

Review Article

The gastrointestinal breach: understanding enterocutaneous fistula

Rajeev M. Joshi¹, Gagan Soni^{2*}, Asma Khalife¹, Deepak Ranvir³, Bhushan Telang⁴

¹Department of Surgery, T.N. Medical College and B.Y.L. Nair Charitable Hospital, Mumbai, Maharashtra, India

²Department of Surgical Disciplines, AIIMS, New Delhi, India

³Department of Surgery, Dr. R. N. Cooper Municipal General Hospital, Mumbai, Maharashtra, India

⁴Department of Surgical Oncology, Government Medical College, Aurangabad, Maharashtra, India

Received: 03 September 2023

Accepted: 06 October 2023

*Correspondence:

Dr. Gagan Soni,

E-mail: sonigagan90@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

The term "fistula" usually refers to abnormal communication between two epithelial surfaces and an enterocutaneous fistula (ECF) is an abnormal communication between any part of gastrointestinal (GI) tract and skin and lined by epithelium or granulation tissue. Common causes include trauma during abdominal surgery, inflammatory bowel disease, malignancy, infection, radiation etc. Sepsis and malnutrition are the leading causes of mortality. In cases of high-output fistula, it is essential to adequately replace the excessive fistula discharge. The patient's nutrition plays a crucial role in the successful management of ECFs. If the patient can tolerate oral or enteral feeding, it should be initiated promptly. However, if oral intake is not feasible, parenteral nutrition should be considered. Adequate wound care, including diligent skincare and timely drainage of localized abscesses, is necessary. Before conducting definitive investigations and initiating treatment, it is important to ensure proper resuscitation and stabilization of the patients. Surgical intervention should be approached in staged manner and should not be rushed to prevent failure in managing this complex condition. To conclude management of ECF is complicated and needs multidisciplinary approach. Initial focus for remedy is on treating fluid and electrolyte disturbances, comprehensive treatment of sepsis, management of fistula output, skin care and psychological support.

Keywords: Fistula, ECF, Management

INTRODUCTION

The term "fistula" usually refers to abnormal communication between two epithelial surfaces and an ECF is an abnormal communication between any part of GI tract and skin and lined by epithelium or granulation tissue.¹⁻³ ECF is associated with significant morbidity and mortality. Sepsis and malnutrition are the leading causes of mortality. The initial focus for the remedy is on treating fluid and electrolyte disturbances, comprehensive treatment of the sepsis, management of fistula output, skin care and psychological support.⁴

Management of ECF is complicated and needs multidisciplinary approach. For most postop fistulae, further surgical treatment is planned if the fistula persists

after conservative measures. Intention is closure of fistula with minimal morbidity and mortality. This article reviews justification and evidence behind current management approach for ECF.

CLASSIFICATION

The classification of ECF is based on two major criteria: anatomy and physiology (output).

Anatomic classification

A. Oral, pharyngeal and esophageal fistulae-These fistulae occur as a consequent to advanced head and neck malignancies, postoperative and post chemo/radiotherapy. B. Gastric fistula- These fistulae occur after

splenectomy, bariatric surgery, partial gastrectomy, closure of perforated gastric ulcer, or as a consequent to removal of gastrostomy feeding tube. C. Duodenal fistula-These results from gastric resection, duodenal trauma or accidental injury during nephrectomy, biliary surgery or right hemicolectomy. It can also occur in peptic ulceration/ Crohn's disease or breakdown of duodenal suture line which can be due to inadequate surgical closure, drain to close to suture line, damage to blood supply, strangulated sutures, obstruction distal to duodenal stump at the GJ anastomosis. D. Small Bowel fistula- Majority of GI fistulas arise from small bowel, 70-90% occur in the postoperative period, from disruption of anastomosis or injury to bowel during resection of bowel or closure of abdomen. A small bowel fistula is a fistula that connects the small bowel to a variety of adjacent organs or surfaces. Common examples of intestinal fistulae are ECF, entero-enteric fistula, enterovesical fistula, enterocolic fistula, enteroatmospheric fistula, and choledochoenteric fistula.⁵⁻⁷ E. Colonic fistula- These result from diverticulitis, malignancy, inflammatory bowel disease, appendicitis and pancreatitis, resection and anastomosis, colostomy closure.

Physiologic classification

Fistulae can be classified depending on their 24-hour output as low output fistula (less than 200 ml/day), moderate output fistula (200-500 ml/day), and high output fistula (greater than 500 ml/day).

ECF output is a predictor of subsequent mortality and also spontaneous closure.

A high output fistula increases the possibility of fluid and electrolyte imbalance and malnutrition. Mortality ranges from 16% in low output to 54% in high output fistula.

Alternative classification

Simple fistula: direct communication or complicated fistula: have many tracts, involve more than one viscus and have associated abscess cavity.

End fistula: no further GI continuity or lateral fistula: partial defect in GI tract.

Primary fistula: disease in wall of gut e.g., Crohn's disease or Secondary fistula: as a consequence of the injury in an otherwise normal gut e.g., the surgical resection.

Postoperative fistula: The 75-80% fistulas occur after the emergency surgery or the surgery done for malignancy or inflammatory bowel disease (IBD) or the spontaneous fistula: 20-25% fistulas occur in the patients with diverticular disease, ischemic or the inflammatory bowel disease.

ETIOLOGY

Inflammatory: Crohn's disease, diverticular disease, peptic ulceration and pancreatitis. Neoplastic like colon, ovarian and small bowel malignancy. Trauma during abdominal surgery, penetrating injury, or due to radiation and infective causes like tuberculosis, actinomycosis, AIDS.

Pathogenesis

ECF result from several process like trauma to normal bowel including inadvertent or missed enterotomies, anastomotic disruption following surgery, diseased bowel extending to surrounding structures and extraintestinal diseases involving otherwise normal bowel.

Magnitude of problem

ECF remain a great challenge and is one of the most dreaded complications following intraabdominal surgery. It ranks amongst the most difficult condition in surgery to manage. Sepsis, malnutrition and electrolyte imbalances are the 3 key factors leading to mortality.

Problems that can arise include: a. Loss of GI content which may lead to hypovolemia, hypoalbuminemia, electrolyte imbalance, malabsorption, vitamins and trace elements deficiency. b. Eczematous excoriation of skin around the mouth of fistula. c. Sepsis due to associated abscess cavity or indwelling urinary catheter and intravenous lines. d. Psychological problems.

ASSESSMENT AND MANAGEMENT

The Maastricht group has proposed the SOWATS regimen for ECF or temporary enterostomy and particularly for patients with ECF and acute intestinal failure.⁸

S=Sepsis control, O=Optimisation of nutritional status, W=Wound care, A=Anatomy of the bowel and the fistula, T=Timing of surgery and S=Surgical planning.

Similar guidance has come from the Salford unit in the UK, with the acronym SNAP: for sepsis, nutrition, anatomy, plan. it can be extended to SSSNAP (stabilization, sepsis, skin care, nutritional support, anatomical delineation, plan to deal with fistula).^{8,9}

Management can be divided into 4 phases

Phase 1

Recognition and stabilization: Development of ECF is suspected when there is delayed return of bowel function, fever, unexplained tachycardia, hypotension, and bilious or feculent drain. Patient is stabilized with IV crystalloids, colloids or blood to maintain Hb >12 gm% and albumin 3.5 gm%, electrolyte repletion and

nutritional support. To control sepsis antibiotics are started and any abscess cavity is drained open or percutaneously. To reduce fistula output PPI, somatostatin/octreotide or infliximab can be given. To control the fistula drainage different methods are available like the use stoma bag, sump drainage, vacuum assisted closure (VAC), opposite dressing and wound manager.

Phase 2

Investigations: Blood investigations include Haemoglobin, CBC, Serum electrolytes, LFT, serum albumin, BUN. Also body weight and skin fold thickness need to be evaluate regularly. Investigations done to define anatomical characteristics of fistula include contrast studies like fistulography, barium contrast study, Endoscopic studies like OGD and colonoscopy. USG or CT scan are done for detection of abscess cavity.

Phase 3

Decision making: Evaluation of likelihood of spontaneous closure and deciding duration of trial of non-operative management is done. 80-90% fistulas close within 6 weeks of conservative management.

Phase 4

Definitive therapy: Definitive operation correction remains the final step in the treatment of non-healing small intestinal fistulae. In majority of cases preferred surgery is resection of involved segment with primary anastomosis. The worst adhesion encountered between 10 days and 6 weeks postoperative and hence it is preferable to wait upto 6 weeks before exploration and repair the defect. In cases of fecal fistula, it is prudent to wait upto 10-12 weeks for the intense inflammation. If conservative treatment fails at 8 weeks and patient is hypoalbuminaemic or septic, exteriorization of bowel end done or if there is no sepsis and hypo-albuminaemia and nutritional status is good then resection of fistula and end to end anastomosis done.

Poor outcome in ECF

Failure of an external small intestinal fistula to close spontaneously may occur due to foreign body in the tract, radiation enteritis, infection/inflammation at fistula origin, epithelization of tract, end fistula, neoplasm, nutritionally depleted patient, distal obstruction, diseased bowel and in cases of duodenal fistula.

Malnutrition in ECF

Anorexia, restricted oral intake, significant protein, electrolytes, and fluid loss from fistula effluent as a result of loss of unabsorbed small bowel secretions, may ultimately result in malnutrition.⁴ In high output fistula, there is a massive loss of ingested nutrients as fistula

effluent and effectively causes short bowel syndrome with resulting intestinal failure. Additionally, patients often have increased energy demands because of ongoing sepsis and inflammation, countered by decreased demands due to immobility.¹⁰

Nutritional support

It is desirable to provide energy as a combination of glucose and fat in amounts that match energy expenditure along with enough amino acids to support protein synthesis. Mortality rate when albumin is < 2.5 mg/dl is around 42% and when albumin >3.5 gm/dl is <1%. 73% of enteric fistulae close spontaneously in adequately nourished patients as against 19% in malnourished patients. In low output fistula requirement of calories and proteins are 30-35 kcal/kg/day and 1-2 gm/kg/day respectively while in high output fistula it is 40-45 kcal/kg/day and 1.5-2.5 gm/kg/day.

Enteral nutrition (EN) is the preferred form of nutrition in ECF unless there is prominent paralytic ileus or the fistula arises from the proximal part of gut. Parenteral nutrition (PN) is indicated in proximal intestinal fistula, high output fistula, or patients with severe sepsis or ileus. In case of intolerance to oral feed, high output fistula, high fistula, balancing therapy (EN + PN synergy) is given to meet the requirements. As the patient start tolerating more and more oral feeds gradually taper the PN and increase the amount of EN and finally go onto Total enteral nutrition.

It is imperative to add immunonutrients (Glutamine, dipeptide, Omega 3-PUFA) and micronutrients (calcium, magnesium, phosphorus, trace elements like Zn and Se), to ensure comprehensive nutritional support along with vitamin B complex and upto 10 times of Vit.C.

Pharmacological support

Proton pump inhibitors (PPI) are helpful, especially in proximal fistula to reduce output. Octreotide and PPI seems to have synergistic effect on reduction of effluent volume with influence in the spontaneous closure rate.

Endoscopic therapies

These therapies are gaining wider application with the advancement of endoscopic therapy techniques. This entails an endoluminal approach with covered stents, sealants, clips, and plugs.^{11,12}

CONCLUSION

Metabolic and nutritional complications in ECF are associated with high morbidity and mortality, hence treatment aims should be directed towards achieving anabolism by resolving sepsis and by instituting nutritional support. Reducing fistula output with PPI and Octreotide, skin protection and controlling efflux with

VAC or wound manager help significantly. Intensive nutritional, metabolic and ancillary support creates a favourable basis for spontaneous closure of ECF or for successful surgical closure. Conventional therapy in the initial phase is always conservative. There should be emphasis on a multidisciplinary and proactive approach.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Davie M, Yung DE, Plevris JN, Koulaouzidis A. Aortoenteric fistula: a rare but critical cause of small bowel bleeding discovered on capsule endoscopy. *BMJ Case Rep.* 2019;12(5):230083.
2. Šumskienė J, Šveikauskaitė E, Kondrackienė J, Kupčinskas L. Aorto-duodenal fistula: a rare but serious complication of gastrointestinal hemorrhage. A case report. *Acta Med Litu.* 2016;23(3):3380.
3. Di Saverio S, Tarasconi A, Walczak DA, Cirocchi R, Mandrioli M, Birindelli A et al. Classification, prevention and management of entero-atmospheric fistula: a state-of-the-art review. *Langenbecks Arch Surg.* 2016;401(1):1-13.
4. Haack CI, Galloway JR, Srinivasan J. Enterocutaneous Fistulas: A Look at Causes and Management. *Curr Surg Rep.* 2014;2:71.
5. Periselnis N, Bong JJ. Choledocho-duodenal fistula encountered during emergency laparotomy for upper gastro-intestinal haemorrhage: what should be the surgical strategy. *Clin Ter.* 2011;162(6):547-8.
6. Farooqi N, Tuma F. Intestinal Fistula. *StatPearls.* Treasure Island. 2020.
7. Waheed A, Mathew G, Tuma F. Cholecystocutaneous Fistula. *Treasure Island.* 2019.
8. Klek S, Forbes A, Gabe S. Management of acute intestinal failure: A position paper from the European Society for. *Clinical Nutrition and Metabolism (ESPEN) Special Interest Group. Clin Nutr.* 2016;35(1):1209-18.
9. Kaushal M, Carlson GL. Management of Enterocutaneous Fistulas. *Clin Colon Rectal Surg.* 2004;17(2):79-88.
10. Badrasawi M, Shahar S, Sagap I. Nutritional Management in Enterocutaneous Fistula. What is the evidence? *Malays J Med Sci.* 2015;22(4):6-16.
11. Lamazza A, Fiori E, Sterpetti AV, Schillaci A, De Cesare A, Lezoche E. Endoscopic placement of selfexpandable metallic stents for rectovaginal fistula after colorectal resection: a comparison with proximal diverting ileostomy alone. *Surg Endosc.* 2016;30(2):797-801.
12. Haito-Chavez Y, Law JK, Kratt T. International multicenter experience with an over-the-scope clipping device for endoscopic management of GI defects. *Gastrointest Endosc.* 2014;80(4):622-10.

Cite this article as: Joshi RM, Soni G, Khalife A, Ranvir D, Telang B. The gastrointestinal breach: understanding enterocutaneous fistula. *Int Surg J* 2023;10:1870-3.