

# Healing peristomal wounds around retracted stomas with negative-pressure wound therapy: a case series

## ABSTRACT

One method for treating a retracted stoma is a vacuum dressing that cleans the wound and protects against intestinal leakage. This case series describes the use of an integrated, single-use negative-pressure wound therapy (NPWT) dressing to treat retracted stomas as an alternative to other noninvasive remedies. The report includes seven patients who were hospitalized in the authors' surgical department from 2019 to 2020. All patients developed severe peristomal infection that failed to respond to local treatment with proper ostomy appliances or specialist dressings. After cleaning each wound and removing necrotic lesions, the authors applied a single-use hydrofiber NPWT dressing to each patient. The dressing was changed every 2 to 5 days, depending on the effects of the therapy. The stoma orifice was covered with a bag with two-piece ostomy systems. The peristomal wound healed in all cases and leakage was eliminated. The mean time of treatment was 14 days (range, 10-21 days), and the vacuum dressings were changed an average of four times (range, 3-7). None of the patients required a stoma translocation or other additional surgery. Three patients received systemic IV antibiotic therapy to treat general infection. Single-use NPWT dressings protect peristomal wounds from bowel leakage and do not hinder the application of stoma bags. This system, similar to standard NPWT devices, effectively protects infected stomas from retraction.

**Keywords** hydrofiber dressing, negative-pressure wound therapy, ostomy, peristomal infection, peristomal leak, retraction, wound care

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## INTRODUCTION

An ostomy is a communication between the lumen of a bowel loop and the abdominal wall; stoma creation is one of the most basic procedures of colorectal surgery. It is performed on the large or small bowel to treat malignant, inflammatory, or vascular diseases and following bowel injuries. Colorectal

cancer is the most common indication, comprising up to 75% of cases.<sup>1,2</sup> Ostomies are performed for almost 100,000 patients per year in the US, and the procedure reduces major morbidity and mortality.<sup>3</sup>

However, there is a relatively high rate of ostomy-related morbidity. The early complications, such as peristomal infection, skin irritation, ischemia, and retraction continue to challenge surgeons.<sup>2</sup> Ostomy retraction causes continuous leakage of bowel contents into the subcutaneous tissue; this can be followed by severe necrosis and infection of the tissues surrounding the ostomy, with ostomy detachment occurring in some cases.<sup>4,5</sup> Although most of the aforementioned complications are treated with proper ostomy appliances and specialist dressings, severe complications can require advanced modalities such as negative-pressure wound therapy (NPWT), which offers effective, continuous evacuation of infectious effusion and pus. However, although ostomy salvage using standard NPWT devices has been described, to the authors' knowledge there are no extant reports about single-use NPWT systems. Accordingly, this case series described the treatment

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of peristomal wounds and stoma retraction prevention with integrated single-use vacuum dressings.

## METHODS

A preliminary and prospective study was carried out from 2019 to 2020 on a group of seven patients with early retracted ostomy and peristomal wounds. The series included four men and three women whose characteristics are presented in Table 1.

All of the patients had a moderate or severe peristomal infection that failed to respond to local treatment with proper ostomy appliances and specialist dressings. In addition, preoperative risk factors for healing dysfunction were observed in the study group, including emergency surgery, malnutrition, steroid use, active inflammatory bowel disease, and other comorbidities (Table 2). All patients received oral immunomodulatory nutrition beginning the second day after surgery, and four of the patients were also fed intravenously during the four postoperative days. Further, three

Table 1. Patient characteristics (N = 7)

Characteristic	n (Range)
Sex	
Men	4
Women	3
Age, y	72 (59-85)
Body mass index, kg/m <sup>2</sup>	29.3 (24.9-32.4)
Indication for operation	
Colorectal cancer	3
Diverticulosis/diverticulitis	3
Ulcerative colitis	1
Type of ostomy	
Terminal ileostomy	2
Loop-ileostomy	1
Colostomy	4

Table 2. Preoperative risk factors for surgical site infection

Risk Factors	n
Diabetes	2
Heart failure (NYHA ≥3)	2
Advanced atherosclerosis	3
Course of hospital admission	
Emergency	2
Elective	5
Age >70 y	4
Body mass index >25 kg/m <sup>2</sup>	6
Active cancer	4
Nutrition Risk Screening 2002 score ≥3	4

Abbreviation: NYHA, New York Heart Association functional classification.

patients required systemic antibiotic therapy due to septic complications.

## Ethics and Consent

Negative-pressure wound therapy is widely approved for medical therapy and the aim of the study was to adapt this method to the treatment of stoma-related complications. Therefore, the ethics committee of the author's institution concluded that there was no need to issue a separate consent for this study. However, due to this atypical application of single-use NPWT, the authors obtained informed consent for the therapy from each patient, as well as written approval to publish images and case details.

## Surgical Technique

First, the authors debrided the infected wound surrounding the retracted ostomy and, if necessary, placed a drain derived from a separate cut given any persistent leakage of the bowel contents into the surgical site (Figure 1). Next, they washed the wound and surrounding skin with disinfectant and applied a carboxymethylated cellulose fiber dressing measuring 15 × 10 cm or 10 × 10 cm (Avelle NPWT System, ConvaTec; or PICO NPWT System, Smith & Nephew; Figure 2). A hole was cut in the dressing to fit the ostomy as well as the wound. The adherence and tightness of the dressings were enhanced with adhesive foil strips placed on the margins (Figure 2). In the next step, a hydrocolloid stoma paste was applied to increase adhesion of the ostomy bag or plate edges (Figure 3). The stoma paste also used to improve the system seal and create a barrier between the stoma contents and the hydrofiber filling of the NPWT dressing. In addition, deep peristomal wound recesses with residual necrosis were filled with silver alginate dressing or silicone open-weave gauze (Figure 4).

Finally, the port of a negative-pressure generator was attached to the dressing and a stable negative pressure of 80 mm Hg was maintained during the therapy. At each dressing change, any bowel leakage into the wound was controlled and eliminated as needed (Figure 5). The dressings were changed at



Figure 1. Stabilization of retracted ostomy with necrectomy and bowel-to-skin sutures

the beginning of every second day with the use of a one-piece stoma bag. Subsequently, dressings were left in place for 3 to 5 days using two-piece ostomy systems (Figure 6). A summary diagram of the procedure is presented in the Table 3.

## RESULTS

Patients' deep, infected peristomal wounds healed and the ostomies were retained in their primary locations. None of the patients required secondary operations. The mean time of treatment was 14 days (range, 10-21 days), and the NPWT was changed an average of four times (range, 3-7). Figure 7 shows a representative treatment effect after four dressing changes. Regular ostomy appliances were used in six patients with terminal ostomy; additional sealing rings were necessary in one patient with loop ostomy. Two patients, one with colostomy and one with ileostomy, received appropriate systemic antibiotic therapy because of elevated inflammatory markers in the serum.



Figure 2. Peristomal wound after single-use negative pressure wound therapy dressing application

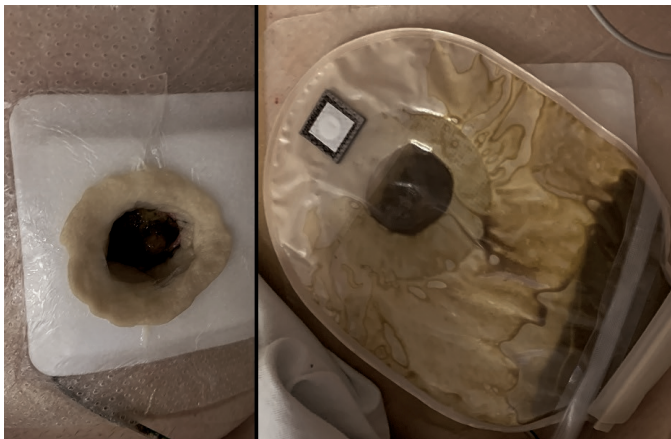


Figure 3. Ostomy bag application during the treatment of a retracted stoma with a negative-pressure wound therapy dressing

Stoma paste fills the space between the edge of the tissues and the dressing (left) ensuring better adhesion of the pouch and protecting against leakage (right)

Table 3. Stoma healing: single-use negative-pressure wound therapy dressing removes necrotic tissue and prevents stoma erosion

<p>1. Debridement of stoma and peristomal area: removal of damaged tissue; drainage of pus, hematomas</p>	
<p>2. A, Silver alginate dressing used to fill cavities and peristomal tissue recesses. B, Seal the edge of the stoma with stoma paste.</p>	
<p>3. A, Application of a vacuum dressing. B, The orifice in the dressing fits tightly around the edge of the stoma and it is covered with the ostomy bag. The negative pressure lifts the stoma (↑) and compresses surrounding tissue (↓↓).</p>	
<p>4. Elevation of the stoma after a few dressing changes.</p>	
<p>5. The stoma is fixed in the abdominal wall. The tissues adhere tightly to the edge of the intestine.</p>	

## DISCUSSION

The incidence of overall stoma-related complications is reported to be between 10% and 70%.<sup>6,7</sup> Hematoma formation, bleeding, ostomy edema, skin irritation with erosion or ulceration, ischemia with necrosis, and early ostomy retraction are the most common complications to occur within 30 days of any procedure, with frequencies ranging from 25% to 34%.<sup>1</sup> Although most of these complications resolve spontaneously within a few days or require only conservative



medical treatment, patients who develop major complications such as ischemia with necrosis or ostomy retraction usually require secondary surgery because of the threat of severe infection and gastrointestinal tract dysfunction.<sup>1,8</sup> Proper surgical technique—displacing the bowel with no tension to the skin surface and suturing it to the pre-planned place—is the most effective way to prevent patients from experiencing complications.

Before elective procedures, a stoma nurse should prepare the location of the stoma, assessing the location of skin folds and scars and considering the patient’s lifestyle and occupation. Typically, the stoma site is designated in standing, lying, and sitting positions. The stoma nurse should also mark an alternative site in case of intraoperative difficulties.<sup>9</sup>

According to the surgical technique, the stoma should be positioned through the rectus abdominis muscle leaving sufficient gut margin above the skin surface. For an end ostomy, it should be 5 cm for the small intestine and 2 cm for the colon, which allows the stoma to contract to about 2 cm



Figure 4. Peristomal wound with silver alginate dressing or silicone open-weave gauze



Figure 5. Ostomy on day 4 of treatment after second change of vacuum drainage with no bowel contents leakage

and 0.5 cm after a few months.<sup>10</sup> Lack of proper pre-operative preparation may occur in emergency operations, where the rate of morbidity is increasing.<sup>11,12</sup>

A refractory ostomy may be cause for reoperation, which, in some cases, then increases the risk of additional complications. Avoiding reoperation is extremely important for some patient populations in particular, such as those with cachexia and/or cancer, for whom surgical site infections or other complications may prolong the length of stay and affect chemotherapy. In addition, avoiding reoperation enables the patient to maintain oral nutrition which improves nutrient absorption and the condition of the gut microbiome.<sup>12,13</sup>

Preventing the continuous leakage of bowel contents into peristomal subcutaneous tissue and enabling the unhindered outflow of bowel contents through the ostomy are the basic therapeutic targets in cases with ostomy complications.<sup>11,14</sup> Those targets are met initially with modified stoma appliances in the form of rings, washers, and feet with a concave profile, the aims of which are shape adaptation and leveling the height of the ostomy.<sup>15</sup> Vacuum-assisted therapy is recommended as an effective method to treat patients with severely retracted ostomy. Vacuum-assisted dressings consist of a polyurethane foam covered with adhesive foil. A stationary or portable electrical suction pump is attached to the dressing and a stable

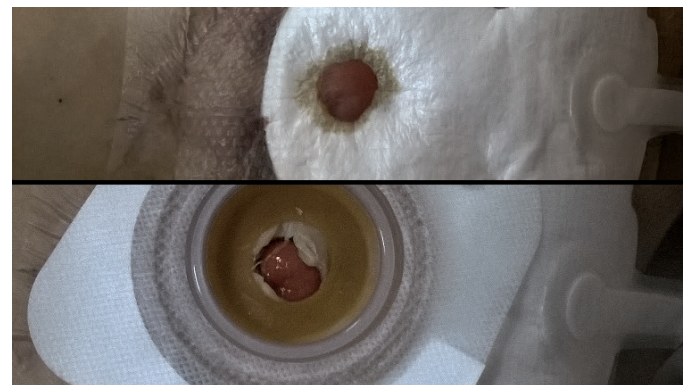


Figure 6. One-piece bag applied to ostomy



Figure 7. Effect on day 10 of treatment and after four dressing changes

negative pressure of 50 to 200 mm Hg is maintained during therapy. The objectives of vacuum treatment are to remove tissue exudate, divert bowel contents, reduce edema, and improve blood supply.<sup>16,17</sup> The polyurethane foam also removes devitalized and infected tissues and improves lymphatic drainage. Thus, after a few dressing changes, the wound contracts and it is covered with fresh granulation tissue.<sup>16,18</sup> The antibacterial mode of action, mostly against Gram-negative bacteria, relies on direct elimination of bacterial cells, followed by local regulation of pharmacodynamic and pharmacokinetic conditions, the effect of which is better antibiotic tissue penetration.<sup>19,20</sup>

Proper application of vacuum dressings on peristomal wounds with a retracted bowel remnant is challenging because bowel contents can be suctioned into a stoma bag through badly adherent layers of the dressing. It is a priority to isolate the stoma from the wound without secondary tissue damage caused by the vacuum dressing. Therefore, it is absolutely necessary to place an insulating layer between the intestine and the polyurethane foam and use an under pressure between 75 mm Hg and 125 mm Hg.<sup>21,22</sup> Close vicinity of the suction port and stoma bag is another drawback of the application. Finally, a patient's daily life activities may be limited by needing to carry a stationary or portable negative pressure electrical suction pump.<sup>23,24</sup> Another important issue remains the long-term outpatient and home-based care with properly selected equipment and qualified personnel. Nurses caring for wounds can successfully carry out vacuum therapy after a few weeks of practical training.<sup>25</sup>

Applying single-use NPWT dressings can help avoid the aforementioned obstacles. Because single-use NPWT dressings are much thinner than regular polyurethane foam and all the layers (separating, absorbent, and insulating) are integrated into one pack, the dressing thoroughly fills the wound and properly adheres to the ostomy margins. Moreover, this type of vacuum therapy may be left in the wound for up to 7 days, on the condition that it retains its full capacity to absorb exudates. Typically, a portable pump included in the set generates a stable pressure of approximately 80 mm Hg as the surface of a wound decreases and the retracted ostomy is elevated.<sup>27,28</sup> Because this system is lightweight, has a silent pump, and requires simple battery changes, it is accepted by patients in both ambulatory settings and at home. In the authors' experience, telemedicine (eg, iWound; Polmedi) improves the safety of NPWT use in patients' continued treatment at home.

## CONCLUSIONS

The use of single-use NPWT dressings combined with properly balanced nutrition and antibiotic therapy is an effective method of treatment for patients with early stoma complications. Single-use NPWT systems are "skin-friendly," because they do not damage the skin surrounding the ostomy and simultaneously heal the area affected by inflammation or infection. They are inexpensive and easy to use, even in home settings. The authors recommend this treatment method for

the management of an early phase retracted ostomy with concomitant peristomal infection.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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