

## A Unique Technique for Management of Challenging Surgical Wounds: Treatment of a Thoracic Wound Complication with a Transforming Powder Dressing (TPD)

Rosalyn Barnabee, BSN, RN, WOC; Tammy Jensen Lichtman, RN, BSN, CWON; AdventHealth Medical Group; Orlando, FL

SAWC Fall 2022 Meeting, Las Vegas, NV | October 13-16, 2022

### BACKGROUND

Traditional standard of care (SOC) management of surgical wounds involves conventional dressing applications or negative pressure wound therapy (NPWT) to accelerate wound healing.<sup>1</sup> Current SOC, however, is limited in treating complex surgical wounds. NPWT can be painful and difficult to apply in certain anatomical locations.<sup>2</sup> Conventional dressings require frequent applications and drain medical resources while increasing patient discomfort and exposure to wound contamination.

Alternative treatment modalities must be considered to provide optimal patient care. We present a case study incorporating treatment with Transforming Powder Dressing (TPD\*) in a patient with a complicated thoracotomy related wound with a chest tube.

### CASE OVERVIEW AND METHODOLOGY

A 34-year-old male with no significant prior medical history was admitted for COVID-19. Hospital course was complicated by pulmonary hemorrhage s/p right thoracotomy, and a subcutaneous hematoma evacuation requiring incision and drainage resulting in a nonhealing right thoracotomy wound. NPWT was utilized unsuccessfully (hard to get a proper seal) due to the presence of a nearby chest tube.

Patient reported pain (VAS 5/10) at the wound site, worsening with dressing changes. The clinical goal was to expedite wound healing so that he could be evaluated for a lung transplant, and to reduce overall pain and number of dressing changes.

NPWT was discontinued and treatment with a novel wound technology, TPD, was initiated in conjunction with anti-microbial therapy to manage the wound.

TPD is comprised primarily of biocompatible polymers. Upon hydration with saline, TPD granules aggregate to form a moist, oxygen-permeable matrix that protects the wound from contamination while helping to manage excess exudate through vapor transpiration. Once applied, TPD may be left in place for up to 30 days and more powder may be added as needed without requiring full dressing changes. Simple secondary dressings may be used in areas of high exudation or friction. TPD dries and flakes off as the wound heals.

### CHALLENGES AND TPD TREATMENT

#### Challenges and Prior Treatment:

- NPWT: Unsuccessful due to location of chest tube in right lung and central line to right jugular; patient was also receiving ECMO
- Lack of mobility
- Necrosis to tips of fingers and toes
- Unable to lay in bed
- Required assistance to elevate arm for dressing changes

#### Patient- Reported Pain:

- Pain levels of increased intensity after NPWT treatment despite pre-administration of IV morphine
- High-level of patient reported pain (VAS 5/10) immediately after NPWT activation
- Moderate to mild patient reported pain (VAS 2/10 to 4/10) continued post NPWT treatment
- Patient reported pain compounded by inability to maintain seal with NPWT

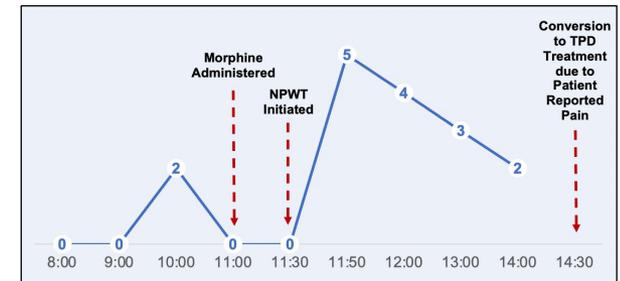
#### TPD Treatment:

- NPWT discontinued due to disturbance to chest tube system and patient reported pain
- TPD mixed with solution of hypochlorous acid to create a gel-like mixture that was used to fill in the wound and stimulate wound base to promote tissue growth\*\*. A silver hydro fiber rope was used to cover the fenestration as an additional barrier

\*\*For application instructions and risk of this device refer to Altrazeal Instructions for Use. Altrazeal's intended use is as a hydrogel wound covering without drugs or biologics. Combinations with active agents is considered off-label.

#### PAIN SCORES

Patient Reported Pain Levels (VAS 0-10): NPWT Treatment



### RESULTS

- VAS pain levels reduced to 0/10 post-TPD application
- Discontinued use of morphine and all pain medications
- Reduction in dressing changes due to TPD's extended wear time
  - Enhanced patient comfort while enabling tissue growth
  - Optimized resource utilization due to fewer dressing change requirements and reduced wound assessments
- Week 6: Significant reduction in wound size
- Week 11: Wound closed; patient was transitioned to another hospital for lung transplant



### REFERENCES

- Harries, R. L., Bosanquet, D. C., & Harding, K. G. (2016). Wound bed preparation: TIME for an update. *International wound journal*, 13 Suppl 3(Suppl 3), 8–14.
- Upton, D., & Andrews, A. (2015). Pain and trauma in negative pressure wound therapy: a review. *International wound journal*, 12(1), 100–105.
- Hernandez MC, El Khatib M, Prokop L, Zielinski MD, Aho JM. Complications in tube thoracostomy: Systematic review and meta-analysis. *J Trauma Acute Care Surg*. 2018;85(2):410-416. doi:10.1097/TA.0000000000001840.

**Acknowledgements:** This poster was presented in collaboration with ULURU Inc. All protocols and clinical assessments were conducted independently by AdventHealth without any compensation.

### CONCLUSION

Although chest tube insertions are used routinely to drain pleural collections, these invasive procedures are associated with high complication rates (20-40%), including surgical site infections and bleeding, that can occasionally be life threatening.<sup>3</sup> SOC treatment, including NPWT, are often problematic in this patient population. Patient comfort and safety are the ultimate priorities in the care of patients with challenging surgical wounds. Alternative treatments must be considered due to the current limitations of SOC.

Based on the clinical observations and outcomes of this case study, we conclude that TPD presents a safe and effective modality for the treatment of challenging surgical wounds, resulting in decreased patient-reported pain and pain medications, improved patient comfort, rapid reduction in wound size and facilitation of wound closure.

Sawyer Cimaroli, MD; Avi Hatami, MD; Brian Gillette, PhD; Scott Gorenstein, MD | NYU Langone Long Island Hospital, Department of General Surgery  
SAWC Fall 2022 Meeting, Las Vegas, NV | October 13-16

## INTRODUCTION:

More than 8 million people a year receive wound treatment in the U.S. Increasing health care costs, limited healthcare resources, an aging population, and life-style related diseases make wound management a growing clinical, social, and economic burden, indicating a vital need for a more effective wound management solution.

Transforming powder dressing (TPD\*) forms a non-occlusive barrier which helps maintain a moist environment while facilitating the flow of excess exudate via vapor transpiration.



## METHODOLOGY & MATERIALS:

- TPD is a novel, biocompatible polymer powder dressing which transforms into an extended-wear gel matrix upon hydration
- Single-center retrospective case series of various acute and chronic wounds treated with TPD
- 50 patients with 50 wounds were treated with TPD and had at least one follow-up visit during the study period

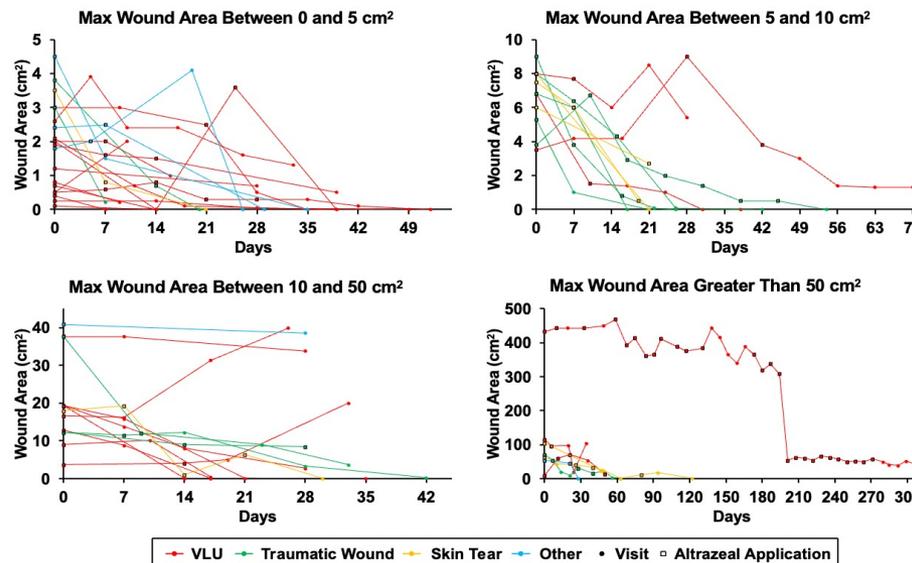
SUMMARY OF DEMOGRAPHICS	
Number of subjects	50
Number of TPD applications	129
Mean age (range)	76 years (18-99)
Male to female participants	20 (40%) / 30 (60%)
Number of current smokers	3 (6%)
Number of previous smokers	25 (50%)
Mean number of comorbidities (range)	6 (0-15)

\*Altrazeal® Transforming Powder Dressing

## TREATMENT:

SUMMARY OF WOUND HEALING				
WOUND TYPE	TOTAL NUMBER	MEAN NUMBER OF TPD APPLICATIONS	NUMBER WITH WOUND HEALING > 10% PER WEEK**	NUMBER HEALED
Venous Leg Ulcer	27 (54%)	2.8	17 (63%)	12 (44%)
Traumatic Wound	11 (22%)	2.5	10 (91%)	6 (55%)
Skin Tear	7 (14%)	2.6	5 (71%)	5 (71%)
Other (Surgical, Arterial, Diabetic)	5 (10%)	1.6	4 (80%)	4 (80%)
<b>TOTAL COUNT / MEAN</b>	<b>50</b>	<b>2.6</b>	<b>36 (72)%</b>	<b>27 (54%)</b>

\*\* Based on average healing per week from baseline to last visit



## REFERENCES & ACKNOWLEDGEMENTS:

Sen CK. Human Wound and Its Burden: Updated 2020 Compendium of Estimates. *Adv Wound Care* (New Rochelle). 2021;10(5):281-292 | Obagi Z DG, Grada A, Falanga V. Principles of Wound Dressings: A Review. *Surg Technol Int*. 2019;10(35):50-57 | Assadian O, Arnoldo B, Purdue G, et al. A prospective, randomized study of a novel transforming methacrylate dressing compared with a silver-containing sodium carboxymethylcellulose dressing on partial-thickness skin graft donor sites in burn patients. *Int Wound J*. 2015;12(3):351-356.

**Acknowledgments:** The study was conducted independently by NYU and no compensation was paid to the authors. This poster was presented in collaboration with ULURU Inc. For application instructions and risks of this device refer to Altrazeal Instructions for Use.

## ILLUSTRATIVE CASES:

### Case 1: Venous Ulcer



### Case 2: Trauma | Skin Care



## DISCUSSION:

Wound area reduction and positive healing trajectories were observed in nearly all wounds regardless of etiology. Complete healing was achieved in 54% of all wounds with 2.6 mean TPD applications. No TPD related adverse events were recorded.

**Chronic Wounds:** Complete healing was achieved in 44% of VLU treated with TPD and compression with 2.8 mean applications. TPD was ideal for venous leg ulcers because of its absorptive property and ability to conform and adhere to challenging locations.

**Acute Wounds:** 61% traumatic and skin tear wounds healed completely with 2.5 mean applications.

We conclude that TPD is a safe and effective way to treat acute and chronic wounds of various etiologies and locations.

## BACKGROUND

Despite advances in surgical care, enteroatmospheric fistulas (EAFs) present a highly challenging and devastating problem in wound care therapy.<sup>1</sup> Proper management of EAFs is critical to improving recovery and fistula healing and requires rapid intervention to prevent sepsis.<sup>2</sup> EAF standard of care (SOC) is variable and may include dressings, pouches, floating stoma, and negative pressure wound therapy (NPWT).<sup>3</sup>

Proper wound care management is vital to ensure wound healing and prevent sepsis. Therefore, alternative treatments to address the following criteria must be considered:

- Promote wound healing
- Isolate the fistula to permit proper treatment
- Improve patient quality of life (QoL)
- Reduce overall healthcare costs

## CASE OVERVIEW

A 37 y/o female presented with extensive trauma to the chest and abdomen following a motor vehicle accident (Day 1). Treatment included wound vac placement on the patient's abdomen. Computed tomography revealed a colcutaneous fistula extending from the right colon into the right pelvic wall. Post-operative procedures involved the right colon, left lower quadrant colostomy and an ileal loop extending into the right pelvic wall, likely representing ileostomy. Hospital course was complicated by a high output EAF extending from the right colon into the right pelvic wall, a left sided abdominal wound measuring 13cm x 11cm x 3.5cm, and three stomatized abdominal fistulae on the right. As the wound was refractory to SOC treatment, NPWT treatment was discontinued (Day 11). Treatment was switched to an expensive specialty pouch (\$900-\$1,200/each). Due to high output effluent, the pouch required two drainage bags, suction set up and 2 replacements per week with 2 staff members dedicating two-hours per replacement. The patient was discharged home with instructions to return to the Ostomy Clinic for appliance replacement 1-2x per week. She was subsequently readmitted to the hospital with a fever and indications of sepsis.

## METHODOLOGY & MATERIALS

Upon readmission, and because the wound was refractory to SOC treatment, wound treatment was converted to a Transforming Powder Dressing (TPD\*), a novel dressing with which our team had successful experiences in complex wounds.

TPD is comprised primarily of biocompatible polymers. Upon hydration with saline, TPD granules aggregate to form a moist, oxygen-permeable matrix that protects the wound from contamination while helping to manage excess exudate through vapor transpiration. Once applied, TPD may be left in place for up to 30 days and more powder may be added as needed without requiring full dressing changes. Simple secondary dressings were used in areas of high exudation or friction. The TPD remained adhered in the wound bed promoting proliferation and flaked off as the wound healed.

The patient was discharged home and returned to the clinic three weeks later. The wound had decreased in size (9cm x 8cm x 1.2cm), and the stomatized fistulae were able to be isolated with a smaller, less costly patient management appliance. Within 10-days of initial TPD treatment, the patient was able to resume daily living activities.

## RESULTS

### SOC Treatment Course for First 11 Weeks (Prior to TPD Application):

- Wound measurement on admission: 13cm x 11cm x 3.5cm
- NPWT: Utilized post-admission to day 11
- Specialty Pouches: Due to high output effluent, 2 drainage bags, suction set up, replacement twice/week, and 2 staff members for 2 hours were required for each change
- Wound was refractory to SOC treatment



### Treatment Course Post TPD Application:

- Wound significantly decreased in size after 3 weeks of TPD treatment: 9cm x 8cm x 1.2cm
- Fistulae were isolated with less costly appliance
- Frequency of dressing changes reduced compared to SOC
- Total labor resource allocation requirements reduced compared to SOC
- Patient resumed activities of daily living within 10 days of initial TPD treatment



## CONCLUSION

In this case study, conversion of wound treatment from SOC to TPD resulted in:

- Facilitation of wound healing
- Isolation of the fistula
- Formation of a barrier protecting the excoriated skin from fluids and thus promoting proliferation
- Improved QoL
- Reduction of labor resources and supply costs

Based on the clinical observations and outcomes of this case study, the use of TPD provided a safe and effective modality for the treatment of this challenging wound and EAF.

## REFERENCES & ACKNOWLEDGEMENTS

(1) Meshkhes AW, Al-Hariri A, Al-Zahir AA, Al-Nahawi M. A rare approach to entero-atmospheric fistula. Am J Case Rep. 2013;14:476-480. Published 2013 Nov 13. doi:10.12659/AJCR.889638. | (2) Ludlow E. What is an Entero-cutaneous Fistula and Entero-atmospheric Fistula? <https://www.insidescompany.com/blog/what-is-an-enterocutaneous-fistula-and-enteroatmospheric-fistula/>; Published online 2020 Nov 9. | (3) Terzi C, Egell T, Canda AE, Arslan NC. Management of enteroatmospheric fistulae. Int Wound J. 2014;11 Suppl 1(Suppl 1):17-21. doi:10.1111/iwj.12288. **Acknowledgements:** This poster was presented in collaboration with ULURU Inc. All protocols and clinical assessments were conducted independently by AdventHealth without any compensation. For application instructions and risks of this device refer to Altrazeal Instructions for Use.

## BACKGROUND

Skin grafting (SG) is used to provide coverage in both acute and chronic wound settings. Preparation of the wound bed with development of granulation tissue is vital for graft success.<sup>1</sup> Traditional standard of care (SOC) wound management principles involve debriding the wound followed by negative pressure wound therapy (NPWT), bolstering or conventional dressing applications to accelerate wound healing prior to grafting.<sup>2</sup> Current SOC is limited in complex painful wounds. NPWT deployment and application is often difficult and painful.<sup>3</sup> Pain is also a significant issue often associated with repeated wound dressing changes.

## METHODOLOGY & MATERIAL

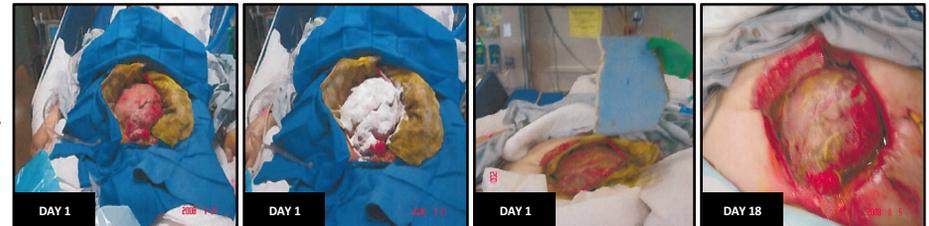
Three case studies incorporating treatment with Transforming Powder Dressing (TPD) to promote granulation in patients with complex wounds are reviewed. In each case, patients had extensive wounds with high levels of reported pain. Prior treatment in all cases failed to progress wounds to the stage to permit grafting. Cases reviewed include a large abdominal wound resultant of an automobile accident, complex wounds associated with uncontrolled chronic vasculitis, and an improvised explosive device (IED) accident. TPD was introduced to facilitate and promote granulation and allow grafting.

TPD is comprised primarily of biocompatible polymers. Upon hydration with saline, TPD granules aggregate to form a moist, oxygen-permeable matrix that protects the wound from contamination while helping to manage excess exudate through vapor transpiration. Once applied, TPD may be left in place for up to 30 days and additional powder may be added ("topped off") as needed without requiring primary dressing changes. Simple secondary dressings may be used in areas of high exudation or friction. TPD dries and flakes off as the wound heals.

## RESULTS

**PATIENT 1:** 40 y/o female with large complex abdominal wound resultant of car accident  
**Challenge:** NPWT could not be placed due to risk of fistula  
**TPD Treatment:** TPD applied to wound with foam for excess exudate absorption  
**Outcomes Post-TPD Treatment:**

- Wound was ready for grafting by Day 18



**PATIENT 2:** 42 y/o male with non-healing progressive venous ulcer, uncontrolled vasculitis, infection history, necrosis, exposed bone  
**Challenge:** High pain score (9/10), failed SOC treatment  
**Treatment:** TPD 2x/week in the first week and 1x/week after  
**Outcomes Post-TPD Treatment:**

- Significant reduction in pain
- Granulation tissue covered bone and patient was grafted
- Avoided amputation



**PATIENT 3:** 40-year-old male with a 25cm x 25cm x 5cm IED blast wound due to consumer firework accident (M-80)  
**Challenge:** NPWT was discontinued due to patient pain, porcine matrix failed to stimulate granulation  
**Treatment:** TPD applied weekly  
**Outcomes Post-TPD Treatment:**

- Wound depth reduced from 5cm to 2cm by day 7
- Wound was ready for grafting by day 18



## CONCLUSION

A marked acceleration in granulation was observed in all three cases. Patients reported reduced pain and the frequency of dressing changes were also reduced relative to SOC. No adverse events were reported. Based on the clinical observations and outcomes, we conclude that TPD presents a safe and effective modality for preparing complex painful wounds for successful grafting.

## REFERENCES

1. Kirsner, R. S., Bernstein, B., Bhatia, A., Lantis, J., Le, L., Lincoln, K., Liu, P., Rodgers, L., Shaw, M., & Young, D. (2015). Clinical Experience and Best Practices Using Epidermal Skin Grafts on Wounds. *Wounds : a compendium of clinical research and practice*, 27(11), 282–292.
2. Harries, R. L., Bosanquet, D. C., & Harding, K. G. (2016). Wound bed preparation: TIME for an update. *International wound journal*, 13 Suppl 3(Suppl 3), 8–14.
3. Upton, D., & Andrews, A. (2015). Pain and trauma in negative pressure wound therapy: a review. *International wound journal*, 12(1), 100–105.

# OPTIMIZING CARE OF PERI-STOMAL SKIN COMPLICATIONS WITH A NOVEL TRANSFORMING POWDER

Janie Hollenbach DNP, RN, WCC, OMS, DWC, CHRNP<sup>a</sup> and Susan Rolniak St. John<sup>b</sup> MSN, APRN-NP

<sup>a</sup>Wound and Ostomy Nurse, Department of Colon and Rectal Surgery, Allegheny Health Network, Pittsburgh, PA | <sup>b</sup>Clinical Consultant, ULURU Inc.

Symposium on Advanced Wound Care (SAWC) Spring Meeting, April 2022

## BACKGROUND | RATIONALE

Patients with Crohn's Disease and stomas frequently develop peri-stomal skin complications such as wounds and Pyoderma Gangrenosum (PG) that are challenging to manage. These patients often experience excruciating pain in the wounds. Enterostomal leakages also exacerbate existing skin damage making it difficult to secure stomal appliances.

The resulting increase in the frequency of appliance and wound dressing changes aggravates pain and frustration, decreases quality of life, and increases overall costs of care. Traditional dressings used to manage such wounds often require daily dressing changes multiplying the time, materials and labor needed to provide adequate care.

The purpose of this poster is to introduce ostomy and wound care clinicians to a new technique for managing peristomal skin and wound complications using Altrazeal® Transforming Powder Dressing (TPD).

A methacrylate-based novel wound modality, TPD is available in the form of sterile white granules. Upon hydration, TPD granules aggregate over the wound bed to form a moist, oxygen permeable barrier that conforms to and seals the wound surface while allowing fluid and gaseous exchange and preventing bacterial penetration. TPD may be left on the wound for up to 4 weeks.

## OBJECTIVE

The objective was to test the feasibility of TPD in simplifying care of complicated peri-stomal wounds.

## METHOD

TPD's performance was tested in a challenging case involving a patient with significant systemic and peristomal wound complications including:

- Crohn's disease
- Pyoderma Gangrenosum (PG)
- Moisture associated dermatitis (MAD)
- Chemical (irritant) dermatitis

## THE CHALLENGE: A CASE STUDY<sup>1</sup>

Female, 60 years old with:

- Crohn's Disease for 26 years with 27 hospitalizations
- Ileum resection, colostomy, loop colostomy revision secondary to hernia complication
- Diagnosed with peri-stomal PG 3 years ago
- 18%+ unintentional recent weight loss
- Excruciating pain (10/10 based on VAS score) secondary to PG and irritant dermatitis requiring
  - Narcotics
  - Hospital admissions for pain management
  - Frequent appliance changes due to severe burning pain around the stoma
- Poorly fitting ostomy appliance and irritant dermatitis from leaking stool

**Failed Treatments:** Tested several devices and dressings. In addition, injectable and topical steroids were tried without improvement. Opioids were taken every six hours to control pain.

**Onerous Care Regime:** Daily or twice daily appliance changes performed by the patient with homecare nurse visits every other day for ostomy evaluation and wound care.

## TREATMENT WITH TPD

TPD was used as a "last resort" after consultation with the patient's gastroenterologist to manage moisture and exudate of peristomal wounds, protect the skin with MAD and irritant dermatitis, and cover PG wounds. TPD was applied after wound cleansing and covered with the appliance. The appliance remained in place over TPD without further leakage of stool.



## REFERENCES | ACKNOWLEDGEMENTS

1. Real life case study, self-reported, photographed, and provided to authors with patient permission and encouragement to share her success story with other patients with similar issues.
2. Manufactured in USA by ULURU Inc. Please see Altrazeal Instructions for Use for a complete listing of indications for use, warnings and precautions.
3. This work was supported by ULURU Inc.

## OUTCOMES | CONCLUSION

**All peri-stomal skin complications, pain, and wounds were resolved** while using TPD. Within 1 week, pain reduced from severe to minimal and wound quality improved markedly. Skin complications were resolved within days and the appliance was worn comfortably for 4 days continuously, without pain or leakage. All oral pain medications were discontinued.

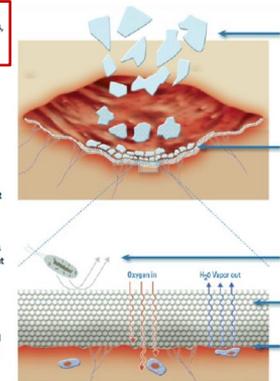
- Pain scores dropped from 10/10 to 0/10 within minutes of TPD application
- All wounds healed within two months
- Significantly improved patient's quality of life
- TPD application also resulted in several cost savings:
  - Reduced home nursing visits
  - Eliminated pain medications
  - Reduced appliance changes, supplies and labor costs
  - Avoided readmission for permanent ileostomy

**Conclusion:** Challenging ostomy complications can be successfully managed and resolved. Involving specialists and adoption of new technologies like TPD are key to delivering successful interventions and outcomes.

## ABOUT TPD<sup>2</sup>

### HOW IT HELPS:

- Wear time up to 30 days: reduces dressing changes, wound disturbance and exposure to infections
- Non-occlusive barrier: blocks entry of external bacteria but allows moisture and oxygen transportation
- Optimum moisture balance: absorbs moisture up to 68% (similar to skin tissue) but permits excess moisture to flow out
- Translucent cover: allows wound inspection without dressing removal
- Enhanced patient comfort: automatically flakes off as the wound heals or may be removed easily and atraumatically if required as it adheres without using adhesives



**HOW IT WORKS:**  
pHEMA (contact lens material) based dressing, scientifically engineered to provide an ideal wound healing environment

Its granules absorb moisture to transform into a transparent, skin-like barrier that seals and protects the wound

Prevents entry of exogenous bacteria

Permits oxygen transportation

Facilitates exudate management via vapor transportation

# Wound Center Open Toe Amputation: "Stump" Cavity Management with Hydroxyethylmethacrylate Powder Dressing

1



Stable L small toe ring gangrene in a high risk patient. Problem list: hemodialysis x 8 years, AD/PS, IFT, a peripheral angiopathy with stents, anticoagulation with Coumadin and variable bacteremic cardiomyopathy prior heel ulcer and finger amputations.  
Anesthesia: Stop of dabigatran po, 20cc plain Lidocaine injected as a digital nerve block and as a wide field tourniquet block. Tourniquet lubricated with to decrease bleeding. Patient is fully anticoagulated with Coumadin.

4



The resulting amputation cavity is 3.5 to 4.0 cm deep. Planning 1/3 of the 5th metatarsal bone is key to healing. To dependably heal, the transected bone end must be covered with adequate soft tissue. Note that the sutured cavity wall appears viable. Note bleeding in normal bedrock of transected Lofotone. Direct pressure on the wound quickly controls bleeding in spite of anticoagulation with Coumadin.

7



Open amputation cavity, POD # 6. Note absence of redness and excellent perfusion of the skin edge. Note that edema has been controlled by Longitudinal Yarn Compression bandage. LVC has created convex furrows on the foot.

2



Planned small toe auto-amputation abandoned when wound drains had smelly purulence: Green sanguinose puslike. Decision to proceed with Wound Center open amputation after patient is unable to be cleared for surgery by respiratory and internal medicine due to medical risks.  
Working behind a large paper drape the digit is removed with #10 blades at the metatarsal joint capsule. While the #5 blade remains sharp, a circumferential incision is made through viable skin. Traction of the small toe is maintained in line with the 5th metatarsal bone to minimize pain caused by traction. First step is to transect the small toe at the metatarsal joint. Second step is to resect one third of the metatarsal bone with a rongeur.

5



Open small toe amputation cavity is packed with powder using the surgeon's finger to pack the cavity open. The original principle of wide open packing keeps the skin edges open. An open wound allows time for the macrophages to deal with devitalized tissue and colonized bacteria. An open wound prevents anaerobic conditions. Macrophages are able to survive.

8



Stump cavity POD #14. Granulation tissue now covers the bone in the base of the amputation cavity. This is remarkable in the face of bacterial colonization, profound arterial ischemia, devitalized tissue in the cavity walls and the daily fluid trauma resulting from ambulation. Note the lack of peri-wound edema and the presence of skin convex furrows resulting from the yarn furrow bands.

3



Removal of adequate metatarsal bone is a surgical challenge. One third of the distal 5th metatarsal has been removed with a double action rongeur. The surgeon's small finger guides the distal metatarsal resection to 2/3rds. Rongeur cavity palpation with the small finger assures that bone fragments are removed and that the bone ends "meet".

6



Note how well powder packs the cavity open. Early "stump cavity" packing is known to be an important surgical principle. Following the rongeur dissection, the cavity has a high burden of foreign material that will cause late infection if not removed.  
After open amputation, the cavity contains a burden of devitalized fat, clot, joint capsule, tendon, and fragments of bone. Powder forms a rubbery gel in the cavity. The gel has adequate tensile strength to be removed in one piece. Each time the cavity is re-packed with powder, necrotic tissue is removed.  
The white residue is Longitudinal Yarn Compression™ (LYC). LYC holds the cavity open and compresses the considerable surgical trauma resulting from the 5th metatarsal osteotomy. Edema decreases skin perfusion. As hand surgeons know, edema is the enemy of healing after digital amputation.

9



POD #23. Cavity is now closed, remarkably, over the 5th metatarsal bone osteotomy. No further powder packing is required. Patient casted shortly after this photo due to heart failure.

Laura Landon-RN  
Manager, Bergan Mercy Hospital Wound Care Clinic-Omaha, Nebraska

Pam Cheslevig-BS  
Director of Human Research, Kohl's Corporation-Omaha, Nebraska

Martin Winkler-MD FACS  
Creighton University College of Medicine-Omaha, Nebraska  
University of Nebraska College of Medicine-Omaha, Nebraska

**Behavioral Objectives:**  
• Define amputation site on amputation in the face of infection and ischemia.  
• Define amputation site on amputation in the face of infection and ischemia.  
• Define amputation site on amputation in the face of infection and ischemia.  
• Define amputation site on amputation in the face of infection and ischemia.

**Background:**  
Open toe amputation is easy to perform in the wound center environment.

(1) In those amputation cases which result from resection of the distal third of the metatarsal bone, the small toe is usually removed along with the amputation. (2) In those amputation cases which result from resection of the distal third of the metatarsal bone, the small toe is usually removed along with the amputation. (3) In those amputation cases which result from resection of the distal third of the metatarsal bone, the small toe is usually removed along with the amputation.

Negative Pressure Wound Therapy (NPWT) has improved "stump cavity" healing in the case of being closed initially. Over the years, medical professionals and high level research institutions (including the NIH) have:

NPWT draws it from the wound surface as a mechanical vacuum.

NPWT draws it from the wound surface as a mechanical vacuum.

NPWT draws it from the wound surface as a mechanical vacuum.

**Outcomes:** Photographs document healing.  
**Checklist:** Hydroxyethylmethacrylate (HEMA) as a novel, cost effective, therapy for chronic cavity management after orthotopic open toe amputation.

**References:** [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

www.CompressionDynamics.com  
www.UluruInc.com

# A novel treatment protocol for the management of nonhealing surgical wounds

Authors:

Jennifer Eingle, PT, DPT  
Advanced Wound Care Team Leader  
Peoplefirst Rehab. Indianapolis, IN

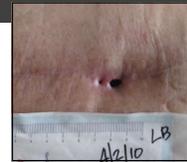
Jodie R. Harper, MD, CWS  
Wound Care Specialists of Indiana  
Indianapolis, IN

## Purpose

The purpose of this evaluation was to test a novel protocol in the management of nonhealing surgical wounds using a novel transforming powder dressing (TPD) to decrease the frequency of dressing changes.

## Conclusions

The study indicated that the use of the TPD<sup>1</sup> on nonhealing surgical wounds with a silicone mesh with adhesive border allows for applications of a moist wound dressing for periods of up to 7 days without dressing change. The technique to the right allows the TPD to be applied to a nonhealing surgical wound with depth and retained in place using an adhesive border dressing:



C-Nonhealing surgical wound with depth

1-Nonhealing surgical wounds with depth can be treated by packing the wound with TPD<sup>1</sup>. This is typically accomplished using a modified funnel.  
2-Packing the TPD with a sterile probe between applications as the powder aggregates.



Step 1-Transfer of TPD into deep wound using "funnel technique"



Step 2-Packing of wound with TPD and repeated funnel applications



Step 3-protecting periwound



Step 4-Application of adhesive border dressing with breathable foam pad

3-The periwound is cleaned and treated with a protective skin barrier<sup>2</sup>.

4-An adhesive border dressing<sup>3</sup> is applied over the wound ensuring that the adhesive does not contact the aggregated TPD. Typical dressing changes including TPD is weekly.

## Products

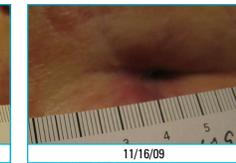
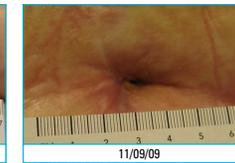
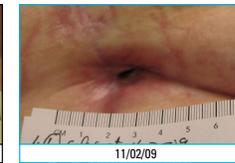
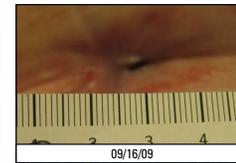
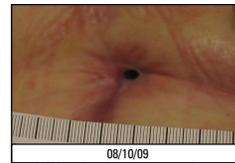
<sup>1</sup>-Altrazeal™ Transforming Powder Dressing - ULURU, Inc.  
<sup>2</sup>-Prep Protective Skin Barrier - Coloplast, Inc.  
<sup>3</sup>-Mepilex™ Border - Molnlycke Healthcare



**PATIENT:** 80 yo female presented to wound center on 9/21/09 with nonhealing surgical wound to left knee following trauma requiring I&D of the prepatellar bursa in March 2009. The wound measured 2.0 x 1.8 x 1.2 cm with undermining at 12 to 12 o'clock, deepest to 2.7 cm. **PMH:** CHF, hypertension, hypothyroidism, osteoarthritis.

**WOUND CENTER COURSE:** The Patient required excisional debridement and enzymatic debridement with Santyl® for 4 weeks and then changed to Prisma™ collagen daily using NU GAUZE® to fill in the dead space (1.5 x 1.5 x 0.7 cm with u/m from 10–12 to 2.8 cm). The Patient wasn't improving so 4 weeks of OASIS® and Iodoflex™ from 11/9–11/20 improved wound to 0.8 x 0.5 x 0.5 cm with u/m to 1.0 cm. 12/7/09: First application of the TPD<sup>1</sup>, the wound measured: 0.8 x 0.5 x 0.2 cm with u/m at 12 o'clock to 1 cm.

12/14/09: Second application of the TPD with measurements of 0.5 x 0.3 x 0.2 cm with u/m at 12 o'clock to 0.3 cm. 12/21/09: Third application of the TPD with measurements of 0.4 x 0.2 x 0.1 cm with u/m at 12 o'clock to 0.2 cm. 12/28/09: f/u visit, the TPD in place and dry, left intact: 0.5 x 0.5 x 0 cm, no depth, no u/m. 1/4/10: Forth application of the TPD the wound measured 0.2 x 0.2 x 0.1 cm, no u/m. 1/11/10: The Patient healed. At f/u visit on 3/1/10, wound remained healed with no complications.



**PATIENT:** 72 yo female on 3/19/09 with nonhealing surgical wound to her anterior chest wall. The Patient was s/p coronary artery bypass in 9/08 that was complicated by sternal wound infection requiring surgical debridement followed by complete reconstruction of her sternum covered with flap in 10/08. Despite treatment with KCI Wound VAC, the Patient required further surgical debridement

including infected bone on 6/11/09 and also received 6 weeks of IV daptomycin. **PMH:** CAD s/p CABG (as above), DM, type 2 on insulin. **WOUND CENTER COURSE:** Initial visit after surgery on 6/17/09, the wound measured 5.2 x 3.4 x 4.2 cm with undermining at 12 o'clock to 2.9 cm and at 3 o'clock to 3.0 cm. We resumed KCI VAC therapy. The wound improved with KCI VAC therapy which was d/c'ed on 7/20/09 due to size limitations (2.0 x 1.2 x 1.3 cm with u/m at 2 o'clock to 4.8 cm). Between 7/20/09–10/5/09, multiple wound products including Mesalt® packing strips, Hydrofera® Blue rope, Fibracol® Plus

collagen, PolyMem Silver® WIC rope, and Multidex® powder were used with minimal improvement (1.0 x 1.1 x 1.0 cm with u/m at 2 o'clock to 3.2 cm). Since the wound had stalled at that size, OASIS was used weekly x 4 from 10/5/09–10/26/09 with measurements improving slightly to 1.0 x 0.5 x 1.0 cm with u/m to 3.2 cm. First application of the TPD<sup>1</sup> was 11/2/09 and in 1 week wound measurement decreased to 0.3 x 0.2 x 1.0 cm with u/m to 1.5 cm. The TPD as reapplied on 11/9/09 and the Patient was healed at her next visit on 11/16/09. F/u visit on 1/04/10 revealed well healed scar.

Michael S. Miller DO, FACOS,  
FAPWCA, CWS  
The Wound Healing Centers  
of Indiana Indianapolis, IN

## Treatment of Post-Operative Chronic Abdominal Wounds Using a Novel Powder Wound Dressing

### Objectives

Upon viewing this poster, attendees will have observed the treatment of post-surgical abdominal wounds that have shifted from an acute postoperative stage to a chronic-non-healing stage.

Attendees will also see the results of the application of a novel powder dressing which allows the coverage of these wounds in a region where torsion and strain can make retaining a dressing difficult.

### Introduction

Healing postoperative wounds is problematic due to their location in positions not conducive to standard dressings, tendency towards dryness and the many etiologies of the failure to heal. Abdominal wounds pose their own set of problems in that they are on areas that are in constant motion which reduces the adherence of the dressings, and their position makes application and adherence difficult due to gravity. A typical patient with a non-healing post-operative abdominal wound can also have fragile skin in this location so minimal adhesive and fewer changes are desirable traits in the choice of dressing. Pain is also a significant factor in patient care. We report on the use of a novel powder dressing in the treatment of two cases involving non-healing post operative wounds in the abdomen.

### Case 1

A 58 year old male patient presenting with an open draining wound of the abdomen which had been present for 6 months. The patient had undergone 4 previous ventral hernia repairs the last of which was 4 years prior and used mesh in the repair. The patient had a history of Staph infections of the wound which necessitated treatment with IV antibiotics. Previous treatments to this wound included topical antibiotics, dry gauze and topical steroids and the wound remained in stasis for the 6 month period. He reported pain as a "6" on a 0 to 10 scale when initially presenting. Sharp debridement of the wound was performed and one week later, the wound was covered with a novel powder dressing. The 4.1 cm X 3.4 cm X .4 cm. Pain decreased to a 1 on the same scale since initiation of Altrazeal. The wound has shown a decrease in depth with some improvement in granulation bed.



Initial Treatment



2 Months



4 months



5 months

### Case 2

A 74 year old male patient presenting with an incisional dehiscence. The patient underwent repair of an abdominal aortic aneurysm 1 month prior and the dehiscence occurred 1 month after surgery. The patient had been undergone treatments including VAC, topical antibiotics, and simple dry dressings with the patient doing his own care for the 4 months prior to referral. After initial evaluation, aggressive debridement of the wound was performed with initiation of treatment with the powder wound dressing commencing one week later. Initial measurements of the wound were 10.6 cm X 6.0 cm X .5 cm. Pain prior to treatment was a "4" on a scale of 0 to 10 and decreased to a "0" after two weeks of treatment. The periwound has shown some decrease in erythema and the wound depth has decreased with improvement in the granulation bed appearance.



Initial Treatment



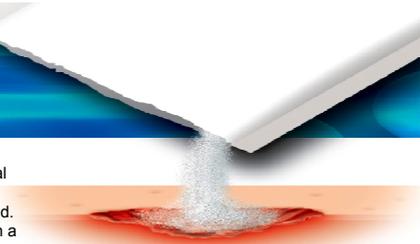
2 Months



3 months



4 months



Stephanie Bixler,  
MSN, CANP, CWCN, AAPWCA  
Wound Care Nurse Practitioner  
Marshfield Clinic Rice Lake Center  
Rice Lake, Wisconsin

# Treatment of a Rheumatoid Nodule Surgical Wound with a Novel Powder Wound Dressing\*

## Introduction:

A rheumatoid nodule is a local swelling or tissue lump which occurs almost exclusively in association with rheumatoid arthritis. The nodules are usually subcutaneous especially over bony prominences such as the tip of the elbow or olecranon or over the finger knuckles. In some cases the nodules can be painful, especially if the overlying skin breaks down and patients opt to have the nodule removed surgically.

## Background:

A 57 year old Caucasian female was referred to the wound care clinic for a non-healing surgical wound of the right elbow created during removal of a rheumatoid nodule. The surgical wound dehisced and remained open 5 weeks post surgery. The patient had a history of similar non-healing surgical wounds from nodule resections in the past complicated by osteomyelitis. The patient was on chronic steroids for rheumatoid arthritis. Treatment was complicated by difficulties in compliance with dressing changes. The wound had been treated with daily dressing changes using triple antibiotic and gauze.

Upon examination, the wound was present on the right arm at the elbow on the lateral olecranon measuring 9 mm in length and 6 mm in width. The depth was 2 mm and there was undermining from 10 to 12 o'clock of approximately 10 mm. The undermining tissue was fibrous and the remaining tissue was red and granulating. There was no evidence of infection. The patient complained of discomfort and pain while sleeping. The patient was treated with a woven hydrocolloid dressing that was covered with an adhesive secondary dressing which was to be changed every three days. Dressing changes were difficult due to discomfort and the wound location.

## Treatment:

A novel powder dressing, was placed on the wound as treatment with an extended wear time based on the manufacturer claims. It was hoped that the ability of this dressing to stay in place for longer periods would allow the patient to have infrequent dressing changes between visits. The dressing is presented as a powder and was applied by pouring the powder directly onto the wound. The powder transforms into a solid, flexible dressing in the presence of exudate or normal saline. More powder was added alternating with saline until a plug formed filling the wound to the surface of the skin. The patient was sent home for one week prior to another dressing change and this procedure was repeated with each office visit until the wound completely healed.



Day 0 of treatment



Day 4 of treatment



Day 11 of treatment



Day 21 of treatment



Day 40 of treatment



Day 47 of treatment



Day 61 of treatment  
Wound Healed

Visit	Examination	Treatment	Patient Comments
1-Day 0 of treatment	Wound measures 0.9 x 0.6 cm with depth of 0.2 cm and undermining of 1 cm. No infection	Sharp debridement, irrigation, powder dressing applied	Dressing comfortable and in place
2-4 days of treatment	Wound measures 0.8 x 0.5 cm with depth of 0.2 cm and undermining of 0.8 cm. Granulation bed robust, some new epithelialization, and no infection present	Wound irrigated, powder dressing applied	Patient did not need to change the dressing, no strikethrough dressing noted, decrease in pain
3-12 days of treatment	Wound measures 0.7 x 0.5 cm with depth of 0.1 cm and undermining of 0.5 cm. Contracture and epithelialization present	Wound irrigated, powder dressing applied, contact layer used to cover powder, secured with tape.	Patient notes better sleep with decreased pain. Patient would like to extend periods between dressing changes.
4-21 days of treatment	Wound measures 0.5 x 0.6 cm with no depth and undermining of 0.8 cm.	Wound irrigated, powder dressing applied, contact layer used to cover powder, secured with tape	Patient did not change dressing, noted no drainage, and has been pain free
5-26 days of treatment	Wound measures 0.5 x 0.5 cm with no depth and undermining of 0.8 cm. New granulation tissue noted in undermining area	Wound irrigated, powder dressing applied, contact layer used to cover powder, secured with tape	patient noted no drainage and the dressing stayed in place. Patient did note some itching at wound margins
6-35 days of treatment	Wound measures 0.5 x 0.3 cm and undermining of between 0.2 and 0.4 cm. Undermining track filled with granulation tissue. Dressing was dry and some redness around the wound with crusting on cover dressing. Possible microbial contamination	Wound irrigated, powder dressing applied. Ag mesh applied fixed with tape.	Dressing remained in place. Patient reports some pain at wound site between visits.
8-47 days of treatment	Wound measures 0.3 x 0.4 cm with undermining of 0.4 cm. Wound is 50:50 granulating and epithelialized tissue.	Wound irrigated, powder dressing applied. Ag mesh applied fixed with tape.	Dressing is comfortable with no pain.
10-54 days of treatment	Wound is insignificant with small area of granulating bed. Remainder of wound epithelialized	Wound irrigated, powder dressing applied. Ag mesh applied fixed with tape.	Patient reports no pain and complete freedom of movement. Patient hopes this is last visit. Patient reports that this is faster healing than previous nodule surgical wounds
11-61 days of treatment	Wound healed	Wound healed. Skin washed and covered with gauze and tape. Patient agreed to protect new skin for 2-4 weeks.	Patient wound has remained healed for nearly four months post treatment.