A fistula is an abnormal opening between two or more organs or structures. The etiology of postsurgical fistula formation varies widely according to the organs involved, precipitating factors, patient risk factors, and surgical technique or procedure. The complexity of an enterocutaneous fistula depends on the volume and nature of the output — low volume output is <200 mL/24 hours, moderate output is 200 to 500 mL/24 hours, and high output is >500 mL/24 hours. Approximately 30% of all types of fistulas close spontaneously within 6 to 7 weeks.

Fistula management is complex and requires clinical knowledge, critical thinking, and technical skill. Factors known to increase the risk of postsurgical fistula formation include, but are not limited to: inadequate blood supply to anastomoses, tension on suture line, distal obstruction, improper suturing technique, foreign body close to anastomosis, tumor or disease in the anastomotic area, hematoma or abscess formation in the mesentery or anastomotic area, and malnutrition.

Peri-fistula skin denudation is a complication often seen in the patient with a fistula. When fistula drainage containment is less than optimal, persistent moisture and chemical irritation from the drainage can cause severe excoriation. Approaches to fistula management include large pouches that cover the

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entire wound, skin barriers to protect the surrounding skin, and the use of transparent dressings. Pouching the wound and fistula helps achieve and maintain wound hygiene by preventing drainage from contaminating the wound.

When the fistula is located within the wound, achieving a seal with a pouching system is virtually impossible because the tissue around the fistula does not facilitate adhesion. Bryant discusses the use of gauze dressings and pouching methods utilizing complex techniques such as silicone dental molds of the fistula surface to achieve fistula containment and preserve skin integrity while preventing wound contamination. Additional methods of drainage containment include troughing procedures, saddle bagging, bridging, and condom and suction catheters used in combination with complex or routine poucheding.

In one case study, an Eakins pouch system was applied, emptied every 3 hours, and changed every 3 days in an attempt to contain drainage from a fistula within a wound. The system failed this patient because it was not large enough to contain the patient’s wound and fistula. In another case report, an Eakins fistula and wound drainage pouching system that covered the entire wound area was used to manage a large abdominal wound with a high output enterocutaneous fistula, achieving 24-hour wear time.

Negative pressure wound therapy (NPWT; V.A.C. Therapy, KCI, San Antonio, Tex) has been used in fistula management. One case study reports fistula effluent was successfully managed and healing of the excoriated periwound/fistula skin promoted in three persons with a moderate-to-high volume output enterocutaneous fistula. In another case study involving a patient with a colocutaneous fistula (the colon was the point of origin and the skin/wound was the point of termination), a drainage device (tube) was placed over the fistula opening, the wound base protected with petroleum-based gauze, the NPWT dressing cut to fit the wound, and an occlusive drape applied. The drainage device was connected to a collection unit and subjected to negative pressure. This system was initially successful for the patient but as the effluent thickened, the drainage occluded the tube and contaminated the wound. The semi-soft effluent required an alternative to tubes and drains to avoid occluding the drain, so the authors designed a system to contain the effluent while allowing the wound to be treated with NPWT.

This case study of a patient with a colocutaneous fistula describes efforts to contain fistula drainage, while providing comfort, facilitating wound healing, and protecting the periwound skin.

**Case Study**

**History and diagnosis.** Ms. L, 50 years old, presented to an outside hospital with right upper quadrant pain. She was treated initially with pain medication and bowel rest. Approximately 1 month after initial presentation she was transferred to the authors’ care with worsening abdominal pain and distention. She underwent exploratory surgery, and a 4-cm to 5-cm posterior right hepatic lobe mass was found, along with a large right hepatic lobe subcapsular hematoma. She was clinically diagnosed as having a ruptured hepatic adenoma with subcapsular bleeding. The transverse abdominal wound was left open and managed with normal saline-dampened gauze dressings.

**Fistula.** Two weeks postoperatively, a colocutaneous fistula developed within the wound.

The wound was contaminated with drainage from the fistula; the location of the fistula within the wound made poucheding for containment difficult (see Figure 1). Wound Ostomy Nurses were asked to provide assistance with wound management, including containment of the fistula drainage. Ms. L required dressing changes every 1 to 2 hours, disturbing her sleep, and the periwound skin was irritated and painful.

**Intervention.** Goals of intervention were identified with the patient and other members of the healthcare team and included containing the fistula drainage; providing a moist healing environment; avoiding...
wound contamination; accurately measuring drainage; preventing periwound skin breakdown; achieving patient comfort, mobility, and odor control; and providing nutritional support.

The wound, which measured 31 cm x 8 cm x 2 cm, was too large for existing pouching systems. Initial efforts were directed toward cleansing, irrigation, and drainage containment utilizing NPWT.

Ms. L was placed on bowel rest with total parenteral nutrition (TPN) monitored by the Nutritional Support Team. Negative pressure wound therapy was applied to the entire wound surface while protecting the fistula with a non-adherent gauze dressing impregnated with Vaseline® (Tyco Health Care/Kendall, Mansfield, Mass). The liquid fistula drainage was effectively contained; however, when Ms. L began oral intake, the drainage thickened and the system could not accommodate the drainage.

A different approach. To facilitate continued NPWT, the system needed modification. The open cell, foam dressing (V.A.C. GranuFoam®, KCI, San Antonio, Tex) was cut to fit within the wound and completely around the fistula (see Figure 2). Care was taken to keep the cut dressing within the boundary of the wound, preventing contact of the wet dressing with intact skin.7

Critical to success was cutting the dressing in a crescent wrench shape to fit the fistula or pseudostoma snugly and placing it completely around the fistula (see Figure 3). This provided a surface on which

**Figure 1.** A colocutaneous fistula within a wound.

**Figure 2.** Open cell foam dressing cut to fit the wound and fistula.

**Figure 3.** The dressing was cut in a crescent shape to accommodate the fistula.

**Figure 4.** The NPWT dressing provided a platform on which to adhere the ostomy pouch.
to adhere the ostomy pouch that was cut to fit the fistula (see Figure 4). To further prepare the pouching system, an Eakins ring was placed on the back of the pouch. After sizing and preparing the pouching system, the NPWT dressing and fistula were completed covered by the transparent dressing retainer (see Figure 5). Using blunt-tipped scissors, an opening was carefully cut in the occlusive dressing directly over the fistula (see Figure 6). This allowed the pouching system to be placed over the fistula by

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**Figure 5.** A transparent dressing retainer covered the NPWT dressing and fistula.

**Figure 6.** An opening was carefully cut into the transparent dressing.

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attaching the adhesive backing to the surface of the transparent dressing (see Figure 7). The pouching system was closed with a clip with the fistula visible through the ostomy pouch. The system now was ready for NPWT activation.

As negative pressure was applied, the fistula was observed for visibility and the dressing was assessed for occlusion. As suction commenced, the foam dressing occasionally collapsed in an irregular fashion. When this occurred and the pouching system was not well centered over the fistula, suction was stopped until the foam softened and then restarted with the clinician using his/her hands to position the pouching system as the foam collapses, a technique devised through experience. The pouching system could be seen sealed around the fistula, containing bowel drainage in the pouching system while allowing the application of negative pressure to the wound bed (see Figure 8).

Initially, the pouching system was secured with a clip. The nursing staff was instructed to empty the pouch when it became one-third to one-half full, per protocol. However, increased amounts of liquid drainage from the fistula necessitated reconfiguration of the pouching system using a connector for gravity drainage. Clinicians also noted that when the clip used to secure the pouch was opened, the occlusive seal needed for correct operation of the NPWT system was temporarily lost. Once the clip was reapplied, suction quickly returned.

The system contained the fistula drainage within the ostomy pouch and drainage unit. Ms. L could ambulate freely with assistance and leave her room for longer periods. With more time for rehabilitation and odor successfully contained within the pouching system, her sense of well being improved. Also, fistula output and wound drainage could be quantified.

Isolating fistula output into the ostomy pouch kept the wound bed free of fecal contamination and helped protect and facilitate healing of the periwound skin. Ms. L’s comfort level and freedom from odor, as well as her sleep, improved as the frequency of dressing changes decreased from every 2 to 3 hours to every 2 to 3 days and the periwound skin healed. Her dietary limitations also were reduced since the output was contained in a pouching system. The costs of wound care supplies were not recorded but it was estimated that the cost of absorbent gauze and alternative-dressing products, along with nursing time, was roughly equivalent to the cost of the NPWT, associated supplies, and ostomy products.

By the time Ms. L was discharged from the hospital to home, the wound had decreased in size to 28 cm x 4 cm x 0.5 cm. An ostomy pouch was placed over the fistula; the wound bed was treated with calcium alginate and covered with a transparent dressing. The dressing was changed every 2 to 3 days until the wound healed and only a pouching system was needed to contain fistula output. The patient received home health care to address her nursing and physical therapy needs and was permitted to consume a regular diet.
Discussion

Enterocutaneous/colocutaneous fistulae can be severely debilitating for the patient and frustrating for the caregiver and the drainage painfully damaging to the surrounding skin. Careful skin management is a primary goal of nonsurgical fistula management.

Available alternatives, such as pouching, wound manager, and NPWT, were explored, attempted, and rejected for this patient because her wound was too large for existing pouching systems and the fistula output was too thick for a tube-type drainage device. The fistula did not close with initial attempts at closure using NPWT but instead matured to a pseudostoma with output consistent with food intake. Adapting the NPWT and pouching system allowed clinicians to contain the drainage, protect the periwound skin, and facilitate closure of the wound.

The potential risks of bleeding, infection, and fistula formation need to be carefully weighed against the potential benefit.

One of the factors key to the success of this application of dressing and pouching system was the use of the open cell foam placed completely around the fistula. This helped form a platform for suction application, creating a relatively flat surface for affixing the ostomy pouching system. When utilizing this system, once the dressing and pouch are in place, the clinician may want to place a gloved hand over the pouch flange to guide the pouch into place as the suction is applied; this further ensures a good pouching system seal.

Conclusion

The system described in the case study was utilized effectively during the patient’s hospitalization. Fistula drainage and odor were contained with the pouching system and a moist wound environment was achieved with the occlusive negative pressure system, reducing the frequency of dressing changes and patient discomfort. Clinician ingenuity and skill helped resolve this challenging wound management dilemma and offered a solution that may be replicated in patients with similar wounds.

References