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Original Research Article

Gastrointestinal fistulae: conservative vs surgical management

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ABSTRACT

Background: Gastrointestinal fistulae are abnormal connections between two hollow organs of the gastrointestinal tract or between the hollow organ and the skin. They remain a major clinical problem, especially if complicated by sepsis, bacteraemia or cancer. General Principles of fistula management consist of- Phase of Diagnosis, Stabilization and Management.
Methods: The study was conducted in Sir JJ Group of Hospitals, Mumbai. A total of 34 patients with gastrointestinal fistulae were studied between January 2020 to January 2023. The patients were studied on the basis of presenting signs and symptoms, details of initial surgery performed, investigations pertaining to the condition and their management.
Results: Out of the 34 cases, 44% of the cases were from the small intestine, 39% cases we]re from the large intestine, and the rest of the cases were from stomach, duodenum, gastrojejunostomy site and appendicular stump following appendicectomy.
Conclusions: The database of our retrospective study regarding age and sex incidence, clinicopathological features and therapeutic outcome was comparable to other studies in various literatures.

Keywords: Comparative study, Gastrointestinal fistula, Management, Surgery, Total parenteral nutrition

INTRODUCTION

Fistula is derived from a Latin word (Festre) which means pipe. Gastrointestinal fistulae are abnormal communication between two hollow viscus of the gastrointestinal tract or between the hollow organs and the skin. Gastrointestinal fistulae remain a major surgical problem, especially if complicated by sepsis, bacteremia or cancer. GI fistulae can be classified as congenital or acquired fistulae. Acquired fistulae can be classified into three parts, postoperative fistulae, traumatic fistulae, spontaneous fistulae. They can also be divided into, internal fistulae-enteroenteric fistulae, enterovesical fistulae, enterocolic fistulae and enterocutaneous fistulae. Here we study the role of total parenteral nutrition and operative management for the same. The effects of a GI fistula are manifold with losses of electrolytes, fluids, nutrients. The hollow viscus connects directly to the skin resulting in the outpouring of native secretions and contents such as feces directly onto the skin with resultant sequelae.[8] The patients usually present with fever (61%), with fever often exceeding 38°C, abdominal pain (88%), with severity ranging from mild to severe and often sudden onset pain followed by a relatively pain free period. 55% of the patients presented with abdominal distension, discharge from the wound and signs of leak, Tachycardia, paralytic ileus and fever. Patients also presented with skin complications, majorly maceration and ulceration and electrolyte imbalance due to fluid loss. The objective was to study the role of TPN in the management of gastrointestinal fistula, and to compare between the surgical and conservative modalities of

management in GI fistulae in GGMC and Sir JJ Group of Hospitals, Mumbai.[4]

METHODS

Study type

It is a retrospective descriptive type of study.

Study place

The study was performed in Grant Medical College and Sir JJ Group of Hospitals, Mumbai.

Study duration

The study period was between January 2020 to January 2023.

Sample size

A total of 34 cases were studied with gastrointestinal fistulae. Patients were diagnosed on the basis of history and previous surgery performed, CT scan to confirm the site of GI fistula.

Investigations

Investigations like Complete blood panel, proteins and albumin, electrolytes were done. Central venous catheterization was done in cases on total parenteral nutrition.

Statistical analysis

Each case was analysed and summarized to include the following data using Statistical package for the social sciences (SPSS) software version 26. Presenting symptoms and signs of leakage, details of the initial operation, investigations performed relevant to the case, management.

Inclusion criteria

Inclusion criteria include patient above 18 years of age, patient with fistula between Gastrointestinal tract and skin, patient giving consent for the study.

Exclusion criteria

Exclusion criteria include patient below 18 years of age. Fistula arising from esophagus, pancreas, biliary system, urinary system.

RESULTS

Of the 34 cases that were studied, 20 were male and 14 were female. Male:female ratio is 1.4:1. Male-58.8%, Female-41.2%. Highest number of cases were seen in the age group of 41-50 years (23%) (Figure 1). Underlying pathology-nonmalignant pathology was more common (83%) as compared to malignant pathology (17%) (Figure 2).

Out of the 34 cases, 20 cases presented as acute emergencies, either as perforation peritonitis or acute intestinal obstruction, and the rest 14 cases were operated on an elective basis (Figure 3).

Site of leak, 15 cases were from small intestinal leak (44%), 11 cases were from colon (39%), 1 case from gastrojejunostomy, 1 case from stomach, 1 case from duodenum, 1 case from appendicular stump following appendicectomy (Figure 4).

Contamination and peritonitis were present in 14 cases (41%), while the rest of 20 cases had minimal to no contamination (Figure 5). Day of leak-although some patients presented with leak as early as day 3 and some patients at day 40, the average fell between post op day 5th to 8th.

Investigations

Hemoglobin

18 cases (52%) presented with normal range of hemoglobin, while the rest of the cases, 16, (48%) were anemic, progressing with time due to nutritional deficiencies.

Proteins

Only 19 patients (55%) showed protein levels in the normal range, but there was decline seen due to restricted nutritional intake.

Total and differential leukocyte counts

17 cases (50%) showed normal to slightly raised total leukocyte counts. Frankly septicemic patients showed leukopenic picture.

Table 1: Organisms seen on culture media.

Organisms	Number of patients	%
E. coli	8	23
***E. coli*+Klebsiella**	5	14
Mixed organisms	17	50
No growth	4	11

Table 2: Fistula associated complications.

Complications	Number of patients	%
Septicemia	12	35
Intraabdominal abscess	9	26
Skin complications	23	67
Electrolyte imbalance	8	34

Table 3: Composition of elementary diet.

Carbohydrates	**212 g**
Proteins	20 g
Fats	0.87 g
Sodium	55 mmol
Potassium	30 mmol
Chlorides	76 mmol
Magnesium	8 mmol
Calcium	11.1 mmol

Management

Management in these patients adopted either a conservative approach (20 cases- 59%), while rest of the 14 cases were managed by conservative followed by definite surgery or immediate definitive surgery (Figure 6). Out of the 20 cases managed conservatively, 4 patients died, mortality-11% and of the 14 cases managed surgically, 7 patients died- mortality of 50%. Cause of death-The leading factor for cause of death in patients with Gastrointestinal Fistula was septicemia (63%), followed by malignant cachexia, electrolyte imbalance and malnutrition (Figure 7).

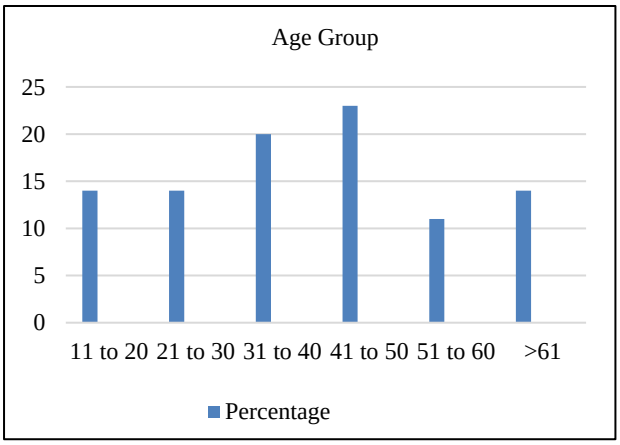

Figure 1: Age wise distribution of cases.

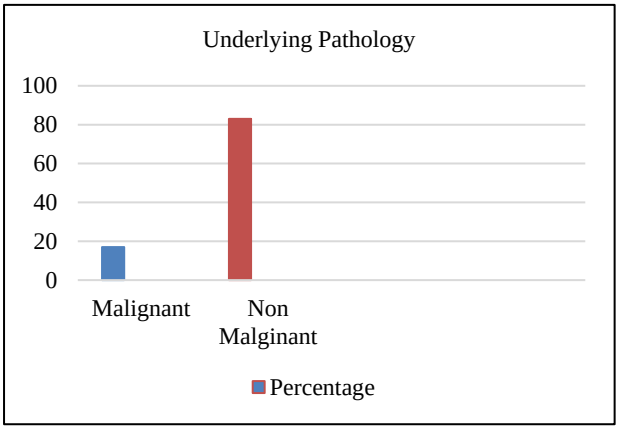

Figure 2: Distribution of cases according to underlying pathology.

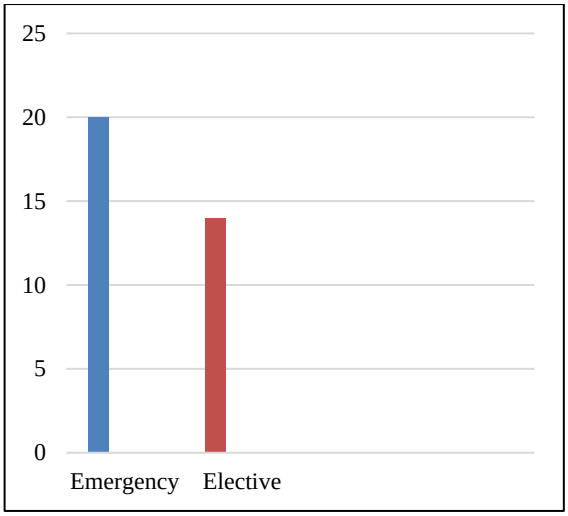

Figure 3: Presentation of study cases.

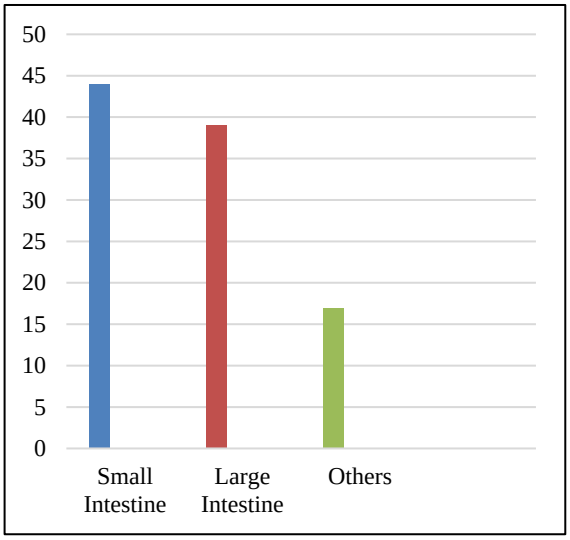

Figure 4: Distribution of cases based on site of leak.

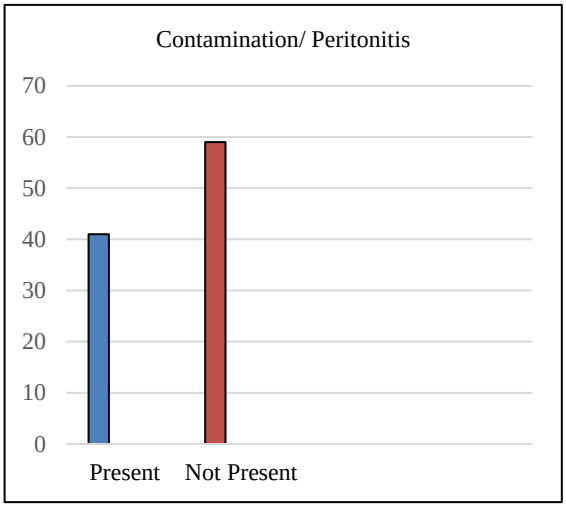

Figure 5: Distribution of cases based on contamination/peritonitis.

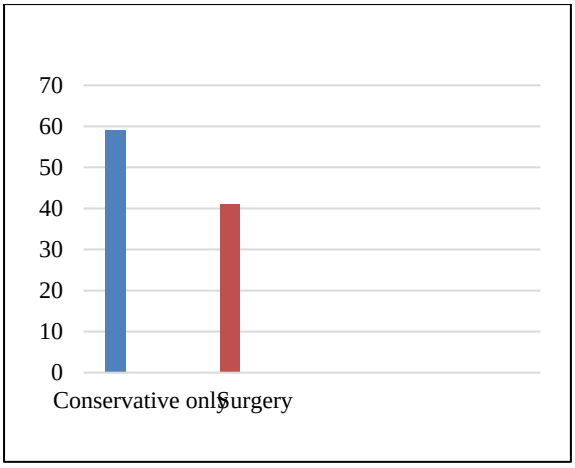

Figure 6: Distribution of cases according to management protocol.

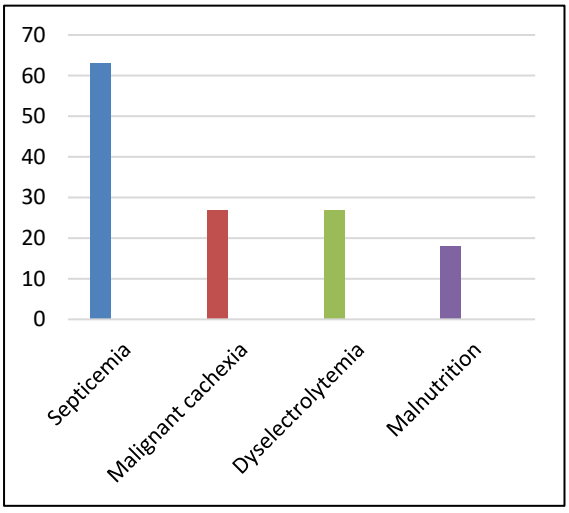

Figure 7: Graph representing cause of death in study cases in percentage.

DISCUSSION

The management of GI fistula are general supportive measures, local specific measures, surgical intervention. Essentially, the principles of management of GI fistula irrespective of cause remains the same.

General supportive measures

These measures aim at maintaining fluid and electrolyte balance, prevention and correction of nutritional deficiencies and prevention and treatment of toxemia and septicemia. Loss of fluid and electrolytes will depend to a large extent on the size and site of the fistula, both quantitatively and qualitatively.

The higher the fistula, more are the losses e.g. duodenal fistulae. Thus, high output fistulae, like pancreatic, gastric, biliary and proximal intestinal fistulae may have fluid losses exceeding 1-2 lit/day with accompanying severe electrolyte losses. The main electrolyte losses are sodium, potassium, and hydrogen ions. In low intestinal fistulae, the losses are mainly sodium and potassium ions. In addition, minerals like magnesium and calcium are also depleted. Hence, replacement of fluids and electrolytes. must be stringently managed with serial estimations of the same.

Support and maintenance of nutrition is, accepted as a fundamental feature in the management of fistulae. In our study as per our observation 20 out of 34 were managed conservatively using the given methods. Methods of nutritional support are commonly used are Hyperalimentation, Enteral nutrition.

Intravenous hyperalimentation

Since Dudrick's original demonstration it is now well established that intravenous alimentation can maintain nutrition for prolonged periods of time.[4] Mac Fayden et al, treated gastrointestinal fistulae with hyperalimentation, reducing mortality to 6.4% and spontaneous closure rate was 75.5%.[4] Similarly, Himal et al, used between 2000-5000 kcal/day. Kaminsky and Deitel 8 had a mortality of 12.5% and spontaneous closure rate of 80%. Sitges serra et al, advocated that intravenous hyperalimentation was more successful in the management of low output fistulae than high output ones.[2,9] The method allows sufficient calories and proteins to be supplied without stimulating the intestinal tract. Its use, however, requires considerable expenditure and strict monitoring and is not without risk of sepsis associated with an indwelling central venous catheter remaining in situ for prolonged periods of time. Commercially available preparations today, enable us to give proteins, carbohydrates and lipids as energy sources.

Dudrick4 recommended the formula 350 ml of 50% glucose+750 ml of 5% glucose in 5% fibrin hydrosylate. To this are added sodium, potassium, magnesium and vitamins. Each such unit consisting of 1100cc provides 1000kcal, 212 gm glucose, 37 gm of hydrolysate, 5.25 gm nitrogen, 7 mEq. of Na and 15 mEq of potassium. The preparation can be given 3-4 times daily depending on the needs and tolerance of the patient. Continuous constant administration is essential for maximum utilisation of nutrients. Lipids are given in the form of soybean extracts.

Advantages of intravenous lipids are that a large number of calories can be given in small volume. Additionally, it provides essential fatty acids, is isotonic with virtually no osmotic effect, less irritant to vessels. Hyper-osmolar coma does not occur. However, it may cause coagulation abnormalities.

Enteral nutrition

This is a form of diet that can be completely absorbed by functioning bowel, proximal or distal to the fistula. It is also termed as elementary diet.

Elementary diets are nutritionally complete, predigested, bulk free, liquid diets containing simple sugars and balanced proteins requiring no significant digestion by enzymes. They do not stimulate the secretion of gastrointestinal juices, thus conserving fluids and electrolytes. All essential vitamins, minerals and trace minerals are present as well as ethyl linoleate as a source of essential fat. In addition, they provide more than 150 kcal/gm of nitrogen provided. It is administered in the form of frequent sips to prevent cramping and diarrhea, with liberal oral fluids to prevent hypertonic dehydration. When not tolerated orally, they may be given through a nasogastric tube with an infusion pump.

In case of proximal fistulae where oral feeds are inappropriate, they may be given via a gastrostomy or a jejunostomy. The diet is especially useful in cases where at least 100 cm of jejunum or 150 cm of ileum is available. When more bowel is available, a liquid whole protein diet may be given which is cheaper and more palatable.

They are available in a powdered form and can be easily reconstituted. However, they are not without problems, with patients often complaining of unpalatable taste, high incidence of diarrhea, malabsorption and dumping syndrome related to too rapid an administration. Rarely hyperosmolar dehydration and skin rashes have been reported.

Control of septicemia and toxemia

Early diagnosis and institution of specific measures to combat impending septicemia remains the ideal goal, whenever possible.

However, in our setting, we found that it sets in early and has a devastating effect. In our study septicemia was most common cause of death owing to 35 % of deaths. Ronaldo Ronaldelli et al, in their study discuss the same. Hence, it's control is necessary.[18]

Control of sepsis may be achieved by identification of site. Appropriate antibiotics, initially parenterally and later orally. As far as possible, it must be selected in accordance with the culture and sensitivity report. Drainage of localized abscess. Improving the immunity and nutrition status esp. the protein and hemoglobin. Specific treatment of diseases like TB and malignancy. Strict aseptic precautions while conducting any procedure.

Pharmacological role

These are aimed at measures to decrease the volume of secretion and possibly, shorten duration of secretion. These include H2 receptor blockers like ranitidine, proton pump blockers like omeprazole. Prolonged NBM status of these patients predisposes them to gastritis and peptic ulceration.

Somatostatin

Has known to reduce fistula output by more than 55% in the first 24 hours. A single dose increases the mouth to caecum transit time from 1 hour to over 3 hrs. In addition, it reduces endogenous secretion and promotes the absorption of water and electrolytes in the small bowel. Although its role in GI fistula is still debated, it is gaining popularity.

Somatostatin 250 mg/day and octreotide 300-600 mg/day have been successfully tried along with total parentral nutrition to decrease the healing time of GI fistulae and to reduce the number of complications.

Local specific measures

Laparotomy corsets

These are aimed at prevention of and containing of burst abdomen. A fecal leak through a laparotomy incision, invariably leads to wound dehiscence or a burst abdomen. However, care must be taken to ensure that the corset itself does not hamper the free drainage of the effluent, as it may then collect in the peritoneal cavity or may track into the abdominal wall layers. Also, recently Santos F and others have reported clinical cases in which they sealed and treated gastrointestinal, chronic, iatrogenic fistulas by injecting biological glue (N-Butyl 2 Cynoacrylate-Histoacryl) into the internal opening and the fistulous tract.[11]

Protection of the skin

Prevention rather than cure remains the key word here. Protection of the skin can be carried by skin barriers, decreasing the quantity of discharge, changing the consistency of discharge, prompt evacuation of discharge from the fistula opening by various pouching techniques, skin barriers, these can be divided into two groups.

Chemically active

These agents act by neutralizing the secretions e.g. dried milk, yeast, porridge and oats. Earlier popular, these are not advocated any more.

Physically active

These act by creating a mechanical barrier e.g. aluminum paint, acriflavine-paraffin emulsions, zinc paraffin. We have used aluminum paint in our study as it is very cheap and effective. Gross et al and Irving rt al, in 1977 successfully treated patients using karaya gum in paste form and a compressed wafer of gelatin pectin and methyl cellulose l (stomahesive), alone or in combination with drainage collecting appliances. In addition, ileostomy cement, glycerine or ion exchange resins help the skin acidic and prevent the activation of pancreatic enzymes. An enterostomal therapist can often prove

valuable. Quantity of discharge can be decreased by decreasing volume of secretions by drugs like Ranitidine somatostatin. Stopping enteral nutrition.

Altering the consistency of the discharge

This decreases the volume loss and excoriation of skin. This can be done with agents like Bismuth, Kaolin, land atropine derivatives.

Prompt evacuation of discharge

Form the fistula opening into an adherent appliance, helps not only in preventing contact between the proteolytic enzymes and the skin, but also charting the volume. In addition, in fistulae like duodenal, pancreatic, biliary and gastric fistulae, the effluent can be strained and used for reinfusion into the gut. In addition, nursing the patient prone in a split bed, use of Neel's apparatus, Farquharson's apparatus, sump drainage has also been widely used, but it may itself, act as a stimulus to increase output and prevent closure.

Though the use of self-adhesive bag is ideal, difficulties often occur when the mouth of fistula is part surgical scar, or closely related to a bony prominence. O'Brien B12 advocated containment devices, principles of pouching and appropriate management of fistula to promote an optimum level of care. An effective pouching method is achieved using skin barriers, adhesives and bowel isolation bag enabling patient to ambulate and perform many other activities.[12] Hyon SH advocated management of high output fistula with a vacuum sealing of intestinal contents inside specially constructed vacuum chamber and at same time providing continuous enteral nutrition.[13] Alvarez successfully treated postoperative GI fistulae in oncology population by use of VAC device.[14] The vacuum assisted closure method is a sub atmospheric pressure technique which significantly improve wound healing along with TPN.

Surgical management

The development of sophisticated methods of nutritional support has seen a decrease in the overall incidence of surgical intervention. In our study 14 out of 34 underwent surgical management owing to various factors, mainly being acute presentation that is due to contamination/peritonitis or obstruction. Surgery is indicated if the fistula fails to close spontaneously even after 4-6 weeks of sepsis free TPN. Development of generalized peritonitis and uncontrolled sepsis while patients are on TPN mIn small bowel fistulas spontaneous closure rates of 30% are currently being achieved after 4 to 6 weeks of conservative therapy with bowel rest, TPN, octreotide, and control of sepsis. Resection of fistula is warranted if fistula closure has not occurred by 4 to 6 weeks.[15] Campos AC and associates concluded after study of 188 patients of gastrointestinal fistula that likelihood of spontaneous fistula closure is higher for fistula with surgical causes, low output and with no complications.[16] Mortality is higher in patients with complications and high output fistulas. Farsi M and associates advocated a new conservative approach in the treatment of post operative digestive tract fistula with use of radiological or endoscopic control mechanical closure with Foleys catheter or Fogarty ballon catheter.[17] Failure of spontaneous closure of a fistula often has an underlying causes resistant disease at the base of the tract, like malignancy, TB irradiation, Crohn's disease, distal obstruction, mucocutaneous continuity, short fistulae<2 cm, high output.

The more proximal the fistula, the lesser are the chances of closure, the cause being the higher output rates. Discontinuation of the bowel ends which follows total disruption of anastomosis, thereby forming an end fistula, which works like an ostomy. Abscess formation at the site of fistula. Multiple orifices or complicated fistulae. Poor nutritional status bowel wall defects of more than 1 cm at the origin of the fistula, are unlikely to close spontaneously, and if they do, is often associated with scarring. Surgical procedures used in the treatment of non-healing fistulae are as follows.

Definitive

This provides a radical cure and involves resection of the diseased bowel and formal closure with excision of the fistulous tract.

Definitive procedures

Consists of excision of the fistulous tract with mobilization and resection of the segment of bowel from where it arises followed by re-anastomosis.

Non definitive

It includes drainage of abscess, disfunctioning of diseased bowel, creation of enterostomies, incomplete bypass operations.

Non definitive procedures

Drainage of abscess

As in all abscess, drainage is must and must be attended to immediately. Once diagnosed the abscess may be approached as standard local approach like transrectal drainage of pelvic abscess or extraperitoneal subcostal approach for a subphrenic abscess. CT scanning is the main diagnostic method for intraabdominal collections. Also, percutaneous placement of catheter can be done CT guided. However, with multiple intra-abdominal collection surgery is the main stay of treatment Miles Irving in 1977 proposed a complete and formal re-exploration either through the old incision or through a separate one. This is specially indicated in the presence of

multiple abscess to ensure adequate drainage and construction of an enterostomy, if need be.

Defunctioning of diseased bowel

Although the concept of creating another defunctioning stoma or fistula, or in other words, replacing one intestinal fistula with another, seems absurd, raising a stoma proximal to an intestinal fistula has been proven beneficial. Such a proximal stoma on the abdominal wall in an ideal position is far more manageable than a leaking anastomosis. This is especially suited for low lying fistulae where the fistulous segment of the bowel is resected, the proximal bowel is brought to the surface as a stoma and the distal end is either closed off or raised as a mucous fistula.

Creation of enterostomies

Creation of an enterostomy is an interesting concept. In case of proximal fistulae, a feeding jejunostomy done well distal to the fistula ensures continuous feeds by constant infusion. In addition, bile and pancreatic juices can be reinfused thus reducing the magnitude of loss. In case of distal fistulae, a feeding gastrostomy provides adequate drainage. Once peristalsis returns, diet rich in fluids and electrolytes may be administered.

Bypass or exclusion operation

The exclusion operation aims at segregating the fistulous bowel from the rest of the gastrointestinal tract either by creating a Roux-en-Y anastomosis in which the fistula lies at the apex of the excluded limb or isolating it altogether by using a segment of healthy bowel on either side of the fistula and restoring continuity with the remaining bowel. This usually results in the drying up of the fistula over next few days.

A high rate of complications, however, has made this procedure unpopular and is now abandoned. These were Kearney R described closure of fistula with combination of skin, muscle, and fascial flaps and intubation of fistula with Malecot catheter and avoiding laparotomy.[19] The role of surgery assumes importance today in view of the changing character of operations. Surgical procedures, if properly planned including selection of the patient, has a high success rate. Edmunds et al, had an operative success rate of 88%. In Fischer's series 68% of the patients were successfully treated with operative closure while failure occurred in 12.6%. In 10%, the fistulae closed spontaneously.[1,2] Mac Fayden and co-workers reported a success rate of 94% with their experience of excision of the fistula with end-to-end anastomosis.[4] Reber successfully treated 10 patients with bypass surgery, while direct suture closure of the fistula, had only a 59% success rate.[21] Chang P successfully treated complex GI fistulas with rectus abdominis muscle flap.[22] During this study, the experience with operative procedures however was limited due to a leaning towards conservative management. However, among the 9 patients who underwent definitive surgery, 5 survived and 4 died. This is probably related to the poor general condition of patients, with most patients being malnourished and immunologically weak. In addition, building the nutritional reserves is expensive and often not affordable with the class of the patients we encounter. However, exteriorization followed by definitive surgery at later date, has been far more successful. Failure to control the primary disease remains one of the main causes of low spontaneous closure in our patients. In this context malignancy and TB prove most resistant to treatment.

The study has limitations like small sample size, lack of randomization, incomplete data reporting due to loss of long term follow up, inconsistent reporting of complications.

CONCLUSION

Total parenteral nutrition and enteral nutrition has an important role in management of Gastrointestinal fistula. In case of very low output distal gastrointestinal fistula Enteral nutrition with high protein low volume diet is preferred. Whereas for moderate output and high output fistulas in the absence of factors responsible for non-closure of fistula, 4-6 weeks TPN should be given and surgery should be undertaken only when fistula does not close after 4-6 weeks of TPN in sepsis free condition. Among surgery definitive surgery has got better result as compared to non-definitive surgery.

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