

Causes & Management of Enterocutaneous Fistula Prospective Study of 50 Cases

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Abstract:

Background:

enterocutaneous fistulae are a major catastrophe to the patients and surgeon and it still has high incidence of morbidity and mortality and their management remain a big challenge.

Aim:

recent experience with parenteral nutrition for treatment of enterocutaneous fistula in Gastroenterology and Hepatology teaching hospital is reviewed to study the main causes of the fistulae and to determine the factors related to successful treatment.

Methods:

a total of 50 consecutive patients with enterocutaneous fistulae were studied prospectively during a period of two years, Thirty-seven patients received total parenteral nutrition and 18 patients underwent surgical operation attempting for fistula closure.

Results:

In 48 patients, the fistulae developed postoperatively, the most common primary cause was missile injury (46%), whereas only 2 patients fistulae occurred spontaneously. 22 patients the fistula closed by conservative treatment, the mean duration of spontaneous closure was 16.5 days. 9 patients the fistulae were closed by surgical interference and 18 patients died, one patient the fistula was failed to close by neither conservative nor surgical treatment. the mean duration of hospitalization was 25.2 days.

Conclusion:

In spite of improvement in spontaneous closure rate of patients with enterocutaneous fistulae who received total parenteral nutrition, there is still high unacceptable mortality rate of this catastrophic disease, which requires additional care and improvement in intensive monitoring.

Introduction:

Enterocutaneous fistula (ECF) is a pathological communication that connects any portion of the gastrointestinal tract with skin, which leads to loss of digestive juice, water, electrolytes and nutrients.

About 40 years ago the role of malnutrition in enterocutaneous fistula was recognized to be associated with increased morbidity and mortality⁽¹⁾. This realization was ascertained in 1964 by study of Chapman et al⁽²⁾, who found in their patients with fistulas that those who received more than 3000k cal/day had a mortality of 12%, whereas those who received less than 1000 kcal/day had a mortality of 55%. Since that time and as result of introduction of parenteral nutrition (PN) during 1970s, mortality rate reduced dramatically, and the incidence of spontaneous closure rose during this period and if spontaneous closure does not occur because of fistula anatomy, patients often will be in better condition for operation⁽³⁾.

For sure this improvement in fistulae outcome is not only due to PN but also due to advance in the parasurgical intensive care; including monitoring, respiratory care and better fluid and electrolyte balance⁽⁴⁾.

However ECF still have high unacceptable mortality rate⁽⁵⁾ and their management makes a big challenge to the surgeons because it results in serious complications that lead to prolonged hospitalization & increase the cost of the treatment. In addition to that, it causes a big psychological suffering to the patients due to severe discomfort, pain, malodorous of drainage fluid & poor body image.

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The aim of this study is to review the etiology of enterocutaneous fistula, in the patients who admitted into the Gastrointestinal & Hepatology Teaching hospital & to study the outcome of this serious disease & to determine the factors that related to the successful treatment or to the increased mortality and morbidity.

Patients and methods:

During a period of 2 years, from November 2002 to October 2004, 50 consecutive patients with enterocutaneous fistula in gastrointestinal and Hepatology teaching hospitals were reviewed. There were 38 males (mean age 35.9 years, ranging between 7 to 75 years) and 12 females (mean age 36.5, ranging from 12 years to 62 years). All patients were reviewed prospectively.

Forty patients were referred as treatment failure from elsewhere after a period that varied from one week to four months.

Each fistula was classified by anatomical location. (Esophageal, gastric---etc.), primary cause (missile injury, colorectal carcinoma --- etc.), mode of closure (spontaneous or surgical closures) and volume of output (high output >

500ml/24h, moderate output 200-500ml/24h and low output < 200ml/24h).

The most common anatomical types of the fistula found in this study were jejunal fistulae (21 patients 42%), which has the largest output volume (mean 1570ml/24h, range 500-3000ml/24h), (table 1).

We have excluded pure biliary, pancreatic and internal fistula from this study because their treatment and prognosis are different.

Thirty-seven patients received total parenteral nutrition (TPN) consisting of 20% or 10% dextrose water (according to the availability). I.V. amino acid solution as Vamin glucose[®] or Vamin 14[®] and 500 milliliters of parenteral lipid emulsion (10% or 20%) twice or thrice weekly according to the availability.

Table 1 the anatomical types of the fistula and their output.

Location	Number (%)	Average output volume (ml/24h) (range)
Esophageal	1(2%)	200
Gastric	2(4%)	450(400-500)
Duodenal	8(16%)	1375(500-2000)
Jejunal	21(42%)	1570(500-3000)
Ileal	10(20%)	535(400-1000)
Colonic	8(16%)	237(100-500)

Each patient had been received 0.25-0.30gm/kg/day⁽⁶⁾ nitrogen (1.5-1.8gm/kg/day protein) as intravenous amino acid (Vamin[®]). Non-protein energy is in ratio of approximately 150kcal-1gm of nitrogen given⁽⁷⁾, the total amount of non-protein energy is subdivided into 2/3 as hypertonic glucose water 10% or 20% and 1/3 as intralipid 10% or 20%⁽⁷⁾. So the total amount of energy was given to the patients is about 40-50kcal/kg, which constitute of 15% amino acid, 25% fat and 60% glucose.

The PN was administered through either peripheral route (cannula placed into cubital fossa veins) for short-term PN or central catheter placed percutaneously into superior vena cava through internal jugular or subclavian vein for long-term parenteral nutrition. Standard measures were taken to avoid skin irritation. All patients received antibiotics consisting of metronidazol and third generation cephalosporin or according culture and sensitivity.

Student-t-test and chi-squared test were used for the statistical analysis of the parameters between the subgroups. P-value of less than 0.05 is considered the level of significance.

Results

From those fifty patients, 22patients (44%) the fistula closed spontaneously, the mean duration of spontaneous closure was 16.5days, ranging between 3-60days. 9patients (18%) the fistulae

were closed by surgical interference and 18 patients (36%) died, one patient the fistula was failed to close by neither conservative nor surgical treatment. the mean duration of hospitalization was 25.2days ranging between 4-210 days. (Table2)

The most common cause of the fistula found in this study was surgery for missile injury (23patients) followed by surgery for colorectal carcinoma (5patients), road traffic accident (RTA) (4patients), carcinoma of the pancreas (3patients)(in two cases fistula developed after triple bypass & one case after Whipple procedure) and three cases after biliary reconstruction for biliary trauma. There were only two spontaneous fistulae; their primary pathology was recurrent carcinoma of the colon in the first case and irradiation for carcinoma of the rectum in the second case.

(Table 3).

Table 2 correlations between anatomical types of the fistula &the outcome

Type of fistula	No. Of pts.	Spontaneous closure (%)	Mean duration of spontaneous closure (days)	Surgical closure (%)	Mortality (%)
Oesophageal	1	1(100%)	10	0	0(0%)
Gastric	2	1(50%)	8	0	1(50%)
Duodenal	8	7(87.5%)	15	0	1(12.5%)
Jejunal	21	8(38%)	19.5	1(4%)	12(57%)
Ileal	10	5(50%)	20.6	1(10%)	4(40%)
Colonic	8	0(0%)		7(87.5%)	0(0%)
Total	50	22(44%)	16.5	9(18%)	18(36%)

Table 3. Aetiology of ECF

AETIOLOGY	NO.OF PATIENTS	POS-OPERATIVE	SPONTANIOUS
Missile	23	23	0
Colorectal Ca.	5	4	1
Ca.pancreas	3	3	0
Biliary injury	3	3	0
Inflammatory bowel disease	2	2	0
RTA	2	4	0
Irradiation	1	0	1
Others	11	9	0
Total	50	48	2

Regarding the relationship between the anatomical type of the fistula and the mortality rate, the highest mortality rate was found in jejunal fistula (57%) followed by gastric and ileal fistulae (50% & 40% respectively). the duration of spontaneous closure was shortest in gastric fistula; 8days, and longest in ileal fistula; 20.6dys. (Table 2)

Colonic fistula was associated with lowest mortality rate (0%), and all except one patient, the fistulae closed surgically by proximal defunctioning colostomy. while one patient with malignant colonic fistula, the fistula failed to close by surgical as well as conservative treatment.

The duodenal fistula had the highest spontaneous closure rate, which was 87.5% (if we exclude

one patient with oesophageal fistula), followed by ileal and gastric fistula, which had spontaneous closure rate of 50% for each.

Morbidity & mortality (table 4 & table 5)

There was 41 complications in 23 patients; the most common complication was central vein catheter infection, which was occurred in 9 patients, all those patients were treated by removal of the catheter.

The next common complication was multiple organ failure (MOF) (6patients), renal failure (6patients) and septicemia (5patients). There were 18 patients died (mortality rate 36%), the main three causes of death were MOF in 6patients, septicemia in 5patients and renal failure (RF) in 6patients.

Table 4. The complications rate

Note: some patients have more than one complication

Role of octreotide (table 7&table 8)

Complications	Number
<u>Fistula related</u>	
MOF	6
Renal failure	6
Septicemia	5
Electrolyte disturbance	4
Malnourishment	2
<u>TPN related</u>	
Hyperglycemia	4
Central vein infection	9
<u>Not related</u>	
Pneumonia	1
Heart failure	1
Bleeding	3
Total	41

Etiology & outcome (table 6)

There were seven main causes of ECF found in this study. In fistulae following operation for missile injury; which was the main cause of fistula in this study (23patients, 46%), 13patients (56.5%) the fistulae were closed spontaneously and 9patients (39.1%) died and one patients closed by surgical interference, the mean duration of spontaneous closure was 14days. The highest mortality rate was found in patient who

had fistula developed after operations for road traffic accident (50%), followed by colorectal carcinoma (40%) and missile injury (34.7%). However fistulae following operation for inflammatory bowel disease had the highest spontaneous closure rate (100%), but they had the longest mean duration of spontaneous closure (31.5days)

Role of octreotide (table 7&table 8)

If we exclude patients who did not receive TPN, all other 36patients octreotide was prescribed for them. But actually only 27patients had received octreotide because this drug was not available always.

However, Those patients who received octreotide in addition to TPN had higher spontaneous closure rate 62.9% vs. 44.4% and they had lower mortality rate 33.3% vs. 44.4% in

comparison to those patients who did not received octreotide but had longer duration for spontaneous closure, although these differences is statistically not significant.

Regarding the effect of octreotide on the fistula output, it is found that there was decrease in fistula output if octreotide is given with TPN in duodenal fistula, but this is not significant statistically, and without any effect on jejunal and ileal fistula output (Table 8).

Table 5. Causes of death.

CAUSES	NO.OF DEATHS
MOF	6
RF	5
Septicemia	4
Electrolyte disturbances	1
Pneumonia	1
TB meningitis	1
Total	18

Table 6.the correlation between the etiology of ECF & the outcome

Etiology	No. Of pts.	Spontaneous closure	Mean duration of spontaneous closure. Days (range)	Surgical Closure (%)	Mortality (%)
Missile	23	13(56.5%)	14 (3-36)	1(4.3)	9(39.1)
Colorectal Ca.	5*	0(0%)		2(40)	2(40)
Ca.pancreas	3	2(66.6%)	18.5 (10-27)		1(33.3)
Biliary injury	3	2(66.6%)	16.5 (14-19)		1(33.3)
Inflammatory bowel disease	2	2(100%)	31.5 (3-60)		0
RTA	2	0(0%)			2(100)
Spontaneous fistula	2	1(50%)	4	1(50)	0

*One patient failure of conservative as well as surgical treatment

Table 7. The role of octreotide on the outcome of ECF

	With octreotide			Without octreotide		
	n.	Mean	Range	n.	Mean	Range
Esophageal	1	200				
Gastric	2	450	(400-500)			
Duodenal*	6	833.3	(500-1000)	2	3000	(2000-4000)
Jejunal**	14	1486.7	(500-3000)	7	1375	(500-2500)
Ileal***	7	550	(400-1000)	3	500	
Total	30	700	(400-3000)	12	1625	(500-4000)

*P> 0.3 not significant

**P> 0.5 not significant

Table 8. effect of octreotide on fistula output

	No. Of pts.	Spontaneous closure*	Mean Duration of spontaneous closure (range) days	Surgical closure (%)	Mortality rate (%)**
TPN with octreotide	27	17(62.9%)	18.8 (3-60)	1(3.8)	9(33.3%)
TPN alone	9	4(44.4%)	4 (3-18)	1(11.2)	4(44.4%)

*P> 0.05 not significant

**P> 0.4 not significant

Surgical intervention:(table 9&table 10)

There were 18 patients with ECF who underwent surgical operation attempting for fistula closure. Regarding the 8 patients with colonic fistula all were treated by proximal defunctioning colostomy, in seven patients (87.5%) the fistulae were closed successfully, and one patient with malignant colonic fistula, the fistula failed to close by surgical as well as conservative treatment.

If we exclude colonic fistula, there were 10 patients (one gastric & nine small bowel fistulae) surgical closure had been attempted because of failure of conservative treatment. The surgical procedures include; resection with end-to-end anastomosis (7 patients), primary closure (one patient), defunctioning stoma (one patient) and drainage of collection (one patient). Three

patients the fistulae were closed (30%), six patients the fistulae were recur (60%), and seven patients died (70%). If they compared with the patients who treated with TPN (total 33 patients) spontaneous closure rate were 63.3% (21 patients), which is statically significant, and the mortality rate 36.3% (12 patients), which is not significant statistically. (Table 10)

Output of the fistula and outcome (table 11)

This study revealed that there is no significant statistical difference between the moderate output fistula and high output fistula regarding the spontaneous closure rate, mortality rate and surgical closure rate. So it is more logic to compare between fistulae with output <200ml/day and fistulae with output >200ml/day.

Patients with low output fistula (<200ml/day) had statistically significant lower mortality rate if

it compared with fistulae with output >200ml/day, also they had significantly higher surgical closure rate, this is because most of those patients who belong to this group were of colonic type (most of them had been treated by defunctioning colostomy).

Number of orifices & outcome (table 12)

Patients with fistula discharge from one orifice (usually drain site) had the highest spontaneous

closure rate (55%) and the lowest mortality rate (20%), however this is statistically not significant. If we compare fistula discharge from multiple orifices and that from surgical wound, we found that there is no statistically difference between these two groups regarding mortality rate and spontaneous closure rate.

Table 9. The types & the outcomes of the surgical procedure

Types of surgery	No. Of pts.	Closure (%)	Recurrence (%)	Mortality (%)
<i>Small bowel</i>				
Resection with reanastomosis	7	2(82.5%)	5(71.5%)	5(71.5%)
Primary closure	1	0(0%)	1(100%)	1(100%)
Defunctioning stoma	1	0(0%)	0(0%)	1(100%)
Abscess drainage	1	1(100%)	0(0%)	0(0%)
Total	10	3(30%)	6(60%)	7(70%)
<i>Large bowel</i>				
Defunctioning stoma	8	7(87.5%)	1(12.5%)	0(0%)

Table 10. Comparison between surgical treatment and conservative treatments of gastric and small bowel fistula.

	No. Of pts.	Closure (%)	Failure (%)	Mortality (%)
Conservative treatment	33	21(63.6%)	12(36.3%)	12(36.3%)
Surgical treatment	9	2(22.3%)	6(66.6%)	7(77.7%)
P value		$P > 0.05$	$P < 0.0005$	$P < 0.05$

Note: colcutaneous fistulae have been excluded from this table.

Effect of serum albumin & hemoglobin (table13)

It is found in this table that there is no significant statistical difference between patients with serum albumin >35gm./L and that with patients with serum albumin < 35gm./L regarding spontaneous closure rate and mortality rate.

Patients who had hemoglobin level more than 10 gm./dl had higher spontaneous closure rate

(53.3% versus 30%) and lower mortality rate (30% versus 45%) if they were compared with those with hemoglobin level less than 10 gm./dl, but this is not significant statically.

Table 11. The correlation between output of the fistula and the

Output of fistula	No. Of pts.	Spontaneous closure (%)*	Mean duration of spontaneous closure (days)	Surgical closure (%)**	Mortality (%)***
Low output	7	1(14.2%)	14	5(71.4%)	0(0%)
Moderate output	17	8(47%)	18.6	3(17.3%)	6(35.3%)
High output	26	13(50%)	15.5	1(4%)	12(46%)

Note: the comparison between fistulae <200ml/day & >200ml/day

*P> 0.05 not significant

**P< 0.0005 very highly significant

***P<0.05 significant

Table12the correlation between the number of the fistula orifices & the outcome

Number of orifice	No. Of pts.	Spontaneous closure (%)*	Mean duration of spontaneous closure (days)	Mortality (%)**
1	20	11(55%)	15.3	4(20%)
>1	11	3(27.2%)	17.3	5(45.4%)
From wound	19	8(42%)	18	9(47.3%)

*P> 0.1 not significant

**P> 0.05 not significant

Table 13 the effect of serum albumin & hemoglobin on the outcome

	No. Of pts	Spontaneous closure (%)	Mean duration of spontaneous closure (days)	Mortality (%)
<u>S.Albumin</u>				
≤35gm/l	40	19(46.8%)	15.35	15(37.5%)
>35gm/l	10	3(30%)	13.3	3(30%)
P value		> 0.3		>0.5
<u>Hemoglobin</u>				
<10gm/dl	20	6(30%)	17	9(45%)
>10gm/dl	30	16(53.3%)	16	9(30%)
P value		> 0.1		> 0.2

Discussion:

In this study it is noted that the main cause of postoperative ECF fistula was missile injury that constitute about the half of the cases. In reviewing other studies it is found that the most common causes were due to cancer operation, operations for inflammatory bowel disease and adhesiolysis^(8,9,10,11). This could be explained by high incidence of violence attaches in this country because of the last war and insecurity as result of American occupation. Also we notice that there is relatively low incidence of spontaneous fistula in present study, which was 4%(one case recurrent colonic and the other irradiation), if it is compared to other studies which range between 15%-25%^(2,10,11,12), and the main causes of spontaneous fistula found in these literatures were; inflammatory bowel disease, radiotherapy, diverticular disease, ischemic bowel disease, pancreatitis and gynecological disease^(9,10,11,12).

In comparison of the spontaneous closure rate of this study (which was 44%) and the average spontaneous closure rate of other studies after 1970(after introduction of TPN), which was 32.6 ranging between 8.6%-81%^(4,8,13,14,15,16), it is found that there is no significant difference. Whereas in comparison the mortality rate of this study, which is 36%, and the average mortality rate of above series, which is 22.3%, this showed that there is a significant higher mortality rate in this study that might be explained as a deficient of a good para surgical care (Table 14).

Regarding the anatomical types of fistulae, this study showed against the traditional concept that, the gastric and ileal fistulae had low spontaneous

closure rate and they usually need surgical intervention for closure⁽⁵⁾, but this study revealed that half of these fistulae were closed spontaneously which is good result if it is compared with Pennsylvania and Texas⁽⁴⁾ studies which were showed that the spontaneous closure rate of gastric and ileal fistulae were 43% and 19% respectively.

Its well known that the three main complications of ECF are sepsis, electrolyte disturbance and malnutrition⁽⁵⁾

However, electrolyte disturbance and malnutrition become uncommon nowadays, because of good monitoring of nutritional status and electrolyte changes and because of introduction of parenteral nutrition.

This change in complications' incidence was proved in this study where the electrolyte disturbance and malnutrition occur in only 8% and 4% respectively.

However, sepsis was the most common cause of death in this study as it is the main cause of multiple organ failure and renal failure, this is also proved by W Fazio et al study⁽¹⁷⁾. Septicemia occur in five patients (10%) in this study four of them died, if this compared with other studies, septicemia occur between 9.6% and 62.9%^(15,18,19). Generalized sepsis usually results from catheter sepsis or pus collection adjacent to fistula tract mainly, but there is another less common causes like pneumonia, (because of patient immobility), severe urinary tract infection (from prolong use of indwelling urinary catheter) and wound infection. In addition to that patient with ECF usually

immunocompromized because of malnutrition and prolong use of antibiotics.

Another common but less dangerous complication is catheter sepsis, which were occurred in nine patients out of fifteen who received central hyperalimentation. This high incidence of central catheter sepsis may be because of lack of trained staff who manipulate with this special type of catheter aseptically. As a bacterial catheter sepsis is directly related to catheter care⁽²⁰⁾. This was proved at the university of Cincinnati Medical Center, the sepsis rate decreases from 27% before the establishment of a hyperalimentation team and rigid protocol, to 0.6%⁽²⁰⁾.

Catheter sepsis suspected if the patient who was previously afebrile, suddenly develops a high fever. The other source of infection such as pneumonia, intrabdominal abscess, urinary tract infection and wound infection should be excluded. Initially the intravenous tube set and the bottle should be changed, and if the fever persists after 8hour the catheter should be removed and the tip cultured⁽²⁰⁾.

The peripheral hyperalimentation may be safer but it is useful only under limited circumstances, when the duration of PN will be limited or one is not certain that PN will be required⁽²⁰⁾.

In this study, peripheral hyperalimentation had been used in 21 patients almost all those patients need to change the cannula every 1-3 days because of superficial thrombophlebitis. This method of administration had been used when short-term parenteral nutrition is expected or failure to obtain central line or the central line had been removed when it become infected. Manish Kaushal and Gordon L. emphasized that, where nursing expertise is limited and in whom

the likelihood of spontaneous closure seems high, intravenous feeding using a peripheral sited catheter may be appropriate and associated with a low risk of serious morbidity than centrally administered TPN⁽²¹⁾.

The results of this study couldn't revealed a significant change in spontaneous closure rate and total volume of fistula output after administration of octreotide, but we noticed that there was decrease in duodenal fistula output after introduction of octreotide, although this changes is statistically not significant.

Spiliotis co- worker proved that the octreotide reduce output significantly and accelerate spontaneous closure rate⁽²²⁾. This also ascertained by Gonzalez-Pinto and Emoreno⁽⁹⁾. While A N Kingsnorth et al conclude that somatostatin failed to accelerate closure of ECF in spite of reducing fistula output⁽¹⁶⁾.

U Hesse et al⁽²³⁾, reviewed six studies that have been examined the effect of octreotide on fistula output reduction, three studies showed that significant reduction in fistula output but no one showed increased closure rate but there is reduction in time of closure. Naila Areba and Alastair Forbes conclude after reviewing of six comparative studies and four non-comparative studies on effect of octreotide on outcome of ECF that, there is insufficient evidence to recommend the use of somatostatin or its analogues in the management of high-output ECF⁽¹²⁾. Carlos Alvarez et al found that octreotide administrations was lead to reduce fistula output, but significantly increase the incidence of septic and thrombotic complications and failed to affect the fistula duration, spontaneous closure rate and length of hospitalization⁽²⁴⁾.

Table 14. medical vs. operative management & mortality in reported fistula series

Study	Year	Number of cases	Fistula location	Percent of patients		
				Medical therapy	Surgical therapy	Overall mortality
Edmunds ⁽²⁶⁾	1960	157	Gastro duodenal, small & large bowel	22	78	44
Lorenzo ⁽⁴⁾	1969	18	Small bowel	8.6	91	30
Nasson ⁽⁴⁾	1971	21	Duodenal Small bowel	33.4	66.6	22
Sheldon ⁽⁴⁾	1971	51	Gastro duodenal, small & large bowel	36.3	64.7	12
Robach ⁽⁴⁾	1972	55	Small bowel	40	60	30
McFadden ⁽⁴⁾	1973	61	Gastro duodenal, small & large bowel	81	18.1	6.5
Aguirre ⁽⁸⁾	1974	38	Gastro duodenal, small & large bowel	29	71.1	21
Kaminsky ⁽¹⁴⁾	1975	56	Gastro duodenal, small & large bowel pancreatic, biliary	80	10.8	16
Tarazi ⁽¹⁵⁾	1976	47	Gastro duodenal	40.4	-	29.8
Coutsofties ⁽⁴⁾	1979	174	Jejunal, ileal, large bowel	17	83	22.4
Sitges-Serra ⁽¹⁹⁾	1982	75	Esophageal, gastric, small & large bowel	61	38.6	21.3
Hallendr ⁽²⁾	1983	54	Small bowel	12	38.8	48
McIntyre ⁽¹¹⁾	1984	114	Small & large bowel	24	75.7	5.3
Rose ⁽¹⁶⁾	1986	108	Gastric, small & large bowel, pancreatic, biliary	42	57.2	10.5
Graham ⁽¹³⁾	1988	85	Gastro duodenal Jejunal, Ileal	42	56	16
Average		74		32.6	57.8	22.3
Present study	2005	50	Gastric, duodenal, jejunal, ileal, colonic	44	18	36

The present study revealed that the surgical intervention is associated with high mortality rate and recurrence rate (70% and 60% respectively) with low closure rate (30%), so only 18% from the total number in this study were closed surgically. Whereas, in reviewing the reported fistula studies between 1960- 1988, we found that the over all mean surgical closure of these studies was 57.8%^(2,4,8,14,15,16,25)(table 14). In reviewing 277 case of ECF treated at St. Mark's Hospital over 11 years, P. Hollington et al found that spontaneous closure rate was 19.9% and surgical closure rate was 64.1%⁽²⁶⁾. The poor outcome of surgical closure found in this study may be explained as; all those patients who underwent operation were performed urgently. In addition to that, this result may reflect that there is poor postoperative intensive care and monitoring in our hospital. So it is recommended that not to attempt surgical closure of the ECF unless the patient is sepsis free for 6 weeks and the fistula

does not show a significant decrease in the output. A. Craig Lynch et al found that those patients who operated on before 12 weeks had recurrence rate higher than those who operated after that time⁽²⁷⁾. Manish Kaushal and Gordon L. Carlson emphasized that, the attempt to restore intestinal continuity or to repair anastomotic leaks in septic patients are associated with a very low chance of success because of anastomotic failure and should not be undertaken⁽²¹⁾.

The reason that all colonic fistulae treated by surgical intervention is that those patients had been treated by conservative treatment before referral to our hospital but without response. Edmund et al found that, 92% of colonic fistulae were treated by surgical resection or proximal defunctioning colostomy with low mortality rate and recurrence rate, so he assumed that surgical treatment for lower bowel fistula offer an

attractive alternative to prolonged medical management⁽²⁵⁾.

The most important physiological determinant of a fistula is the daily output of intestinal fluid. Fistula output is often depending on the anatomical site and high output fistulae are more difficult to treat⁽⁹⁾. This study showed that the output volume is inversely related to spontaneous closure rate and directly related to the mortality rate. Also it is found that there was no significant difference between moderate output fistulae (200-500ml/24h) and high output fistulae (>500ml/24h) regarding the spontaneous closure and the mortality rate. So it is preferred to use high output fistula term if the daily discharge volume more than 200ml/24h since it has the same prognosis and outcome.

It is well known that the increase in number of orifices associated with higher morbidity and mortality, and this proved in this study in which we found that fistulae, which has more than one orifice, had higher mortality rate and lower spontaneous closure rate if they compared with fistulae which has one orifice, but this found statistically not significant.

Vector W Fazio et al⁽¹⁷⁾; found that hypoalbuminemia and anemia is strongly associated with increased mortality rate of ECF, although this was also found in this study but it is statistically not significant. Regarding the spontaneous closure rate, this study revealed that hypoalbuminemia had no effect on spontaneous closure rate, whereas anemia reduces but without statistical significant, the rate of spontaneous closure.

Conclusion:

In spite of rather a good number of patients treated successfully in this hospital but there is still unacceptable morbidity and mortality. Attempt for surgical closure for small bowel fistula associated with high failure rate but good closure rate of colonic fistula. Octreotide administration neither changes the output of the fistula nor the outcomes but it decrease the duodenal fistula output although it is statistically not significant.

Hypoalbuminemia and anemia associated with increase the mortality rate and decrease the spontaneous closure rate but it is statistically not significant.

Recommendations:

1. Surgical closure should not be performed urgently, and should be attempted only after failure of conservative treatment for more than 6 weeks.
2. It is more logic to call fistulae with output <200ml/day as low output fistula and fistulae with output >200ml/day as high output fistula.
3. Establish special units for PN in the major hospitals, and provide these with drugs and nutrient necessary for PN. Training special team on PN, this team includes: Nutritionist, Surgeons, Physicians, pharmacists and Nursing staff.

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