A Clinical Study on Comprehensive Analysis of Enterocutaneous Fistula

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ABSTRACT

BACKGROUND

An enterocutaneous fistula (ECF) is an abnormal communication between the small or large bowel and the skin. It is one of the serious complications of gastrointestinal surgery and has a mortality rate of up to 20%. Management involves dealing with malnutrition, sepsis, metabolic derangement and electrolyte imbalance.

METHODS

This is a combined prospective and retrospective study conducted at SVMC & RC from June 2017 to May 2019. Thirty patients with ECF were enrolled in this study. Patients with biliary, pancreatic and anal fistulas were excluded. Factors influencing spontaneous closure of fistula such as fistula characteristics, organ of origin, sepsis etc. were studied. Initial management for all patients was conservative with restoration of fluid and electrolyte imbalance, and were initially started on parenteral nutrition using dextrose 10%, Astymin, Intralipid, human albumin and total parenteral nutrition (TPN).

RESULTS

Fistula closed spontaneously in 22 patients. Operative closure was done in 5. Death occurred in 3 (mortality rate- 10%). Out of 30 fistulas, 28 were post-operative fistulas. One was due to trauma and one was due to Crohn's disease. Among the former, 83% developed a fistula following emergency surgery. Albumin levels after 3 weeks of treatment, were predictive of both spontaneous closure and mortality.

CONCLUSIONS

Post-operative causes account for majority of enterocutaneous fistulas. Anatomical origin of fistula, associated factors like sepsis, malnutrition, hypoalbuminemia and abdominal wall defect, influence the spontaneous closure. Total parenteral nutrition increases the spontaneous closure rate of fistulas and decrease mortality rate.

KEY WORDS

Enterocutaneous Fistula, Intestinal Fistula, Bowel Fistula, Faecal Fistula

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BACKGROUND

Enterocutaneous Fistula, one of the serious complications of gastrointestinal surgery, imposes a certain amount of chronic morbidity to the patient and has a mortality rate of up to 20%. Management of enterocutaneous fistula patients involves team work especially for dealing malnutrition, sepsis, metabolic derangement and electrolyte imbalance. In spite of an immense amount of advancement in the post-operative care now a days they remain one of the fascinating challenges to the surgeon. While treating these patients it is important to know when to wait for a spontaneous closure and when to do a surgical closure.¹ The word 'fistula' is derived and identical latin word for a pipe but its incorporation into English medical terminology was probably not directly from its Latin origin, but from the old French word 'Festre' which led to the English word 'Fistle' and 'Fistula'.²

A fistula is an abnormal communication between two epithelialized surfaces. An enterocutaneous fistula (ECF) is defined as an abnormal communication between the small or large bowel and the skin. Although fistulas arising from other regions of the gastrointestinal (GI) tract (e.g.: stomach, oesophagus) may sometimes be included in the definition of ECF, the discussion is limited to the conventional definition of ECF. An ECF, which is classified as an external fistula (As opposed to an internal fistula, which is an abnormal communication between 2 hollow viscera), is a complication that is usually seen following surgery on the small or large bowel. ECF is a common presentation in general surgical wards, and despite advances in the management of these lesions, they are still responsible for a significant mortality rate, ranging from 5-20%, due to associated sepsis, nutritional abnormalities, and electrolyte imbalances. Understanding the pathophysiology of, as well as the risk factors for, ECFs should help to reduce their occurrence. Moreover, the well-established treatment guidelines for these lesions, along with some newer treatment options, should help clinicians to achieve a better outcome in patients with an ECF.^{3,4,5}

The most commonly used schemes for classification are anatomic, physiologic and etiologic which are not exclusive of one another. Sitges- Sera et al⁵ proposed an alternative classification of postoperative ECF which integrates the role of nutrition, surgery and prognosis of a given patient and which can be used as a guideline to treatment.

Enterocutaneous fistula (ECF) is a common condition in most general surgical wards. Over the past few decades, improvement in the management of ECF has resulted in a gradual decrease in the associated mortality rate. Nonetheless, the mortality rate from these lesions, at 5-20%, remains significant. Once a patient develops an ECF, the morbidity associated with the surgical procedure or the primary disease increases, affecting the patient's quality of life, lengthening his/her hospital stay, and raising the overall cost of treatment.

Treatment of enterocutaneous fistulas (ECFs) continues to be a difficult task. The problems associated with an intestinal wound breakdown were mentioned as early as 53 BC, by Celsus, who stated that the large intestine can be sutured, not with any certain assurance, but because this doubtful hope is preferable to certain despair; for occasionally it heals up." In the mid-19th century, John Hunter also described the difficulties in treating ECFs, insisting that "in such cases nothing is to be done but dressing the wound superficially, and

when the contents of the wounded viscus become less, we may hope for a cure." In a landmark article, Edmunds et al provided a comprehensive discussion of ECF. Out of 157 patients in the study, 67 developed ECF following surgery. Important complications of ECF included fluid and electrolyte imbalance, malnutrition, and generalized peritonitis. Mortality was 62% in patients with gastric and duodenal fistulas, 54% in patients with small-bowel fistulas, and 16% with colonic fistulas.

Enterocutaneous fistulas can occur as a complication following any type of surgery on the GI tract. Indeed, more than 75% of all ECFs arise as a postoperative complication, while about 15-25% of them result from abdominal trauma or occur spontaneously in relation to cancer, irradiation, inflammatory bowel disease, or ischemic or infective conditions. Previous studies reported mortality rate as high as 65% in cases with ECF. With recent advances in radio imaging, nutritional support and effective antibiotic availability, now the mortality rate has been reduced to 20%.^{5,6}

We wanted to analyse all cases of ECF treated in our institute, to identify the factors influencing the spontaneous closure, mortality, presentation, prognosis, outcome of patients and assess the importance of management of fistula.

METHODS

This was a combined prospective and retrospective study conducted at the SVMC & RC. Study was done after getting approval from the institutional ethical committee, and an informed consent was obtained from patients. The period of study was from June 2017 to May 2019. All patients with ECF were enrolled in this study. Patients with biliary, pancreatic and anal fistulas were excluded.

Initial management for all patients was conservative with restoration of fluid and electrolyte balance being given the first priority. All patients were initially started on parenteral nutrition using dextrose 10%, Astymin, Intralipid, Human albumin and TPN. Later some were switched over to enteral or Ryles feeds depending on the clinical situation.

Patients with clinical features of sepsis were subjected to an ultrasound scan and treated with transperitoneal drainage if there was significant intra-abdominal collection. Emergency surgical intervention was undertaken only in patients who had an intra-abdominal abscess. Diversion procedure were undertaken in some patients at this time. Elective surgical closure was done if the fistula failed to close spontaneously after 4 weeks of conservative management. A proforma was made and all cases of enterocutaneous fistulas were followed up from the day of recognition of fistula and till the date of discharge. Details regarding types of surgery performed, category of the fistula, origin of fistula were collected. Management policies for each patient is individualized and details of management were taken down. Analysis of morbidity and mortality were taken into the study.

Statistical Analysis

The statistical analysis was done by using SPSS software version 10.0 was used. p Value of less than 5% was considered as significant.

RESULTS

A total of 30 patients were studied. There were 23 males (77%) and 7 females (23%) involved in this study. Males were commonly affected compared to females, 23 males > 7 females. Majority of the fistulas were observed in the age group of 30 to 60 years. Out of 30 fistulas, 28 were post-operative, 1 was due to trauma and 1 was due to Crohn's disease. Among the former group 83% developed a fistula following emergency surgery. The mean interval between the initial surgery and appearance of the fistula was 9 days. Ileal fistulas were the most common accounting for 46.66% of patients (refer- table-1). Among the surgeries responsible for ECF, perforation closure accounted for the maximum in 22 (73.3%) patients (Refer- Table- 2).

Out of 30 patients, 11 (36.6%) patients had high output and 19 (63.3%) had low output fistulas (Refer -Table-3). Fistulas closed in 22 patients spontaneously, operative closure was done in 5 patients. Death occurred in 3 patients with a mortality rate of 10% (Refer- Table- 4).

Site of Origin of ECF	No. of Patients
Duodenum	8
Jejunum	1
Ileum	14
Colon and Appendix	7

Table 1. Based on Site of ECF Involved

Types of Surgery	No. of Patients
Perforation closure	22
Intestinal resection and anastomosis	6
Appendicectomy	1
Others	1

Table 2. Based on Surgeries Causing ECF

Site of Fistula	No. of Patients	
	High Output	Low Output
Duodenum	5	3
Jejunum	-	1
Ileum	5	9
Colon	1	5
Appendix	-	1

Table 3. Based on Output of Fistula Involved

Outcome	No. of Patients
Closed by surgical intervention	5
Spontaneous closure	22
Death	3

Table 4. Based on the Outcome of Patients with ECF

Risk Factors	No. of Patients	Closure	Closure	Expired
		Spontaneous	Operative	
Age >51 years	15	9	4	2
Sepsis	14	6	5	3
Malnutrition	15	7	5	3
Large abdominal defect	9	1	5	3
High output	11	3	5	3
Serum Albumin <3 gm %	9	1	5	3

Table 5. Based on Risk Factors Involved

Patients with single or no risk factor had no mortality refer (Table-5), whereas mortality steadily rose as risk factors accumulated. The mean duration of the fistula closure was achieved in 32 days in case of spontaneous closure.

Among the risk factors analysed the presence of a large abdominal wall defect and high output fistulas were significantly associated with failure of the fistula to close spontaneously. Among the factors analysed with respect to

survival hypoalbuminemia, malnutrition and sepsis were significantly associated with high mortality.

Serum albumin levels measured at the beginning of treatment showed no significant difference between patients who had spontaneous closure and those who did not, but there was a significant difference in serum albumin levels at the beginning of treatment between survivors and non survivors.

Effects of TPN

- TPN increases the spontaneous closure rate of fistula.
- TPN reduces the duration of fistula by hastening the spontaneous closure.
- TPN has contributed to decreased mortality in patients with fistula.
- Even if spontaneous closure is not achieved because of complex fistula anatomy the patient's general condition was improved to be taken up for definitive surgery.

DISCUSSION

The outcome of treatment of enterocutaneous fistulas vary widely from hospital to hospital. Mortality rates quoted in literature varies from 6.25% to 60%. Spontaneous closure occurs in 30 to 70%. This is because of the heterogenous nature of this condition. This study revealed a mortality rate of 10% and spontaneous closure rate of 73.33% which is similar to other studies in literature. Ileal fistulas in this study closed spontaneously in 92.3% cases, which is far better compared to other series where the rates are less than 40% despite it being an anatomically favourable location. In this study Ileal fistulas were the most common accounting for 46.66% of patients. A similar distribution is reported in a study done by Roback et al.⁷

In a study done by Edmunds et al¹ out of 157 patients studied, 67 developed ECF following surgery. Important complications of ECF included fluid and electrolyte imbalance, malnutrition, and generalized peritonitis. Mortality was 62% in patients with gastric and duodenal fistulas, 54% in patients with small-bowel fistulas, and 16% with colonic fistulas. Reber et al⁸ observed that 90% of patients who had closure of fistula did so within 1 month after sepsis was controlled. Less than 10% closed in 2 months and none after 3 months. Fazio et al⁹ observed that surgical mortality and success rate when surgery was done before and after 6 weeks was 21 and 70% and 12 and 84% respectively. Thus, elective surgery is best undertaken at least 4 to 6 weeks after resolution of intra-abdominal sepsis, which is usually 60 – 75 days after initial surgery.

In this study among the factors analysed the only factor that was predictive of spontaneous closure was the size of the abdominal wall defect. It was found that malnutrition, hypoalbuminemia and large abdominal wall defect were all predictive of mortality. Altomare et al showed that sepsis, serum albumin and high output fistulas were significantly related to the risk of death in ECF, which is similar to our study.

Operative closure was undertaken between 4 to 6 weeks except in one case where it was done in the first week for emergency drainage of an intra-abdominal abscess. In the 22 patients who had spontaneous closure only 6 had sepsis which was controlled by giving higher antibiotics, 7 had malnutrition

which was corrected and 1 had abdominal wall defect. None of them had hypoalbuminemia. Mortality in this series was due to a combination of risk factors with the rate increasing as these factors accumulated. Among the 5 cases that needed operative closure all cases had sepsis, 3 had abdominal wall defect, 1 patient had distal obstruction and abdominal wall defect and one had Crohn's disease. Although serum albumin levels at the appearance of the fistula did not predict spontaneous closure, it was predictive of mortality. Kuvshinoff et al¹⁰ reported that serum transferrin levels of > 200 mg/dl was predictive of spontaneous closure. Age of the patient influences mortality, but not spontaneous closure. Rubelowsky et al¹¹ reported spontaneous closure rates have been estimated to be between 50% and 80%.

In this study the albumin levels after 3 weeks of treatment, however, were predictive of both spontaneous closure and mortality. This shows that improving the nutritional status of the patient as evidenced by the increase in serum albumin levels after 3 weeks of treatment increases the chances of spontaneous closure. Similarly, failure to correct malnutrition as evidenced by decreased serum albumin levels after 3 weeks increases the mortality. Altomare et al reported a statistically significant difference in albumin levels between survivors and non-survivors and concluded that serum albumin levels have a 94% accuracy in predicting outcome. In this study another outcome is TPN which increases the spontaneous closure and also decreases the mortality in enterocutaneous fistula. Coutsoffides¹² reported mortality rates of 32% and 4% in the malnourished and well-nourished patients respectively. Serum visceral protein levels can be used to predict outcome in ECF.

This study revealed a mortality rate of 10% and spontaneous closure rate of 73.33% which is similar to other studies in literature. Edmunds, Sitges Serra et al and Levy observed mortality rates of 54%, 32% and 50% for high output fistulas and 16%, 6% and 26% for low output fistulas respectively. Chapman¹³ observed a mortality rate of 12% and spontaneous closure in 89% of patients with ECF who received more than 3000 kcal/24 hrs. But in patients who received less than 1000 kcal/24 hrs corresponding values were 55% and 37%. Fazio et al⁹ reported mortality rate of 0% and 42% in patients with serum albumin above 3.5 g/dl and below 2.5 g/dl respectively. Reber et al⁸ reported mortality rates of 22% and 48% in patients below and above 65 years respectively. Narsos et al¹⁴ reported a mortality rate of 48% for jejunal fistulas and 18% for ileal fistulas in their study. Hollender's et al¹⁵ in their study reported that advances in percutaneous drainage of abscesses and the availability of better antibiotics could be responsible for the huge difference in mortality reported.

In the present study, 73% of the total patients were managed conservatively, whereas 27% of patients required surgical intervention. The common surgeries done in our patients are resection of segment of bowel containing fistula and end-to-end anastomosis, exteriorization of both ends, adhesiolysis and primary closure. Our study correlates with Lorenzo et al¹⁶ and Tarazi et al¹⁷ that the timing of operation and selection of the operative procedure depends on the type of fistula, response to conservative management, and the state of the patient.

CONCLUSIONS

Post-operative causes account for majority of enterocutaneous fistulas. Anatomical origin of fistula, associated adverse factors like sepsis, malnutrition, hypoalbuminemia and abdominal wall defect influence the spontaneous closure. Total parenteral nutrition increases the spontaneous closure rate of fistulas and also decreases of mortality rate. Definitive surgery should be carried out in the following patients

- Spontaneous closure not occurred even after 4 to 6 weeks of conservative therapy.
- Patient having complex fistula anatomy.
- Patient having distal bowel obstruction.

The management of ECF needs competent teamwork. The team members are the surgeon, staff nurses, stoma therapist, physiotherapist, dietician and pharmacist.

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