General Surgery

A COMPARATIVE STUDY BETWEEN TGI (TOTAL GUT IRRIGATION) GUIDED V/S NON TGI GUIDED MANAGEMENT OF ACUTE FECAL FISTULA.

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ABSTRACT

Background: a fecal fistula is dreadful complication both for patients ,surgeons and care takers after the major abdominal surgery. though rarely encountered but very challenging as the chance of operability and future healing always remains a question in surgeon's mind and sigh of relief isn't possible until patients starts tolerating oral feeds. A conservative management option always hit the surgeon's mind, the same idea has been evaluated here in detail. **Objectives:** the objective was to analyze and check the effectiveness of conservative management option of fecal fistula in our patients and to which extent it is viable to adhere it in patients. We have choose some parameters to assess it which has been described later. **Patients and Methods:** In this study, a comparative study was done about evaluation of total gut irrigation method for the closure of fecal fistula. The total 40 patients over the period of 2 years were included in the study and 20 patients were divided in each group, in one group we had given the total gut irrigation and in another group we did not give any gut irrigation. We evaluated the both groups on following parameters.1. spontaneous closure of fecal fistula 2. Skin conditions 3. Time to start the oral feed 4. Days of hospitalization 5. Development of features of intestinal obstruction 6. Sepsis in patients. Results: In this study we found that for the low output fistula and some selective cases of medium output fistula, the TGI is good and attractive option, though the statistical test doesn't show difference on some points mentioned above but in half of the parameters they were significant. In high output fistula group we found not much usability of TGI but in previous two types there was clear positive difference on almost all parameters. **Conclusion:** Total gut irrigation(TGI) is a simple and an important bedside test whose methodology when applied to acute fecal fistula helps to characterize the fistula from a functional aspect. In our study of 40 patients we found the clear mandate of TGI in low output and selective medium output fistula.

KEYWORDS : total gut irrigation, fecal fistula

INTRODUCTION :

A —*fistula"* is a Latin word means pipe, reed, tube, cane, musical pipe. In a medical context, fistula means an abnormal connection between two epithelial- lined organs.

The earliest record of an enterocutaneous fistula appears in The Old Testament Book of Judges written by SAMUEL between 1043 BC and 1004 BC. It has been also mentioned by Celsus who stated that large intestine can be repaired. In 19th century, john hunter also mentioned his observation about the same condition.

Enterocutaneous fistulas are as old as the science of surgery itself. As the field of abdominal surgery progressed in the post renaissance era, surgeons became more capable and courageous. Parallel with surgery the fields of histopathology and radiology bloomed helping discover new illnesses and aiding the surgeon confirm his clinical judgement thus allowing patients to be operated on sooner hence improving the overall outcome of our sciences. However an inevitable accompaniment to the increasing abdominal surgeries were increased incidence of post-op complications e.g enterocutaneous fistulae

Enterocutaneous fistulas are abnormal communications between the gastrointestinal tract and the skin. It requires the good management plan and optimistic view to understand the etiopathogenesis and its management.

The goal in management is closure of fistula either by conservative means or by surgical intervention. The current practice is to correction of fluid and electrolytes, building up the good nutrition, control of sepsis, managing the skin condition and psychological support to the patient.

The management depends on the underlying etiology (spontaneous or iatrogenic) and the anatomical classification (simple fistula or complex fistula).

Together these will determine the chances of fistula closure. The final outcome of a patient with fecal fistula is its closure. This can happen spontaneously or surgically. However due to the debilitating nature of the illness, especially in the acute phase, the mortality of fecal fistula remains high. Hence the role of surgeon in this crucial phase is paramount in deciding whether to intervene surgically or manage conservatively a deteriorating patient.

Total gut irrigation (TGI) is a process of rapid administration of large volumes of electrolyte solutions either orally or via a nasogastric tube to flush out the entire gastrointestinal tract. It is traditionally used to prepare the bowel for elective colorectal surgeries or procedures like colonoscopy. In some centres across India, TGI has been used in fecal fistulas both as a diagnostic as well as a therapeutic tool. By detailed observations made during the TGI, one can characterize and thus classify a fistula. It helps to unify both the anatomical and physiological aspects of the fistula in its assessment. This leads to a better judgement on understanding the fecal fistula and expecting a reliable outcome. As it has gut cleansing properties and also relieves sub-acute obstruction, it helps in spontaneous healing of the fistula.

Aim

To study only the impact on morbidity and mortality between total gut irrigation and non-total gut irrigation guided management of acute faecal fistulae.

Objectives

To study the impact on the following MORBIDITY variables
Spontaneous closure
The time to begin oral alimentation
Condition of surrounding skin
- Reduction of the length of hospital stay,if at all any
- The effect on ameliorating the features of sub-acute intestinal obstruction (SAIO)
- Reduction of sepsis, if at all any
- Impact on nutritional status as reflected by weight

Based upon the above mentioned morbidity variables,to study the overall impact on MORTALITY.
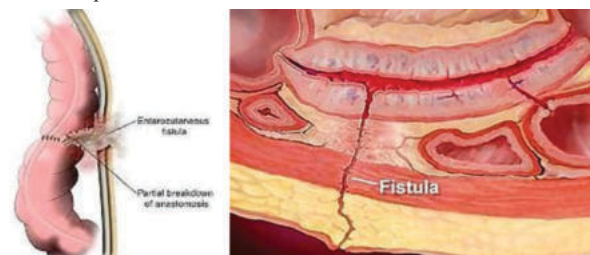
Fistulas more commonly occur following emergency surgery. Surgical errors like inadvertent enterotomy in patient with severe adhesions or a mesh migration in case of hernia repair may be a initiating factor in fecal fistula along with other parameters like malnutrition, diabetes

etc. Postoperative fecal fistulas may be due to inadequate blood flow as a result of devascularization or systemic hypotension, tension on the suture lines, perianastomotic abscesses, anastomosis on diseased bowel, inadequate bowel preparation, poor drain placement and malnutrition.

In 15-25% of instances, Spontaneous fistulas occur when a disease extends out of the organ of origin to invade surrounding tissues. In the developed world, Inflammatory bowel disease in particular Crohn's disease is the commonest cause of spontaneous enterocutaneous fistulation .In developing countries, spontaneous fistulation complicate infectious conditions, such as gastrointestinal tuberculosis, amoebiasis due to E. histolytica and typhoid due to S. typhi.

Other causes of spontaneous enterocutaneous fistula are: Malignant tumors, diverticular disease, Radiation enteritis and Intra-abdominal sepsis due to any cause etc. Rarely, inadvertent incision of a malignant tumor can lead to an ECF.

The classification for enterocutaneous fistulas is usually made on the basis of anatomy (site of origin, simple or complex fistula, end or lateral fistula, presence or absence of distal obstruction) or fistula output quantity.

Fistulas also can be classified as Internal or External.
Internal fistula:
it is a communication between 2 or morehollow viscera, without external communication.

External(enterocutaneous) fistula:
it is when a hollowviscus discharges to body surface
Internal fistulas are usually spontaneous and external ones post operative.

Anatomical and physiolofical classification
Anatomical :
single, branched, multiple, fistula with distal obstruction, fistula with terminal end

Physiological :
high output is more than 500ml per day, low output means less than100ml per day

Current management of fecal fistula
The current management is described in these 5 headings. 1.Stabilization, 2. investigations, 3. decision making, 4. definitive procedure, 5. Healing. Each point has been described here in detail.

1. STABILIZATION
The aims of stabilization is to control the three major complications of a fistula and consists of rehydration, electrolyte repletion, correction of anemia, drainage of sepsis, restoration of oncotic pressure, nutritional support, control of fistula drainage and institution of skin care.Main categories are –nutritional support, control of sepsis and wound care.

1.1 Enteral Nutrition
The primary role of nutritional support, whether enteral or parenteral, is the prevention of malnutrition. Baseline nutritional requirements are 20 kcal/kg/d of carbohydrate and fat and 0.8 to 1 g/kg/d of protein.No more than 30% of the daily caloric needs should be provided as lipid. Requirements for low-output fistulas increase to 25 to 30 kcal/kg/d with a protein need of 1.5 to 2 g/kg/d of protein. High-output fistulas may require up to 2 times the overall caloric daily requirement and 2 to 2.5×baseline protein requirements to achieve a positive nitrogen balance; This nutritional regimen should also include twice the recommended daily allowance (RDA) for vitamins and trace minerals, up to 10 times the RDA for vitamin C, and zinc supplements.

1.2 Parenteral Nutrition
In some cases, parenteral nutrition does not need to be total, as patients can have oral intake. It has been shown to decrease the capacity by upto 50%. It provides the nutrition and provide the main building block protient for healing but due to many complications in long term, its use can't be overzealous. Basic TPN solutions are prepared using sterile techniques, usually in liter batches according to standard formulas. All in one combination packs are available for total patrentaral nutrition by central venous line.

If this not available then Glucose is given by Dextrose 25% 100 ml iv twice daily. Amino acid solution 10 Plus/5S daily. Celipid 10% which is advanced general fat emulsion is given daily which suffice daily nutrition. Trace elemental injection 5/7 is given every week. Normally, 2 L/day solution is needed, out of which most calorie is by carbohydrate, followed by lipids.

The solution is given from the central line which is either subclavian vein or internal jugular vein.

In a patient who is taking inadequate orally or through nasogastric tube are candidates for partial parenteral nutrition through peripheral iv line in the form of triple chambered bag once daily. This can be used as Total Parenteral nutrition through peripheral line if given twice daily for 10-15 days. Than the enteral feed is gradually increased and parenteral nutrition is gradually stopped.

1.3 Control Of Sepsis
Sepsis is mainly found in the acute phase of ECF and is the commonest cause of death. Regardless of the cause, leakage of intestinal juices often leads to localised and systemic sepsis. Initial measures to treat abdominal sepsis are associated with an improved outcome in patients with intestinal failure.

Resection of the fistulating segment with exteriorization of the bowel ends as stomas (total gastrointestinal disconnection), proximal diversion, abscess drainage or formation of a laparostomy may occasionally be needed to control sepsis.

Antibiotic therapy should be complemented by identification of the site of sepsis by imaging modalities. Computed tomography (CT) should be used as the first line investigation. Higher antibiotics are started once the fecal fistula develops followed by specific antibiotics according to culture sensitivity report. Commonly gram negative bacteria like E.coli, Pseudomonas, Klebsiella are responsible as well as less commonly staphylococcus aureus, streptococcus etc.

When no bacterias are isolated in a patient with fecal fistula, same antibiotic protocol is maintained for 10 days. Antibiotic can be stopped after 10-15 days if lumen of intestine is near the wound.

1.4 Wound Care
The effects of continuous moisture and enzymic irritation can severely compromise skin integrity and lead to infection and delayed wound healing. Many commercially available products are available according to different skin types, fistula type and characteristics which can be used.

Severe ulceration and infection create a moist non-adherent surface that causes considerable difficulties with pouch and barrier methods.

Negative pressure wound dressings have also been a recent advance in the wound care of fistulas. These devices can protect the skin of patients with some of the most challenging ECF wounds when more simple devices do not suffice.

2. Investigations
Assessment Of Gastrointestinal Fistulae

The fistula must be investigated to determine:
Clinical/physical signs :
Patients may present with abdominal pain or tenderness, fever, and leucocytosis. The local examination may suggest abscess formation, the fistula happenening in early 7 to 10 days of surgery is due to anastomotic failure.

Radiological assessment :
Several modes of imaging are available to obtain the necessary information. Barium follow through in combination with fistulograms

have been shown to be accurate in determining length of remaining bowel. However, a drawback is that they can fail to define the presence of disease proximal to the ECF or distal if an associated abscess cavity is present and extravasated barium may induce an acute inflammatory reaction in the thoracic or peritoneal cavity and therefore an alternative—iodinated water soluble medium—should be used where perforations of the oesophagus, stomach, small bowel, or colon is suspected. Small bowel follow through is useful in evaluation of the distal bowel and identification of intraluminal causes of ECF, but it may fail to identify the location of the ECF. Small bowel enterography provides greater mucosal detail then a follow through, but requires the placement of a nasogastric tube.

While these examinations are useful in determining the length of remaining bowel other examinations such as CT enteroclysis and Magnetic Resonance Imaging (MRI) enteroclysis are also very useful in examining pathological bowel and areas of on-going pathology such as areas of on-going obstruction or septic collection. They can also provide valuable information such as safe sites of entry into the abdominal cavity and the size of the abdominal wall defect. CT scans are used with intravenous contrast to demonstrate inflammation, and oral contrast to differentiate loops of bowel from extra luminal abscesses or collections. CT provides the clinician with the option of percutaneous drainage of an abscess or collection under radiological guidance.

3. Decision Making
The main goal of therapy in ECF is to reestablish intestinal continuity and close the fistula, which may happen spontaneously or surgically. Still operative intervention is necessary in many patients to close the fistula, especially in ileal fistulas which close spontaneously in only 40 % of patients, due to small diameter, vigorous motility and relative obstruction of ileocaecal valve.

Favorable factors for fistula closure are low output fistula, good enteric and parenteral nutrition, no distal obstruction etc.

Unfavorable factors for spontaneous closure are presence of forign body, radiation, inflammatory bowel disease, malignancy, distal obstruction.

Emergency is indicated only in cases of sepsis or haemorrhage. Otherwise, conservative therapy is the treatment of choice in the initial period. The cases considered for late elective surgery are those in which the fistula has not healed after 4 to 6 weeks of appropriate conservative management and those where local conditions preclude spontaneous closure.

Reoperative surgery and conservative management are not opposing forms of therapy, rather they are complementary.There are two categories of operation. The first include those designed to improve general condition (e.g. drainage of abscess), correct malnutrition (feeding enterostomies) or control output from a difficult fistula (proximal diversion).

In the second category are definitive operations to remove the fistula and diseased bowel. In a well-nourished patient without sepsis, resection of fistula and end to end anastomosis is preferred. In a malnourished septic patient, proximal diversion or resection with exteriorization is done. Intestinal bypass is not recommended.

Conservative treatment should be continued if the patient is improving as demonstrated by decreasing output, rising plasma albumin level and body weight and return of defecation.

Spontaneous closure is most likely to take place within 4 to 6 weeks of sepsis and is unlikely to happen later. Thus elective surgery is best undertaken at least 4 to 6 weeks after resolution of intra abdominal sepsis, which is usually 60 to 75 days after initial surgery.

4. Definitive Treatment
Once the decision for surgery is made, careful preparation should begin. The abdominal wall should be reevaluated, loculations drained and cellulitis aggressively treated.

If meticulous skin care and control of fistula drainage has been achieved, the operation can be carried out through a healthy abdominal wall, enhancing the chance of secure abdominal closure.

The abdomen and operative site should be washed with antibacterial solutions for several days prior to operation. Bowel preparation, both mechanical and antibiotic preparation should be carried out. Systemic antibiotics should always be used, as these are by definition at least clean contaminated cases.

The operative approach is preferably though a new incision so that the major operative field is relatively clean. If this is not possible, the old incision is used but extended for easier access to the abdomen. The operative incision should be planned so that if end-to end anastomosis will be necessary which usually is the case, it can be carried out well away from the area of maximal contamination.

In operation the adhesiolysis is done as well as definitive resection and end-to-end anastomosis of involved nonviable segment of bowel.

Total Gut Irrigation
Total gut irrigation(TGI) is a bedside procedure used in diagnostic as well as therapeutic capacity in fecal fistulas. Its been in use in a few centres in India for a few years however no formal study has been done on the topic. It is included in the investigative phase. It should be done only after the stabilization phase is complete. Total gut irrigation was originally developed to cleanse the large bowel before surgery or colonoscopy.

Materials used for TGI are Sodium chloride, Potassium chloride, Sodium bicarbonate and Polyethylene glycol solutions.Total gut irrigation is taken by oral route or via a nasogastric tube and delivered down the tube into the stomach.Timing- The TGI in fecal fistula is done on 10th postoperative day. The only prerequisite is that peristalsis is present and patient has started orally.

Selection of patient-
Post intestinal anastomoses and primary closure of perforation leaks with Low, medium and high output fistulas with patient on oral feed
Post appendecectomies fistula
Post stoma closure leaks

The entire procedure usually takes 2 to 4 hours. Fluid is administered at the rate of 15-20 ml/minute. Side effects- nausea, vomiting, abdominal cramps, and bloating.

The following observations are noted-the onset time of output from external opening is made, the total output draining from the external openings of the fistula is collected and measured. This is called as fistula output. The total output passed per rectally is measured. This constitutes the stool output. The abdominal girth is monitored during the procedure. Vomiting, if any, was collected and measured. Based on these observations inferences are made.

One of the results which we obtain out of a TGI is the TGI SCORE, which is a ratio of fistula output to stool output. This value helps us draw comparisons between people who have been administered a TGI. There are some eight important prognostic factors that influence outcome in ECF.

1.Local fistula characteristics:
Lower rates of spontaneous closure and higher mortality have been associated with distal obstruction, epithelialisation of the tract, short tracts less than 2 cm, complete disruption, diseased adjacent bowel, multiple fistulas, abdominal wall defects etc.

2.Organ of origin:
Spontaneous closure is more frequent and mortality is lower in biliopancreatic than duodeno-jejunoileal fistulas.

3.Sepsis:
Presence of sepsis decreases the rate of spontaneous closure and increases mortality.

4.Etiology:
Postoperative fistulas have a higher mortality but are more likely to close spontaneously. Presence of cancer significantly increases mortality rates. Fistulas associated with IBD, cancer or radiations have lower rates of spontaneous closure.

5.Age:
Age of the patient influences mortality, but not spontaneous closure.

6.Fistula Output:
Edmunds, Sitges –serra and Levy observed mortality rates of 54%, 32% and 50% for high output fistulas and 16%, 6% and 26% for low output fistulas respectively.

7.Nutritional Status:
Chapman observed a mortality rate of 12% and spontaneous closure in 89% of patients with ECF who received more than 3000 kcal/24 hrs. Fazio reported mortality rates of 0% and 42% in patients with serum albumin above 3.5 gm/dl and below 2.5 gm/dl respectively.

8.Duration of fistula:
Acute ECF are more likely to close spontaneously than chronic ones but the mortality is higher for acute than chronic fistulas.

MATERIAL AND METHODS
Study Design
Study type: Prospective
Study place: Department of General Surgery, BJMC & CHA
Study duration: August 2016 to August 2018

Subject Selection:
Inclusion Criteria
- All patients with distal jejunal, ileal and colonic fistulas, irrespective of age or gender.
- All patients having fistula for less than 1 month duration either primarily operated in civil hospital or referred from outside institutions.
- All hemodynamically stable patients with active peristalsis
- All patients passing or not passing stool/flatus
- Patients willing to participate in study.

Exclusion criteria
- Patients with fistula involving stomach, duodenum and proximal jejunum
- Patients having spontaneous fecal fistulas
- Patients having fistula for more than 1 month duration from the date of surgery
- Patients with absent peristalsis
- Patients who are hemodynamically unstable
- Patients did not give consent for study

METHODOLOGY:
This study included all cases of acute faecal fistula operated in CHA over a period of 2 years, that fell in inclusive criterias.

Patients were followed from the time of admission, perioperative period, till the time of discharge, with pre op routine blood investigations, imaging (USG, CECT when required).Detailed proforma was developed to record information on demographic data, admission details, present history findings and TGI findings.

There were total of 40 people who were enrolled in the study and they were divided in 2 groups: control and test group. The control group which did not receive a TGI constituting the NON-TGI guided management. The test group received a TGI constituting the TGI guided management. The TGI in fecal fistula is done on 10th postoperative day .Subsequent inferences were drawn which I shall discuss in our observations and results.

OBSERVATIONS AND DISCUSSION
In our study, which was conducted in the department of general surgery, Civil Hospital, Ahmedabad, a total of 40 patients were enrolled. The patients were divided in 2 groups: control group and test group.

The control group was the one which had patients with ECF which satisfied our inclusion criterion and were not given a TGI. Their subsequent course had no role of a TGI and they constituted our non-TGI guided management limb. The test group had ECF patients which satisfied the inclusion criterion and were given a TGI on post-op day 10 and this is going to constitute our TGI guided management limb.

surgery	Number of cases	percentage
Resection and anastomosis	26	65%
Adhesiolysis	7	17.5%
Primary repair of intestinal perforation	4	10%
Stoma closure	3	7.5%

In our observation, Resection and anastomosis was the most common surgery leading to fecal fistulas followed by adhesinolysis and other surgeries as shown. This helps us understand the relative morbidity of doing intestinal anastomoses as opposed to other procedures.

The most common time period of developing faecal fistula following the primary surgery was between days 4 to 7 ,with total of 32 patients (80%) out of 40 patients developed a fistula in that bracket. 4 patients developed the fistula in less than 3 days post surgery and 4 patients developed the fistula after 7 days of primary surgery. Leakage of intestinal contents causes localized infection, abscess formation, and burrowing of septic focus into body surface. A wound abscess appears 5 to 6 days after surgery and is drained. Within the next 24 hours, fecal contents appear on the wound surface.

	TGI Limb	Non-TGI Limb	total
Age<15 years	0	1	1
age 15 to 50 years	12	14	26
Age>50 years	8	5	13
total	20	20	40

On dividing the patients in various age groups, the maximal concentration of patients was seen in the age group of 15-50 years with total of 26 patients belonging to that age group. This probably reflects the higher number of surgeries being done in this age group more than anything else.

	TGI Limb	Non-TGI Limb	total
Male	14	13	27
female	6	7	13
total	20	20	40

Majority of our patients were male, total being 27 out of 40. In TGI limb, 14 patients were male while in NON-TGI limb 13 patients were male. This shows an overall preponderance of males amongst the faecal fistula cases.

	Low output fistula(<100ml per day)	medium output fistula(100-500ml per day)	High output fistula(>500ml per day)	total
Spontaneous closure	16	3	1	20
Surgery done for fecal fistula repair	2	3	4	9
Patients expired	0	3	8	11
total	18	9	13	40

Classifying the fecal fistulas as low, medium and high output gave us 18(45%) of low output, 9(22.5%) of medium output and 13(32.5%) of high output fistulas. More than one fourth number of patients had a high output fistula. No patient with a low output fistula died; on the contrary more than 50% with high output and almost 33% with medium output did.

Spontaneous closure rates were 88.8% in low output and 33.3% in medium and 7% in high output respectively. Thus like in other studies, high output fistulas pose a significant threat to patient's life; however medium output also remain a formidable problem.

	TGI Limb	Non-TGI Limb	total
Spontaneous closure	12(60%)	8(40%)	20
Elective surgery	4(20%)	0	4
Emergency surgery	1(5%)	4(20%)	5
Expired patients	3(15%)	8(40%)	11
total	20	20	40

When we compared the spontaneous closure rates in TGI and NON-TGI limb, we see a difference of 20%. 12 patients had shown spontaneous closure in TGI limb against 8 patients in NON-TGI limb. 25% of TGI limb patients ended up requiring a surgery against 20% of NON- TGI limb. In so far, the mortality is concerned a stark difference is observed in TGI, NON-TGI limbs with 15% mortality in TGI and 40% mortality in NON-TGI limb.

	Spontaneous closure in TGI Limb	Spontaneous closure in Non-TGI Limb	total
Low output fistula	10	6	16
Medium output fistula	1	2	3

High output fistula	1	0	1
total	12	8	20

The chi-square statistic is 1.6. The p-value is .205903. This result is not significant at p < 0.05.

In our study, 20(50%) patients had a spontaneous closure. The comparison with other studies is shown below. The higher rate of spontaneous closure rate in our study as compared to 2 previous ones can be explained by the fact that authors in the other studies were more in the favour of surgical closure. Also we included only postoperative fistulas in our study while spontaneous fecal fistulas which are a commoner cause in developed nations were not included in our study. Postoperative fecal fistulas are said to be have a better prognosis in developed countries with spontaneous closure being reported in upto 90% of patients. However due to the wide difference in the types of surgeries that lead to postoperative fecal fistulas in developed and developing countries, the results obtained differ. These surgeries in turn reflect the primary diseases that are prevalent in those.

Spontaneous closure rates of various studies
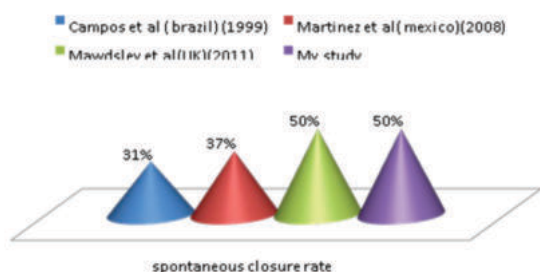
In our study, we have administered TGI on post-op day 10, by which time many of the patients in either limbs were already oral. There was still sizeable numbers which could not take orally because of complaints of vomiting/abdominal distension. On administering TGI, we observed that many patients could begin oral alimentation because of amelioration of their such complaints . We observed that total of 9 patients were not taking orally on the day of administration and within 5 days of giving the high fluid bowel irrigation i.e TGI. 8 began oral alimentation and 1 remained non-oral. We fixed an arbitrary time limit of 5 days to calculate this benefit. Any such improvement happening after 5 days was ascribed to chance and not to TGI. In the NON-TGI limb, at post-op day 10, 13 patients were already taking orally. Of the remaining 7, at the end of the arbitrary fixed point of 5 days (total post-op day 15), 5 patients remained non-oral implying a benefit of TGI on oral alimentation.

	TGI Limb	Non-TGI Limb	total
Patients already taking oral elementation	11	13	24
Time to start oral elementation <2 days	6	1	7
Time to start oral elementation 2 to 5 days	2	1	3
Patient could not start oral elementation even after the TGI.	1	5	6
total	20	20	40

The chi-square statistic with Yates correction is 3.3333 The p-value is .067889 which is not significant at p < 0.05 One of the major problems of patients of faecal fistula is the skin surrounding the fistula wounds. There is skin excoriations,macerations which give significant distress to the patients. Another problem is with inconsistent fistula output which impedes the application of a proper fistula manager which also indirectly contributes to the poor skin around the wounds. On giving TGI, the output stands to become consistent, and the septic skin complications of the skin are likely to reduce. In we study, We have observed the condition of skin in the pre and post TGI phase. For the post TGI phase we have set an arbitrary time limit of 5 days after administration of TGI. The results are as follows.

	TGI Limb	Non-TGI Limb	total
Condition of skin worsened	0	0	0
Condition of skin remained same	17	20	37
Condition of skin improved	3	0	3
total	20	20	40

The chi-square statistic is 1.2196 The p-value is .269443, This result is not significant at p < 0.05. The chi-square statistic with Yates correction is 0.3339 The p-value is .563362 which is Not significant at p < 0.05.

A significant morbidity is the length of hospital stay. There are many factors which have the bearing on the patients' hospital stay. we have in our study attempted to compare this variable in the 2 limbs. The length of hospital stay in these 2 limbs has been compared only for those patients who had a spontaneous closure as their final outcome. The length of hospital stay has been divided in to 3 brackets : 30-49 days, 50-59 days, and >60 days. The results are as follows.

	TGI Limb	Non-TGI Limb	total
>60 days of hospitalization	1	3	4
50-59 days of hospitalization	2	3	5
30-49 days of hospitalization	9	2	11
total	12	8	20

The chi-square statistic is 5.0568 The p-value is .079786 The result is not significant at p < 0.05 Patients with faecal fistulas have various manifestations of subacute intestinal obstuctions ranging from vomiting, abdominal distension, inconsistent stomal output. Delayed time to begin oral alimentation is closely related to the features of subacute intestinal obstructuion. TGI is primarily nothing but a high volume bowel wash of the proximal enteric system. It acts to was off impacted faeces /food bolus, thus contributing to ameliorating the features of SAIO. The results are as follows.

	TGI Limb	Non-TGI Limb	total
Features of intestinal obstruction absent	11	13	24
Features of intestinal onstruction present and relieved afterwards	8	2	10
Features of intestinal onstruction present and not relieved afterwards	1	5	6
	20	20	40

The chi-square statistic is 4.8. The p-value is .02846 This result is significant at p < 0.05

The chi-square statistic with Yates correction is 3.3333.

The p-value is .067889. Not significant at p < 0.05 Sepsis is the most common complication and cause of death in ECF. Gastrointestinal fistulae can also be associated with serious abdominal wall infections.The most efficient marker for sepsis is total WBC count.TGI acts as a flush for the enteric system. It washes out impacted stool ,pus,superficial cutaneous abcesses and contributes to reduction in total counts.it also helps the patients begin oral alimentation which indirectly brings down the septic complications. The results are as follows.

	TGI Limb	Non-TGI Limb	total
Increased sepsis	2	0	2
Decreased sepsis	6	0	6
No change in WBC count	12	20	32
total	20	20	40

The chi-square statistic is 4.329 The p-value is .037468
This result is significant at p < .05. The chi-square statistic with Yates correction is 2.7706 The p-value is .096012

Not significant at p < 0.05

It was observed that 8 patients started taking orally on giving TGI as shown previously. These patients put on weight, we have set an arbitrary time limit of 10 days and a minimum gain or loss of 2 kg as significant. In the patients who have put on weight, we have assumed that the gain is solely because of their starting orally, post-TGI.
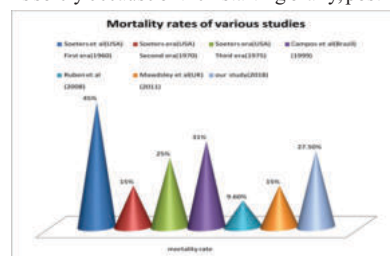
The chi-square statistic is 3.1348 The p-value is 0.076638
This result is not significant at $p < 0.05$

CONCLUSIONS

Fecal fistulas are an inevitable accompaniment of abdominal surgeries. The management protocols, especially in the acute phase, are varied amongst institutions and no uniform guidelines are established delineating the indications of surgical intervention for emergency fecal diversion procedures.

Total gut irrigation(TGI) is a simple and an important bedside test whose methodology when applied to acute fecal fistula helps to characterize the fistula from a functional aspect.

Our study is from a single institute which included a total of 40 patients comparing them upon morbidity indicators like spontaneous closure, time to oral alimentation, condition of skin, length of hospital stay, effect on features of subacute intestinal obstruction and reduction of sepsis, impact on nutritional status and upon total mortality.

The most important factor which has a bearing on the final outcome of an enterocutaneous fistula is the fistula output. The maximum spontaneous closures happen in patients with low output fistulae, whereas maximum deaths happen in high output fistulae patients.

The results of Our study have been promising upon certain indicators like oral alimentation, effect on SAIO and effect on sepsis but this being a single institute study involving a size of 40 patients, a larger randomized control trial could give us solid evidence about the beneficial role of TGI.

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