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Original Research Article

Clinical study of enterocutaneous fistula

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ABSTRACT

Background: An enterocutaneous fistulae (ECF) may be challenging to manage due to the large volume of fluid losses, that may result in severe dehydration, electrolyte imbalances, malnutrition and sepsis. It is imperative that this group of patients receive adequate nutrition, as malnutrition and sepsis are the leading cause of death.
Methods: This descriptive study was conducted prospectively in the Department of Surgery between September 2004 and August 2010. Patients whom develop ECF after surgery were included in the study while patients with esophageal, biliary, pancreatic, and perianal fistulas were excluded. The description of fistula included cause, anatomical location, fistula output, complications, and outcome. Fistula output was quantified by direct measurement, in the presence of drain or by calculating number of dressing pads soaked per day. To examine the statistical significance of association between attributes, Chi-square test and Fisher's exact test were used. A probability value of less than 5% ($P < 0.05$) was considered significant.
Results: A total of 42 patients were included in the study, of which 23 were males and 19 were females and the male:female ratio was 1.2:1. Most patients with ECF were aged 41-50 (mean age, 44.23±2.72). Of the 42 patients, 9 patients had colonic fistula and the remaining had small intestinal fistula; 16 ileal, 5 duodenal, and 12 jejunal. There were 22 patients with high-output fistula as compared to 20 patients with low output fistula. Mortality was significantly higher in patients with males, age >60 years, high-output fistula, mesenteric ischemia as underlying pathology, serum albumin <2.5g/dl and re-surgery.
Conclusions: Early diagnosis and stabilization form key aspects of management of ECF as most patients are managed conservatively. Prompt nutritional supplementation alters the outcome of this disease. High output fistulae required mostly surgical management and had high morbidity and mortality.

Keywords: Enteral nutrition, Enterocutaneous fistulae, Fistulae output, Total parental nutrition

INTRODUCTION

An Enterocutaneous fistula (ECF) is an abnormal communication between stomach, small or large bowel, and the skin allowing the gastrointestinal contents to flow onto the skin.[1,2] Literature has shown that ECF occurs as a result of a set of factors: surgical misadventure is the most common cause, other factors include malignancy, inflammatory bowel disease, post radiation therapy for malignancy , distal obstruction; iatrogenic or spontaneous bowel injury, complicated intra-abdominal infections such as tuberculosis, amoebiasis, and typhoid, or diverticular disease.[3-6] Enterocutaneous fistulas (ECF) may be challenging to manage due to the large volume of fluid losses, that may result in severe dehydration, electrolyte imbalances, malnutrition and sepsis. It is imperative that this group of patients receive adequate nutrition, as malnutrition and sepsis are the leading cause of death.[7,8] ECF treatment is complex and based on various assessments, treatment can be conservative management or surgical. Priorities in the management of GI fistulas include restoration of blood volume and correction of fluid, electrolyte, and acid-base imbalances; control of infection and sepsis with appropriate

antibiotics and drainage of abscesses; initiation of GI tract rest including secretory inhibition and nasogastric suction; control and collection of fistula drainage with protection of the surrounding skin; and provision of optimal nutrition by total parenteral nutrition (TPN) or enteral nutrition (EN) (or both). The role of nutrition support in the management of enterocutaneous fistulas as either TPN or EN is primarily one of supportive care to prevent malnutrition, thereby obviating further deterioration of an already debilitated patient.[9,10] Majority of the ECF are managed conservatively with bowel rest, nutritional and fluid support, antibiotics and monitoring. However, signs of generalized peritonitis, increasing fistula output, inability to provide adequate nutrition and sepsis are indications for surgical intervention.[7,9] Determining the optimal time for surgical intervention has not been well defined in the literature. However, surgery should be delayed until the intra-abdominal and systemic conditions of the patient are conducive to major surgery. The timing of definitive surgery should be individualized according to patient characteristics. Additionally, non-healing EC fistulas are associated with a foreign body, radiation, inflammation, infection, inflammatory bowel disease, epithelization of the fistula tract, neoplasms and distal obstructions.[2] The aims of surgery for EC fistulas are: re-functionalization of the entire bowel, resection of the fistula with end-to-end anastomosis of the bowel and secure abdominal wall closure. Once surgery is planned, care should be taken not to injure the adjacent bowels while opening the abdomen. The fistula tract is detected by staining with methylene blue or guided probes. After identifying the fistula opening in the bowel, resection of the diseased bowel and end-to-end anastomosis is the preferred method compared to over-sewing the fistula opening of the bowel, as recurrent fistula is more likely after over-sewing (36%) than resection (16%). To facilitate early feeding and decompression of the proximal bowel, selected cases require gastrostomy, diverting ileostomy or jejunostomy.

METHODS

This descriptive study was conducted prospectively in the Department of Surgery, between September 2004 and 2010. All consecutive patients, who developed or presented with ECF in the post-operative setting during the study period were included in the study. Patients with esophageal, biliary, pancreatic, and perianal fistulas were excluded from this study. A diagnosis of ECF was made clinically on detection of intestinal or fecal effluent from the drain site or abdominal incision site. Radiological evaluation in the form of contrast enhanced was used to identify the origin of the fistula. All enrolled patients were managed as per the policy of the department. Parameters studied included patients demographic profile, fistula output, biochemical parameters and outcome. The description of fistula included cause, anatomical location, fistula output, complications, and outcome. Fistula output was quantified by direct measurement, in the presence of drain or by calculating number of dressing pads soaked per day. A fistula output of 500 mL/day was taken as the cutoff between high and low output fistulas as described in literature. The choice of this method to quantify fistula output was mainly owing to the ease and cost of measurement and may have a higher error rate than a more objective measure using wound collection devices. Decision to conserve or to operate was taken by the consultant in charge of the patient.

To examine the statistical significance of association between attributes, Chi-square test and Fisher's exact test were used. The Statistical Package for Social Sciences (SPSS) software version 10.0 was used. A probability value of less than 5% ($P < 0.05$) was considered significant.

RESULTS

A total of 42 patients were included in the study, of which 23 were males and 19 were females and the male:female ratio was 1.2:1. Most of the patients with ECF were aged between 41 and 50 years. The mean age in our study was 44.23±2.72 years which concurs with the etiology.

Table 1: Age distribution of patients.

Age (years)	No. of patients
18-30	5
31-40	7
41-50	11
51-60	5
61-70	8
70	6

Of the 42 patients, emergency laparotomy was performed in 26 patients against 16 elective surgeries prior to the formation of ECF. The surgeries performed for mesenteric vascular ischemia were more prone for ECFs over other etiologies (TB, Malignancy, diverticulitis and trauma). Mesenteric vascular ischemia was the most common underlying surgical pathology amongst patient developing ECFs after emergency surgery. While malignancy and TB were common underlying pathology in the elective setting.

Table 2: Etiological distribution of ECF in elective and emergency setting.

Etiology	Elective (16)	Emergency (26)
Mesenteric vascular ischemia	3	13
Tuberculosis	5	7
Malignancy	6	3
Diverticulitis	2	1
Trauma	-	2

Nine patients had colonic fistula with diverticulitis and malignancy being the most common underlying pathology. 33 patients had small intestinal fistula 16 had ileal, 12 had jejunal, and 5 had duodenal fistulae with mesenteric vascular ischemia being the commonest underlying pathology.

Table 3: Site of ECF.

Site of fistula	No. of patients
Small intestine	33
Duodenum	5
Jejunum	12
Ileum	16
Large intestine	9

Table 4: Predictors of mortality in ECF.

Predictors	Died	Survived	p-value
Male	8	15	<0.05
Age >60 years	6	8	<0.05
mesenteric vascular ischemia	6	10	<0.05
high output fistulae	8	17	<0.05
Jejunal fistulae	7	10	<0.05
Re-surgery	5	6	<0.05
Albumin (<2.5g/dl)	7	12	<0.05

There were 20 patients with high-output fistula as compared to 22 patients with low output fistula. Duodenal and jejunal fistulae accounted for 70% of high-output fistulae. Colonic fistulae were more likely to have a low output (P <0.05).

Average hospital stay was 19.3±2 days with a range of 12-41 days. 31 patients were managed conservatively while 11 patients needed re-surgery. Males, underlying pathology being mesenteric ischemia, high output jejunal fistulae and emergency surgery were significant predictors of re-surgery. Cutaneous complications like skin excoriation was 35.7% and cellulitis was seen in 9.5% patients while intra-abdominal abscess was seen in 32.4%.

Serum albumin was greater than 2.5g/dl in 23 patients with a mortality of 8.3%, and serum albumin was less than 2.5g/dl in 19 patients with a mortality of 36.8% and there was significant association with mortality when albumin was lower than 2.5g/dl.

Total parenteral nutrition was used in nine patients, while partial parenteral nutrition was used in 11 patients while 22 patients were managed with exclusive enteral nutrition. Oral route (n=15) was the predominant route of administration of enteral nutrition while jejunostomy was used in seven patients commonly in duodenal fistulae.

Mortality in the present study was 21.4% (n=9), with males having higher mortality (7 versus 2). The significant predictors of mortality in the present study were male sex, age >60 years, ECF following emergency surgery, mesenteric vascular ischemia as the underlying pathology, high output fistulae, jejunum as the origin of fistula, serum albumin <2.5g/dl and requirement of re-surgery.

DISCUSSION

ECFs are a significant post-surgical complication however its incidence is less. The incidence of ECFs were more common in males than females (23 versus 19), which is similar to results in other studies. Incidence of ECFs were common in 41-50 years of age with a mean age of 44.2±2.7 years, which also corresponds to the common age for mesenteric ischemia.[11-13] However mortality was higher in patients greater than 60 years compared to those lesser than 60 (6 versus 3) with a significant association with mortality.

ECF following emergency laparotomy were commoner than elective laparotomy which could be explained by the presence of significant inflammation, contamination and poorly stabilized patients in the emergency setup giving rise to poor wound healing and chances for inadvertent enterotomies.

With respect to the underlying surgical pathology for which surgery was performed mesenteric ischemia (n=16) was the most common etiology predisposing to ECF due to ongoing ischemia and poor wound healing associated with the same. Other etiologies identified in our study were malignancy, tuberculosis, diverticulitis and trauma. Malignancy was the most common underlying pathology in the elective setup while mesenteric ischemia was most common in the emergency setup. Fistulae following appendectomy was not noted in the present study as all appendectomies were performed under the supervision of senior surgeons in the present study.

ECFs originating from small intestine were commoner than large intestine, this was due to the common underlying pathology of mesenteric ischemia which affects small intestine more than large intestine. Amongst small intestine ileum (n=16) was the most common site of origin of ECF followed by jejunum (n=12) and duodenum being the least common site and jejunal origin having higher mortality than others. This was discordant with literature search which showed ileum being the common site of origin and having high mortality. The site of origin correlates closely with the nature of output as more distal fistulae have low output in comparison with proximal fistulae.

The average hospital stay was 19.3 days with range of 12-41 days. Conservative management was used for most of the patients (73%) with rest requiring re-surgery. Most of the patients required emergency re-surgery with male sex, jejuna fistulae, high output, previous emergency

surgery and mesenteric ischemia as underlying pathology were significant predictors for the need of re-surgery with re-surgery increasing the risk of morbidity and mortality.

Serum albumin was measured in all patients of ECF and levels lower than 2.5g/dl were associated with significant chance of mortality, however low serum albumin levels were not significantly associated with the need for re-surgery.[14,15] This emphasizes the need for early supplemental nutrition and maintenance of serum albumin levels for prompt wound healing and quick recovery.[10,16]

With regards to nutrition, enteral nutrition was the most common route preferred in 75% patients with 50% exclusive enteral and 25% partial parenteral nutrition. Total parenteral nutrition was used in 25% of patients. Amongst the enterally fed patients oral route was the preferred one with tube feeding resorted to patients not tolerating enteral feeds. Duodenal fistulae have the peculiar need for tube jejunostomy feeding due to the inability to use the upper gastrointestinal tract. As previously mentioned early and adequate nutritional supplementation mitigates the stress response, the route of supplementation also provides advantage. The preferred route being enteral with its preservation of mucosal integrity over parenteral route due to the inherent risks associated with obtaining access and provision of parenteral nutrition.[17-18]

Mortality in the present study was 21.4% (n=9). The significant predictors of mortality in our study were male sex, age >60 years, ECF following emergency surgery, mesenteric vascular ischemia as the underlying pathology, high output fistulae, jejunum as the origin of fistula, serum albumin <2.5g/dl and requirement of re-surgery corresponding to literature. However, classification of mortality into early and late was not performed in our study which would have facilitated in identifying the cause of death in each participant, as early mortality is usually due to systemic response syndrome and delayed mortality due to sepsis.[19]

CONCLUSION

Thus, ECF are a surgical problem that warrants keen understanding of the plethora of factors determining the outcome and every surgeon is bound to treat it along his/her career.

The treatment of ECF needs a multidisciplinary team comprising of the surgeon, intensivist, nutritional therapist, physiotherapist and staff nurses for effective functioning and expediting the recovery.

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