Managing Patients with Fistulas

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1 Introduction

Fistulas are abnormal communications between two epithelialized surfaces. Most occur after surgical intervention. Enteric fistulas represent abnormal connections between the gastrointestinal tract and the skin or open surgical wound. Common etiologies include surgical intervention, Crohn's disease, trauma, foreign bodies, infectious disease, and tumors. An enterocutaneous fistula is a devastating complication for both surgeon, clinical provider, and patient. Prior to the advent of sophisticated treatment plans, enterocutaneous fistulas held a large mortality rate. In current era, the mortality rate has been reduced from 5 to 20% [1]. However, the development and management of an ECF remain a chronic, debilitating condition associated with prolonged intensive care stay, increased length of hospital stay, and hospital costs of over $500,000 [1].

The primary goals of a patient with an enterocutaneous fistula include skin protection, control, containment, quantification of fistula effluent, and patient comfort. Control of effluent is critical to protect the wound bed from the corrosive effects of the enteric contents and to allow the surrounding wound bed to develop granulation tissue before skin grafting or closure. Failure to control effluent has been associated with poor wound healing.

2 Goals of Treatment

Protection and prevention of skin breakdown surrounding the ECF are essential components in the wound care aspects of treatment. There are several causes of impaired skin integrity at the site of the ECF. The four most common causes are mechanical trauma, allergic responses, infections, and chemical irritants [2]. Frequent dressing changes with pouches that contain abrasive adhesives along with poor pouching techniques can cause repetitive mechanical trauma to the peri-wound skin. Weeping skin, edema, and erythema can be seen in an allergic response to the materials that construct the pouches. When the pouches begin to lift along the wound edge, effluent gets trapped against the skin causing moisture-related skin damage, fungal rashes, and skin infections. The most common chemical irritant is bowel contents. The enzymatic contents of the effluent can be very caustic to skin integrity. Healing the surrounding skin, preventing further skin breakdown, and minimizing wound contamination are key components in wound management [2].

Skin irritation and discomfort can seriously compromise the healing potential of the patient. The proper application of an appropriate intervention can prevent unnecessary patient discomfort and promote adequate wound healing.

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Mobility should not be restricted in ambulatory patients as this may hinder their recovery. Treatment plans should be individualized to meet the needs desired by each patient.

Effluent containment is key to improving skin integrity. Enteric contents can spill onto the surrounding skin leading to persistent tissue inflammation and infection and, if left untreated, can develop into sepsis [2]. Containment of effluent can be accomplished with pouching devices, specialized dressings, or a combination of both techniques. Patient status will ultimately dictate the best treatment option.

Odor from the ECF can be a cause of great anxiety for these patients. Containment of effluent is obviously the best way to control odor. Most pouches have odor-proof linings, and external deodorizers are also available. Deodorizers are available in tablet, liquid, and powder form from a multitude of distributors.

Measurement of the fluid and electrolyte balances in these patients is another important goal in the management of the ECF patient. Certain dressings can give an inaccurate reading of actual fluid loss while others can be more precise. These factors must be considered while managing these patients. In patients with short bowel and proximal ECFs, fluid losses can be up to multiple liters daily [2]. Electrolyte abnormalities can lead to secondary conditions that may be life-threatening. Nutritional needs of these patients are often overlooked. Accurate measurement of the effluent will help guide supplementation and caloric intake.

3 Techniques

There are several methods to managing the patient with a complex abdomen and fistula. The goals of treatment are to contain effluent, to maintain periwound skin integrity, to promote granulation tissue, and most importantly to support the patient's emotional well-being. Initial treatment consists of an overall assessment of the patient, nature of the fistula, and assessment of the wound. The patient also needs to be evaluated for sepsis and electrolyte abnormalities, and imaging of the fistula needs to be completed. Radiologic fistulograms and abdominal CT scans generally assist in identifying the source and anatomy of the fistulas and indicate whether there is a distal bowel obstruction [3]. Once radiographic studies are completed, patients are typically made NPO, and nutritional support with total parenteral nutrition is initiated. Nasogastric tubes may or may not be placed depending on the location of the fistula. Nonoperative medical management continues to be the main objective when tackling fistulas in the hopes for spontaneous closure. When spontaneous closure does not occur, containment of fistula content and protection of the periwound skin become an imperative part of the treatment plan [3].

Containment of fistula effluent can be achieved in several ways. Over the years, there have been several enhancements in the products and clinical techniques in achieving containment. One of the techniques used include the use of roll gauze, an occlusive dressing, and wall suction. Roll gauze is placed into the wound ensuring that it comes into contact with the entire wound base. Once the base is covered, a red rubber catheter is placed on top of the gauze. This procedure is accomplished by cutting extra holes into the catheter to facilitate the removal of drainage. The catheter is then covered with the remaining roll gauze ensuring that the entire wound space is filled. The roll gauze is then held in place with an occlusive dressing that is applied over the entire wound. Barrier rings may be used to encompass the catheter or applied in skin folds to achieve an airtight seal. The catheter is then connected to low continuous bedside suction. This technique has proven to contain drainage and quantify output, but it does not allow the patient to be ambulatory, dressing changes tend to cause the patient discomfort, granulation tissue promotion is minimal, and it also becomes a barrier to discharge from an acute care facility (Fig. 1).

Another method to contain effluent from a functioning fistula is to apply a fistula management pouch. Fistula management pouches are available in many shapes and sizes. These pouches can be applied by a clinician, or the patient can be taught to change the pouch independently. Depending on the size of the wound and location

Fig. 1 The use of roll gauze, a red rubber catheter with extra holes placed into it, and occlusive dressing connected to bedside suction

of the fistula, the fistula management pouch is cut to encompass the entire area. Barrier rings may be utilized to fill creases and gaps where leaking may occur. Pouches are typically changed on a regular basis to eliminate the risk of leaking and periwound skin breakdown. Just like the prior technique, this method also helps to contain drainage and quantify output. This technique allows the patient to be ambulatory, pouch application can be taught to the patient, and barriers to discharge can be minimal but are dependent on each individual case. Despite more positive outcomes with this technique, it also has some less attractive clinical outcomes which include the following. The caustic effluent from the fistula may wash away the barrier of the fistula management pouch and barrier rings quickly causing frequent leaking episodes and periwound skin breakdown. Application of the pouches can also be labor-intensive. Pouches may be costly depending on the patient's need and insurance coverage (Fig. 2).

A newer method of treatment includes the use of fistula isolation devices along with negative-pressure wound therapy (NPWT). This method has proven to contain effluent while promoting wound healing. By isolating the fistula with an isolation device, it provides a conduit to allow the effluent to easily pass into a pouching system [4]. There are three types of fistula isolation devices that can be used to isolate a fistula. These products include a wound crown, fistula funnel, and isolator strip (Table 1). Location of the fistula and depth of the wound will be the deciding factors as to what product will be best suited to contain fistula output while promoting wound healing.

The wound is cleansed with a wound cleanser. The fistula isolation device is then cut to contour the wound bed while also encompassing the fistula. The base of the wound crown and fistula funnel is cut open with a scissors and trimmed to fit around the fistula before placement over the fistula. The base of these isolation devices are intended to be cut to best fit the contours of the wound bed and should be tailored for each individual patient to mirror the wound bed and create the best possible seal. Depending on the

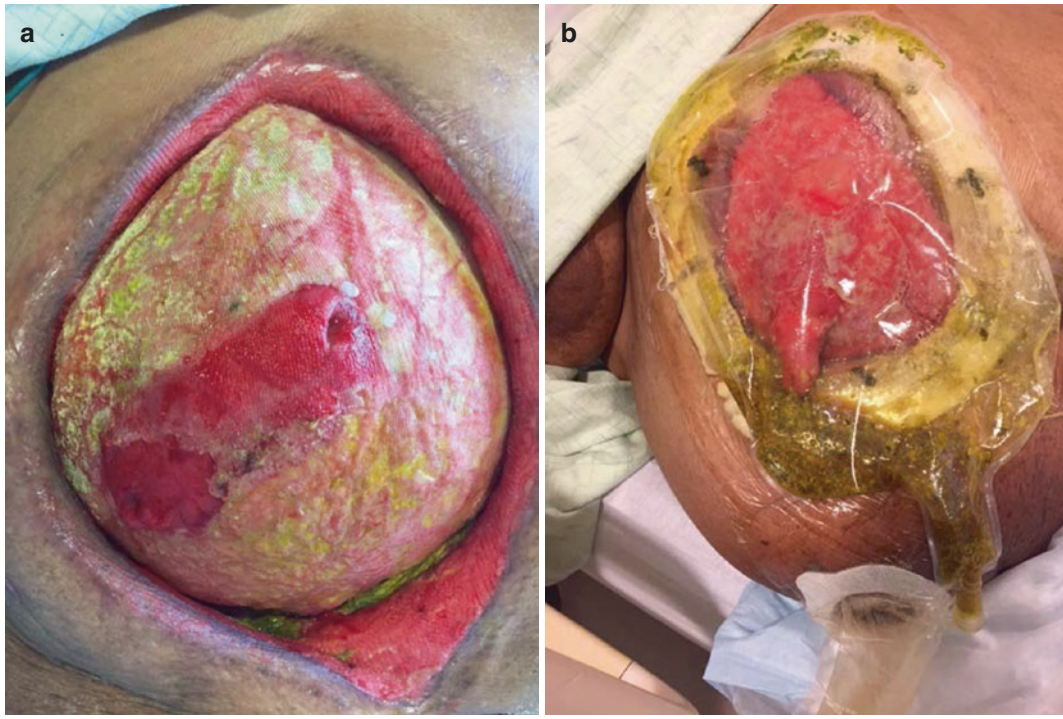

Fig. 2 The use of a fistula management pouch to contain output

Table 1 KCI fistula devices

KCI
An Acelity Company

FISTULA SOLUTION® Devices

One–piece, compressible isolation devices to contain and control effluent

You Need to Isolate	Solution	
• Small intestinal fistula • Ileostomy	**Wound Crown®** • General applications • Isolates and controls the effluent of enteric fistulas and ostomy stomas	 Item #00860013000301
• Small sized fistulas • Sidewell fistulas • Deep crevice wound bed areas	**Fistula Funnel®** • Tapered design flexes to isolate sidewall fistulas • Sizeable to 1, 2, or 3 centimeter isolation area diameter	 Item #00860013000325
• Large fistulas • Group of fistulas • Large or uniquely shaped wound bed areas	**Isolator Strip®** • Flexible strip designed to be shaped as needed for specific isolation applications	 Item #00860013000318

contour of the wound bed, a barrier ring may be used between the fistula isolation device and the wound bed to assist with the seal. Table 2 describes the procedure for a dressing application with negative-pressure wound therapy and a fistula isolation device. Figure 3 demonstrates the use of a fistula isolation device and negative-pressure wound therapy on an actual patient.

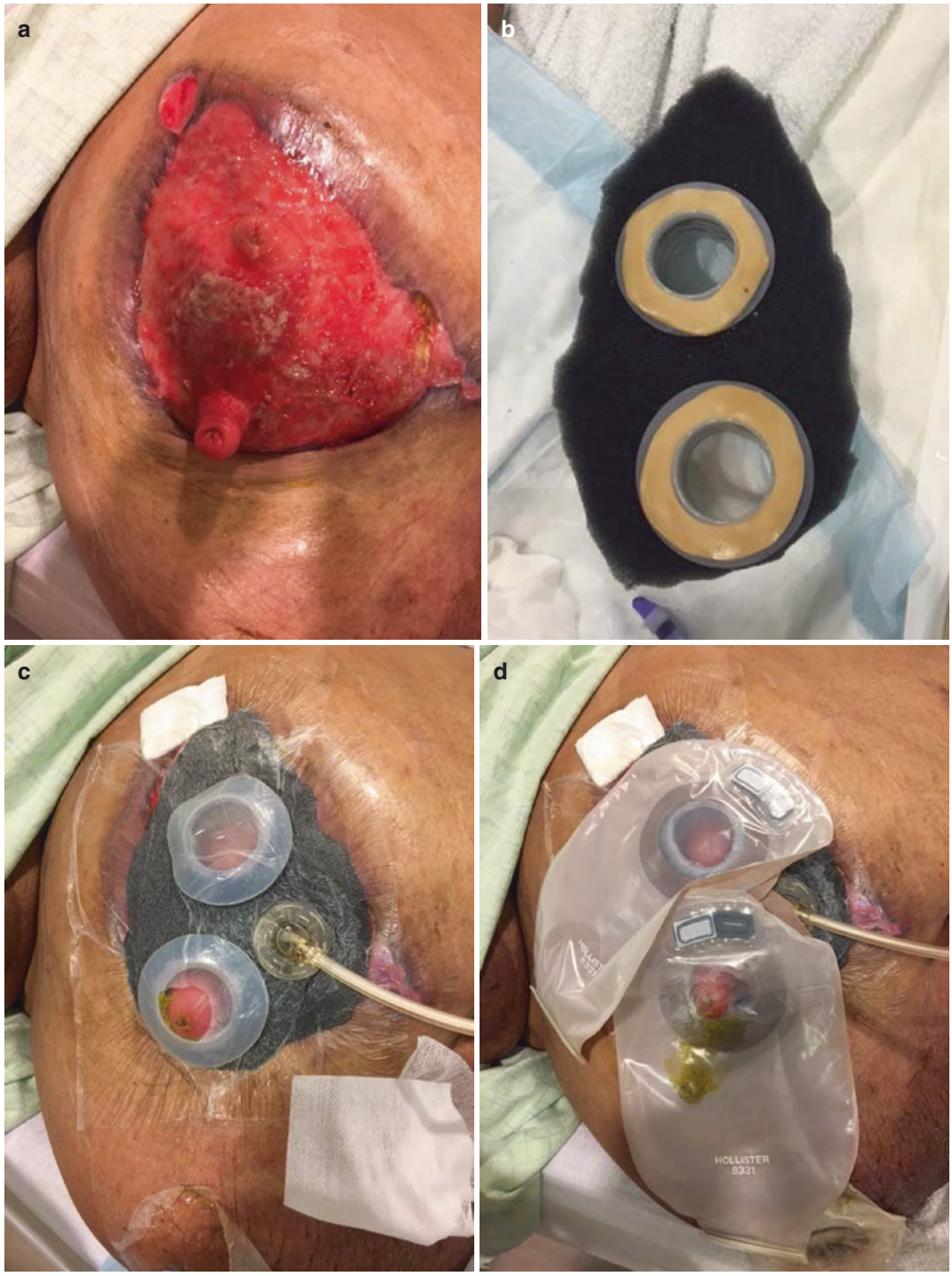

Fig. 3 (**a**) Presentation of the wound with two stomatized fistulas. (**b**) Fistula isolation device is fit into holes cut into NPWT foam dressing that is cut to fit the dimensions of the wound. (**c**) Fistula isolation devices and NPWT in place. (**d**) Pouching system applied over the fistula isolation device to contain effluent

4 Discussion

Enteric fistulas are a relatively common complications of bowel surgery where the bowel has been exposed. The primary goal when a fistula develops is to ensure the patient is stabilized systemically [5]. Fluid and electrolyte imbalance, sepsis, nutrition, and skin care are the focus areas of clinical concern. Control of the effluent is critical not only to protect the skin from the corrosiveness of the enteric contents but also to facilitate adequate nursing care of the patient until definitive closure can be undertaken [6]. Application of a dressing to help manage effluent and promote healing of the abdominal wound is imperative. Dressings and techniques used will be dependent upon the output and depth of the fistula along with the surgeons specific recommendations [6]. Closure of the fistula using acellular dermal matrix and fibrin glue has been described in the literature and sounds attractive but neither tends to be successful in clinical practice. The same can be said for local, extraperitoneal repair of the hole in the bowel followed by split-thickness skin graft [7]. Intubating the fistula with a tube draining system may result in the creation of a larger lesion that is more difficult to control. The tube may enlarge the hole causing erosion into the adjacent bowel [8]. Until recently, fistulas were commonly managed with large bags such as Eakin fistula bags, which could be placed over the wound to collect and contain effluent. While this is satisfactorily efficient at containing effluent, there was no active treatment applied to the wound bed to promote granulation tissue and wound contracture [5]. In addition depending on the wound, contour of the patient abdomen, and amount of effluent, the bags tend to leak causing periwound skin breakdown and patient dissatisfaction.

The most promising techniques combine NPWT with fistula isolation devices and ostomy appliances. This technique enables isolation of the fistula necessary for effective containment of effluent while protecting the surrounding wound bed and promoting sufficient granulation tissue to accept a split-thickness skin graft or reconstruction and closure [4].

Table 2 Procedure for applying negative-pressure wound therapy and fistula isolation device

1. Foam is measured and cut to fit the wound bed
2. After tailoring the foam, a hole is cut into the foam where the fistula would be centered
3. The collapsible fistula isolation device is then inserted into the hole created into the polyurethane foam until the top and bottom flanges lie flush against the foam
4. The flanges anchor the collapsible fistula isolation device within the polyurethane foam and create a channel to capture the effluent draining from the fistula
5. The assembled dressing is then placed into the wound bed so that the collapsible fistula isolation device base is centered over the fistula
6. The device and foam is then covered by clear drape and negative-pressure wound therapy at 125 mmHg continuous
7. After a seal is achieved, an opening is cut in the clear drape at the top of the fistula isolation device
8. An ostomy appliance is then applied to the top flange of the fistula isolation device to contain effluent

Conclusions

Enterocutaneous fistulas are uniquely challenging for care providers and the patient. Goals for treatment of an ECF include effective containment of effluent from the fistula, along with topical and systemic therapies designed to promote granulation of the surrounding wound bed essential to primary healing, or secondary surgical closure. Utilizing a collapsible fistula isolation device along with NPWT has proven to be the most effective form of treatment.

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