

Management of High Output Intestinal Fistulae

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Introduction:

Management of high output intestinal fistula is a challenging task. When a fistula develops there is rapid development of hypovolemia and electrolyte imbalance. Also there is a tendency to do nothing at first and see how bad it is going to be. By the time the patient is septic, anaemic, nutritionally depleted and having extensive breakdown of skin¹. Early surgical closure almost always fails and mortality rate further increases². To prevent this entire catastrophe and thus to reduce mortality and morbidity, the problems should be defined and classified, and a planned approach to the management of the patients with fistula must be followed³.

Definitions:

A fistula is an abnormal communication between two epithelial surfaces lined by unhealthy granulation tissues, epithelium or endothelium⁴ and the discharge should be continued for more than 24 hours^{3,5}. It is said to be high output when the discharge is more than 500³-1000⁶ ml/d.

Classifications:

Fistulae can be classified according to communicating surfaces as internal, external and mixed. The communicating tract may be straight and single when it is said simple and multiple /horseshoe tract or tract abscess making it complicated².

According to the continuity of the viscous wall, fistulae again can be designated as lateral fistula and end fistula³.

The term proximal and distal was used according to the part of the viscera involved². Enterocutaneous fistulae are also classified into type I fistula like esophageal, gastric and duodenal, type II fistula involving small intestine, type III fistula involving large intestine and type IV fistula where any of the above drains through a major abdominal wound defect⁷.

Most important for management is the fistula output and it is considered as high output when the discharge is more than 500 ml in 24 hour, when it is less than 500 ml/d it is said to be a low output fistula³.

Causes:

About 80% of all fistulae results from surgical intervention and is due to unrecognized injury and anastomotic disruption². Momen and Siddiqui have shown that emergency surgery for typhoid perforation (45%) and intestinal tuberculosis (30%) were the commonest causes of postoperative enterocutaneous fistula⁸, 2% of the fistulae may be spontaneous due to underlying disease⁶. The other causes of fistulae are developmental, accidental injury, malignancy, inflammatory bowel disease, diverticular diseases, anastomotic ulcer, radiation enteritis and erosion by drain tube or suction catheter^{2, 6}.

Pathology:

High output fistula usually is complicated with three major systemic problems² with 15-20% overall mortality⁹:

1. Nutritional disturbances:

It is the major cause of death in intestinal fistula even if the fluid and electrolytes are replaced¹⁰. There is fewer intakes and more demand. About 30-70% of this increased demand is due to the fistula and 10% is due to abscess and wound dehiscence. So, there will be muscle wasting, hypoproteinaemia, vitamin and trace element deficiency resulting the decreases in resistance to infection and impaired wound healing^{2, 3}.

2. Water, electrolyte and acid base imbalance:

This is due to loss of proximal gastrointestinal content and partial or complete failure of absorption from the distal part as it is bypassed^{2, 3}.

3. Sepsis:

It is a consequent effect of leakage of contents into peritoneal/ pleural cavity and remains the major factor in determining mortality⁶.

In addition, there may be skin excoriation and associated urinary and respiratory tract infection¹¹. Septicaemia may be the final blow leading to SIRS and MODS¹².

Management outline:

A patient having a high output fistula needs skill nutritional support, parenteral nutrition and maintenance of fluid and electrolyte balance. Adequate and careful stoma therapy for protection of skin is also mandatory. Elimination of sepsis by free external drainage of the effluent and septic focus is the key steps for successful outcome. A carefully timed, well judged and well carried out surgery is needed if it does not heal spontaneously^{2, 3}.

Sheldon and his coworkers' four phase approach¹³ has given a basis for a logical management and if adopted with minor modifications, will give the best result².

In phase I, resuscitation and skin protection is the main concern. Nutritional support in phase II is essential for the patient to have a spontaneous closure or to make the patient fit for surgery. The next step or phase III is to do necessary investigations for anatomical delineation of the tract and to assess the condition of the proximal and distal gut. The definitive treatment is planned and done in phase IV.

Phase I (resuscitation and skin protection):

Resuscitation by correcting hypovolemia and electrolyte imbalance should be done with blood transfusion and intravenous fluid containing electrolytes¹⁰.

For protection of skin the opening of the fistulae are classified into four categories and their management is according to the situation¹⁴.

Category 1

A single orifice passing through intact skin is easily manageable by barrier skin gel² (ZnO² /Stomhasive paste/ Orabase/ Karaya gum) and intubations of the fistula tract with a drain tube⁶ or with the application of a flat adhesive drainage bag to prevent soiling².

Category 2

In this category a single or multiple orifices are close to bony prominence, umbilicus, surgical scar or other stoma, where flat bags can not be used effectively.

These can be managed by frequent change of dressings, multiple small bags can be used or a large sheet of adhesive dressing with multiple holes can be applied over the whole area with the patient nursing in a face down position².

Category 3

If the fistula is through a small wound dehiscence, low pressure suction (sump drain) can be used to prevent spread of the discharge. Stomhasive wafers with fashioned hole and repeated wound dressing will minimize the skin excoriation².

Category 4

Here the opening is through a major wound dehiscence and can be managed by low pressure suction, postural drainage and frequent dressing. Proximal diversion with enterostomy is most effective method² or if possible, recycling of the effluents with controlled collection from proximal stoma of the intestinal secretion by any suitable technique and reinfusion of these into the distal part may be the alternative and effective method¹⁵. The use of octreotide is highly recommended by Memon and his colleagues as it definitely converts high output fistula to a low output one⁸.

A semi permeable barrier method to keep the intestinal content into the lumen and continuing enteral feeding is shown very effective in reducing output immediately without the need for octreotide or parenteral nutrition in selected cases.¹⁶

Phase II (Nutrition and electrolyte balance):

Daily calorie requirements for a patient having high output fistula is suggested as 2000 C and very rarely they may need up to 4000 C. The nitrogen requirement is 3 to 4 gm plus daily loss in urine (1 gm nitrogen is for 150-200 C). The fluid balance is assessed and maintained by usual rule. Electrolytes, vitamins, trace elements should be replaced as required². A patient with hypercatabolic state will not be benefited by excess nitrogen, in that case 15-18 gm is the highest amount to be replaced³.

The patient will need regular monitoring for change of body weight, urinary volume and nitrogen loss in urine daily². Serum electrolytes and blood urea should be checked, at least twice weekly³. Monitoring of Hb%, plasma albumin, liver enzymes

and WBC total count should be done weekly¹⁷. Accordingly blood transfusion, plasma or albumin infusion, amino acids, intralipose supplements should be given. Sodium, potassium and vitamin replacement is to be given as daily requirement and to replace ongoing loss. Trace element should also be monitored and replaced twice weekly^{2,3}. Dextrose as 40% solution can be given through central vein and will provide 1600 C. The remaining need will be better fulfilled by 10-20 percent fat emulsion.¹⁸

Phase III

Once the patient is settled, thorough investigations should be done to ascertain the origin of the fistula and the condition of the gut *i.e.* continuity, active disease, any distal obstruction and the length of the proximal or distal segment. Intraabdominal abscess or a fistula abscess should be searched, and the general health status should be assessed².

Assessment is done clinically and with some tests like contrast X-ray of the fistula tract and small/large gut enema, endoscopic examination of upper/lower GIT. Cystoscopy is done if indicated. Ultrasonography, CT scan and isotope studies may be needed in some cases. For overall evaluation biochemical, hematological, bacteriological examination are to be done^{2,3}.

Phase IV (Definitive treatment):

Spontaneous closure is expected if there is decrease in fistula output, increase in plasma albumin, increase in body weight and increase in Hb%^{2,3}. A flow chart is maintained and with the above criteria, conservative treatment can be continued for at least 4-6 weeks^{6,10}. Treatment with somatostatin analog may be useful to reduce fistula/stoma output¹².

Urgent laparotomy:

Urgent exploration is indicated if the fistula is interno-external and if there is spreading or generalized peritonitis and/or distended silent abdomen with uncontrolled sepsis. All these cases need intervention for peritoneal lavage and to exteriorise the ends to have an effective sepsis control².

Early operation:

The indications for early operation are: if the fistula is associated with intra-peritoneal abscess cavity or if the fistula is unusually complicated by the presence

of intra-peritoneal abscess or the stoma is in a difficult anatomical location².

The definitive elective operation:

Elective operation should be done in the situations like total discontinuity or more than 50% of bowel circumference disruption⁶, distal obstruction^{2,3}, mucocutaneous continuity or epithelialization of the tract⁶, complicated fistula with multiple serpentine tract³, tract less than 2.5cm in length⁶, tract drains through an abscess², presence of foreign body³, presence of active diseases like malignancy, inflammatory bowel diseases or TB, any internal fistula producing symptoms or nutritional problem and radiation enteritis⁶ which will prevent the fistula to heal spontaneously². If there is no sign of healing within 4-6 weeks, elective operation is suggested in that case also^{2,3,6}.

Management of complications of fistula infection:

Infection is the common complication in these patients, the types of infections are intraabdominal abscess², wound infection, sepsis, spreading cellulites², UTI³, RTI³ and septicemia^{2,3}. These should be treated with appropriate antibiotics, drainage of the abscess by percutaneous method with wide bore drain or open free drainage may be needed if there is recurrent, multiple or pancreatic abscess^{2,3,6}.

Hemorrhage:

The causes of bleeding are erosion of blood vessels at the site of fistula due to infection, stress ulceration, hematemesis and melena due to sepsis, and strain of fistula^{2,3}. Bleeding can occur due to the underlying disease⁶. Treatment should be started immediately by blood transfusion if the bleeding is alarming. Antibiotics and drainage of abscess with debridement and packing of the cavity as early as possible and H₂ receptor or proton channel blocker should be given to treat or prevent stress ulcer².

Pulmonary complications like pneumonia, embolism from deep vein thrombosis and urinary tract infection should be prevented or treated^{3,11}.

Principles of surgical intervention for management of fistula:

It has become the classical surgical teaching “no suture in pus” because intestinal hyperaemia, oedema, friability and bacterial enzymatic protein lysis caused by enteric fistula associated peritonitis

cause the leakage of the intestinal anastomosis or suture of early operative closure of enteric fistula¹⁹, but with the recent advancement in infection control, nutritional repletion and enhancement of tissue healing, and definitive early operation in enterocutaneous fistula may be viewed as the first choice of treatment for certain cases²⁰.

Patients can be divided into two major groups for surgical intervention². The first group includes those patients who need operations to improve general condition for definitive management and the procedure includes drainage of abscesses, insertion of central venous line and creation of feeding enterostomy or proximal diversion (controlled fistula)^{2, 3}. The other group of patients need definitive operation for fistula closure².

Principles of definitive operation:

The incision should be made through the previous wound, should be extensive and should commence in a virgin area². A good exposure is mandatory and to avoid injury to the underlying adherent structures, entry should be through the residual peritoneal cavity^{2, 3, 6}.

The total procedure can also be done with a small incision around the granulation bed after laparoscopic adhesionolysis from the anterior abdominal wall²¹. Regan and Salky have concluded that laparoscopic management of enteric fistula diseases is safe and effective²².

Surgical treatment entails complete mobilization of the bowel², resection of the involved segment along with the fistula tract and re-anastomosis; if there is no sepsis, there is no hypoalbuminaemia, and no malnutrition².

Primary reanastomosis and proximal diversion should be done if there is sepsis, anaemia, malnutrition, hypoalbuminaemia and associated abscess cavity^{2, 3}. If it is not possible, exteriorization of the gut may be done to do a reanastomosis later on^{2, 3}. If the fistula is not resectable, proximal diversion or a bypass operation are the alternatives^{2, 3, 18}.

Discussion:

The high output gastrointestinal fistula was a surgical catastrophe of the first order of magnitude²³ and although the management of these cases is still

troublesome, with proper management in the form of effective fluid and electrolyte replacement and nutritional support^{24,25}, good local care and appropriate antibiotics²³, a survival rate up to 80-95% can be achieved^{24,25}. The only factor that remains in determining mortality is uncontrolled sepsis²⁶. About 92% of death of fistula patient is due to sepsis, and poor drainage at early stage is the principle reason for development of tertiary peritonitis²⁷. Surgical wound infection was almost 100% in patient with partial or complete wound dehiscence and routine use of ileostomy for diverting the faecal stream was effective in bringing down the mortality rates²⁸. In general, early surgical attempt at closure almost invariably follows recurrence and high death rate (43%)^{2,13}. About 80% of early operation fails due to severe intra-abdominal infection in which intestinal loops are oedematous and healing process was impaired²⁷. Near about 70-80% of intestinal fistula closes spontaneously with modern conservative management²⁵. Among them, more than 90% of small intestinal fistula close within one month, less than 10% fistula close within two months and none closes spontaneously after three months²⁹. Lavy and Yasin³⁰ have shown that treating with somatostatin in fistula resulting from Crohn's disease have some role for spontaneous closure. Failure to eliminate sepsis is almost always fatal². Failure to maintain adequate nutrition is the major cause of death in intestinal fistula even if the fluid and electrolytes are replaced³¹. The single most important factor to a successful outcome in the management of intestinal fistula is adequate and sustained nutritional support³. The aim is to improve the general condition of the patient till the fistula closes spontaneously or the patient is fit for surgery^{2,3}. Jieshou and co-worker achieved 98% success with definitive surgery in non-healing fistula²⁷. Chapman and coworkers have shown that mortality rate was 57-65% if only fluid and electrolytes are replaced without nutritional support and if at least 1600 C is added daily the mortality dropped to only 18%¹. Bazaev and his colleagues adopted a differential approach to choice of treatment method, intraaortic therapy before and after surgery, use of developed devices for treatment of non-formed fistulas permitted to improve results of treatment and to reduce lethality from 10.3% to 3.3%

in different groups³². Taryk and his colleagues also have shown that nutritional status and well timed surgery influence the healing of enterocutaneous fistula³³. In high output fistula parenteral nutrition should be started within 48 hours via central venous catheter²⁹. If total parenteral nutrition is given, 37% of fistula heals spontaneously, 24% need intervention for sepsis for spontaneous closure and others need definitive surgery³⁴. Enteral feeding can be substituted if there is more than 100 cm of healthy gut present proximal or distal to fistula through oral or enterostomy²⁹. The most important and serious prognostic sign is low serum albumin and if it continues to fall, which is a good indication of the presence of coexistence active infection, one is almost certainly losing the battle for the patient's life³. In an acutely ill patient, body weight is an indicator for body water rather than body mass⁵. For the assessment of long term progress, anthropometric measurements like mid arm circumference and triceps skin fold thickness should be made at weekly interval^{2,6}.

Although the outcome has been substantially improved but still there are many factors that need further study because the overall mortality is still high, spontaneous closure is still low and treatment duration is long²⁷ specially in high output fistula. The best management for fistula is prevention, because most of the fistulae are iatrogenic. So, we should be very cautious not to invite surgical misadventure¹³ like anastomotic leakage, injury of the bowel or blood supply and laceration of bowel wall during or after surgery with surgical instruments or appliances.⁶

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