Iraqi Journal of
Gastroenterology
Original Article

Enteral nutrition for enterocutaneous fistula Experience of 10 years

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ABSTRACT

Background: Enterocutaneous fistulas (ECF) are abnormal connections between bowel and skin through which bowel contents pass Nutrition is the key component of the conservative approach for ECF management. Without proper nutrition, ECF is associated with high mortality. The issue of enteral versus parenteral feeding is an ongoing discussion. **Objective:** This study aims to evaluate the role of enteral nutrition in the management of ECF. **Methods:** Over a period of 10 years, 314 patients with ECF were studied retrospectively, of whom 213 patients who received enteral nutrition included in this study. The types, location and the etiology of each fistula were reported. The general management of the patients including the availability and the route of nutritional supplementation was reviewed and the patients' tolerance to enteral nutrition reported. **Results:** Two hundred and thirteen patients with different types of ECF were able to receive enteral nutrition with good tolerance. Initially all patients with enteral feeding had an increase in the volume of the fistula output after starting enteral feeding ranging between 10-40%. with conservative treatment 135 (63.4%) patients had spontaneous closure of the fistula with a mean duration of spontaneous closure of 21.4 days. Fifty-three (24.8%) required surgical definite treatment after failure to response to conservative treatment. Unfortunately 34 (15.9%) patients died, 9 of them after surgical intervention. **Conclusion:** The enteral route is safe and effective way for providing nutrition for patients with ECF.
Key words: enteral nutrition, enterocutaneous fistulas, faecal fistula, total parenteral nutrition

Introduction:

Enterocutaneous fistulae (ECF) are abnormal connections between bowel and skin through which bowel contents pass (1). ECF are most commonly iatrogenic, usually as a result of a surgical misadventure (e.g., anastomotic leakage, injury of the bowel or blood supply, laceration of the bowel by wire mesh, or retention suture). In addition, fistulas may result from erosion by suction catheters, adjacent abscesses, or trauma. Contributing factors in some patients may include previous radiation therapy, intestinal obstruction, inflammatory bowel disease, mesenteric vascular disease, or intra-abdominal sepsis. Less than 2% of ECF occur spontaneously, and they are usually the result of Crohn's disease. Contributing factors in some patients may include previous radiation therapy, intestinal obstruction, inflammatory bowel diseases, mesenteric vascular disease, or intra-abdominal sepsis (2,3, and 4).

Management of patients with ECF is extremely challenging and carries a high degree of morbidity and mortality (2, 5, and 6).Successful management of patients with ECF should include stabilization of the patient with fluid and electrolyte resuscitation, provision of adequate nutrition,control of sepsis with antibiotics and drainage of abscesses and protection of the skin from the fistula effluent with ostomy appliances or fistula drains. The overall objectives are to increase the probability of spontaneous closure. More than 50% of ECF close spontaneously over a period of 4-6weeks. Failure of fistula to close within this period raise the possibility of surgical treatment (2, 7, 8, 9).

Nutrition is the key component of the conservative approach for ECF management and over the last four decades nutritional support in the form of total parenteral nutrition (TPN) has gained a central management role, before that ECF were associated with very high mortality rate reaching60 %(6, 10, 11, and 12). Due to the improvement in the parasurgical care (and mainly control of sepsis and nutrition supplementation) the mortality rate falls down to 15% in the 1970s. (6)Intensive nutritional therapy is necessary to reverse the catabolic state associated with ECF Once established, it allows proper time, preparation, and planning for definitive management of the fistula, and in many cases provides the support for spontaneous closure (7,8,12,13).

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The issue of enteral versus parenteral feeding is an ongoing discussion. Based on the critical care literature, the enteral route should be employed when possible as it is more effective in improving nutritional state, with beneficial effects on wound healing and possible favorable effects on gut mucosal integrity. Further, enteral nutrition avoids metabolic, infectious, and other safety concerns associated with total parenteral nutrition (TPN). Moreover Enteral nutrition is more physiological, associated with fewer complications and cheaper when compared to parenteral nutrition. (5,10,12,14). .The concept that bowel rest is beneficial for spontaneous closure is based on a 30%50% decrease in gastrointestinal secretions in patients on TPN and receiving nothing by mouth. (3, 5, 8, 9, 10).

However, while bowel rest will improve fluid and electrolyte management, data supporting spontaneous fistula closure or other significant outcomes are largely lacking (12,14). Many authors recommend TPN for patients with high-output fistulae (> 500 mL/day), while others found that it is possible to give enteral nutrition to all patients even those with high output fistulae (15). The problem of large volume loss associated with high output fistulae can be ameliorated with the somatostatin analogue(Octreotide[td]
), which is available in two forms, the long acting and short acting ones, both proved to be very effective in reducing the volume of fistula output (16).Due to the unavailability of proper TPN at our hospitals over the last two decades we found ourselves obliged to use the enteral route for providing our patients with nutrition even those with high-output fistula.

The idea of using enteral feeding in patients with enterocutaneous fistulas is the subject of this paper.

Patients and methods:

During a period of 10 years (from June 2003 to May 2013) 314 patients with ECF were studied retrospectively in the Gastroenterology &Hepatology Teaching Hospital and Alkadhimia Teaching Hospital.Ninety seven patients were found to receive proper TPN and were excluded from the study. Seventeen patients had intestinal obstruction with repeated vomiting and abdominal pain, 13 patients responded well to conservative treatment by nasogastric suction with i.v. fluid and electrolytes replacement and maintenance therapy for 2-6 days after which enteral feeding started and 4 patients did not respond to conservative treatment and required emergency surgical intervention. These 4 patients were also excluded from the study also. The remaining 213 patients who received enteral nutrition included in this study. Each fistula was classified by anatomical location such as duodenal, jejunal, ileal and colonic and volume of output, high output (more than 500 ml) , moderate output (200-500 ml) and low output (<200 ml).

Those patients who received proper TPN were excluded from this study.The work up was include full history and physical examination with revision of the operative notes of the former operation and the type of this operation recorded. All patients were sent for hematological investigations. Blood transfusion was arranged for those with hemoglobin level below 10 g/dl and any clotting abnormality corrected. All patients were sent for biochemical investigations including renal function tests, serum electrolytes, liver function tests and serum proteins and any abnormality was corrected properly. Abdominal ultrasound examination was done for each patient with and without CT scan to exclude intraperitoneal abscesses and for percutaneous drainage of these abscesses.

Colostomy appliances were used at the fistula site at the abdominal wall to protect the skin and to measure the output, for those patient whom fistulae manifest themselves through a drain tubes the site of the drain was well dressed and protected.Systemic antibiotics including metronidazole and 3[rd]generation cephalosporin or according to the results of culture and sensitivity were given to all patients until there is no clinical, hematological and radiological evidence of infection and sepsis.

Enteral nutrition including high calories, protein rich and low residues diet was given for each patient unless there are contraindications for oral intake like repeated vomiting, abdominal pain and anorexia due to associated intestinal obstruction. In these cases intravenous fluid with proper electrolytes supplementation were given and according to the availability, partial parenteral nutrition like hypertonic glucose 10-50% with or without amino acid solutions

and with or without lipid solutions were given either through a peripheral vein or central one until the underlying cause is resolved and if so then enteral feeding is resumed. The aim was to provide each patient with a diet containing approximately 40-50 kcal/kg/24 hours and 1.5-1.8 gram protein/kg body weight/24. While receiving enteral feeding, all patients were monitored by a 6 hourly chart of vital signs with daily measurement of fistula output volume and observation of the color and nature of the discharge. Hematological

and biochemical investigations were also done every 24-72 hours according to the general condition of the patients. Their body weights are measured every week. According to the availability, we used to give our patients the somatostatin analogue (Octreotide) whether the short acting one(Sandostatin, Novartis) 0.05mgsubcutaneously in 8 hourly dose or the long acting one (Sandostatin LAR, Novartis) 20 mg via intramuscular route in

a single monthly dose. When the long acting one is used it is usually accompanied by the short acting one in the first week of treatment.
Gastrointestinal series and fistulograms were obtained if the patients do not responded to conservative treatment or when surgical intervention was decided.Our strategy was to treat the patients conservatively primarily for six weeks and surgical intervention was only adopted when the fistula does not show any evidence of healing after this period or when there are anatomical (intestinal obstruction) or pathological (malignant fistula) conditions that prohibit a spontaneous closure.Those patients who can receive enteral feeding well and have a decrease in the fistula output with no evidence of sepsis and who can manage their fistula site properly were discharged from the hospital and followed up at the outpatient clinic every 3-5 days until their fistula closed.

Statistical analysis: - the SPSS 17 was used for analyzing the data using Chi square for string value considering that P value less than 0.005 as a significant statistical difference.The test used was according to the type of data, T-tests were used in analyzing the numeric values and the Chi square was used in analyzing string values.

Results:

Those 213 patients who received enteral nutrition, 52 were females and 161 were males with a mean age of 37.4 ranging 6-78. One hundred eighty-one patients were referred from other hospitals for further management due to treatment failure. Fig. 1 Shows the former surgical operations or the primary pathology that was complicated by fistula formation, the most common one was exploratory laparotomy for missile injury.

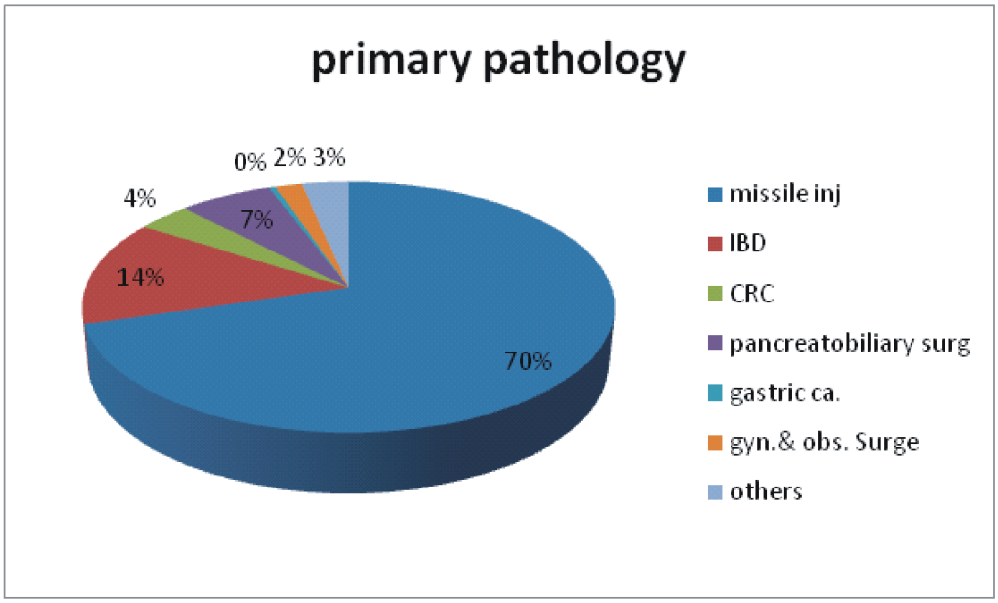

Figure 1 primary pathology of the fistula.

Types of fistulae and volumes of output.

The most common anatomical type of the fistula found in this study was jejunal fistula (97patients, 45.5%) which has the largest output. The somatostatin analogue (Octreotide) had significant effect in reducing the volume of output in proximal enterocutaneous fistulas and minimum or no effect on distal ones. **(Table 1).**

Table 1, types of enterocutaneous fistulas, no. patients average output volume.

Type of fistula	Number of patients& (%)	Average output volume ml/24h (range) without octreotide	Average output volume ml/24h (range) with octreotide
duodenal	42 (19.7)	1135 (500 - 4000)(14 patients)	687 (350-2700) (28 patients)
jejunal	97 (45.5)	1600 (500 - 3000) (32 patients)	1189 (400-2500) (65 patients)
ileal	53 (24..9)	540 (100 – 1200)(18 patients)	550 (100-1300) (35 patients)
colonic	21 (9.9)	480(100 – 700) (16 patients)	500 (150-900) (5 patients)
total	213 (100)		

Patients' response to enteral feeding and outcome
From those 213patients who receive enteral feeding at the first few days after the development of the fistula, 21(9.8%)patients of them developed nausea and dyspepsia with simple supportive measures they were able to tolerate enteral feeding very soon. Thirteen(6.1%) patients had intestinal obstruction with repeated vomiting and abdominal pain but (as mentioned above) they responded well to conservative treatment by nasogastric suction with i.v. fluid and electrolytes replacement and maintenance therapy for 2-6 days after which enteral feeding started successfully. Thirty five(16.4%)patients had intra-abdominal abscesses with systemic signs of sepsis, percutaneous drainage was done under US guide using peritoneal dialysis catheter or nephrostomy set and systemic antibiotics and enteral feeding started.
Initially all patients with enteral feeding had an increase in the volume of the fistula output after starting enteral feeding ranging between 10-40% of the volume of the ingested fluid and the more proximal the fistula the more increase in the output but over the next 4-14 days the volume of output started to decrease gradually.Eventually, with conservative treatment 135 (63.4%) patients had spontaneous closure of the fistula with a mean duration of spontaneous closure of 21.4 days ranging between 7-122 days, the duration of spontaneous closure was the least in duodenal fistula and the most in colonic fistula. Fifty-three (24.8%) required surgical definite treatment after failure to response to conservative treatment including enteral nutrition **(table2).** The surgical treatment included resection of the loop of bowel involved by the fistula with end to end anastomosis and relief of distal obstruction if present for small bowel fistula and proximal colostomy or loop ileostomy for colonic fistula. The surgical operations were preceded by radiological study of the enterocutaneous fistula, fig.2.

Table 2, modes of fistula closure and their mortality rates.

type	Spontaneous closure	Mean duration of spontaneous closure (days)	Surgical closure	Fistula related mortality	Postoperative mortality
Duodenal	37 (87.1%)	18.6	0	5 (11.9)	0
Jejunal	58 (51.5)	21.4	27 (27.8%)	12 (12.4)	4
Ileal	34 (86.7)	26.3	13 (37%)	6 (11.3)	3
colonic	6 (38.1)	57.8	13 (61.9)	2 (9.5)	2
total	135 (63.4%)	-	53 (24.8)	25 (11.7%)	9 (17%)

EFFECT OF OCTREOTIDE

Octreotide showed no significant effects on the rate of fistula closure, **(table 3)**

Table3 , effects of octreotide on fistula closure.

Type of fistula	Patients who received octreotide	Spontaneous closure (%)	Patients who not received octreotide	Spontaneous closure (%)	P value
Duodenal	28	25(89%)	14	12(85%)	0.736
Jejuna	65	39(60%)	32	19(59.3%)	0.953
Ileal	35	22(62%)	18	12(66.6%)	0.784
Colonic	5	1(20%)	16	5(31.2%)	0.627

Figure 2 fistlogram

Mortality and morbidity

Unfortunately 34 (15.9%) patients died, 9 of them after surgical intervention. The most common cause of fistula related mortality was septicemia with multiple organ failure syndrome and the most common complication related to the enterocutaneous fistula was chemical burn to the skin which varied from simple skin irritation to extensive burn involving the anterior and posterior abdominal walls, **(table 4)**

Table 4, fistula related morbidity and mortality.

Complications	No. of patients	No. of mortality
Septicemia with multiorgan failure syndrome	21	21*
Chemical burn on the surrounding skin	78	1
Electrolytes disturbances	45	
Deep vein thrombosis	3	
Myocardial infarction	2	2
Pulmonary embolism		1
Stress ulcers& upper GIT bleeding	1	
Respiratory tract infection	23	
Urinary tract infection	15	
Cannula site infection (thrombophlebitis)	198	

*Most of these patients had other complications that might contribute to the mortality

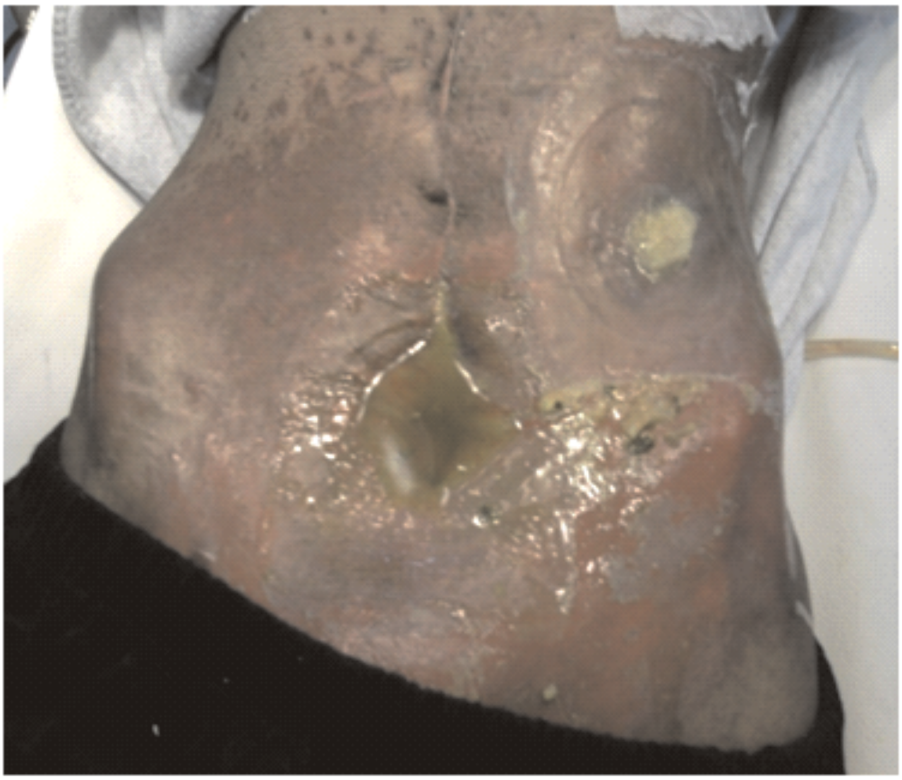

Fig.3a

Fig. 3b

Fig. 3 a & b show extensive chemical burn to the skin of the anterior and posterior abdomial walls.

Table 5 lists the most important postoperative morbidity and mortality following fistula closure operations.

Table 5, postoperative mortality and morbidity.

complications	Number of patients	mortality
Myocardial infarction	2	2
Deep vein thrombosis	1	
Pulmonary embolism without evidence of DVT	1	1
Acute renal failure	2	1
Acute lung injury (respiratory failure)	2	2
Dissemenated intravascular coagulation	1	1
Sever upper GIT bleeding	2	1
Paralytic ileus	3	
Anastomosis disruption & septicaemia	1	1

Five patients with inflammatory bowel disease developed recurrence of fistula after conservative measures including percutaneous drainage under ultrasound guide and2 patients after surgical treatment. One patient with rectal cancer developed recurrence after surgical treatment.

It was possible to discharge 96 patients from those who showed good response to conservative treatment including enteral nutrition with decrease in the volume of fistula output and followed them as an outpatient cases.

Table 6 shows outcome of treatment and average time of hospitalization

	conservative	surgery
Length of hospitalization	Range 8 – 122 d Average 25 d	Range 35-60 d* Average 50 d
Success of treatment	130 /213 (61%)	41/53 (77.3%)
Recurrence	5	3

* including preoperative period with conservative management & nutritional support.

Discussion:

This study reviews the nutritional supplementation of patients with ECF, one of the most important components of the conservative approach for fistula management.In this study we found that the most common operation complicated by development of ECF is exploratory laparotomy for missile injuries which constituted for 70.4% cases and this surely due to the increase in the violence accidents over the last 10 years. P. Hollington et al(17) in their 11 years study found that the most common cause for ECF was inflammatory bowel diseases (52.7%) while missile injuries constituted a small group of patients.Initially, and for the first few years involved by this study the aim was to provide the patients proper TPN including carbohydrates, protein, lipid, vitamins, electrolytes and trace elements and sometimes it was possible to do that and sometimes not. So the trend was to change to the enteral routes. With time we found that this is a simple and safe way to provide our patients with nutrition aiming for spontaneous closure or for preparing them for surgical closure if the fistula failed to be closed spontaneously. In this study we found that most of the patients were able to receive enteral nutrition although some of them required some conservative and minimal invasive measures like nasogastric suction and intravenous fluid for intestinal obstruction and percutaneous aspiration of abdominal abscesses before starting enteral Yet, we have a 21 patients (9.85%) developed anorexia later due to sever sepsis and died. The patients included in this study were of low, moderate and high output fistulae. The spontaneous closure rate was 63.4% with a mean duration of spontaneous closure of 21.4daysand the overall mortality was 15.96%.We have a 100% mortality for a group of patients with septicaemia and multiple organ failure (no intervention group). The overall success rate was 80.28%. The average time for hospitalization of our patients was 25 days for those treated conservatively and 50 days for those treated by surgical intervention.

E.le'vy et al (15) provided 85% of their patients who were presented with high output fistulae with enteral nutrition with and reported a spontaneous closure rate of 38% and overall mortality of 34% and 100% mortality for a group of patients with septicemi a (non-intervention group).Our results regarding the mortality of those patients with septicemia and multiple organ failure (no intervention group) is similar to that of E.Le'vy et al, but the overall mortality is lower and the spontaneous closure rate is higher than that of them and this obviously due to the fact that all of their patients were presented with high output fistulae while our patients were presented with low, moderate and high output fistulae. Deepa Taggarshe et al (1) in their 10 years study presented 83 patients with low, moderate and high output fistulae, 66 of them were treated conservatively with TPN and 17 patients required initial surgical treatment (emergency). Of those treated conservatively 43 patients (65%) had spontaneous closure (with a mean duration of spontaneous closure of 20 days) and 18 patients needed subsequent surgical treatment. The overall success rate was 85% and the overall mortality was 9%. The average time of hospitalization was 20 days.When we compare our result with this study (at which TPN was used) we found that the spontaneous closure rate is similar but the overall success rate is slightly lower and the overall mortality is higher. There were no significant differences regarding the mean duration of spontaneous closure and the average time of hospitalization.

Regarding the use of enteral nutrition for those patients with high output fistulae we found that octreotide greatly ameliorates the problems associated with a massive fistula loss thus helps patients to take enteral nutrition. There was no problem with those with moderate and low output fistulae while receiving enteral nutrition.Some series have reported that octreotide significantly improved the rate of fistula closure hereas we and other studies have failed to document this. (2, 18.19, 20) However, there is no doubt that octreotide greatly ameliorates the problems associated with a massive volume loss and allows better control of the fistula tract.In conclusion, enteral (oral) feeding is a good substitution to parenteral nutrition in the most of patients with enterocutaneous fistula with comparable result of spontaneous nutrition. The advantages of enteral feeding are cheap, available, easily administered, not required trained personal or central venous catheter, and most importantly no complications.

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