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BRIEF ARTICLE

# Management of enterocutaneous fistulae: A 10 years experience

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## Abstract

**AIM:** To compare the outcomes of conservative *vs* surgical treatment of enterocutaneous fistulae (ECF) in a community teaching hospital over a decade.

**METHODS:** All cases of ECF between 1997 and 2007 were reviewed for management strategy.

**RESULTS:** Of the 83 patients with ECF, 60 (72%) were postoperative. Sixty-six patients (79.5%) were treated initially with conservative measures. Eighteen patients failed to respond to conservative treatment and required later (secondary) exploration; this group consisted of an equal number of low *vs* high output fistulae. Seventeen (20.5%) patients underwent initial (primary) definitive-surgery secondary to anastomotic leak and peritonitis. Surgical procedures included resection of ECF with anastomosis (24), exclusion (6) and direct-drainage (4). No significant difference was seen in the recurrence rate for conservative (10%) *vs* operative-treatment (20%).

**CONCLUSION:** Conservative treatment plays a pivotal role as an initial management in both low and high output fistulae. In selective cases only, early primary exploration is recommended.



**Key words:** Low-output; High-output; Enterocutaneous fistulae

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## INTRODUCTION

Enterocutaneous fistulae (ECF) are abnormal communications between the skin and gastrointestinal tract. Patients with ECF are generally malnourished, have wound infection and coexisting sepsis. ECF has been historically associated with long hospital stays and high morbidity and mortality. In recent years, there has been an improvement in the mortality rates but the current reported figures still remain at 5% to 20%[1-4].

The strategies for management of ECF include nutritional support, correction of electrolyte imbalances, recognition and treatment of sepsis, localization and delineation of the anatomy of the fistula and a correctly timed operative procedure[5]. Spontaneous closure rate of ECF is small and persistent fistulae do need definitive surgery. Newer therapies including wound vacuum-assisted closure (VAC), fibrin glue and the use of somatostatin analogues

have been used to promote the closure of ECF[6-8]. The objective of this study was to evaluate the trend in the management of ECF in a community teaching hospital and to compare the outcomes of conservative versus surgical management.

## MATERIALS AND METHODS

We reviewed the charts of all patients who underwent inpatient treatment at Providence Hospital for ECF, during the period from January 1997 to July 2007. Cases of fistulae are coded using the ICD9 code, which includes cases of enteroenteric, enterocolic, ileorectal and ECF. Patients with ECF were identified and included in this study.

Each chart was reviewed for the following information: (1) origin of the fistula; (2) volume of the fistula output; (3) etiology of the ECF; (4) length of hospital stay; (5) type of therapy (conservative or surgery); (6) use of total parenteral nutrition (TPN); (7) use of antibiotics; (8) wound care; (9) use of somatostatin analogues; and (10) outcomes of both therapies. The differences between the outcomes of the two modalities of treatment (conservative and surgery) were analysed using $\chi^2$ test.

## RESULTS

Eighty-three patients underwent treatment for ECF at Providence Hospital during the period from January 1997 to July 2007. This included 25 men and 58 women. The most common age group was 65-70 years (range, 30-94 years).

### *Fistula characteristics*

The most common cause for ECF was recent surgery in 60 (72%) patients. These surgical procedures included ventral hernia repair, small bowel resection with anastomosis and gynecological procedures for cancer. Among the rest, 5 patients had diverticular disease, 4 had inflammatory bowel disease and in 5 patients the cause was cancer-related (carcinomatosis or post-radiation). In 8 patients, the fistula was noted after feeding tube displacement or removal. The most common site of ECF was small bowel, seen in 46 patients. Other sites were stomach in 3 and colon in 10 patients. Imaging studies localizing the anatomic location of the fistula were either inconclusive or unavailable for the remaining patients. Twenty-eight patients had high-output fistulae (output > 500 mls in 24 h) whereas the rest had low-output fistulae.

### *Management of the enterocutaneous fistulae*

Sixty-six patients were initially treated with conservative management. Figure 1 shows an algorithm of the management of these patients with ECF. After initial assessment, most patients were made NPO and started on metabolic support with parenteral nutrition. TPN was initiated in 56/66 (84.8%) patients with both high and low output fistulae. The average number of inpatient days of TPN use was 14 d (range, 4-39 d). Patients were started on enteral diet (oral diet -32, tube feeds-2) as soon as they could tolerate it or their fistula output was manageable with enteric feed. Thirty four patients needed long-term home TPN either, because they had high-output fistulas and could not tolerate enteric diet, or as an additional nutritional support in very malnourished patients.

Our wound clinic team comprising specialized stoma nurses managed wound care. Most patients had stoma bags with suction and adequate protection of the surrounding skin. Patients were evaluated and treated for sepsis. Different antibiotic regimes were used on advice of the infectious disease team who were involved in the care of the patients. The commonest antibiotics used were a combination of Cefazolin, Gentamicin and Metronidazole or Unasyn and Gentamicin respectively.

Octreotide, a somatostatin analogue was used to control the fistula output in 21/66 (31.8%) patients. Reduced fistula output was seen in many and spontaneous closure of the ECF was seen in 12 (57%) patients. Octreotide did not influence closure in nine patients, seven of whom then had definitive surgery whereas the remaining two had persistent ECFs (Figure 1).

Success was determined by the complete closure of the enterocutaneous fistula. Amongst the sixty-six patients managed conservatively, 43 (65%) had a successful outcome. Eighteen of the remaining patients needed definitive surgery for closure, whereas five patients had persistent fistulas.

Seventeen patients were treated with initial definitive surgery as they had signs of peritonitis. Eighteen patients, with failed conservative management, also underwent definitive surgery after stabilization. The surgical procedures involved resection of the ECF and primary anastomosis in 24 patients, exclusion of ECF by bypass in 6 and drainage of the abscess in 4. In one patient, with previous multiple surgeries resulting in dense adhesions and matting of bowel loops, the procedure was abandoned after attempting extensive adhesiolysis due to safety reasons. Surgery was successful in 28/35 (80%) patients.

### *Outcomes*

Differences between conservative and surgical management were analysed for the following outcomes - length of hospital stay, success rate, recurrence rate and mortality rate (Table 1). Patients who failed initial conservative management and were then treated with surgery were included in both groups when comparing the outcomes of the conservative and surgical management. There was no statistical difference between the two modalities of treatment. Five patients died, three due to sepsis, one due to carcinomatosis, and the other had a severe CVA.

Conservative management was more successful in low output fistulae (75%) than high output fistulae (43%) (Table 2). More patients with high output fistulae (i.e. fistula output > 500 mls in 24 h) needed definitive surgery (64% *vs* 31% low output fistulae). Conservative management by itself was successful in 64% of the patients with post surgical ECF. Although the numbers were small, majority of the

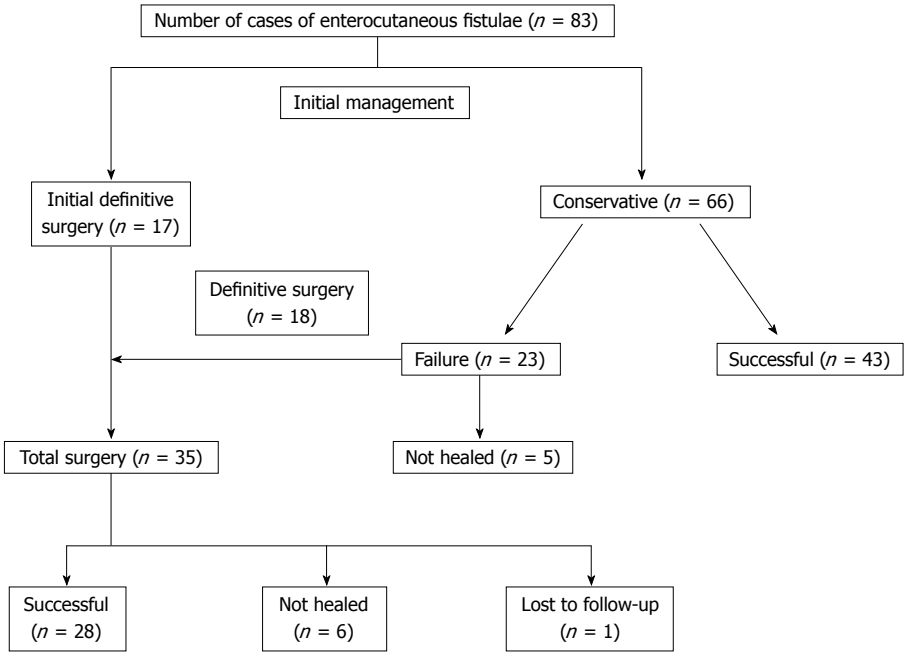


**Figure 1 An algorithm showing the management of the 83 patients with enterocutaneous fistulae.**

**Table 1 Treatment outcomes of conservative and surgical management of enterocutaneous fistulae**

| | Conservative | Surgery | $\lambda^2$ |
|---|---|---|---|
| Length of stay | Range: 4-67 d<br>Average: 20 d | Range: 4-30 d<br>Average: 20 d | NS |
| Success of treatment | 43/66 (65%) | 28/35 (80%) | NS |
| Recurrence | 7/66 (10%) | 7/35 (20%) | NS |
| Mortality | 4/66 (6%) | 2/35 (5%) | NS |

$\lambda^2$: $\chi^2$ test; NS: Not significant.

**Table 2 Outcomes of low and high output fistulae**

| | Low output fistulae | High output fistulae |
|---|---|---|
| Number of patients who needed surgery | 17/55 (31%) | 18/28 (64%) |
| Success of conservative management | 34/45 (75%) | 9/21 (43%) |

patients with radiation exposure had failure of conservative management.

Wound VAC was used in three patients, two of whom, had low output fistulae and spontaneous closure was seen in all three patients. Fibrin glue was used in two patients with low output and one patient with high output fistula, and was successful in spontaneous closure of ECF in all.

## DISCUSSION

ECF are a challenging problem to manage. The spontaneous closure rates depend on various factors and the reported range from 17% to 75% is reflective of this[9]. These factors include etiology, free distal flow, size of the enteral defect, healthy bowel, fistula output, associated co morbidity and epithelialization of the tract[10]. In recent years, total parenteral nutrition, somatostatin analogues, wound VAC and fibrin glue have been used to decrease the output and help in spontaneous closure.

In this series, we have analyzed the management of 83 patients with ECF in a community teaching hospital over a ten-year period. Most ECF occur after surgery[11], and in our series 72% were seen in the postoperative period. Only four of our patients had inflammatory bowel disease.

Sixty-six patients were treated conservatively, whereas, 35 patients underwent definitive ECF surgery. Success of spontaneous closure of ECF in patients treated conservatively was 43/66 (65%), whereas 28/35 (80%) patients had successful operative treatment of ECF. The overall success rate was 85%. Majority of our patients were treated conservatively, with only 17 patients who had initial surgery. These were patients who had clinical features warranting an early surgery, i.e. peritonitis or abscess.

Nutritional support is central to treatment of ECF. Since the 1970s, parenteral nutrition has been used to provide nutritional support in ECF patients. "Bowel rest" and TPN by decreasing the enteric secretions and thereby fistula output have been suggested to aid spontaneous fistula closure[12,13]. Other authors have reported that enteral elemental diets may provide similar rates of spontaneous closure of ECF as TPN[14]. In our series TPN was used in 56 patients treated conservatively, and spontaneous closure was seen in 35 (62%) patients; ten of whom had high output fistulae.

Octreotide, which is a somatostatin 14 analogue, has been used to aid ECF closure along with standard conservative treatment[8,15]. However, this has been controversial with some suggesting that it has no benefits[16], especially in complex fistulae[17]. We used Octreotide in 21 of the patients treated conservatively. Octreotide decreased output

in almost all patients. The closure rate of ECF was 12/21 (57%).

Wound VAC has now been used extensively in patients with large open wounds, skin grafts and in some burns patients. The use of wound VAC to contain the effluent, protect the skin and probably promote healing of ECF was first reported by Cro *et al*[6]. Our institutional use of wound VAC for ECF patients was limited to three cases and showed success in all. Similarly, fibrin glue has been used as a sealant to aid fistula closure[7]. We used fibrin glue in three patients, and it helped in closure in all three. One of the patients had a high output fistula, which had been treated with surgery and then had recurred.

Conservative management was successful in 65% of cases. Moreover, when surgical and conservative treatments were compared for recurrence, success rate and mortality there was no statistically significant differences between the two (Table 1). However, conservative management was more successful in patients with low output fistulae. Fewer patients with low out put fistulae needed any surgery, when compared to patients with high output fistulae. This is in keeping with the general opinion regarding high output fistulae, which are more difficult to manage. However, Draus *et al*[2] and McIntyre *et al*[4] reported a higher spontaneous closure rates in patients with high output fistulae. The low mortality rates in the present series are in keeping with the improvement in the management of these patients seen in recent years.

In conclusion, no statistically significant difference in outcomes was seen between conservative and surgical management of ECF. Though, as seen in past, low output fistulae had a better spontaneous closure rate. Patients with peritonitis or a fistula in the early postoperative period benefitted from surgical management in our series and these were the main indications for early surgical intervention. Conservative management is the mainstay for treatment in all other patients. Conservative management plays a role as a bridge to formal surgical resection by improving the nutritional status of the patient and better wound management. This maybe useful in patients with high output fistulae that have a low spontaneous closure rate and may need surgical treatment.

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## COMMENTS

### Background

Enterocutaneous fistulae (ECF) constitute a challenging surgical disorder associated with significant morbidity. Traditional conservative management results in spontaneous closure in small numbers. Newer therapies have been used to aid in closure of fistulae but the efficacy of these remains to be seen.

### Research frontiers

Somatostatin analogues, wound vacuum-assisted closure (VAC) placement and fibrin glue have been tried to assist spontaneous closure of ECF. We assessed the trend of management of ECF over the last decade in a single community teaching hospital with the advent of these modalities and compared the outcomes of conservative and surgical management.

### Innovations and breakthroughs

Our data highlight that conservative management has comparable outcomes with surgical management. Spontaneous closure rates are better with low-output fistulae. Fistula output decreased in all patients and spontaneous closure was seen in half of the patients treated with the somatostatin analogue- Octreotide.

### Applications

Conservative management should be the mainstay of treatment in all patients with ECF unless they have peritonitis or abscesses which warrant surgical drainage. Octreotide, Wound VAC and fibrin glue assist in decreasing output and wound care and thereby aid conservative management. In patients with persistent fistulae, conservative management can act as a bridge to formal surgical resection by improving the nutritional status of the patient and better wound management.

### Terminology

ECF are abnormal communications between the skin and gastrointestinal tract seen post bowel surgery and in patients with inflammatory bowel disease, radiation enteritis, diverticular disease, perforated duodenal ulcers, and pancreatic or gynecologic malignancies. Low-output fistulae are fistulae with a 24 h output less than 500 mls, whereas high-output fistulae have an output higher than 500 mls in 24 h.

### Peer review

The authors presented data of 83 ECF patients in a community based teaching hospital during the last 10 years and concluded that conservative treatment plays pivotal role as an initial management in the final outcome of both low and high output fistulae. The study was important and drew a robust conclusion. The manuscript was well presented and had good readability.

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