary fistulas form when an otherwise normal gut is injured during surgical or endoscopic treatments. Most fistulas (75% to 85%) are related

to operations. [3] Anastomotic leaks, intraoperative damage to the intestine or its blood supply, erosion from intra-abdominal tubes or drains, implantation of prosthetic meshes, and suture misplacement when sealing the abdominal wall are all prevalent causes. Fistulas may also form as a result of percutaneous abscess or hematoma drainage. [4] Managing intestinal fistulas presents several obstacles to a surgeon. These patients' physiologic, metabolic, and immunologic derangements must be carefully monitored. These fistulas are potentially fatal to the patient for several reasons. First and foremost, the patient is often systemically unwell with severe sepsis. Second, they are malnourished and dehydrated, with a broad range of electrolyte and acid-base imbalances. Malnourishment and loss of vital micro and macro nutrients result from the loss of nutrient-rich fluid via the fistula. Due to sepsis, post-operative stress, and a lack of protein intake essential for optimal anabolism, the patients are in a hypercatabolic condition [5].

Edmunds et al. recognised the traditional triad of enterocutaneous fistula consequences as sepsis, malnutrition, and fluid or electrolyte imbalances. Early and active treatment of fluid and electrolyte

imbalances, as well as sufficient (parenteral or enteral) nutrition, are critical in minimising or preventing severe problems. Enterocutaneous fistulas are classified in a variety of ways. Primary and secondary fistulas are distinguished by their aetiology. They may be categorised as follows based on the outflow of the fistula:

- Low output (200ml per day)
- Medium Output (200-500ml/day)
- High Output (>500ml/day) [6]

Secondary postsurgical enterocutaneous fistulas are more prevalent than initial fistulas, as previously indicated. This research exclusively looks at postsurgical fistulas identified at our hospital throughout the study period. This research discusses variables that contribute to spontaneous fistula closure or the need for surgical intervention, as well as those that contribute to fistula recurrence. [7]

A multidisciplinary team of health care providers, including surgeons, infectious disease experts, intensivists, radiologists, nurses, entero-stomal therapists, and nutrition specialists, is required for successful treatment of a patient with enterocutaneous fistula. The mental and emotional requirements of the patient and his or her family must also be considered throughout a lengthy and frequently difficult treatment cycle. [7]

Malnourishment was recognised as a risk factor for morbidity and death in enterocutaneous fistulas around 40 years ago." This was corroborated by Chapmen et al, who discovered that patients receiving more than 3000 kcal/day had a 12% death rate, whereas those receiving less than 1000 kcal/day had a 55% mortality rate. Despite being a well-known condition, enterocutaneous fistulas have a significant death rate. There is a need for further surgical intervention, and managing these fistulas remains a significant issue for surgeons. [8]

Aim & Objective

To study the role of early enteral feeding in early closure of enterocutaneous fistula in post-operative patients and its comparison with delayed enteral feeding.

Material & Methods

This is a prospective research that compares the effects of early enteral feeding (after 48 hours, before 10 days) versus delayed enteral feeding (after 10 days) in post-operative enterocutaneous fistulas in the General Surgical unit at S.C.B. MCH from 2017 to 2019. In the first 48 hours, patients will be forcefully resuscitated with fluids and

electrolytes. Simultaneously, stoma care device will be used to protect the skin from effluent while also providing reliable assessment of daily fistula output. Parenteral nourishment began as soon as it was feasible. If intestinal access and alimentation are feasible, nutritional assistance with enteral feeding will begin. After that, enteral feeding was implemented, and parenteral nutrition was phased out. The anatomical location of the fistula will be traced utilising fistulography and barium testing. In all situations with high output fistula, octreotide will be utilised. We will examine the number of simple fistulas closed and the number of complex fistulas that need final closure by operations after a period of sepsis correction and nutritional care.

The following parameters will be observed and compared:

1. Amount of fistula output
2. Nature of output
3. Site of fistula

Inclusion Criteria

1. Patients developing enterocutaneous fistula in post op period admitted to Gen. Surgery SCB MCH, CTC.
2. Patients willing to be included in the study after consent.

Exclusion Criteria

1. Patients not giving consent for study.
2. Patients with primary enterocutaneous fistula due to causes other than postsurgical.
3. Pregnant patients.
4. Psychiatry patients.
5. Patients who lost their life during course of treatment.

Study Area: Dept. of Gen. Surgery SCBMCH, CTC

Period of Study: 2yr from Oct 2020-Sept 2022.

Study design: Hospital based prospective study

Sample size: 30 patients.

Sampling Procedure

All clinically suspected patients of enterocutaneous fistula those got admitted to our dept. will be enrolled into the study after informed consent and following exclusion criteria. They will be equally divided into 2 groups (group A & group B). Group A will be subjected to early enteral feeding (after 48hrs, before 10 days) and Group B will be subjected to delayed enteral feeding (after 10 days).

Results

Table 1: Age Distribution

Age	Frequency	Percentage
<18 yrs	0	0
18-30	4(3+1)	13.3%
31-40	5(3+2)	16.7%
41-50	7(4+3)	23.3%
51-60	8(4+4)	26.7%
61-70	5(3+2)	16.7%
>70yrs	1(1+0)	3.3%

Minimum is 27yrs
Maximum is 72yrs

Table 2: Sex Distribution

Sex	Frequency	Percentage
Male	18	60%
Female	12	40%

In 28 of these cases the initial surgery was an emergency procedure whereas in 2 patients the procedure was elective.

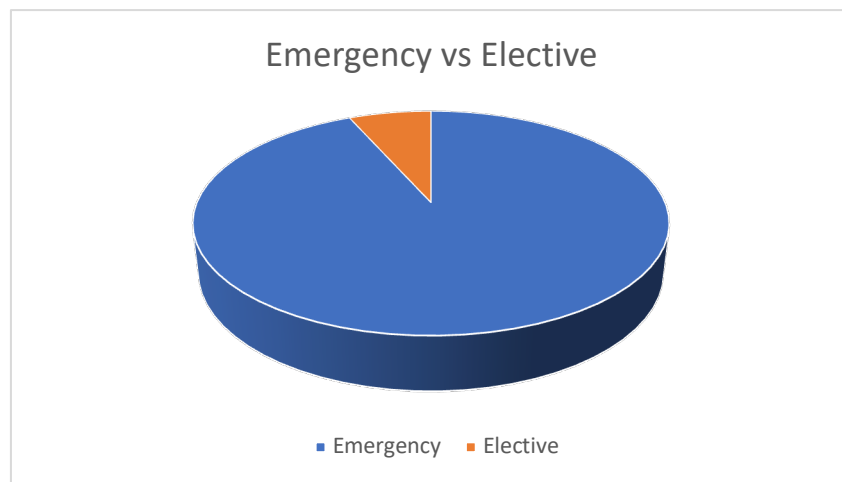


Figure 1: Emergency Vs Elective

Classifying based on anatomical location of the fistula they were 3 gastric fistulas, 5 jejunal fistulas, 12 ileal fistulas, 4 caecal fistulas and 6 colonic fistulas. Small intestine fistulas were more common than large intestinal and gastric fistulas.

Anatomical sites of the fistula

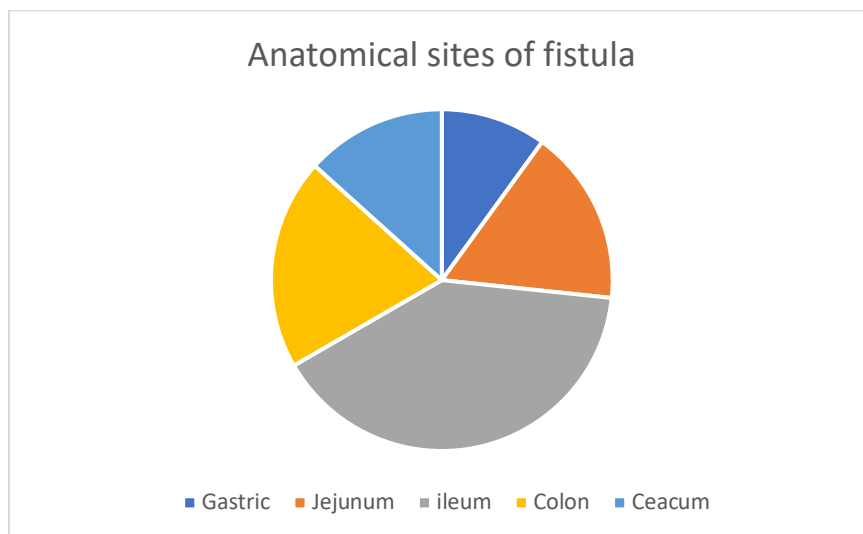


Figure 2: Anatomical sites of the fistula

Classifying fistulas according to the quantity of output we have 10 low output fistulas (<200ml), 8 medium output fistulas (200 to 500ml) and 12 high fistulas (>500ml). Of these gastric and jejunal fistulas were all high output fistulas and colonic fistulas were always low output fistulas. Ileum had 1 low output, 7 medium output and 4 high output fistulas and caecum had 3 low output and 1 medium output fistulas.

Fistula Grouping by Distal Obstruction

Table 3:

	Cases	Percentage
Without Obstruction	27	90%
With Obstruction	3	10%

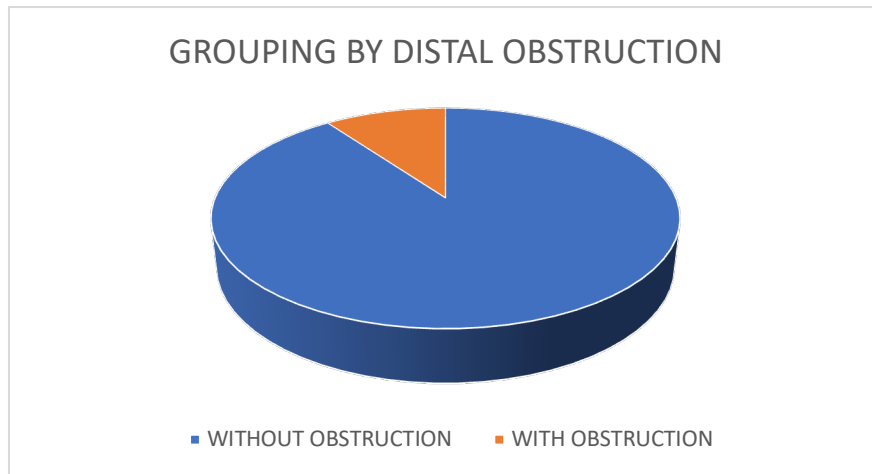


Figure 3: Grouping by distal obstruction

Table 4: In Early Enteral Feeding (14 cases)

	Cases	Percentage
Fistula closed spontaneously within 30 days	9/14	64.29%
Persists	5/14	35.71%

Table 5: Enteral Feeding After 10 Days (3 cases)

	Cases	Percentage
Closed Spontaneously in 30-45 days	5/13	38.46%
Not closed	8/13	61.54%

Discussion

The management of enterocutaneous fistula is a significant difficulty for surgeons. The technique used integrates medical, surgical, and intensive care unit teams, therefore encompassing a comprehensive management strategy. This research examines a total of 30 instances of post-operative enterocutaneous fistula.[9]

Most of the patients were between the age range of 40 to 70 years. The primary aetiology of fistula formation was anastomotic leakage, with secondary occurrences seen after appendectomy, perforation of hollow viscera, and unintentional enterotomy. In a comprehensive case series conducted by Rose et al. (5), consisting of 114 cases, the primary aetiology of fistulas was identified as "surgical misadventure," accounting for around 76% of the observed instances. This research found that anastomotic leak constituted 69% of the observed cases, while unintentional enterotomy was only seen in a single instance. The term "postoperative"

refers to the period of time following a surgical procedure.[10,11] The majority of cases included in this research (93%) were conducted in an emergency medical context, primarily as a result of acute intestinal blockage, hollow viscous perforation, or acute gangrenous appendicitis. Elective surgery was performed in just two out of the thirty patients. A patient had a postoperative leak after a right hemicolectomy performed to address cancer in the ascending colon. The surgical procedure included an ileo-transverse anastomosis.[12] Fortunately, the leak closed without intervention. The second patient had a transverse loop colostomy procedure to address sigmoid volvulus by creating a sigmoid colon anastomosis. The loop colostomy was closed in an extra peritoneal manner, resulting in the development of a leak that subsequently resolved spontaneously.[13]

Patients who have emergency surgery often face an elevated risk of developing fistulas due to the

presence of sepsis, reduced hemodynamics, and impaired renal and/or liver functions. In this particular context, those who belong to a lower socioeconomic class, often characterised by limited access to resources and opportunities, are also included as patients.[14] It is worth noting that these patients often exhibit signs of inadequate nutrition. This finding is reminiscent of research conducted by Kumar et al., which revealed that 11% of operations performed in an emergency context resulted in the development of fistulas, but no instances of fistula formation were seen after elective procedures.[15,16]

The ileum exhibited the highest prevalence as the primary location for the development of enterocutaneous fistula, accounting for 40% of reported cases. This was followed by the colon, jejunum, caecum, and stomach. Ileal fistulas were mostly attributed to anastomotic leakage. stomach fistulas arise only from significant stomach holes that have been addressed with the application of omental patch closure. Subsequently, the patients exhibited the manifestation of fistula.[17]

The role of distal blockage and spontaneous closure of the fistula has been extensively demonstrated in several research, as previously discussed. This phenomenon might perhaps be attributed to the limited number of patients (n=3) in our research who presented with distal blockage, and the absence of any instances of spontaneous closure in these cases.[18,19]

Most participants in this research exhibited signs of malnutrition, with just a small subset of 5 individuals demonstrating a serum total protein level of 7 g/dl or above, while a larger group of 17 individuals had protein levels of 6 g/dl or less. In this investigation, four individuals had severe hypoalbuminemia, whereas mild to moderate hypoalbuminemia was seen in 21 patients. The observed phenomenon may be attributed to the catabolic condition of the patient, which is a result of the continuous excretion of peptide-rich fluids via the fistula.[20]

Patients diagnosed with hypoalbuminemia exhibit significantly reduced blood oncotic pressure, which may result in the leakage of fluid into interstitial spaces. This accumulation of fluid in these spaces can have detrimental effects on the patient's hemodynamics, potentially exacerbating their condition. Additionally, it is important to note that this fluid extravasation may lead to an underestimation of the required fluid correction.[21]

The patients consistently had signs of sepsis, with a significant majority already presenting with sepsis prior to the surgical procedure. The bacteria often identified in the culture of the fistula discharge were coliforms, namely *Escherichia coli* and those

belonging to the *Klebsiella* genus. Although no enterococci were identified in the present investigation, this finding may pose additional complications due to the prevalence of resistance to a majority of the more potent antibiotics.[22,23]

The therapy of enterocutaneous fistulas also involves considering nutrition as a crucial factor. Individuals who have developed enterocutaneous fistula after surgery often experience malnutrition as a result of inadequate oral intake, a hypercatabolic septic condition, and the loss of protein-rich enteral contents via the fistula.[24]

Adequate diet has the potential to enhance immunological function, provide protein precursors for the process of wound healing, and facilitate the proper functioning of the gastrointestinal system. The user's text is already academic and does not require any rewriting. After achieving sepsis control, it is important to shift emphasis towards providing metabolic and nutritional support. [25] According to the established recommendations, the recommended caloric intake for individuals is typically between 25-32 kilocalories per kilogramme per day. Additionally, it is advised to maintain a calorie to nitrogen ratio ranging from 150:1 to 100:1, and a protein intake of 1.5 grammes per kilogramme per day is deemed required for early closure. The adoption of partial or complete enteral feeding has been recommended as a strategy to mitigate the risk of gastrointestinal hormonal function atrophy in the gut and liver. The mucosa provides support for the immunologic functions of the body. Enteral feeding may be administered orally, by feeding tubes inserted into the nasoenteric or nasogastric regions, or directly through a fistula.[16]

The provision of enteral support generally requires a minimum of four feet of small intestine, free from any obstructions in the distal region. It is anticipated that the drainage originating from the fistula would intensify at initiation of enteral feeding. However, it is possible for the fistula to spontaneously close, often after a reduction in the output of the fistula. The normalisation of nutritional factors might enhance the likelihood of effective fistula closure in patients requiring operational intervention. This is achieved by improving gut calibre, thickness, and suture retention capacity.[27]

The preference for enteral feeding over parenteral nutrition arises from its ability to enhance gut flora and mitigate electrolyte imbalances [4]. Enteral nourishment may be administered through a feeding enterostomy tube positioned distally to the fistula. In several instances, it may not be feasible to do such a task. The practise of maintaining a patient in a state of nil peroral and implementing a period of 'bowel rest' is increasingly being considered outdated. The numerical value provided

is 46. Enteral feeding has been shown to have protective effects on the mucosal lining of the gastrointestinal tract. Additionally, the practise of reintroducing the fistulous output into either a mucous fistula or an enterostomy tube is observed. While this approach may be seen unfavourable by a significant number of patients, it provides an effective means to sustain enteral nutrition.[28]

In the cohort of patients receiving early enteral nourishment (within 48 hours to 10 days), who presented with enterocutaneous fistula without distal obstruction, the closure of the fistula was seen in 64% (9 out of 14 instances) during a 30-day period. In the group of patients who received delayed enteral nourishment (after 10 days), enterocutaneous fistula closure was seen in 38% of instances (5 out of 13 cases), in the absence of distal blockage. This statement elucidates the significance of enteral feeding in facilitating the spontaneous closure of an enterocutaneous fistula, as previously documented.[29]

Frequently seen problems include anaemia, loss of weight, skin excoriations, intra-abdominal abscesses, and the existence of a substantial defect in the abdominal wall. The occurrence of cutaneous and subcutaneous tissue inflammation poses a challenge during the closure of the abdominal region after surgical procedures. Skin excoriations need the use of robust treatment measures including the application of soothing creams and lotions. Additionally, it is essential to prevent the contact of effluent with the skin by using isolated stoma bags or VAC dressings.[30]The patient also experiences the social disapproval associated with the presence of a foul-smelling odour and the release of bodily fluids. This also imposes tremendous psychological burden on the sufferer. It is essential to provide patients and their relatives with sufficient and appropriate counselling in order to effectively address this issue.

Summary

The occurrence of gastrointestinal cutaneous fistula continues to be a very concerning complication in the context of abdominal procedures, as well as in cases involving cancer and inflammatory diseases. A comprehensive comprehension of the pathophysiological mechanisms and identification of risk factors might potentially mitigate their occurrence and facilitate the development of effective strategies for their treatment. The prompt recognition and resuscitation, together with the implementation of sepsis management measures and the provision of adequate nutritional support, have the potential to mitigate the development of problems associated with sepsis. An examination of the anatomical and etiological features of fistula might provide insights into the probability of natural closure or indicate the need for surgical intervention at an earlier stage.

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The optimal outcome for fistula clearance may be achieved by meticulous planning, precise surgical techniques, and the active participation of a multidisciplinary team. The provision of post-operative care, including proper nutrition and comprehensive support for physical and mental well-being, may facilitate the patient's recovery and enable them to resume a functioning and productive role in society. Additionally, this approach contributes to the long-term success and sustainability of the surgical repair.

Conclusion

Enteric fistulas, whether they arise spontaneously or because of surgery, provide a substantial challenge in terms of care. These fistulas may lead to prolonged periods of illness, causing morbidity, and in some cases, even death for the affected patient. The provision of treatment for these patients may be intricate and has resulted in the development of dedicated intestinal failure units, with the goal of improving overall patient outcomes.

The scope of this investigation is limited only to postoperative fistulas. The occurrence of spontaneous fistulas resulting from underlying intestinal disease has not been well examined or investigated in academic discourse. Furthermore, there is a lack of multiple randomised controlled trials examining the effects of appropriate diet, the use of pharmacological agents, and different surgical procedures.

1. Enterocutaneous fistula with distal obstruction - definitive management is surgery.
2. In cases without distal obstruction. Fistula closure by early enteral feeding in 9 out of 14 cases within 30 days i.e., 64.29%.
3. In cases without distal obstruction. Fistula closure by delayed enteral feeding is 5 out of 13 cases i.e., 38.46% So, by these studies, early enteral feeding favours the improvement of general condition of the patients and thereby early closure of entero- cutaneous fistula.

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