# **Review Article**

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# Current concepts in the management of enterocutaneous fistula

## Amabra Dodiyi-Manuel\*, Promise N. Wichendu

Department of Surgery, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria

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### \*Correspondence:

Dr. Amabra Dodiyi-Manuel, E-mail: dodman\_05@yahoo.com

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### **ABSTRACT**

Enterocutaneous fistula is an abnormal connection between the intra-abdominal gastrointestinal tract and skin. It causes considerable morbidity and mortality. The goals of management are restoration of gastrointestinal continuity and allowance of enteral nutrition with minimal morbidity and mortality. A multidisciplinary approach is essential in the successful management and this has led to closure rates ranging from 5-20% following conservative management and 75-85% with operative treatment. This article seeks to review the current concepts in the management of enterocutaneous fistula. A systematic search of literature on enterocutaneous fistula was conducted. Relevant materials were selected and selected references from relevant books, journal articles and abstracts using Medline, Google scholar and Pubmed databases were critically reviewed. Enterocutaneous fistulas can be classified by the anatomy, aetiology or physiology. Anatomically, enterocutaneous fistula has been classified based on the organ of origin and this is useful in the consideration of management options: type I (abdominal oesophageal and gastroduodenal fistula), type ll (small bowel fistula), type lll (large bowel fistula) and type IV (enteroatmospheric, regardless of origin. The anatomy also depends on the presence or absence of associated abscess cavity and the length and characteristics of the fistula tract. Aetiologically, the majority of enterocutaneous fistulas are iatrogenic (75-85%) while between 15 and 25% occur spontaneously. The physiological classification is based on the volume of its output. High output fistulas drain more than 500mls in 24 hours, moderate output between 200 and 500mls in 24 hours and low output less than 200mls in 24 hours. Successful management requires a multidisciplinary approach and would consist of initial resuscitaion with fluids and electrolytes, control of sepsis, good and adequate nutrition, wound care and skin protection and definitive management. The treatment of enterocutaneous fistula is multidisciplinary and remains a challenge despite the recent improvement in supportive care. Once enterocutaneous fistula occurs, adequate stabilization of the patient and non-operative management should be commenced. If surgery is required, careful planning, meticulous dissection, restoration of bowel continuity and reconstruction of abdominal wall are critical.

Keywords: Closure, Enterocutaneous fistula, Management

### INTRODUCTION

Enterocutaneous fistula is an abnormal connection between the intra-abdominal gastrointestinal tract and skin.It is one of the most disheartening experiences to both the surgeon and the physician. In spite of the advances made in critical care, antibiotics and nutritional support, the management of enterocutaneous fistula remains a challenge to surgeons today with mortality remaining at 5-15%. <sup>1,2</sup> The goals of management are restoration of gastrointestinal continuity and allowance of enteral nutrition with minimal morbidity and mortality. A multidisciplinary approach is essential in the successful management which is either by operative and non-operative means. This involves optimal medical management, good and meticulous surgical technique where indicated with social and emotional support for

patients and their families. This has led to closure rates ranging from 5-20% following conservative management and 75-85% with operative treatment.<sup>3,4</sup> In spite of the improvement in mortality rates over the past 4 decades, leading institutions have reported high morbidity rates of over 85%.<sup>5</sup> Mortality has been attributed to sepsis, malnutrition and fluid and electrolyte imbalance.<sup>6,7</sup> Predictive factors of high mortality are infectious and non infectious complications, high output fistula and age.<sup>8-10</sup>

This article seeks to review the current concepts in the management of enterocutaneous fistula.

#### **METHODS**

A systematic search of literature on enterocutaneous fistula was conducted. Relevant materials were selected and selected references from relevant books, journal articles and abstracts using Medline, Google scholar and Pubmed databases were critically reviewed.

### **CLASSIFICATION**

Enterocutaneous fistulas can be classified by the anatomy, aetiology or physiology and these will contribute to the morbidity, mortality and likelihood of spontaneous closure. 8,11-12

Anatomically, enterocutaneous fistula has been classified based on the organ of origin and this is useful in the consideration of management options: type 1 (abdominal oesophageal and gastroduodenal fistula), type ll (small bowel fistula), type lll (large bowel fistula) and type IV (enteroatmospheric, regardless of origin.11 The anatomy also depends on the presence or absence of associated abscess cavity and the length and characteristics of the fistula tract i.e. simple fistula has single and direct tract while complex fistula has multiple tracts or an associated abscess cavity. It is also classified into an end fistula (the entire circumference of the bowel wall is involved in the fistula) and lateral fistula (part of the bowel wall is Aetiologically, the majority enterocutaneous fistulas are iatrogenic (75-85%) while between 15 and 25% occur spontaneously.<sup>13</sup> Causes of spontaneous fistula include inflammatory bowel diseases (commonest), malignancy, appendicitis, diverticulitis, radiation, tuberculosis/actinomycosis and ischaemia.<sup>13</sup>

The physiological classification is based on the volume of its output. High output fistulas drain more than 500mls in 24 hours, moderate output between 200 and 500mls in 24 hours and low output less than 200mls in 24 hours. 12,13 Monitoring of the volume and character of output of the fistula can guide nutritional support and resuscitation. Fistula output has been documented to predict likelihood of spontaneous closure and mortality. 9,14,15 Other physiologic features that predict spontaneous closure rate include absence of sepsis, good nutritional status and low C- reactive protein to albumin ratio. 16

#### **MANAGEMENT**

Successful management of enterocutaneous fistula requires a multidisciplinary approach involving the surgeon, wound and ostomy nurses, specialized nutrition support team, intensive care and general floor nursing, physiological and occupational therapy, medical social workers, pain management, psychiatry, palliative care and spiritual support services.<sup>17</sup> This multidisciplinary approach has led to 50% decrease in mortality.<sup>18</sup>

#### Initial resuscitation

The aim of resuscitation is to restore intravascular volume and optimize oxygen carrying capacity. <sup>12</sup> Fluid and electrolyte losses should be replaced with crystalloids. Patients that are severely dehydrated and have electrolyte derrangements will require assessment of their renal functions and electrolytes regularly. There should be daily assessment of intake and output. Sodium, potassium and magnesium are the electrolytes that often require significant supplementation. <sup>19</sup> Replacement should be done in high output small intestinal fistula with normal saline and 10mmol of potassium chloride. <sup>20</sup> Placement of central venous catheter may be required for haemodynamic monitoring especially when sepsis is suspected.

### Control of sepsis

Sepsis is a major source of morbidity and responsible for about 77% of mortality in patients with enterocutaneous fistula. Computerized tomography (CT) scan of the abdomen and pelvis together with percutaneous drainage with radiological guidance is essential to evaluate and treat the source of infection. When enhancing contrast media are used, CT scan has an accuracy of greater than 97%. Ultrasound scan and magnetic resonance imaging (MRI) can also be used as adjuncts. Percutaneous drainage may also decompress a complex fistula and convert it to a simple one. In cases of peritonitis and inability to control the source with conservative measures, prompt fluid resuscitation, antibiotics administration and operative control of infection are essential.

Broad spectrum antibiotics should be started at the onset of sepsis and cultures taken from all possible sources of infection.<sup>22</sup> Antibiotics should then be tailored to the results from culture and sensitivity and reserved for patients with ongoing sepsis with special consideration given to fungal infections.<sup>12</sup> The indiscriminate use of antibiotics should be avoided as this may lead to selection of highly resistant pathogens that may cause untreatable overwhelming infections. Empiric antibiotic coverage should not exceed 4 to 7 days.<sup>23,24</sup> There is no role for antibiotic coverage in patients whose sepsis is fully controlled with percutaneous drainage.<sup>23</sup> Resolution of sepsis is essential to achieve spontaneous closure of enterocutaneous fistula.<sup>19</sup>

#### Nutrition

Basically, there are 3 sources of malnutrition in patients with enterocutaneous fistula: inadequate calorie intake, catabolism related to ongoing sepsis and ongoing losses from the gastrointestinal tract.<sup>25</sup> The basal energy needs of a healthy adult can be estimated using the Harris-Benedict equation and a patient with enterocutaneous fistula will require 1 to 2.5 times of the basal energy needs.<sup>25</sup>

Generally, patients with enterocutaneous fistula require 25-32 kcal/kg/day, with a calorie to nitrogen ratio ranging from 150 to 200:1, and a protein intake of 1.5g/kg/day, taking into account adjustments for metabolic stress and fistula losses. 12,26 After initial resuscitation with fluids and electrolytes and control of sepsis, parenteral nutrition is started in high output fistula and enteral nutrition in low output fistula patients. 19

Parenteral nutrition is an established part of management of enterocutaneous fistula.<sup>15</sup> Its institution can help meet the nutritional demands of the patient while minimizing the flow of enteric contents through the fistula. Despite the fact that reduction of flow through the intestinal tract and fistula output are associated with increased nonoperative closure rates, enteral nutrition remains an important factor in the maintenance of mucosal barrier and integrity, optimization of the immune and hormonal function of the bowel and prevention of sepsis by improving hepatic protein synthesis. 12,27 As little as 20% of calorie requirement administered administered enterally can achieve these effects.<sup>12</sup> For enteral feeding to be moderately successful, about 4 feet of healthy intestine is needed from the ligament of Treitz to the external fistula opening.19

Attempts at oral nutrition can be made in high output fistula with the following modifications<sup>28</sup>: i) Limit intake of low sodium fluids to 500mls/kg/day, ii) Provide patient with oral solution high in sodium (90-120mmol/l sodium content), iii) Small volume of fluid intake with solid meals, iv) Protein pump inhibitor therapy, antimotility drugs and octreotide. contraindications to enteral nutrition include insufficient length (<75cm), intestinal discontinuity, symptomatic intolerance to enteral nutrition, significant increases in fistula output leading to electrolyte disturbances at start of enteral nutrition and inability to establish/maintain feeding access.<sup>29</sup>

Fistuloclysis (feeding through the fistula) has been described and is possible if the fistula is proximal enough to allow at least 5 feet of small bowel absorption to occur in the absence of distal obstruction.<sup>22,30</sup>

### Medical management

Acid reduction therapies like H2 receptor antagonists and proton pump inhibitors (PPIs) have been shown to

increase the rate of fistula closure.<sup>19</sup> However, they decrease acidity and quantity of gastric secretions and are recommended as part of atandard treatment regimen in high output fistula. 6,12,17 Sucrafate can also be used for its neutralizing and constipating gastric effects.<sup>12</sup> Antidiarrheal agents like loperamide, codeine,diphenoxylate/atropine have been used to decrease fistula output.<sup>19</sup> In a British Intestinal Failure Centre, up to 40mg/day of loperamide and 240mg/day of codeine are being used to control refractory high output fistulas with success. 17,28

Somatostatin and its long acting analogue octreotide have been useful in reducing fistula effluent. In fistulas that are more likely to close on conservative management, somastostatin and octreotide will decrease output and time to closure but there will be no increase in non-operative closure rate.<sup>2,12,31-33</sup> Some complications that may occur following the use of octreotide decrease perfusion in the splanchnic and portal circulation, worsening cholestasis and possible adverse effect on immune system.<sup>34,35</sup>

### Wound care and skin protection

Skin care and control of fistula output should be started as soon as the diagnosis is made to decrease local skin excoriation and inflammation, pain and infection. Low output fistulas can be controlled with wet to dry dressing or dry gauze, while moderate output fistulas with an ostomy appliance with appropriate skin protection around the fistula in the form of adhesive ring paste, powder or hydrophilic dressing.<sup>36</sup> In high output fistulas, several types of collection device exist such as ostomy appliances, wound managers, pouching systems that can be collected to wall sunction. Negative pressure dressings are a relatively recent development in the management of complex wounds. While some authors have published their experience with vacuum assisted closure (VAC) devices to protect the skin, promote wound contraction or close the fistula some others raised the concern that these devices can cause recurrent enterocutaneous fistula with increased mortality. 2,37-39

As a result of the fact that negative pressure therapy can cause bowel injury and lead to fistula formation, interposition of a layer of material between bowel and the sponge of the device when in use has been recommended as a cautionary measure. The use of fibrin glue has been reported in carefully selected patients with favourable anatomy and physiology. 40

Only case series are available for fistula plugs in the treatment of enterocutaneous fistula. However, they have been utilized with some successes in anrectal fistulas. 19,22

### Investigations

Fistulogram is done once the patient is stabilized. This will define the source of fistula, the length and course of

its tract, presence or absence of bowel continuity, presence of distal obstruction and associated abscess cavity.<sup>22</sup> Water soluble contrast enemas will rule out colonic or small bowel obstruction. CT scan can visualize abscess cavities and shows abdominal wall defect. MRI is helpful when enterocutaneous fistula is due to malignancy or crohn's disease and helps to define pre existing shortened intestine.<sup>22</sup>

### Definitive management

The conservative measures lasting at least 4 weeks are done in almost all patients. These measures allow for fistula closure in approximately 4-6 weeks. About 90% of the fistulas destined to close spontaneously will do so within this period. However, this occurs in only 30% of fistulas. 41,42

Conservative management is considered to have failed if decreased output or fistula closure is not observed after 4 weeks of sepsis control, nutritional supplementation and establishing wound care and planning of operative intervention should be done. Requirements before definitive fistula operative intervention include nutritional optimization and eradication of sepsis, addressing psychological morbidity and clinical evidence of softening scars and abdominal wall on examination.

The goal of surgery is reestablishment of gastrointestinal continuity and soft tissue coverage of intra-abdominal contents with abdominal wall closure. Recurrence rates are minimized (18%) when the involved bowel is fully mobilized and resected.<sup>19</sup> Oversewing or wedge resection/bowel repair results in higher recurrence rates at 33%.<sup>3</sup>

#### CONCLUSION

The treatment of enterocutaneous fistula is multidisciplinary and remains a challenge despite the recent improvement in supportive care. Once enterocutaneous fistula occurs, adequate stabilization of the patient and non-operative management should be commenced. If surgery is required, careful planning, meticulous dissection, restoration of bowel continuity and reconstruction of abdominal wall are critical.

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