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## The challenge of enterocutaneous fistulae

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### ABSTRACT

During a period of three years (01.01.2009-31.12.2011), 17 cases of enterocutaneous fistulas arising from the small intestine were managed.

The majority of the fistulas (76%) resulted from surgical complications. There were 6 females and 11 male patients. The mean age of the patients was 40 years.

For 9 out of 17 patients (52%) the fistulae arose from the proximal small gut (duodenum and jejunum) and in the remaining 48%, from the ileum.

Octreotide was used for 11/17 patients (64%). Enteral nutrition was used for 9/17 patients (52%), while re-feed from the proximal gut fistulae was used in 4/9 patients (44%) in order to maintain the nutrition of the above mentioned subjects.

Only one fistula (6%) closed spontaneously.

There were 2 deaths (12%) in this study.

For 14 out of 17 patients (82%) the surgical intervention at some stage was required for successful closure of intestinal fistula. Aggressive surgical treatment with judicious use of octreotide, nutritional support, stoma care and control of sepsis significantly improves the outcome of small intestinal fistulae.

**Keywords:** Enterocutaneous; Fistula; Nutrition; Octreotide

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### Introduction

Management of small intestinal fistulas is associated with high morbidity and mortality, primarily due to inadequate nutrition, sepsis, fluid and electrolyte disturbance and skin digestion [1]. The treatment, even if successful, may require prolonged hospitalization.

The spectrum of etiology is changing from the once common, spontaneous extension of intra-abdominal disease in the form of strangulated hernia, emphysema gall bladder or extension of intestinal malignancy [2]. In our country, those above mentioned are seen only rarely and the single most common cause is a fistula following a surgical operation, followed by blunt and penetrating trauma [3].

As a general rule, the more proximal in the digestive tract is, the greater the fistula's output will be [4]. High output enterocutaneous fistulas are more likely to be associated with malnutrition, sepsis, fluid and electrolyte disturbances and a lower incidence of spontaneous closure. Spontaneous closure is dependent on a number of factors which are including anatomical site, presence of inter current disease and whether or not the fistula tract is simple or complex (i.e. if there is associated abscesses or multiple tracts).

Expectant treatment for spontaneous closure

is associated with high mortality and prolonged morbidity [5]. There is a need for abandoning the expectant line of management for more aggressive surgical approach once the patients' nutritional problems, fluid and electrolyte disturbance and sepsis have been tackled by selective use of octreotide, total parenteral nutrition (TPN) / enteral nutrition (EN) and antibiotics.

A different strategy is needed for tackling the proximal and distal small bowel fistulas, the difference arising primarily due to the fistula output and the availability of the proximal bowel for EN.

In this prospective study, 17 cases of small intestinal fistulas treated with the above approach are presented.

## Material and Methods

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Between Jan 2009 and Dec 2011, 17 patients with small intestine-cutaneous fistulas were treated in the Surgical Clinic of Emergency County Hospital Constanta.

The initial management was along the principles defined by Shelton et al [6]. Patients were aggressively resuscitated with fluid and electrolytes in the first 48 hours. Simultaneously, a stoma care apparatus was applied to the fistula opening in order to protect the skin from the effluent and to give an accurate measurement of the daily fistula output. Plan for nutritional support was also decided. Whenever possible, the gut was utilized for maintenance of nutrition. We used fistulography and barium study to define the anatomical site of the fistula and ultra sound (US) and computerized tomography of the abdomen (CT) to localize intra-abdominal abscesses. Patients found to have intra-abdominal abscess were treated by US guided aspiration and / or open surgical drainage. Once the patients' condition was stabilized, one of the following surgical procedures was undertaken:

a) laparotomy, drainage and feeding jejunostomy for leaks from duodenum,

b) laparotomy, exteriorization of fistula and feeding jejunostomy for leaks from jejunum,

c) laparotomy, ileostomy and mucus fistula for ileal injuries,

d) excision of fistula, end to end anastomosis with removal of foreign body.

Octreotide was used in a dose of 100 micro gram eight hourly subcutaneous for a maximum period of 14 days in all cases of high output fistula, to decrease the fistula output and to correct fluid, electrolyte and nutritional disturbances.

Octreotide was used both before and after the initial surgery, as per the demands of a given situation. After a period of four weeks, once sepsis and nutrition have been tackled, definitive closure of the exteriorized gut was done.

## Results

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17 cases of enterocutaneous fistulas were treated over a period of three years from Jan 2009 to Dec 2011. There were 6 females and 11 male patients with a mean age of 40 years (range 19-65). The etiology and location of the fistula is given in Table I. The mean fistula output was 650ml/day (range 150-1200ml/day). 11/17 patients (64%) had high output fistula (> 500ml/day). In this high output fistula group, the mean output was 750ml/day (range 650-1200ml/day). For the same group, 48 hours after starting octreotide, the fistula output decreased to a mean 120ml/day (range 50-200ml/day). Significant intra-abdominal collection was detected in 4/ 17 cases (23%), using US/CT scan study of the abdomen. All 4 cases were successfully treated by repeated US guided aspiration of the collections. The volume of pus aspirated per sitting was mean 106ml (range 40 -240ml). Number of sittings was mean 2.25 (range 1-3). The dominant was Klebsiella for two patients and Pseudomonas for the other two. Fistulogram and / or barium study was done for 5/17 patients (29%) in order to track the location of the fistula. However, only in 2/5 cases (40%), the contrast study could

Table I - Etiology and location of small intestinal fistula.

Age/sex	Location	Broad etiology	Exact cause
29/M	Jejunum	Blunt abdominal trauma	Missed injury at first laparotomy
19/F	Duodenum	Post Operative	Leaking duodenojejunostomy
38/M	Jejunum	Post Operative	Leaking jejunal anastomosis
56/F	Ileum	Post Operative	Leaking stricturoplasty for tuberculosis
32/F	Ileum	Post Operative	Ileal perforation during D & C
32/M	Duodenum	Blunt abdominal trauma	Leak from primary duodenal repair
64/M	Ileum	Post Operative	Missed ileal injury during surgery for burst abdomen
36/M	Jejunum	Post Operative	Prolene mesh eroding into jejunum
42/M	Jejunum	Penetrating injury abdomen	Missed injury at first laparotomy
68/M	Ileum	Post Operative	Post radiation for Ca Prostate; leak from ileal anastomosis
24/F	Ileum	Post Operative	Ileal perforation during D & C
36/M	Ileum	Post Operative	Leaking stricturoplasty for tuberculosis
26/F	Duodenum	Post Operative	Leaking duodenotomy done to retrieve stuck dormia
52/M	Jejunum	Post Operative	Erosion by tube drain after Whipple's
60/M	Ileum	Post Operative	Leaking ileo-transverse anastomosis after right hemicolectomy
26/F	Jejunum	Penetrating injury abdomen	Leaking jejunal anastomosis
40/M	Ileum	Post Operative	Missed injury during surgery for obstruction due to adhesions

convincingly show the location of the fistula. During this study, all 17 patients were given nutritional support either in the form of TPN or EN. 9/17 patients (53%) were given TPN for a maximum period of 14 days. 10/17 patients (59%) including 2 patients, who were initially given TPN, were given EN either orally or through the feeding jejunostomy. In addition, 4/6 patients (66%) with jejunal fistula were given re-feed of the fistula effluent into the jejunostomy.

There were two deaths (12%) in this study.

One of these patients developed a jejunal fistula due to erosion by tube drain after Whipples procedure and died seven days after the onset of fistula due to uncontrolled sepsis.

The other patient who died had developed a fistula due to a missed small gut injury while separating adhesions for intestinal obstruction and died 15 days after the onset of fistula due to septicemia.

One fistula (6%) closed spontaneously with conservative treatment.

For the remaining 14 patients (83%), the fistula was successfully closed with surgical intervention. Out of these, only 4 patients required one procedure,

while the remaining 10 patients required a second procedure for the final closure of the fistula. The operative procedures done in this study are presented in Table II.

## Discussions

Enterocutaneous fistulas are representing a challenge for the combined surgical and medical management. Morbidity and mortality associated with fistulae are still considerable and the current treatment, even if successful, may require prolonged hospitalization [1].

Seventeen cases of small intestine cutaneous fistulas were treated in this study. 'Surgical misadventure' or 'post-operative' was the commonest cause, accounting for 76% of the cases; the remaining 24% were due to abdominal trauma. Leaking

Table II - Operative procedures done

Time gap between fistula & operation	Initial operation	Time gap between 1st&2nd operation	Final operation
4 days	EF, FJ	30 days	EEA of jejunum spontaneous closure on day 6
3 days	EF, FJ	27 days	EEA of jejunum
6 days	I & MF	33 days	Right hemicolectomy
17 days	I & MF	30 days	EEA of ileum
13 days	Closure of duodenum over T-tube, FJ	-	-
16 days	EEA of ileum	-	-
69 days	days Removal of mesh, EEA of jejunum	-	-
5 days	EF, FJ	28 days	EEA of jejunum
4 days	I & MF	43 days	SSA of ileum
23 days	I & MF, right hemicolectomy	31 days	Ileo transverse Anastomosis
5 days	I & MF	29 days	EEA of ileum
3 days	Drainage, FJ	-	-
2 days	EJ,FJ	-	Died after 5 days
4 days	I & MF	31 days	EEA of ileum
3 days	EF, FJ	31 days	EEA of jejunum
2 days	Nil	-	Died after 15 days

anastomosis was responsible for fistula formation in 5 cases, while missed small gut injury at laparotomy, leading to enterocutaneous fistula accounted for 4 cases.

In a large series of 114 cases of gastrointestinal fistulae, 51% resulted from surgical complications of which almost half were due to unrecognized intestinal injury [5]. In the same series, inflammatory bowel disease caused 30% of all fistulas; Crohn's being the commonest cause. In this series there was no case of Crohn disease but there were 2 cases of breakdown of stricturoplasty done for tuberculosis strictures.

Fistulography and barium study (as a modality of investigation to find the location of fistula and presence of distal obstruction) was used for 5 cases in this study. Only in 2 out of 5 cases the fistulography was able to define the location of the fistulae. For these subjects also, it did not contribute to the overall management of the patients. This comes as a contrast to the time old teaching of using these studies in the

management of enterocutaneous fistulas [3].

We found US and CT scan of the abdomen useful in detecting intra-abdominal abscesses and US guided aspiration of the abscess an effective modality of treatment. Nutritional support has gained a central role in the management of enterocutaneous fistulas. To optimize nutrient metabolism, circulation and tissue oxygenation must be adequate [7].

After initial resuscitation, prompt initiation of nutritional support is crucial.

The breakdown of lean body mass is relentless and sufficiently rapid, so that each day the patient is suffering septic starvation; significant deficits are compounded [8].

In our study, nutritional support was instituted from the moment when fistula was identified. It was also our aim to use the gut for nutrition whenever possible.

In proximal small intestine fistula, we used the re-feed technique for 4 patients, thereby obviating

the need of prolonged TPN. The need to decrease the fistula output, particularly in high output fistulas, is felt by one and all, to help in nutritional and fluid and electrolyte management in the initial phase and in non-surgical closure of fistulas in the long run [9,10].

Octreotide, a synthetic analogue of somatostatin, inhibits the release of practically all known gut hormones and decreases splanchnic and portal flow, thereby decreasing the fistula output [11,12]. We used octreotide in all cases of high output fistulas and found a significant reduction in the fistula output within the first 48 hours. However, except for one fistula that closed spontaneously after six days of octreotide, all other patients required a surgical procedure to close the fistula. Significant reduction in fistula output after octreotide has been reported by Paran et al., Sleth et al. and Kocak et al. [13-15].

Although somatostatin effectively reduces the fistula output, the rate of spontaneous closure is not modified [16,17]. With conservative medical management including TPN, spontaneous closure of fistula occurs in about 24% patients within 27-39 days, with a mortality of around 29% [18]. It must be noted that these results were seen in those favorable group of patients who had low output fistula, no organic disease, no abscess cavity etc, and were thus, subjected to conservative treatment. We used an aggressive protocol in which surgical intervention was done after a maximum period of 14 days of conservative treatment.

We differentiated proximal small gut fistula from distal small gut fistula in the type of surgery done and the method of nutritional support used. In our study, the mean fistula closure time was 26 days for all types of fistulae (favorable and unfavorable), with a mortality of 12%.

## Conclusions

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Small intestine cutaneous fistulas are a challenging problem. Majority of them are an end result of postoperative complications. Contrast studies

do not contribute significantly to the ultimate outcome of the patient. Rather than following a conservative line of management, hoping for spontaneous closure of fistula, we feel staged surgery at appropriate time will lead to less morbidity and mortality with a higher fistula closure rate.

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