

ENTEROCUTANEOUS FISTULAE: A CLINICAL STUDY IN TERTIARY CARE CENTER

Pallam Praveen¹, N. Krishna Mohan², D. Devender³

¹Assistant Professor, Department of General Surgery, Gandhi Medical College, Hyderabad.

²Associate Professor, Department of General Surgery, Gandhi Medical College, Hyderabad.

³Post Graduate, Department of General Surgery, Gandhi Medical College, Hyderabad.

ABSTRACT

Enterocutaneous fistula is a common complication encountered in the post-operative period. It is the most catastrophic problem resulting in significant morbidity and mortality. Various factors have been detected which play a role in the development of enterocutaneous fistulae like age of the patient, time of presentation, Organ of Origin, pathology of the disease, general condition of the patient, metabolic abnormalities, etc. Identification of these risk factors, early diagnosis and early intervention and decision making will give good outcomes.

AIM

To study the aetiology, risk factors, morbidity and ideal management of enterocutaneous fistulae.

MATERIALS AND METHODS

Study includes thirty two (32) patients treated for enterocutaneous fistulae in our hospital between January 2012 and December 2014. At the time of diagnosis of the fistula, the patients were classified according to the site of the fistula and the volume of output. They were subsequently investigated and managed according to the standard protocol.

RESULTS

Mortality is 50% in 5th decade of life. In the present series, 0% mortality was noted in patients who had duodenum and jejunum as the organ of origin. Ileum and stomach comprised of 25% each in the contribution to mortality while 50% of all the patients with colcutaneous fistulae died subsequently. High output fistula has mortality of 27.77%. Mortality of 20% and 27.41% was noted in patients were managed conservatively and by surgery respectively.

CONCLUSION

Index surgery early admission, an adequate antibiotic cover, vigorous resuscitation replacing fluids and electrolytes, blood transfusions, monitoring of all basic parameters and rightful decompression of the proximal bowel are all important measures to prevent the development of an enterocutaneous fistula. Prevention plays a definitely important role in patients with enterocutaneous fistulae.

KEYWORDS

Enterocutaneous Fistulae, Ligament of Treitz, Total Parenteral Nutrition.

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INTRODUCTION: Enterocutaneous fistulae encompass a wide spectrum of disease entities with significant morbidity and mortality.¹ It's the most catastrophic and common complication encountered in the post-operative period.

A large number of factors govern the incidence of enterocutaneous fistulae apart from affecting its prognosis, morbidity and mortality. Although the present day mortality of most elective procedures is below 2%, and in emergency procedures the mortality remains between 6.25% and 45%. Also, it's not unnatural for a surgeon to avoid confronting an operative failure by adopting an attitude of "wait and see".

In this study therefore, an attempt has been made to find out the efficacy of early diagnosis and decision making regarding management and to study the various factors which affect the prognosis². This is to have a better

understanding, so that the incidence of morbidity and mortality in these patients can be decreased³.

Scheme	Classification	Favorable	Unfavorable
Anatomic	Internal External Organ involved	Esophageal Duodenal stump Jejunal, tract > 2cm, Defect < 1sq.cm	Gastric, lateral, duodenal, ligament of Treitz, Distal obstruction.
Physiologic	Output: Low: < 200ml/dl Mod: 200-500ml/dl High: > 500ml/dl	Out-put not prognosticate the closure.	Output not prognosticate the closure
Etiologic	Disease process	Appendicitis, Diverticulitis, Post – operative	Malignancy. IBD, Foreign body, Irradiation.
Classification of Enterocutaneous Fistulae and its Significance⁴			

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Corresponding Author:

Dr. Pallam Praveen,
Assistant Professor, Department of Surgery,
Gandhi Medical College, Hyderabad.

E-mail: pallampraveen@yahoo.com

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These classification schemes are by no means exclusive of one another; indeed, it is desirable to define each fistula by all three systems. In this way an integrated understanding of the gastrointestinal fistula and its physiologic impact on the patient can be achieved.



Figure 1

AIM: To study the aetiology, risk factors, morbidity and ideal management of enterocutaneous fistulae.

MATERIAL AND METHODS: This includes thirty two (32) patients treated for enterocutaneous fistulae in our hospital between January 2012 and December 2014. At the time of diagnosis of the fistula, the patients were classified according to the site of the fistula and the volume of output. They were subsequently investigated and managed according to the standard protocol.



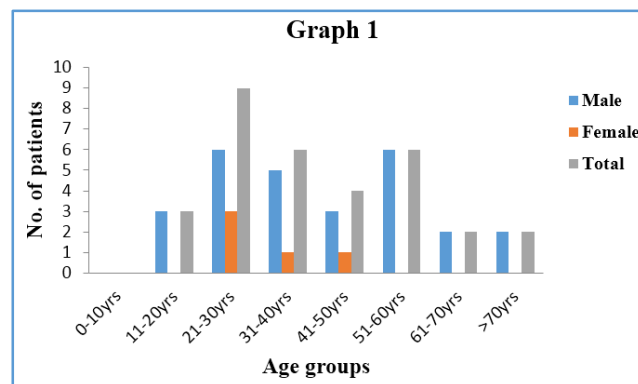
Figure 2

ANALYSIS AND OBSERVATION:

AGE: The age incidence of the patients of enterocutaneous fistulae in the present series is presented as a frequency distribution curve.

Age-group	Male	Female	Total	Mortality %
0-10	0	0	0	0
11-20	3	0	3	33.3
21-30	6	3	9	0
31-40	5	1	6	0
41-50	3	1	4	50
51-60	6	0	6	33.3
61-70	2	0	2	50
>70	2	0	2	50

Table 1



Enterocutaneous fistulae have been encountered in nearly all age groups in the present series. The age of the youngest patient among the series was 16 years and the eldest was 82years.

SEX: The series comprises of totally 32 patients, and the male incidence was found to be more.

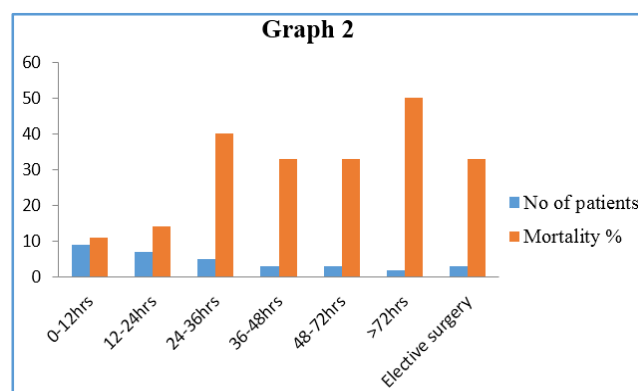
Sex	Number
Males	27
Females	05

Table 2

Analysis of Duration of Complaints Prior to Primary Surgery:

Sl. No.	Duration	No. of patients	Mortality %
1	0-12	9	11.11
2	12-24	7	14.23
3	24-36	5	40
4	36-48	3	33
5	48-72	3	33
6	>72	2	50
7	Elective surgery	3	33

Table 3



The present series depicts that a high percentage of patients had presented in the early period of the disease. Patients referred from rural hospitals tend to arrive late in the course of the disease which affects tremendously the mortality of the patient.

General Condition of the Patient: In the present study four factors have been found to be important with regards to assessment of the general condition of the patient. They are;

1. Pulse Rate
2. Blood Pressure
3. Temperature
4. Urine Output

Parameter	Poor risk	Good risk
Pulse Rate	>100/min	<100/min
Blood Pressure	<100 mm Hg	>100 mm Hg
Temperature	>100 deg F	<100 deg F
Urine Output	<30 ml/min	>30 ml/min

Table 4

The incidence of patients based on their general conditions is as follows:

Sl. No.	General condition	No. of patients	Mortality	Average hospital stay
1	Poor	20	30%	30.6days
2	Good	12	16.6%	25.8days

Table 5

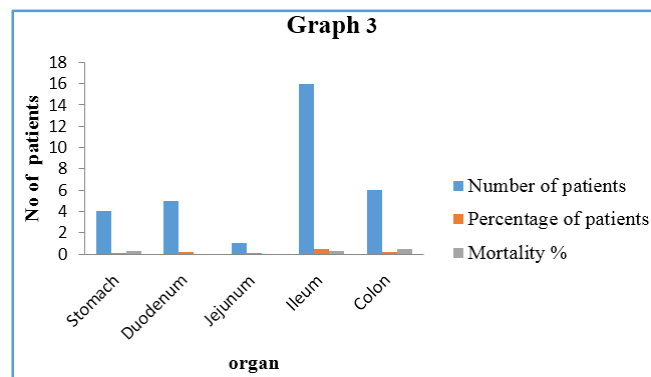
The tabular column depicted above shows that more than half of the patients in the present series were among the poor risk group.

The Organ of Origin: The fistula site is important to predict spontaneous closure and also influences the mortality. An analysis of the organ of origin shows the following:

Sl. No.	Organ of origin	No. of patients	Percentage of patients	Mortality %
1	Stomach	4	12.5%	25%
2	Duodenum	5	15.62%	0%
3	Jejunum	1	3.125%	0%
4	Ileum	16	50.0%	25%
5	Colon	6	18.75%	50%

Table 6

The most common organ of origin among either sex as in the table was the ileum. Only one case of all the thirty two cases was from the jejunum, a case of post-traumatic enterocutaneous fistula.



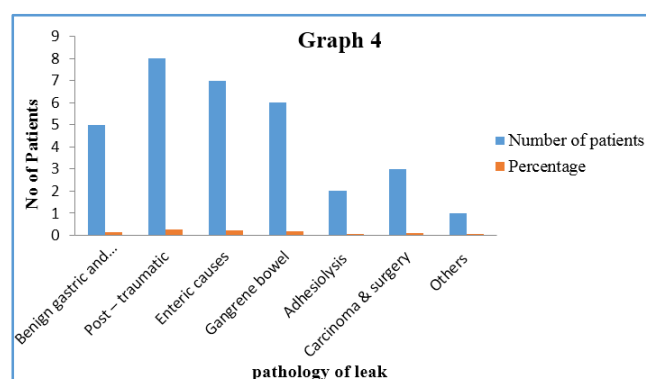
Pathology of the Fistulae: Pathology of the fistulous leak relates directly with the patient prognosis. A number of pathologies have been enumerated among the causes of enterocutaneous fistulae, of which in our series the post-traumatic and enteric causes were found to be the most common.

Sl. No.	Pathology of leak	No. of patients	Percentage
1	Benign gastric and duodenal ulcer perforations	5	15.625%
2	Post – traumatic	8	25.0%
3	Enteric causes	7	21.875%
4	Gangrene bowel	6	18.75%
5	Adhesiolysis	2	6.25%
6	Carcinoma & surgery	3	9.375%
7	Others	1	3.125%

Table 7

Of the seven cases of enteric fever perforations, resection and EEA was done in two, others managed by simple closure.

Malignancy was associated in three cases, two of them operated for Billroth-II surgery for carcinoma stomach and one patient with colonic malignancy that was managed by a limited resection and EEA.



Nature of Surgery: Elective surgery always carries a better prognosis to the patient than an emergency procedure with regards to development of a fistulous leak. The analysis of the nature of surgery with relation to the mortality rate has been depicted in the tabular column below;

Sl. No.	Nature of Surgery	No. of Patients	Mortality	Mortality Percentage
1	Elective	3	0	0%
2	Emergency	29	8	27.58%

Table 8

Only 3 of total 32 patients with fistulous leaks were operated for index surgery electively. But the mortality observed in this group was noted as zero, in contrast to 27.58% of the mortality found patients who are operated an emergency basis.

Nature of Management: Based on the age, general condition of the patient, the organ of origin and the amount of the fistulous leak, patients were managed differently as shown in the following table.

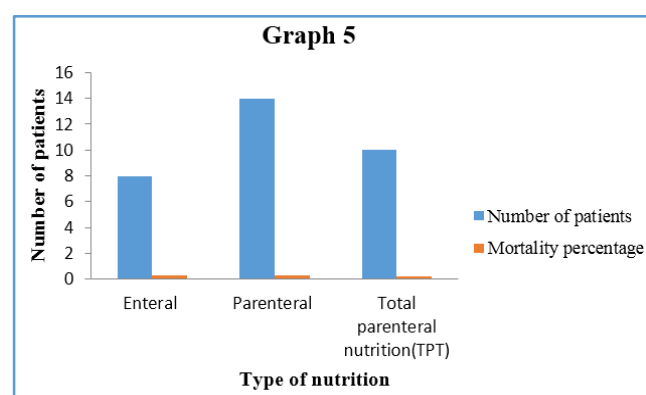
Sl. No.	Nature of Surgery	No. of Patients	Mortality	Mortality Percentage
1	Conservative	15	3	20%
2	Operative	17	5	27.41%

Table 9

Type of Nutrition: The type of nutritional support also influences the prognosis of the patients with enterocutaneous fistulae. The analytical data regarding the type of nutrition is depicted as follows.

Sl. No.	Type of nutrition	No. of patients	Percentage of Patients	Mortality Percentage
1	Enteral	8	25%	25%
2	Parenteral	14	43.75%	28.5%
3	Total parenteral nutrition (TPN)	10	31.25%	20%

Table 10



In our study most of the patients were on parenteral and total parenteral nutrition. Enteral feeding was encouraged at two places

- In patients with the site of leak being the distal ileum or the colon.
- In patients with feeding jejunostomy.

Feeding jejunostomy was found to be very useful mode of nutrition for patients being operated on the stomach and duodenum.

About three patients in this series were placed with a feeding jejunostomy and all of them were subsequently discharged.

Analysis of Fistula Output: Enterocutaneous fistulae are divided based on output into the low, moderate and high output fistulae. Fistula output greatly influences both mortality and spontaneous closure of the fistulous leak. The higher output, the higher is the mortality rate seen. High-output fistulae denote worst prognosis because of greater fluid, electrolyte and nutrient losses. Also rarely, the fistula output may exceed 1500ml per day.

Sl. No.	Amount of Output	Type of Fistula	No. of Patients	Mortality	Mortality Percentage
1	<200ml	Low	6	1	16.66%
2	200-500ml	Moderate	8	2	25.0%
3	>500ml	High	18	5	27.77%

Table 11: Fistula output and mortality

Metabolic Abnormalities with Relation to Mortality: A number of patients diagnosed with enterocutaneous fistulae had metabolic abnormalities which include electrolyte imbalances as hypokalaemia, hyponatremia etc. The prognosis in these groups of patients was relatively poor. The data below proves this.

Sl. No.	Metabolic abnormalities	No. of patients	Mortality	Mortality Percentage
1	Present	22	6	27.27%
2	Absent	10	2	20.0%

Table 12

Serum Protein Level: All the cases in the study were subjected to serum protein level analysis at the time of diagnosing the fistulous leak. The analysis shows the following;

Sl. No.	Serum Proteins (albumin)	No. of Patients	Mortality	Mortality Percentage
1	<3.5gm/dl	22	6	27.27%
2	>3.5gm/dl	10	2	20.0%

Table 13

Low serum albumin is not uncommon among enterocutaneous fistula patients. The low level of albumin is included in equations developed for the predilection of morbidity and mortality in surgical patients. It was found that the mortality percentage was higher among the patients with hypoalbuminemia.

Analysis of Releak and Mortality: Mortality in enterocutaneous fistulae reached a tremendous peak once the patient who is operated for the fistulous leak and develops a releak post-operatively. In our present series 100% mortality in these groups of patients was noted.

Sl. No.	Releak	No. of Patients	Mortality	Mortality Percentage
1	Present	4	4	100%
2	Absent	13	1	7.69%

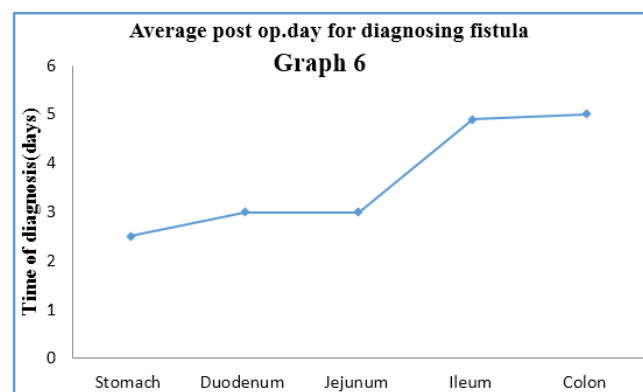
Table 14

Analysis of average day of diagnosis of fistulae post-operatively in relation to organ of origin:

Sl. No.	Organ of Origin	Average Day
1	Stomach	2.5
2	Duodenum	3
3	Jejunum	3
4	Ileum	4.9
5	Colon	5

Table 15

The average day for diagnosing enterocutaneous fistulae post operatively is least in stomach (2.5) and maximum in colon (5.0).



Duration between diagnosis of leak & 2nd surgery and mortality:

Sl. No.	Duration	No. of patients	Mortality	Mortality Percentage
1	<2days	9	1	11.11%
2	>2days	8	4	50%

Table 16

The average mortality in patients in whom the leak occur after 1st surgery and the 2nd surgery.

- Within 2 days the mortality (11.11%).
- More than 2 days the mortality (50%).

DISCUSSION: A study of 32 patients of enterocutaneous fistulae, admitted from January 2012 to December 2014 in Gandhi Hospital, Secunderabad was made.

Age and Sex Distribution: The distribution among the patients studied, was ranging from 16years to 82 years (table 1). A higher rate of mortality (50%) was noted from the 5th decade onwards (graph1). These statistics reveals similarities with the study of Levy et al where over and less than 50 years of age was considered to be of prognostic value.⁵

The overall mortality in Reber et al's study was 22%, but it was 48% in patients over 65years of age.⁶ In the most recent series by "Thomas", the mortality was 53% and 8% for patients over and under 65 years of age respectively. In contrast, in the most recent study by some authors, age was no longer considered of prognostic significance.

In the 32 patients studied 5 patients were female and the rest were males (table 2). Sex was not found in any of the previous studies to be a contributory factor in the development of these fistulae.

Duration of Complaints Prior to the Primary Surgery

(Table 3): About 28% of the patients presented to the hospital within 12 hours of symptomatology and a mortality rate 11.11% was noted in this group. On the contrary, about 6.25% patients who presented after 72hours of complaints had a mortality of 50% (graph 2).

The patients who are referred from other institutions frequently arrive in poor general and nutritional conditions and their mortality is higher. Kuvshinoff et al also found that a result of treatment of these patients is usually worse in referred patients.⁷

General Condition of the Patient: A poor general condition is noted when arrive late in the course of the disease or if the patient are referred from other health centers. Due to diffuse peritonism and local complications of the disease, patients tend to have features of hypovolemia and septicaemia that carry a high risk of post-operative leak compared to patients who presented early, prior to the occurrence of these complications.⁸

Basic parameters such as pulse rate, blood pressure, temperature and hourly urine output was used in this series which serve an easy way to depict the general condition of the patient (Table 4).

A 16.66% mortality among the good-risk group and a 30% mortality in the poor-risk group was noted. The average hospital stay was 25.8days and 30.6 days among the good and poor-risk patients respectively (Table 5).

The Organ of Origin: About 50% of the cases had ileum as the organ of origin (Table 6). The mortality in patients with enterocutaneous fistula.

In the present series, 0% mortality was noted in patients who had duodenum and jejunum as the organ of origin. Ileum and stomach comprised of 25% each in the contribution to mortality while 50% of all the patients with colocutaneous fistulae died subsequently (graph 3).

Of the five cases who had duodenum as the organ of origin, two were operated for Billroth II surgery for carcinoma antrum of the stomach, in the primary laparotomy

and in both the cause of the leak was a duodenal stump blow-cut⁹. In both the cases, a tube duodenostomy and feeding jejunostomy was done which served a good prognosis to both and they were discharged later.

Pathology of the Leak: The cause of fistulae influences both spontaneous closure and mortality. Fistulae secondary to trauma, necrotizing enteritis and enteric fever were found to be the most common causes in the present study (Table 7).

Among the rarer causes, benign peptic ulcer perforations were found in five patients and malignancy was associated with three cases.

About 33.33% and 28.57% mortality rates was found in patients having necrotizing enteritis (Gangrene bowel) and enteric perforations respectively as the pathology of the fistula. A mortality of only 20% was noted in patients with benign peptic ulcer disease (Graph 4).

Acute post-operative fistulae have a higher mortality but are more likely to close spontaneously than a low-output fistula of prolonged duration, due to other causes; Reber et al reported an overall spontaneous closure rate 32%, but only 8% when the fistulae are associated with carcinomas.⁶

Nature of Surgery: Patients presenting to the emergency wards are usually associated with dehydration, hypovolemia and features of septicaemia. All these factors are found to have a tremendous contribution to the development of an enterocutaneous fistula.¹⁰ Thus, the prognosis of patients operated on an emergency basis always stands poor with comparison to the electively operated cases, as seen in the study (Table 8).

Nature of Management: In the present series, both conservative and operative mode of management was followed in roughly equal number of patients. The decision to operate was taken in patients with;

- a) A good general condition.
- b) A high output fistula.
- c) Where the cause was post-traumatic.

Patients with low and moderate output fistulae (14) were managed non operatively (conservatively).

Mortality of 20% and 27.41% was noted in patients managed conservatively and by surgery respectively (Table 9).

Apart from the fistula output a few fistula characteristics contribute to both spontaneous closure and mortality. They include epithelialisation of the fistulous tract and its length.

Type of Nutrition: In this study, total parenteral nutrition was associated with a good prognosis and least mortality. Of one 10 patients maintained on TPN (Table 10), only 20% of them died while the mortality was 25% and 28.5% in patients receiving enteral and parenteral types of nutrition respectively (Graph 5).

The type of nutritional support influences the prognosis of patients with enterocutaneous fistulae. The mortality rate has decreased with the advent of TPN, but is still higher in

patients receiving parenteral nutrition than in patients on enteral feeds. Enteral feeding should be used in patients with low-output fistulae where mortality is very low.

Fistula Output: A very high mortality rate (27.77%) was noted in high out-put fistulae when compared to the mortality rate (16.66%) among patients with low out-put fistulous leak (Table 11).

A more significant difference in the mortality percentage was noted by Sitges Serra et al who reported 32% and 6% mortality in high and low out-put fistulae respectively, where as in Levy et al's study, it was 50% and 26% respectively.

The reduction of fistula output is one of the goals of the treatment of fistula patients. By decreasing the output, fluid electrolyte and nutrient losses are minimized, thus decreasing mortality and increasing the likelihood of fistula closure. Some studies reported decreased fistula output with initiation of TPN.¹¹

Sl. No.	Study & Mortality %	Low-output fistula	High-output Fistula
1	Sitges-Serra et al	6%	32%
2	Levy et al	26%	50%
3	Present study	16.6%	27.7%
Comparison of mortality rates of the different studies			

Metabolic Abnormalities: Diagnosis of an enterocutaneous fistula occurs on an average, on the 3rd to the 6th post-operative day. With the parenteral support, patient is always at a risk to develop metabolic abnormalities as electrolyte imbalances and changes in the blood Ph. The prognosis of a patient deteriorates with the onset of development of these metabolic changes.

In our study a mortality rate of 41.17% was found in patients associated with these abnormalities. Only 6.17% mortality was noted in patients without these disturbances (Table 12).

Serum Protein Level: The serum albumin level, although not strictly related to the nutritional status, is of predictive importance in both medical and surgical patients.⁹

Usually 3.5gm/dl of albumin is taken as assessing criteria. Mortality of 20% was noted in patients with serum albumin level greater than 3.5gm/dl whereas the mortality was 27.72% in patients with serum albumin less than the same (Table 13).

The level of serum albumin is considered an important predictive factor for both mortality and fistula closure. Fazia et al reported on mortality in patients with serum albumin above 3.5gm/dl whereas mortality was 42% in patients with serum albumin level below 3.5 gm/dl. In the recent study by Kvushinoff et al serum transferring level was also a strong factor influencing mortality and fistula closure.

Skin Care: Both pouch appliances and skin barriers were used in the present series, former used in high-output fistulae and latter in the low-output fistulae.

Diagnosis of Leak: A particular importance was tried to be laid upon the relation of the organ of origin and the average day of diagnosis involving a leak from it. It was found that fistulae involving the stomach were diagnosed averagely after 2.5 days; Duodenum and Jejunum was diagnosed averagely on the 3rd post-operative day while it was averagely 5 days for patients with Ileac and Colonic leaks (Graph 6). This is noted to be important with reference to the day of removing the drain after a primary surgery.

Duration between Diagnosing Leak and Relaparotomy: Stabilization of the patient and improving the general condition plays a very important role once the fistula is diagnosed, well before the second surgery. An expeditious stabilization and an early decision for surgery are mandatory measures for attaining good results.¹²

In the present series, of the 17 patients who were managed by surgery, 9 were taken up within two days of diagnosing a leak. The mortality in this group was 11.11% whereas a 50% mortality was noted in patients operated for a second procedure after more than two days.

Antibiotic and Outcome of the Patient: Apart from Metronidazole which used nearly in all the patients, Ciprofloxacin, Ampicillin, Gentamycin and Cefotaxime were the other antibiotics which were used in the present study. A good outcome was noted with Cefotaxime and Ciprofloxacin compared to Ampicillin & Gentamycin, the mortality rates being 14%, 28% and 30% respectively.

Releak and Mortality: Of the 17 patients in our series who were re-operated 4 developed releak and a 100% mortality was noted in this group of patients (Table 14). An aggressive systematic stabilization and correction of dehydration, anaemia and metabolic disturbances before a second intervention help in preventing this complication of a releak.

CONCLUSIONS:

1. Enterocutaneous Fistulae, a frequently encountered problem in the postoperative ward, encompasses a wide spectrum of disease entities with significant morbidity and mortality.
2. Patients in the later decades have an increased mortality rate when compared to patients in the younger age-groups.
3. Patients who arrive late in the course of disease, or who are referred late from peripheral institutions risk due to their poor general condition.
4. The most common pathology leading to the development of enterocutaneous fistulae in our setup are trauma, Enteric fever perforations and peptic ulcer disease. Other causes include necrotizing enteritis (gangrene bowel) and associated malignancy.
5. Severe malnutrition, uncontrolled sepsis, delayed decision for second intervention, metabolic abnormalities and high-output fistulae are the most common factors deciding mortality in patients with enterocutaneous fistulae, and it's a must to tackle each

factor separately and monitor it, as all these can be monitored clinically and with basic investigations.

6. Treatment should be aggressive with early stabilization, correction of fluid and electrolyte imbalance and specific care for nutrition and control of infection.
7. Total parental nutrition has proved to be a good achievement in the nutritional support of these patients.
8. Skin care should start at the earliest and liberal use of pouch appliances and drainage devices decrease and morbidity.
9. Early re-exploration is found to have a very significant improvement in the prognosis in patients with high-output fistulae, in our setup.
10. Prevention plays a definitely important role in patients with enterocutaneous fistulae.

Index surgery early admission, an adequate antibiotic cover, vigorous resuscitation replacing fluids and electrolytes, blood transfusions, monitoring of all basic parameters and rightful decompression of the proximal bowel are all important measures to prevent the development of an enterocutaneous fistula.

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