INTERNATIONAL
CASE STUDIES

Retrospective case series:
Wounds treated with 3M™ Veraflo™ Therapy

CASE STUDIES SERIES 2020

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In these cases, Veraflo Therapy was used with other wound care products. As with any case studies, the results and outcomes should not be interpreted as a guarantee or warranty of similar results. Individual results may vary depending on the patient's circumstances and condition.

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Negative Pressure Wound Therapy with instillation and a dwell time (NPWTi-d) using 3M™ Veraflo™ Therapy

Delayed wound healing remains a key challenge in clinical practice, with hard-to-heal wounds resulting in pain, morbidity, prolonged treatment, and in some instances requiring major reconstructive surgery (Agarwal et al, 2019). If wound healing is delayed for a substantial amount of time, this can be a challenge for clinical teams with regards to increasing complications, such as infection, resource expenditure, posing a great burden on the healthcare system.

It is well-known that wound infection and bioburden play a major role in delayed wound healing and so prompt diagnosis and treatment are necessary to stimulate wound closure and minimise the impact on the individual, their carer and healthcare systems (International Wound Infection Institute [IWII], 2016).

The principles of wound bed preparation drive the prevention and management of wound bioburden and guide the maintenance of the healthy wound bed, through therapeutic wound cleansing, and disruption and removal of non-viable tissue through debridement (IWII, 2016). Wound cleansing can:

- Potentially disrupt biofilm by decreasing bioburden through repeated cleansing cycles
- Promote healing of the wound
- Maintain the periwound and protect from maceration.

NEGATIVE PRESSURE WOUND THERAPY

Negative pressure wound therapy (NPWT), also referred to as vacuum-assisted closure (3M™ V.A.C.® Therapy) and microdeformational wound therapy, is the continuous or intermittent application of subatmospheric pressure to the wound bed or incision using a suction pump, tubing and a dressing. It has been shown to be effective in the management of acute, chronic and surgical wounds (Argenta et al, 2006; Krug et al, 2011), and may also be used as an adjunct to surgical intervention or as an alternative to surgery in a patient with underlying comorbidities and presence of frailty. Specifically, NPWT is beneficial in creating a moist wound healing environment, managing exudate/drainage, eliminating dead space and protecting wounds from external contamination (World Union of Wound Healing Societies [WUWHS], 2018).

NPWT has revolutionised the treatment of complex wounds by helping to enhance granulation tissue formation (Othman, 2012; Schintler, 2012), while requiring fewer dressing changes compared with more conventional dressings (Wu and Armstrong, 2008). Used widely in the management of surgical wound dehiscence, there are four key actions of NPWT that aid the healing of open wounds:

- Contraction of wound edges to reduce wound size
- Stimulation of angiogenesis and granulation tissue formation (Othman, 2012; Schintler, 2012)
- Reduction of oedema
- Improvements in tissue perfusion (WUWHS, 2018).

In addition, the implementation of this therapy in practice has helped to reduce nursing time (Dowsett et al, 2012) and costs (Othman, 2012), as well as help improve patient quality of life (Othman, 2012). Nevertheless, proper training and instruction of NPWT placement is necessary to maximise treatment and to promote optimal wound healing (Fagerdahl, 2014). It is also important

for this treatment modality to be used in the context of holistic management of the patient and for contraindications/cautions of the device to be taken into account (WUWHS, 2018).

NPWT WITH INSTILLATION AND DWELL TIME

NPWT with instillation may be used in the management of acute and chronically infected wounds in conjunction with good clinical practice such as debridement or antibiotic therapy. It delivers topical solutions, such as saline or antimicrobial agents, to the wound bed, while maintaining a seal over the wound (Gupta et al, 2016). NPWT with instillation and dwell time (NPWTi-d) involves the regular introduction of solutions into the wound bed, before the vacuum pump is halted for a short time to allow for soaking of the solution (Back et al, 2013). It has been suggested that using NPWTi-d after thorough debridement is sufficient to shift the wound healing trajectory from risk of infection and delayed healing to granulation formation (Brinkert et al, 2013).

3M™ VERAFLO™ THERAPY – NPWT WITH INSTILLATION AND DWELL TIME

Veraflo Therapy (3M USA, Inc, San Antonio, TX) also known as NPWTi-d combines NPWT with the addition of wound cleansing with topical wound solutions (*Figure 1*). Veraflo Therapy can be used on all wounds that are indicated for NPWT, including wounds that have failed to respond to conventional NPWT without instillation, following surgical wound debridement (Goss et al, 2014; Gupta et al, 2016).

NPWTi-d differs from NPWT with irrigation and lavage in that the instilled fluid is slowly introduced into the wound and soaks in the wound bed for a defined period of time before being removed by applying negative pressure (Gupta et al, 2016). Treatment is delivered in automated treatment cycles allowing wounds to be repetitively cleansed, without the need for dressing removal.
3M™ Veraflo™ Therapy can be used with three dressing types, and as part of a step-down approach

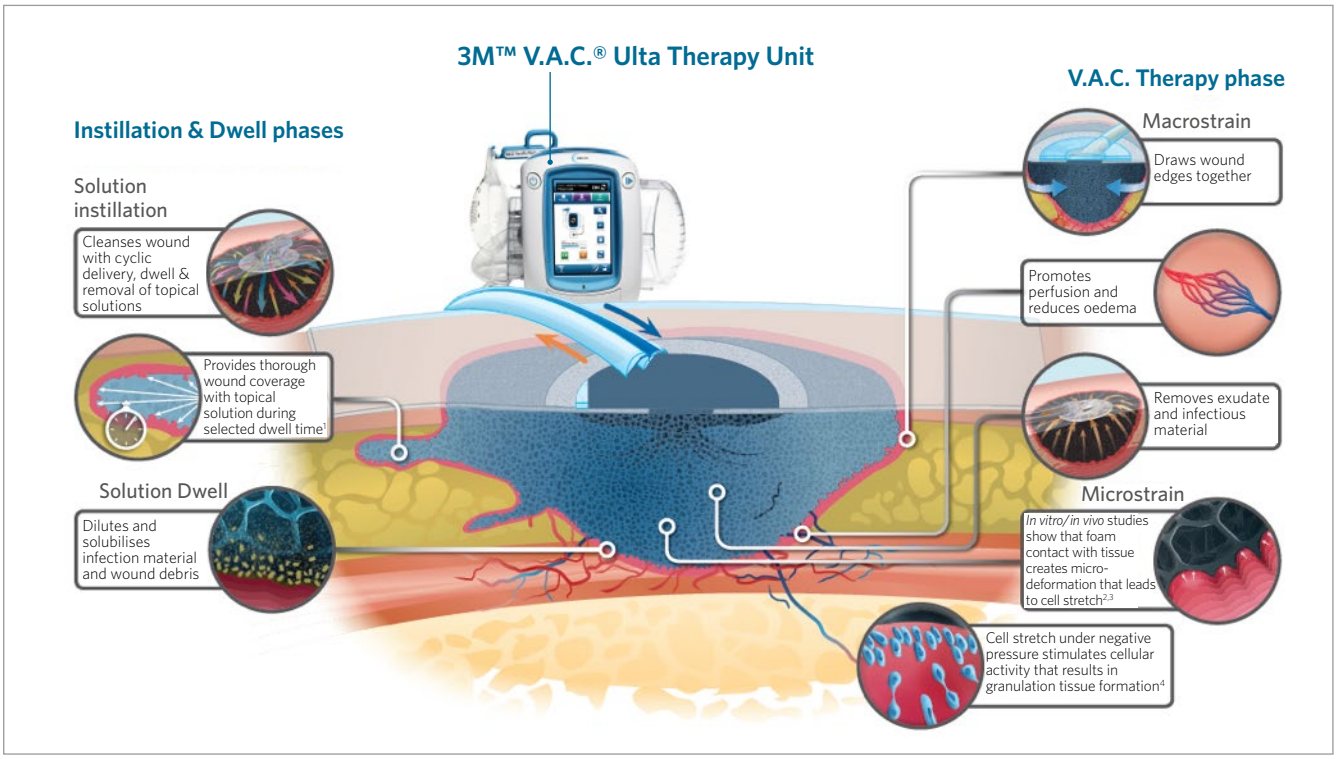
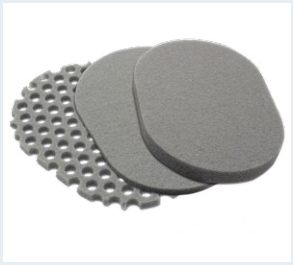


Figure 1. Veraflo Therapy ([1]Rycerz et al, 2013; [2]McNulty et al, 2007; [3]McNulty et al, 2009; [4]Saxena et al, 2004)

- **3M™ V.A.C. Veraflo™ Dressing:** available in a spiral-cut foam and block foam pre-slit into two layers. Clinicians tend to use V.A.C. Veraflo Dressings for open wounds, when the main goal of the therapy is granulation, along with effective wound cleansing.
- **3M™ V.A.C. Veraflo Cleanse™ Dressing:** composed of denser material than the V.A.C. Veraflo Dressing and is typically chosen when wound cleansing is the primary goal of therapy. It is a tubular-shaped foam, suitable for addressing wounds with complex geometries, such as tunnels, undermining.
- **3M™ V.A.C. Veraflo Cleanse Choice™ Dressing:** unique 3-layer foam dressing, which includes a wound contact layer with a pattern of 10 mm holes and two cover layers (without holes) to provide application options for wounds of varying depths (Fletcher et al, 2019). The dressing has the potential to promote wound healing and facilitate the removal of infectious materials by providing a 'mechanical' movement at the wound surface in combination with cyclic delivery and dwell of topical solutions (Fletcher et al, 2019). V.A.C. Veraflo Cleanse Choice Dressing also provides a wound cleansing option for clinicians when surgical debridement must be delayed or is not possible or appropriate, for example, when the patient will not tolerate general anaesthetic (Teot et al, 2017).

3M™ V.A.C. Veraflo™ Dressing

3M™ V.A.C. Veraflo Cleanse™ Dressing



3M™ V.A.C. Veraflo Cleanse Choice™ Dressing

EVIDENCE SUPPORTING 3M™ VERAFLO™ THERAPY

In recent years, NPWTi-d has been increasingly used as an adjunctive treatment for acute and chronic wounds (Gupta et al, 2016), and clinical studies have further demonstrated the efficacy of Veraflo Therapy. For example, Brinkert at al (2013) demonstrated in a prospective clinical study, that following the use of NPWTi-d, newly formed granulation tissue was visibly moist and more enhanced compared with conventional NPWT treatment — particularly, with regards to filling the dead space rapidly and completely. In addition, the outcomes of a pre-clinical study comparing the granulation response of NPWTi-d (instillation foam dressing with saline) with NPWT (standard foam dressing) in continuous and non-continuous modes suggested that NPWTi-d has the potential to stimulate a faster rate of wound granulation (Lessing et al, 2013).

There is also evidence to suggest that NPWTi-d may be more beneficial than standard NPWT for the adjunctive treatment of acutely and chronically infected wounds that require hospital admission (Kim et al, 2014). Following this, Kim et al (2015) carried out a prospective, randomised, effectiveness study, which indicated that 0.9% normal saline may be as effective as an antiseptic (0.1% polyhexanide plus 0.1% betaine) for NPWTi-d for the adjunctive inpatient management of infected wounds along with debridement or antibiotic therapy. The combined use of regular cleansing and applied negative pressure of NPWTi-d are essential to reducing bioburden and, therefore, are likely of greatest benefit in critically colonised or infected wounds (Gupta et al, 2016).

Positive clinical outcomes and potential cost savings have been demonstrated using 3M™ Veraflo™ Therapy. A study by Gabriel et al (2014) showed that NPWTi-d assisted with wound cleansing and exudate removal and may have facilitated earlier wound closure compared with conventional NPWT. In addition, hypothetical economic model findings illustrated the potential cost-effectiveness of NPWTi-d compared with NPWT, due to a decrease in the need for an operating room or hospital visit(s), earlier wound closure, reduced hospital stay, fewer required dressing changes and improved limb salvage rates (Gabriel et al, 2014).

CONCLUSION

Veraflo Therapy is appropriate for use on all common wounds where vacuum-assisted closure is indicated for use, as well as in the management of chronic and surgical wounds. Veraflo Therapy combines the benefits of NPWT with automated topical wound solution distribution and removal to help heal the wound, but also has the potential to reduce nursing time, costs and promote optimal patient outcomes, leading to better patient quality of life compared to traditional NPWT (Gupta et al, 2016).

A series of case studies illustrates the range of uses for Veraflo Therapy on a range of common wound types — diabetic foot ulcers (DFU), venous leg ulcers (VLU), pressure ulcer (PU), dehisced surgical sites and necrotising fasciitis and are representative of a clinician's everyday use of this device. Cases studies were submitted as part of an international competition to share best practice using Veraflo Therapy.

To see all entries, visit **https://npwt-instillation.com**

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CASE 1: DEHISCED INFECTED SURGICAL WOUND

Authors: **Maud Vanderbrugghe**[1], Care and Paramedic Activity Team Supervisor; **Dr Hélène Esnault**[2], PhD Geriatrician Orthopedic Unit Care; **Dr François Raimbault**[1], PhD Geriatrician Rehabilitation Care; **Dr Nathalie Faucher**[2], PhD Geriatrician, Geriatric Unit Care
[1]Bretonneau Hospital, APHP-NORD- University of Paris, France; [2]Bichat Claude Bernard Hospital, APHP-NORD-University of Paris, France

PATIENT PRESENTATION AND HISTORY

An 84-year-old patient with type 1 diabetes, hypertension and renal failure presented with a wound to the right lower limb that had been progressing for a year. In July 2019, exposure of an internal fixation device for a right tibial fracture was observed (*Figure 1*). A surgeon removed the device 5 days later. The wound was managed with an alginate dressing. Specimens were positive for meticillin-sensitive *Staphylococcus aureus* (MSSA) revealing osteitis (inflammation of bone); therefore, antibiotic therapy was introduced for 4 weeks. However, the wound rapidly dehisced (*Figure 2*).

MANAGEMENT AND OUTCOMES

The team introduce 3M™ Veraflo™ Therapy with 3M™ V.A.C. Veraflo™ Dressing on Day 27. Continuous pressure was delivered at –125 mmHg for 3.5 hours with a 10-minute instillation of 10 mL of saline. The dressing was reapplied twice per week.

In 3 weeks, the wound had made very satisfactory progress; granulation tissue was developing, and the wound was reducing in size (*Figures 3 and 4*).

Treatment was switched to a hydrocellular dressing on Day 49. The wound developed epithelialised tissue (*Figure 5*). Due to the care, which included NPWTi-d, the patient was able to avoid repeat surgery and amputation. The patient continued his recovery in the follow-up care and rehabilitation unit, enabling him to regain his independence.

CONCLUSION

Veraflo Therapy is simple to use and is a treatment option for complex wounds following a surgical procedure. In addition to the benefits provided by classic NPWT, NPWTi-d provides regular cleaning of the wound bed, which is particularly effective for infected wounds or even wounds at high risk of infection, while stimulating the generation of granulation tissue.

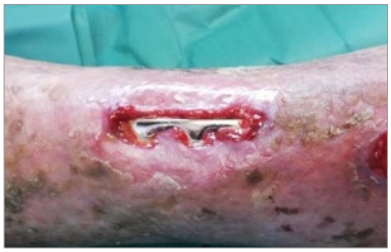

Figure 1. Initial presentation (Day 1)

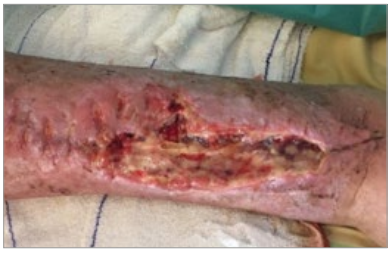

Figure 2. Wound dehisced (Day 23)

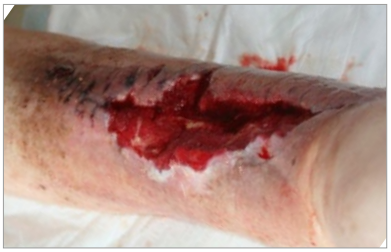

Figure 3. One week after Veraflo Therapy (Day 34)

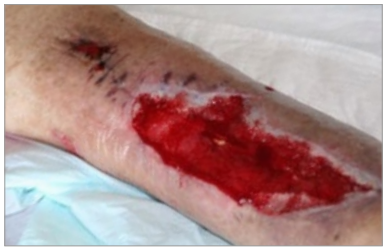

Figure 4. Three weeks after Veraflo Therapy (Day 48)

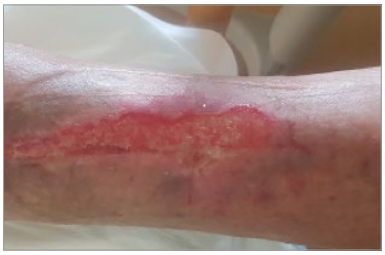

Figure 5. Epithelialised wound 3 months after admittance (Day 91)

CASE 2: QUICK ACTION AT FIRST PRESENTATION OF A DIABETIC FOOT ULCER

Authors: **Kris Bernaerts**[1], Clinical Nurse Specialist Wound Care; **Sabrina Houthoofd**[1], Vascular Surgeon, Chief Physician of Diabetic Foot Clinic; **Annelies de Graaf**[1], Clinical Nurse Specialist Wound Care; **Leen Dox**[1], Diabetic Foot Nurse.
[1]University Hospitals Leuven, Belgium

PATIENT PRESENTATION AND HISTORY

A 54-year-old man with no relevant medical history developed a blister playing sport on the right sole of his foot. Due to redness, a GP prescribed antibiotic treatment, and the wound appeared to improve. However, a week later, new wounds appeared on the foot, so local treatment and a second antibiotic treatment was commenced. Due to a serious deterioration of the wound (*Figure 1*), the man presented himself to the emergency room.

On admittance, there was substantial inflammation at the foot. On the plantar side there were two ulcers of about 1 cm deep, with no apparent bone contact. On the dorsal side of the foot, there was necrotic tissue. There is fluctuation on the dorsum of the foot. Blood results of the patient confirmed the inflammatory status (leukocyte count 12.19 x 10^9/L; C-reactive protein of 228 mg/dL). Wound cultures identified increasing numbers of *Staphylococcus aureus*. There was a good capillary refill at the foot with palpable distal pulsations.

MANAGEMENT AND OUTCOMES

Extensive surgical debridement and drainage of the pus and resection of the necrotic tissue was performed on the day of admittance. The wound bed was irrigated thoroughly. Intravenous antibiotics were adjusted. Over the following week, surgical debridement was performed twice until all necrotic tissue was removed (*Figure 2*). At admittance, patient was diagnosed with diabetes and insulin therapy was started and the patient was informed about the disease.

After the last debridement, 3M™ Veraflo™ Therapy with 3M™ V.A.C. Veraflo™ Dressing was initiated (*Figure 3*). The pressure was set to –125 mmHg with a 15-minute instillation of 20 mL of polyhexanide

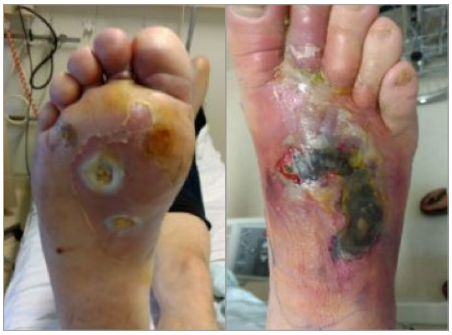

Figure 1. At admittance to hospital (Day 1)

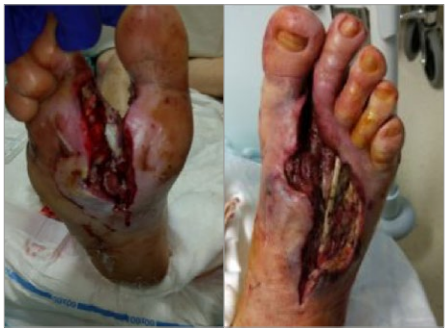

Figure 2. After surgical debridement (Day 2)

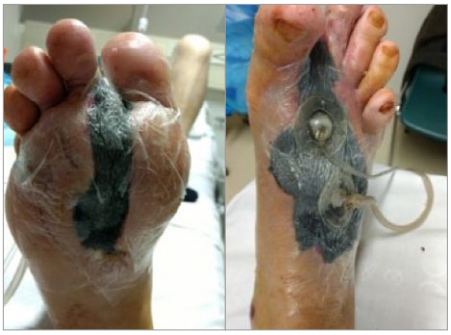

Figure 3. Initiation of Veraflo Therapy (Day 4)

betaine every 3.5 hours. 3M™ Cavilon™ Advanced Skin Protectant was applied to the wound edge to protect the periwound skin. The dressing was changed twice a week (*Figure 4*).

A final debridement was performed 13 days after starting 3M™ Veraflo™ Therapy to remove a small amount of necrotic tissue and resection of digit II. The wound was closed at the plantar side using a split-thickness skin graft (*Figure 5*).

After 5 weeks, the wounds had sufficiently healed and the patient was discharged. He had strict instructions not to stand on his foot and received daily wound treatment by homecare nurses. Follow-up was at first on a weekly basis, and then bi-weekly by the diabetic foot ulcer multidisciplinary team. He also received adjusted orthopaedic shoes. Four and a half months after he was admitted to hospital, the wound had fully epithelialised (*Figure 6)* and he was able to return to work providing he wore the orthopaedic shoes.

CONCLUSION

Quick action is necessary in the presentation of acute diabetic foot. In the sub-acute phase, the use of Veraflo Therapy is an important treatment tool in healing of complex diabetic foot wounds. Veraflo Therapy is a crucial part of the wound healing pathway in the multidisciplinary diabetic foot clinic of UZ Leuven.

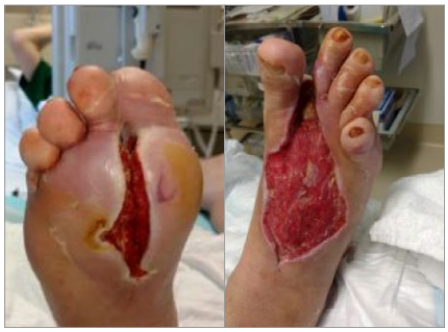

Figure 4. Wound during first week of Veraflo Therapy

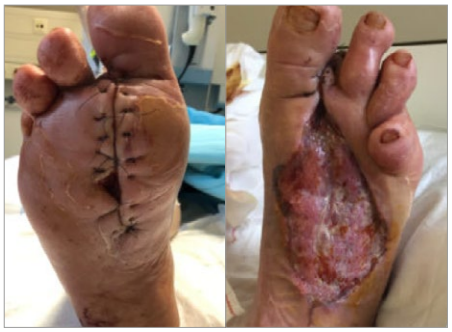

Figure 5. Split-thickness skin graft (Day 17)

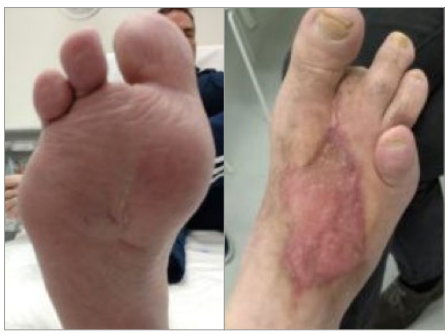

Figure 6. Fully epithelialised wound (Approx 136 days)

CASE 3: ESCALATION AND DE-ESCALATION OF 3M™ VERAFLO™ THERAPY TO AVOID A MAJOR AMPUTATION

Author: **Torsten Milder**, Chief Physician for Vascular Surgery, Endovascular Surgery and Phlebology, Department of Vascular and Endovascular Surgery, Harzklinikum Wernigerode, Germany

PATIENT PRESENTATION AND HISTORY

A 67-year-old male patient came to our emergency department with gangrene in the foot (*Figure 1*) and signs suggestive of sepsis: a temperature of 38°C and C-reactive protein (CRP) of 308 mg/L (standard value <5 mg/L). He had diabetes for more than 20 years and Korsakov's syndrome (a chronic memory disorder caused by severe deficiency of thiamine commonly caused by chronic alcohol abuse).

MANAGEMENT AND OUTCOMES

Antibiotics (ampicillin) were immediately commenced and emergency surgery to amputate the gangreous toes. A major amputation of the lower limb was considered, but instead a minor amputation and a necrectomy was conducted to try to save the limb (*Figure 2*).

On Day 3, Veraflo Therapy with 3M™ V.A.C. Veraflo™ Dressing was commenced with the department's standard setting (instillation liquid, 0.04% polyhexanide solution; dwell time, 15 minutes; V.A.C. time, 2 hours; pressure, –125 mmHg). Two weeks after emergency surgery to remove the necrotic tissue, antibiotics and Veraflo Therapy, there was CRP decreased to 6.9 mg/L.

Unfortunately, there was an increase of necrosis so the fifth toe was amputated. Due to increased necrosis, on Day 19 Veraflo Therapy with the 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing was used with the department's standard setting for this therapy (instillation liquid, 0.04 % polyhexanide solution; dwell time, 15 minutes; V.A.C. time, 90 minutes; pressure –125 mmHg) (*Figure 3*).

After only 3 days using V.A.C. Veraflo Cleanse Choice Dressing, there was a reduction in necrosis and an increase of granulation tissue (*Figure 4*). On Day 31, it was possible to de-escalate to 3M™ V.A.C.® Therapy (*Figure 5*) in order to consolidate and prepare the wound for a skin graft (*Figure 6*).

A skin graft was performed on Day 35 and V.A.C.® Therapy was applied for an additional 5 days (pressure –100 mmHg) as per local protocol (*Figure 7*). One week after surgery, the patient was discharged. Unfortunately, the patient did not attend the follow-up appointment.

CONCLUSION

Veraflo Therapy is a well-known and well-established therapy for treating DFUs and is used often in the

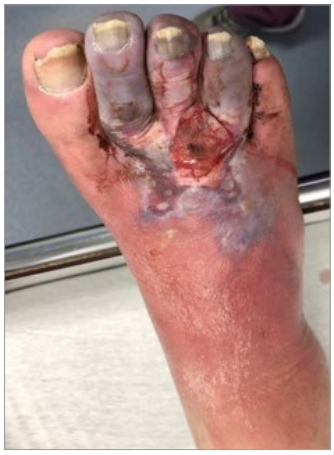

Figure 1. Presentation in the emergency room (Day 1)

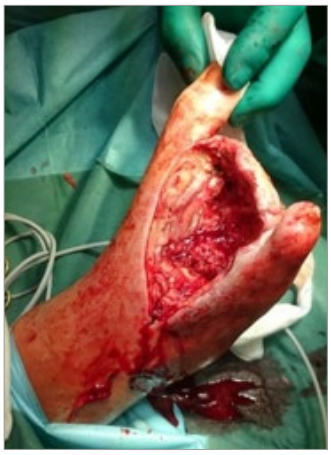

Figure 2. After emergency surgery (Day 1)

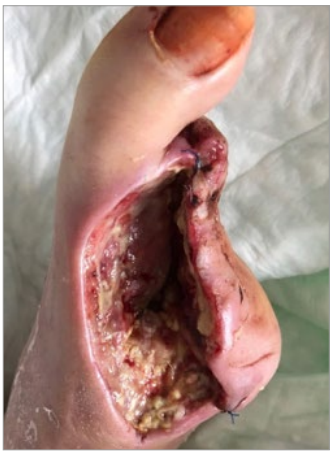

Figure 3. Veraflo Therapy with V.A.C. Veraflo Cleanse Choice Dressing commenced (Day 19)

department to treat diabetic foot ulceration and other vascular wounds. The department has developed a de-escalation system with economic value by using our de-escalation system:

1. Use 3M™ Veraflo™ Therapy with 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing for wound cleansing to remove debris and thick exudate.
2. De-escalate to 3M™ V.A.C.® Therapy to 'kick-start' formation of granulation tissue.

For this patient, Veraflo Therapy decreased the amount of necrotic tissue effectively, and, together with systemic antibiotics, managed and removed the infected tissue. Furthermore, there was an increase in granulation tissue. Combining NPWTi-d with systemic antibiotics and surgical intervention, the clinicial team were able to prevent a major amputation in this high-risk individual and could discharge the patient from hospital after 42 days.

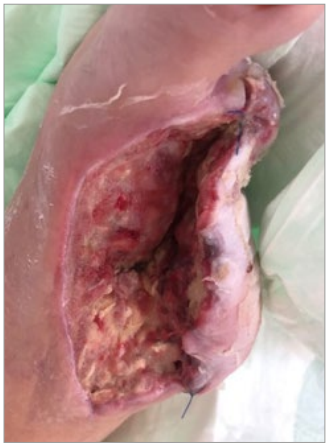

Figure 4. After 3 days of using 3M V.A.C. Veraflo Cleanse Choice Dressing (Day 22)

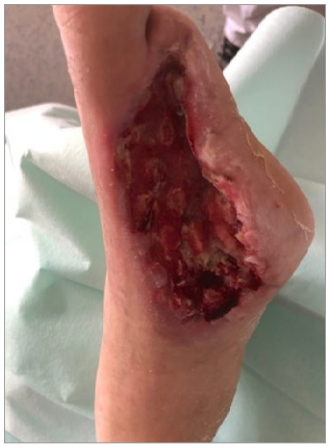

Figure 5. De-escalation to V.A.C.® Therapy (Day 31)

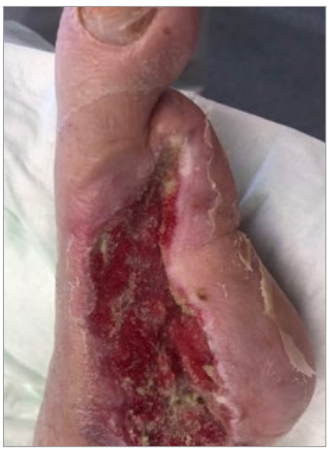

Figure 6. Consolidated wound before the skin graft (Day 34)

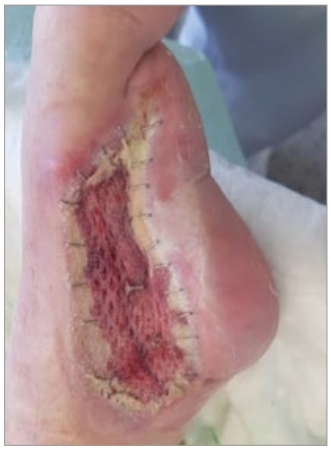

Figure 7. After 5 days of V.A.C.® Therapy following skin graft (Day 40)

1st prize

CASE 4: INFECTED CATEGORY 4 PRESSURE ULCER

Author: **Paula O'Malley,** Tissue Viability Nurse, Mater Private Hospital, Republic of Ireland

PATIENT PRESENTATION AND HISTORY

The patient was a 59-year-old male individual who 30 years previous had sustained a traumatic T12 spinal cord injury that left him paraplegic. The patient used a wheelchair, was independent with his activities of daily living and worked full time. Initially, he thought that he had developed an abscess on his buttock. Over time, the amount of exudate increased and he attended his primary care team. There was an attempt made by the community team to heal the wound using conventional NPWT.

The wound became infected and he presented via the emergency department with signs of sepsis and cellulitis. The wound was over his left ischial tuberosity and thus was most likely a pressure ulcer (PU). On admission to the hospital the wound measured 7.8 cm x 5.5 cm and there was extensive undermining. There was a large amount of offensive smelling, thick, green exudate.

A wound swab showed the presence of *Enterobacter* and *Escherichia coli*. An MRI demonstrated the presence of osteomyelitis in the left ischium and pubic bone, over an anteroposterior distance of 8.3 cm and a craniocaudal distance of 7.7 cm.

MANAGEMENT AND OUTCOMES

Antibiotics were changed to ciprofloxacin when the sensitivities became available and showed that *E. coli* was resistant to tazocin. He received a review by the Plastics Team who felt a washout and debridement was needed. The wound was surgically debrided and 3 days later when the postoperative dressing was removed the wound measured 14.5 cm x 7.5 cm x 4 cm and bone was visible (*Figure 1*). There continued to be a large amount of offensive smelling, thick, green exudate. A decision was made with the Tissue Viability Nurse, Plastics Consultant and the patient to use NPWT with instillation and dwell (NPWTi-d). This decision was made as the wound would benefit from the rapid granulation that occurs with negative pressure in addition to the cleansing that the instillation would offer.

The 3M™ V.A.C. Veraflo™ Dressing was changed every 48–72 hours. The wound was instilled with 100 mL of saline for 10 minutes every 3.5 hours, with continuous negative pressure at –125 mmHg. Due to the proximity of the wound to the anus (approx 1 cm), 3M™ V.A.C.® Gel strips were used to ensure a good seal. With the size of the wound, the wound exudate and the fluid for instillation, the intensity was set to high. The dressing was bridged up onto the patient's abdomen so that he would not be seated on the 3M™ VeraT.R.A.C.™ tubing.

After 4 days of 3M™ Veraflo™ Therapy the wound had improved dramatically (*Figure 2*). There was less purulent exudate, the odour had been eradicated and granulation tissue was beginning to develop.

On day 10 of Veraflo Therapy (Day 13 postoperative), the wound measured 13 cm x 10 cm x 3 cm (*Figure 3*). The wound bed was more granulated and was significantly less sloughy. The irregular nature of the wound and the hip flexion affected the accurate wound measurements. The patient was independent and mobile, but the 3M™ V.A.C.® Ulta Therapy Unit (due to its size and weight) was restricting the patient's mobility in his wheelchair and impacting on his quality of life. In addition, due to the wound location and fluid associated with the wound, leakage was frequent and required nursing intervention, which disrupted the patient's day and intimate care. With the patient, the decision was made to discontinue Veraflo Therapy and switch to the 3M™ V.A.C.® Granufoam™ Dressing, using the 3M™ ActiV.A.C.™ Therapy Unit — a portable, lightweight unit.

NPWT was delivered at –125 mmHg, with dressings changed every 48–72 hours. The patient was discharged 22 days post-wound debridement. The wound measured 12.5 cm x 7.5 cm x 2.5 cm. NPWT continued post-discharge in the community.

The patient was readmitted 10 weeks postoperatively into a tertiary hospital under the same plastic surgeon and had a flap reconstruction using thigh muscle moved over the left buttock (*Figure 4*). Over 1 year on the wound remains closed with no further issues.

CONCLUSION

The patient was admitted with a large infected PU and post-debridement had a large open wound that needed substantial new tissue growth to close. The use of 3M™ Veraflo™ Therapy allowed continuous washout of the wound and prevented the patient from requiring further surgical intervention. This reduced patient exposure to anaesthetic, reduced theatre time and associated staff and consumable costs; it allowed the patient to carry out his activities of daily living without fasting or the effects of anaesthetic.

It is clear to see from *Figures 1–3* the effects of only 10 days of Veraflo Therapy in removing slough and promoting granulation tissue. Furthermore, his length of stay was shorter than one would have expected if using only conventional dressings — only 22 days postoperatively.

The current consensus is for saline as the first choice of instillation solution in NPWTi (Kim et al, 2020). There exists some debate over whether this holds true for infected wounds. While the wound had positive swab cultures, most of the infected tissue had been removed during surgery and concurrent intravenous antibiotics were being administered. Thus to avoid any cytotoxic effects from antiseptic solutions, saline was chosen. A drawback of the 3M™ Veraflo™ system is the use of the 3M™ V.A.C.® Ulta Therapy Unit, which impacted on the patient's independence and mobility. He needed assistance to transfer into his wheelchair and the unit when placed on the back of his wheelchair decreased the chair's stability. A small unit would be beneficial for mobile, active patients.

There is no doubt that the use of Veraflo Therapy allowed such an extensive, infected wound to be cleaned and granulated to such an extent it was closed within 10 weeks of debridement. Using conventional dressings would have taken months, increased the length of stay, would likely have increased the risk of further infection and necessitated further surgeries for debridement or washout. Veraflo Therapy is a useful tool to have in the healing of infected PUs.

Kim PJ et al (2020) Negative pressure wound therapy with instillation: International consensus guidelines update. *Int Wound J* 17(1):174-186

Acknowledgement

Paula O'Malley would like to thank Kevin Cronin, Consultant Plastic Surgeon, for his involvement in this case.

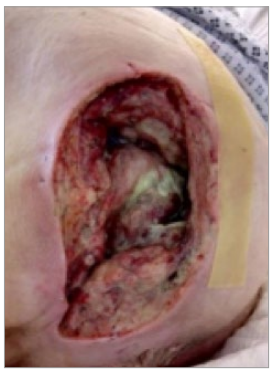

Figure 1. Day 3 post-operative

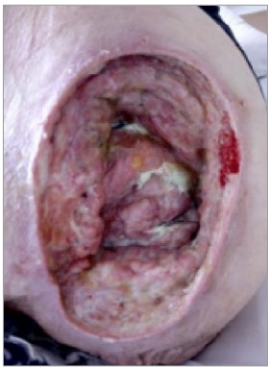

Figure 2. Day 7 post-operative (Day 4 of Veraflo Therapy)

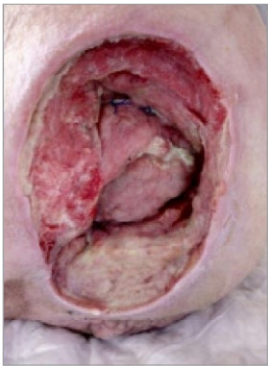

Figure 3. Day 13 post-op (Day 10 of Veraflo Therapy)

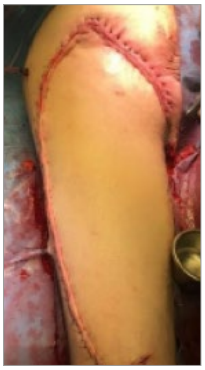

Figure 4. Flap reconstruction using thigh muscle moved over the left buttock

CASE 5: CATEGORY 4 BILATERAL HEEL PRESSURE ULCERS

Author: **Katie O'Shea**, Tissue Viability Nurse Specialist, Galway University Hospitals, Galway, Republic of Ireland

PATIENT PRESENTATION AND HISTORY

A 34-year-old female patient was admitted from a tertiary hospital with sepsis secondary to category IV pressure ulcers (PUs) to both heels. She underwent surgery to treat Cauda Equina syndrome 3 years ago, resulting in peripheral neuropathy and decreased mobility. On examination of the feet, all the soft tissue was displaced off bone posteriorly and medial laterally down to bone with significant wet necrosis (*Figure 1*). Bilateral dorsalis pedis pulses were present on Doppler ultrasound.

In clinical practice, evidence of exposed bone or probing to bone is moderately predictive of osteomyelitis, which allows for early commencement of medical treatment with magnetic resonance imaging (MRI) confirming diagnosis (Dinh et al, 2008). MRI of bilateral ankle/foot was performed to assess the extent of injury. Findings from the MRI were highly suspicious of osteomyelitis, the left foot being more affected than the right. There was exposed bone but no degradation or bone loss.

MANAGEMENT AND OUTCOMES

Osteomyelitis was treated with antibiotics as per microbiology results. Surgery was not required as deemed by the orthopaedic team.

The devitalised, necrotic tissue was sharp debrided at the bedside under local anaesthetic 2 days post-admission (*Figure 2*). 3M™ Veraflo™ Therapy was applied with propylbetaine-polyhexanide solution as irrigation fluid post-debridement. 3M™ V.A.C. Veraflo™ Dressing was applied to both heels, propylbetaine-polyhexanide solution was instilled for a 10-minute dwell time, followed by 3.5 hours of continuous negative pressure at –125 mmHg. V.A.C. Veraflo Dressings were changed twice weekly. After 2 weeks the instillation fluid was changed to sodium chloride (NaCl). There is limited evidence in the literature to support the use of propylbetaine-polyhexanide solution over NaCl (Kim et al, 2015). However, in view of the presentation of this patient, the clinicians favoured the antimicrobial properties of the antimicrobial propylbetaine-polyhexanide solution for initial treatment.

After 3 days of Veraflo Therapy, both wounds showed a marked improvement, with eradication of slough and evidence of healthy granulating tissue (*Figure 3*). There was increased granulation and epithelialised tissue in the wound bed, so that after 30 days of NPWTi-d, both heels were suitable for split-thickness skin grafting (STSG) (*Figures 4 and 5*).

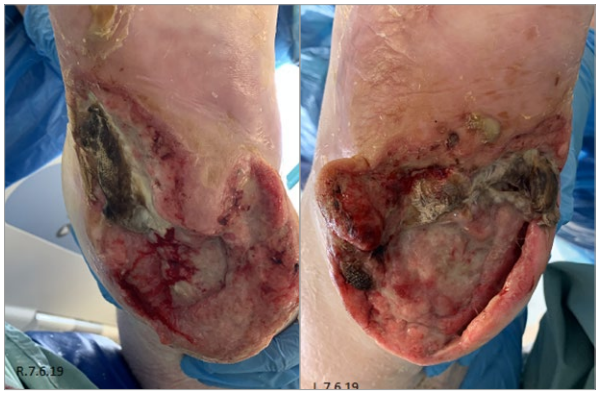

Figure 1. Initial presentation (Day 1)

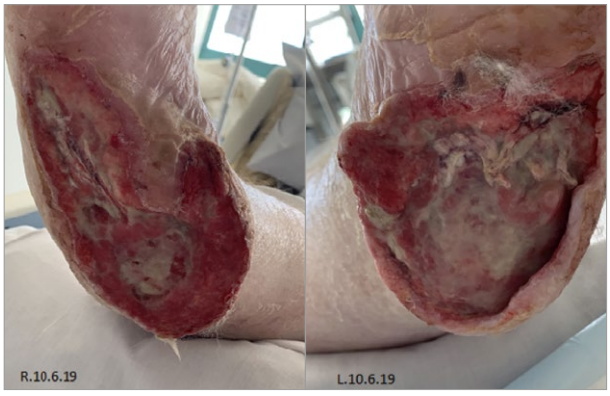

Figure 2. Following sharp debridement (Day 3)

CONCLUSION

The development of granulation tissue was rapid and vigorous considering the extent of the injury and the presence of infection and osteomyelitis. The STSG achieved 100% graft take and the patient was able to begin weight-bearing 2 weeks post-grafting and discharge.

This case study identifies the use of 3M™ Veraflo™ Therapy as a suitable aggressive therapy to optimise the wound bed. The patient was suitable for a STSG, rather than requiring a free flap graft, thus potentiating a reduced length of hospital stay, reduced physical and psychological impact of hospitalisation on the patient and reduced associated healthcare costs. Using Veraflo Therapy as an adjuvant to medical systematic management of the underlying infection and condition has potential positive implications for future use in the treatment of category III and IV heel PUs.

Dinh MT et al (2008) Diagnostic accuracy of the physical examination and imaging tests for osteomyelitis underlying diabetic foot ulcers: met-analysis. *Clin Infectious Dis* 47(4): 519–27

Kim PJ et al (2015) Comparison of outcomes for normal saline and an antiseptic solution for negative-pressure wound therapy with instillation. *Plast Reconstr Surg* 657 e–664e

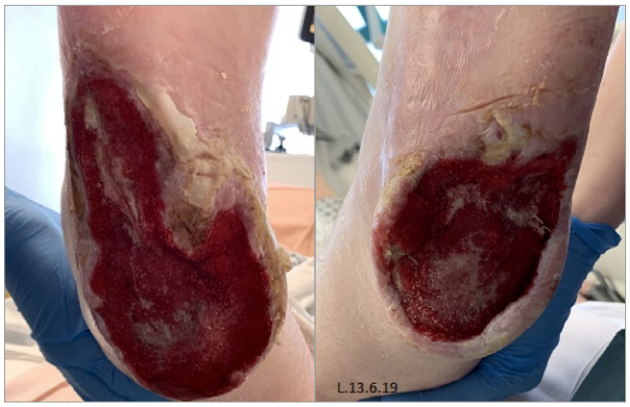

Figure 3. After 3 days of Veraflo Therapy (Day 6)

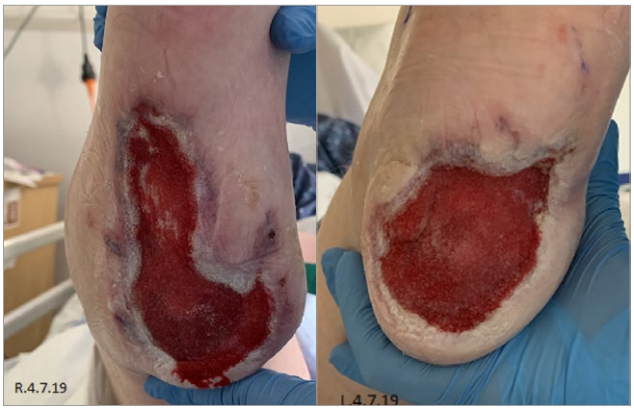

Figure 4. Consolidated wound prior to skin graft (Day 28)

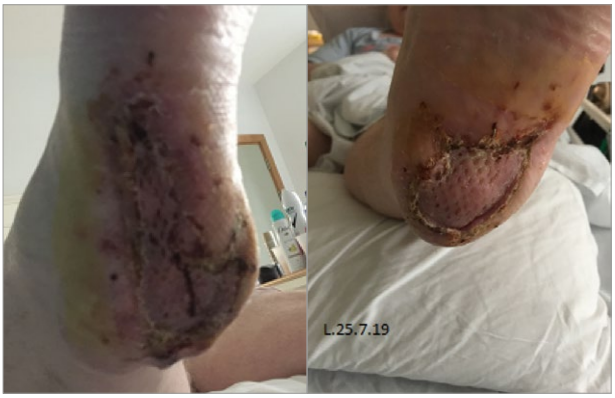

Figure 5. Healed wounds post-grafting (Day 49)

2nd prize

CASE 6: 3M™ VERAFLO™ THERAPY WITH THREE TYPES OF FILLERS IN TEMPORAL SUCCESSION FOR POST-TRAUMATIC NECROTIZING FASCIITIS AND AN INFECTED WOUND

Author: **Stefano Colognese**, Wound Care Specialist, Azienda USL, Presidio Ospedaliero ASMN-IRCCS, Reggio Emilia, Italy

PATIENT PRESENTATION AND HISTORY

An 81-year-old female pedestrian was hospitalised after being hit by a car. CT scans and traditional radiology identified sub-arachnoid haemorrhage, head trauma, thoracic trauma with multiple rib fractures, spinal trauma and vertebral fractures, trauma and fracture of the pelvis in multiple locations, multiple fractures in the left arm and forearm and multiple fractures to the femurs. She was in intensive care with a reserved prognosis.

After 2 weeks, the Wound Care Specialist was contacted by orthopedic surgeons to assess and treat an extensive cavity lesion on the medial side of the right thigh. Surgical debridement had been performed to remove most of the necrotic tissue.

The lesion had an area of 59.0 cm^2. The wound bed presented slough, yellow-black necrosis and signs of local infection: the exudate was abundant and purulent (dense, viscous, turbid, milky), yellow-brown in colour and odourous. The edges were necrotic, jagged, irregular, rounded, rolled and blocked. There was undermining (detachment) between 12 and 4 hours, detected with sterile specimen and clock/position technique. The periwound skin was red, hot and macerated, with the presence of oedema and cellulitis. Culture tests (blood cultures, deep biopsies, bronchial aspirate) were positive for infection (*Elizabethkingia meningoseptica, Enterobacter cloacae*, *Proteus vulgaris* group, *Acinetobacter* spp., *Stenotrophomonas maltophilia*) (*Figure 1*).

Initial empirical antibiotic with amoxicillin clavulanate, then, after antibiotic window and purulent evacuation of right thigh collection, Piperacillin Tazobactam + Vancomycin were administered for 10 days.

MANAGEMENT AND OUTCOMES

The wound was cleaned with a 0.05 % sodium hypochlorite-based solution using a cavity pack held in place for 10 minutes. 3M™ Veraflo™ Therapy with 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing was used according to the following method:

1) Protection of perilesional skin with 3M™ Cavilon™ No Sting Barrier Film
2) Additional protection of perilesional skin with a 'dam' using 3M™ V.A.C.® Advanced Drape (sterile transparent adhesive film)
3) V.A.C. Veraflo Cleanse Choice Dressing was cut and shaped to the wound and changed every 3 days
4) The filler was sealed and reinforced with V.A.C.® Advanced Drape
5) Central positioning of 3M™ V.A.C. VeraT.R.A.C. Duo™ Tube Set
6) Solution instilled: 500 mL of Physiological Solution + 500 mL of 0.05 % sodium hypochlorite; Instillation volume: 100 mL per cycle (every 3 hours, for a total of 8 washes in 24 hours); Infiltration time: 10 minutes
7) Duration V.A.C. Therapy: 3 hours post-infiltration; Target Pressure: –125 mmHg; Intensity: Medium; Device: 3M™ V.A.C.® Ulta Therapy Unit; Canister:

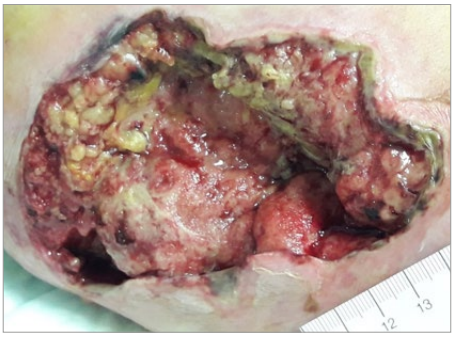

Figure 1. Initial assessment by the Wound Care Specialist (Day 0)

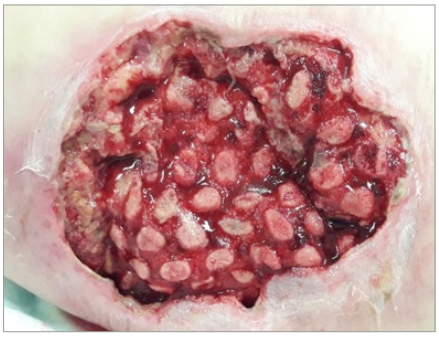

Figure 2. After 3 days of treatment with 3M V.A.C. Veraflo Cleanse Choice Dressing (Day 3 of 3M™ Veraflo™ Therapy)

INFOV.A.C.™ 1,000 mL Canister with Gel.

After 3 days of 3M™ Veraflo™ Therapy with 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing, the wound bed was cleansed with abundant tissue growth. The exudate was non-odourous and was at a moderate level. The periwound skin was slightly red but less oedematous (*Figure 2*). Therefore, it was decided to continue to cleanse and decontaminate the wound, changing only the type of filler to 3M™ V.A.C. Veraflo Cleanse™ Dressing.

Three days later (6 days of NPWTi-d), the devitalised tissue was removed and the wound bed comprised richly vascularised granulation tissue (*Figure 3*). The granulation tissue was developing and adapting and modelling itself to the morphology of V.A.C. Veraflo Cleanse Dressing. The periwound skin was normothermic and was not oedematous. The cellulitis had also resolved. All the signs and symptoms of inflammation and infection were in rapid regression.

The objective was now to promote growth of the granulation tissue, homogenising both the volume and the surface of the lesion. Therefore, the filler was changed to 3M™ V.A.C. Veraflo™ Dressing. The treatment method has remained unchanged.

After 7 days of Veraflo Therapy with V.A.C. Veraflo Dressing, the wound bed was almost completely homogenised with areas of epithelialised tissue. The undermining had been completely resolved, and there were no local signs of infection present (*Figure 4*).

Veraflo Therapy was discontinued and the patient was transferred to a respiratory rehabilitation centre. The wound continued to be managed with advanced dressings. A follow-up with the Wound Care Specialist was requested by the patient 2.5 months later. The wound had completely closed and re-epithelialised and a further follow-up was carried out 9 months after the trauma (*Figure 5*).

CONCLUSION

After only 13 days of Veraflo Therapy, this infected and deep wound improved dramatically (*Figure 1 to Figure 4*). The clinician's experience using Veraflo Therapy suggests that the most appropriate filler should be chosen based on wound bed conditions and treatment goals (e.g. cleansing, decontamination or granulation tissue growth). The management of this clinical case has clearly demonstrated that by varying the type of filler according to the development of the wound, the use of NPWTi-d can result in early achievement of treatment aims. The findings support work by Apelqvist et al (2017) that, in certain clinical situations, NPWTi is more beneficial than standard NPWT for the adjunctive management of acutely and chronically infected wounds that require hospital admission.

Apelqvist J et al (2017) EWMA Document: Negative Pressure Wound Therapy. Overview, challenges and perspectives. *J Wound Care* 26 (3): Suppl 3: S1–S113

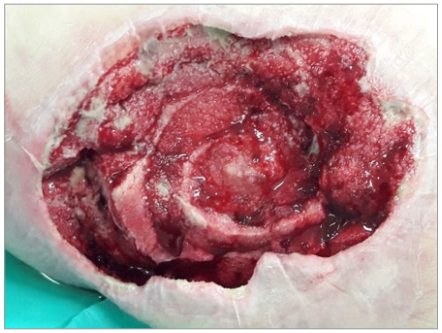

Figure 3. After 3 days of treatment with V.A.C. Veraflo Cleanse Dressing (Day 6 of 3M™ Veraflo™ Therapy)

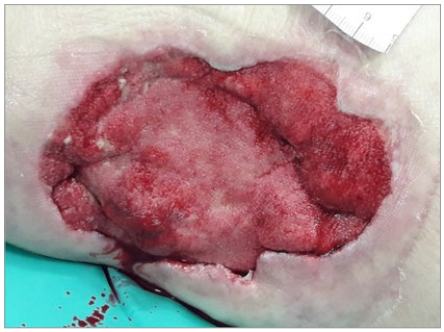

Figure 4. After 7 days of treatment with V.A.C. Veraflo Dressing (Day 13 of Veraflo Therapy)

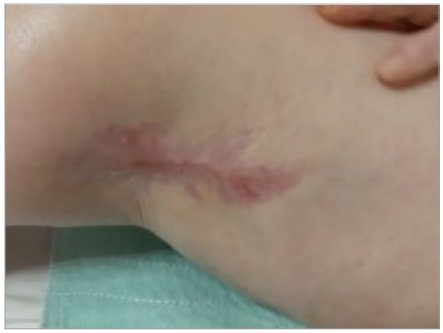

Figure 5. Healed wound 9 months' after the initial trauma

CASE 7: 3M™ VERAFLO™ THERAPY WITH TWO TYPES OF FILLERS IN TEMPORAL SUCCESSION FOR AN INFECTED LOWER LIMB VENOUS ULCER

Author: **Stefano Colognese,** Wound Care Specialist, Azienda USL, Presidio Ospedaliero ASMN-IRCCS, Reggio Emilia, Italy

PATIENT PRESENTATION AND HISTORY

A 64-year-old male patient with chronic bilateral lymphoedema was admitted to the Department of Infectious Diseases for an infected venous ulcer. He had a history of multiple hospital admissions for wound infection over the previous year (*Figure 1*). He lived alone, inconsistently adhered to treatment and only attended clinics when the situation becomes critical. The wound would be debrided with a curette (*Figure 2*). On discharge, the maintenance care would included cleansing with a polyiesanide/PHMB (polyhexamethylene biguanide) and betaine solution, silver sulfadiazine cream and a PHMB antimicrobial gauze in roll + superimposed sterile gauze. The wound was covered with a bandage with self-fixing cohesive gauze. The dressing needed to be changed at least every 24 hours due to the high levels of fluid saturating the dressings. The patient also had chronic renal insufficiency and acute urinary retention, due to benign prostatic hypertrophy. The patient was discharged and entrusted to home nursing assistance.

The patient was readmitted 9 months later as the wound was deteriorating and there were signs and symptoms of local and systemic infection: increased pain (pain score of 8; where 0=total absence of pain and 10=worst pain imaginable by the patient), erythema, oedema, local heat, odour, increased exudate levels and delayed healing.

The wound bed consisted of fibrin, slough, necrosis (yellow/black), unstable eschar (soft, moist, fluctuating), bleeding granulation tissue and friable granulation tissue (*Figure 3*). Exudate levels were extremely high and saturated more than 75% of the dressing. The consistency of the exudate was purulent (dense, viscous, turbid, milky), and it was yellow/cyan-green in colour suggestive of *Pseudomonas aeruginosa.*

The wound edges were macerated, irregular, jagged, infected, reddened, in extension, and the periwound skin was infected, macerated and hot, and there was presence of erythema, oedema and cellulitis. Antibiotic therapy with piperacillin-tazobactam was prescribed.

MANAGEMENT AND OUTCOMES

As the traditional treatment of debridement by dermatological curette and advanced dressing had not been successful, the Wound Care Specialist decided to use NPWTi-d to manage wounds. Veraflo Therapy was commenced with the rationale to promote healing and a less painful alternative to curette debridement. At first, the wound was cleaned with a 0.05 % sodium hypochlorite-based solution using a pack held in place for 10 minutes.

Veraflo Therapy with 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing was applied, according to the following method:

1) Protection of periwound skin with 3M™ Cavilon™

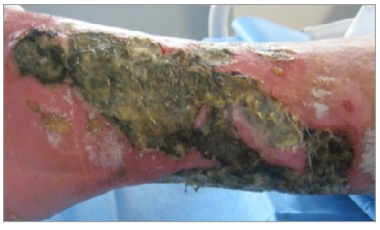

Figure 1. Appeareance of wound bed on previous hospital admissions (10 months prior to NPWTi-d therapy)

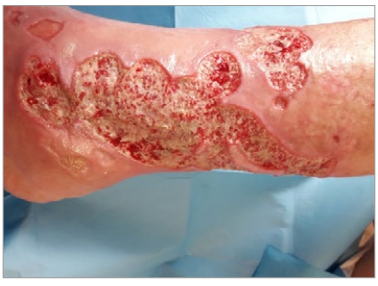

Figure 2. Wound bed after curette debridement on previous admission (10 months prior to NPWTi-d therapy)

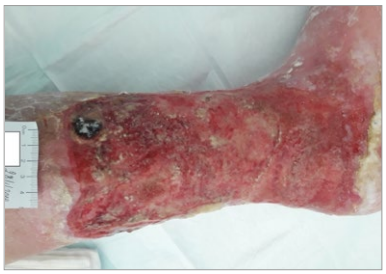

Figure 3. Wound bed at the new assessment (Day 0 of Veraflo Therapy)

No Sting Barrier Film

2) Additional protection of periwound skin with a 'dam' using 3M™ V.A.C.® Advanced Drape (sterile transparent adhesive film)
3) 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing was cut and shaped to the wound and changed every 2 days
4) The filler was sealed and reinforced with V.A.C.® Advanced Drape
5) Central positioning of 3M™ V.A.C. VeraT.R.A.C. Duo™ Tube Set
6) Solution instilled: 500 mL of physiological solution + 500 mL of 0.05 % sodium hypochlorite; Instillation volume: 100 mL per cycle (every 3 hours, for a total of 8 washes in 24 hours); Infiltration time: 10 minutes; Duration 3M™ Veraflo™ Therapy: 3 hours post-infiltration; Target Pressure: –125 mmHg; Intensity: Medium; Device: 3M™ V.A.C.® Ulta Therapy Unit; Canister: INFOV.A.C.™ 1,000 mL Canister with Gel.

After 2 days of treatment with V.A.C. Veraflo Cleanse Choice Dressing, the wound bed appeared to be clean and comprised of granulation tissue. There was complete removal of the fibrin, unstable eschar, pus and slough (*Figure 4*). Now that the wound bed was optimally cleansed and decontaminated, the primary objective was to promote growth of granulation tissue. The filler was changed to 3M™ V.A.C. Veraflo™ Dressing, and the same treatment settings were maintained.

After 2 days of treatment with V.A.C. Veraflo Dressing, the wound continued to improve (*Figure 5*). Unfortunately, the patient no longer wished to use NPWTi-d, so Veraflo Therapy was discontinued and the wound was managed with advanced dressings. Antibiotic therapy with a combination of piperacillin-tazobactam and NPWTi-d resulted in clear and obvious improvement to the wound and resolved infection.

CONCLUSION

Although there is limited rigorous randomised controlled trial evidence available on the clinical effectiveness of NPWT in the treatment of leg ulcers (Dumville et al, 2015; Apelqvist et al, 2017), in this case and in the experience of the clinician, NPWTi-d has produced optimal results in an extremely short time, reducing both the infection and the biofilm present on the wound bed in infected venous ulcers. The V.A.C. filler V.A.C. Veraflo Cleanse Choice softened and solubilised viscous exudate, wet slough, fibrin and other infectious materials and avoided the need for more painful curette debridement. The subsequent use of V.A.C. Veraflo Dressing promoted the growth of the granulation tissue and prepared the wound to accommodate an appropriate advanced dressing.

Apelqvist J et al (2017) EWMA Document: Negative Pressure Wound Therapy. Overview, challenges and perspectives. *J Wound Care* 26 (3): Suppl 3: S1–S113

Dumville JC et al (2015) Negative pressure wound therapy for treating leg ulcers. *Cochrane Database Syst Rev* 7(7):CD011354

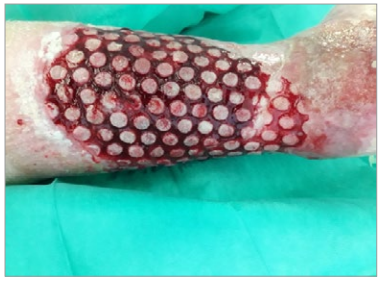

Figure 4. After 2 days of treatment with V.A.C. Veraflo Cleanse Choice Dressing (Day 2 of Veraflo Therapy)

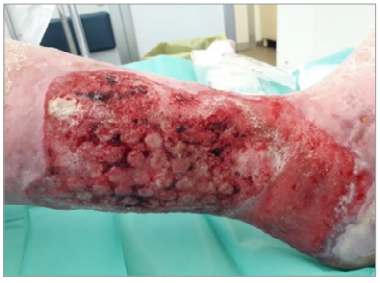

Figure 5. After 2 days of treatment with V.A.C. Veraflo Dressing (Day 4 of Veraflo Therapy)

CASE 8: COMPLEX DIABETIC FOOT ULCER

Author: **Sameer Al Assar,** Consultant Physician, Rashid Hospital, United Arab Emirates

PATIENT PRESENTATION AND HISTORY

A 64-year-old male patient was admitted with a diabetic foot ulcer (DFU) to his left foot. The DFU extended from the heel to plantar, to lateral and medial to lateral side (*Figure 1*). The wound bed was highly sloughy and necrotic tissue was present. Debridement performed twice on day 2 and day 11 (*Figure 2*).

On day 16, the wound bed comprised 20 % granulation tissue, 20 % dry slough, and 60 % necrotic tissue. The wound was probed to Calcaneal bone and there was multiple tunneling in different area of the wound. There was moderate, purulent discharge and foot swelling and erythema in the periwound area.

MANAGEMENT AND OUTCOMES

The DFU was washed with betadine, super-oxidised water solution* and chlorohexidine wash, and ultrasonic debridement was performed.

*Oxidised water (99.97 %), sodium hypochlorite (NaOCl) 0.004 %, hypochlorous acid (HOCl) 0.003 %, sodium chloride (NaCl) 0.023 %

On Day 16, 3M™ Veraflo™ Therapy was initiated (20 mL super-oxidized water solution, 3-minute soak time, and 3 hours V.A.C. cycle on –125 mmHg) using 3M™ V.A.C. Veraflo™ Dressing. Veraflo Therapy was used for 1 month alongside complete offloading of the left foot, glycaemic control and nutritional support. The dressing was changed three times a week. After 1 month, the wound comprised 70 % granulation tissue and 30 % slough. There was moderate serous discharge and no malodour (*Figure 3*).

Therefore, V.A.C. Veraflo Dressing was discontinued on day 47 and 3M™ V.A.C.® Granufoam™ Dressing was used for 34 days. The same standard care was continued.

On day 89, 8 days after Veraflo Therapy was discontinued, the patient underwent a split-thickness skin graft from the medial aspect of the thigh. The graft was dressed with INADINE™ PVP-I Non-Adherent Dressing and covered with a secondary silver foam dressing (*Figure 4*). After 4 weeks (Day 112), the graft has taken in almost 80% of wound surface area (*Figure 5*).

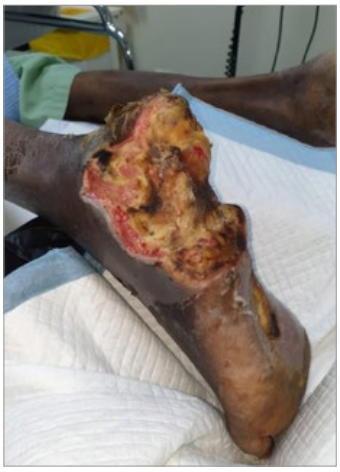

Figure 1. Foot upon admission (Day 1)

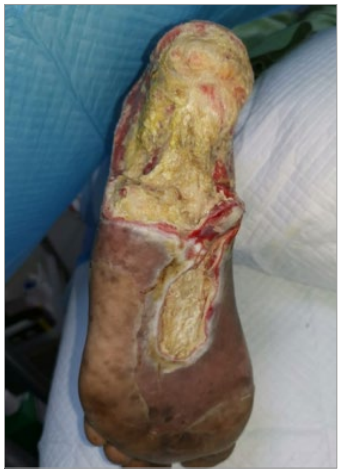

Figure 2. After 2 sessions of debridement (Day 11)

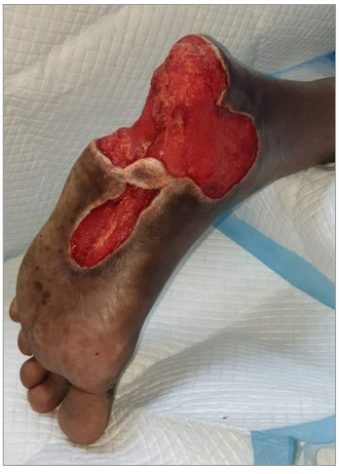

Figure 3. After 1 month of Veraflo Therapy with V.A.C. Veraflo Dressing (Day 47)

CONCLUSION

The use of negative pressure in conjunction with instillation provides an important evolution in the NPWT concept with the potential added benefit of supplying an antimicrobial solution to the wound bed (Kim et al. 2013). NPWTi-d can be used to treat DFUs as per 100% consensus agreement (Kim et al, 2013).

Some studies indicated that use of NPWT can minimize the rate of lower extremity amputation in diabetic patients versus use of moist wound healing dressing (Frykberg and Williams, 2007; Bernstein et al, 2005). It is empirical to understand the challenges remain with regards to accurate diagnosis, and effective and appropriate treatment, of wound infection. Yet, there is a need to focus on building a strong evidence base for use of NPWTi-d as an advanced treatment for complex wounds and as an adjunct in the management of infected wounds along with debridement and antibiotic therapy. Therefore, it would be of significance to document success and failures using such modality on different complex DFUs and share experiences and to collect data from randomised controlled trials to help build the evidence base.

Bernstein BH, Tam H (2005) Combination of subatmospheric pressure dressing and gravity feed antibiotic instillation in the treatment of post-surgical diabetic foot wounds: a case series. *Wounds* 17(2): 37-48

Frykberg RG, Williams DV (2007) Negative-pressure wound therapy and diabetic foot amputations: a retrospective study of payer claims data. *J Am Podiatr Medic Assoc* 97(5): 351–9

Kim PJ et al (2013) Negative-pressure wound therapy with instillation: international consensus guidelines. *Plast Reconstr Surg* 132(6): 1569-79.

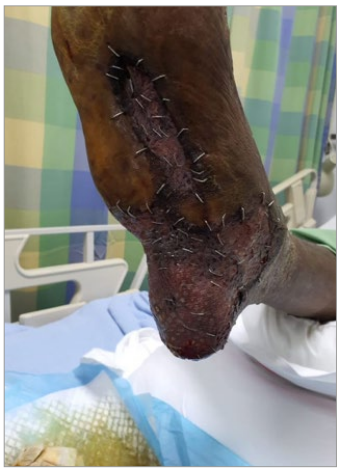

Figure 4. Day 5 post-skin grafting (Day 94)

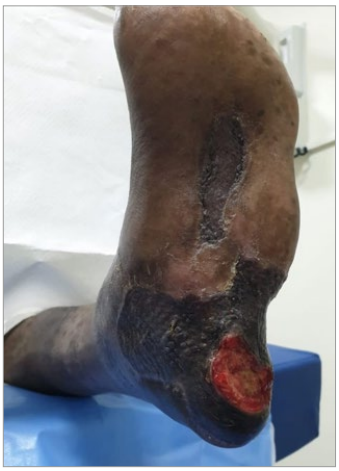

Figure 5. Follow-up 4 weeks postoperative (Day 112)

CASE 9: A PATIENT WITH HIGH PAIN AND ANXIETY AND LOWER LIMB NECROTISING FASCIITIS

Author: **Usha Sharma**, Tissue Viability Specialist Nurse, The Royal Wolverhampton NHS Trust, Wolverhampton, United Kingdom

PATIENT PRESENTATION AND HISTORY

A 72-year-old female patient was admitted via the Emergency Department with sepsis. First impression in medical notes was of cellulitis of legs (*Figure 1*). The lady had a complex past medical history including irritable bowel syndrome, asthma, diabetes, chronic kidney disease, Pyoderma gangrenosum, osteoarthritis and vasculitis.

MANAGEMENT AND OUTCOMES

The patient underwent two surgical debridement procedures over the course of 2 days. A second debridement was required due to extensive spread of necrotising fasciitis, extending to the foot.

Postoperative in intensive care, a referral to the Tissue Viability (TV) Team was requested to assess the leg wound following extensive surgical debridement of the patient's left leg. The leg wound started on the dorsum of the foot to below knee, fasciotomy medially exposing muscle, tendon, ligaments, fascia, total length 40 cm circumferential (*Figure 2*). The patient was ventilated and unstable. Pain was expressed during dressing changes from facial expressions and analgesia was increased before continuing the procedure. Discussions on the viable options were held between the TV Team and Plastics Team.

The wound bed was sloughy, and there was exposed tendon and muscle and no granular tissue; *Figure 3* captures the severity of the non-viable tissue. The patient was being treated for ongoing sepsis with antibiotics and it was apparent the infection was still a risk to this patient. The TV Team referred to clinical nurse advisors from 3M to conduct a joint assessment for 3M™ Veraflo™ Therapy. The patient had been to theatre twice and the surgeons were keen avoid more surgery. Veraflo Therapy was the preferred option for the viability of this patient's leg healing.

Five pieces of 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing were used and changed three times per week with 3M™ V.A.C. VeraT.R.A.C.™ Pad. Hydrocolloid and 3M™ Cavilon™ No Sting Barrier Film (contained in 3M™ V.A.C. Veraflo™ Dressing Kit) were applied to periwound and silicone contact layer to protect ligaments and muscle. Veraflo Therapy was set to pressure –125 mmHg, 2 hours cycle with a 10-minute dwell time with saline.

Dressing changes initially took two TV nurses (TVNs) and a 3M clinical advisor or ward staff member 2–3 hours. After 9 days of treatment with V.A.C. Veraflo Cleanse Choice Dressing with the dressing changed three times per week, significant granulation was achieved (*Figure 4*).

The TVN made a referral to the pain specialist team and requested an anxiety review by ward doctors. Analgesia was reviewed and prescribed as needed,

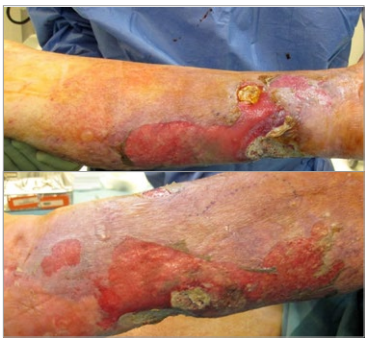

Figure 1. Initial presentation

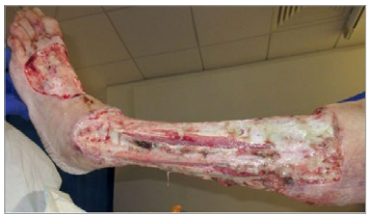

Figure 2. After three surgical debridement procedures to remove necrotic tissue

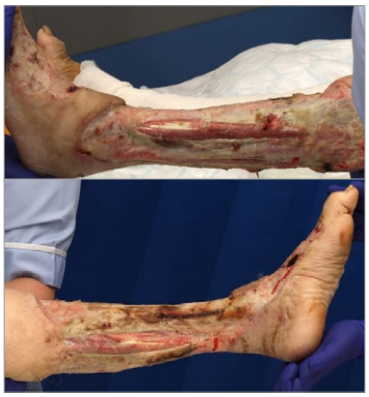

Figure 3. Prior to application of Veraflo Therapy

and anti-anxiety medication was prescribed before dressing changes, and nitrous oxide (gas and air) was used during dressing changes. The patient's favourite music was played at dressing changes to reduce anxiety and a nurse would talk to the patient as a diversional therapy. Wound dressing changes continued, and progress with wound healing captured after 16 days (*Figure 5*).

After 4 weeks and 4 day (32 days) of 3M™ Veraflo™ Therapy, substantial levels of granulation tissue were observed (*Figure 6*) and the wound was ready for a skin graft. The patient continued to display low moods, and the TVN requested depression score/assessment from ward doctors as it was so important to manage this patient's anxiety as her pain was heightened by her anxiety and this could have compromised the use of Veraflo Therapy.

Day 14 after the skin graft (*Figure 7*), the patient was transferred to a rehabilitation clinic and subsequently discharged with a home care package in place. Both legs went on to fully heal (*Figure 8*).

CONCLUSION

TVNs recognised the importance of a holistic approach to wound care and to supporting the patient's anxieties during dressing changes. A collaborative approach with the multidisciplinary team, including the plastic team and ward staff to administer pain and anti-anxiety medication before the TVN visited, ensured optimum patient comfort and increase TVN efficiency.

For this patient, 3M™ V.A.C. Veraflo™ Dressings helped to cleanse the wounds by helping to soften and gently vacuum viscous exudate, wet slough, fibrin, and other infectious materials. No further debridement was required in theatre after Veraflo Therapy application.

It is the clinician's impression the patient avoided a amputation due to the use of Veraflo Therapy.

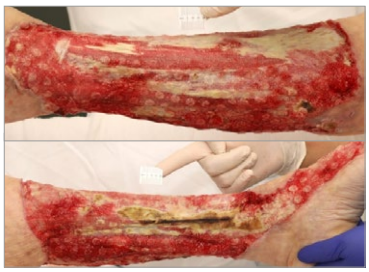

Figure 4. Day 9 of Veraflo Therapy

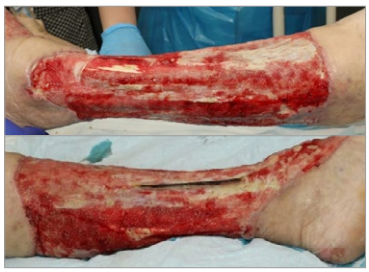

Figure 5. Day 16 of Veraflo Therapy

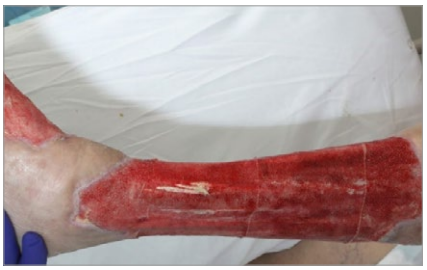

Figure 6. 32 days of Veraflo Therapy

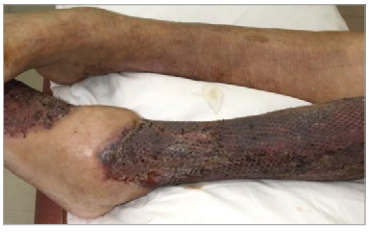

Figure 7. Day 14 post-skin graft

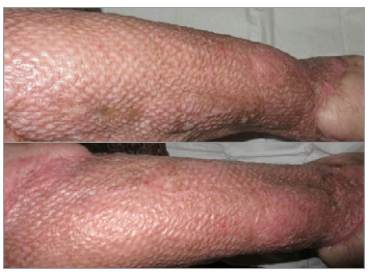

Figure 8. 8 months' post-skin graft

CASE 10: CHRONIC LOWER LEG ULCERATION DUE TO NON-UREMIC CALCIPHYLAXIS

Authors: **Alison Sims**[1], Lead Clinical Nurse Specialist; **Chris Paton**[1], Clinical Nurse Specialist; **Leanne Gane**[1], Clinical Nurse Specialist

[1]Tissue Viability, Salisbury NHS Foundation Trust

PATIENT PRESENTATION AND HISTORY

A 61-year-old patient was admitted due to possible sepsis attributed to lower leg ulceration. The patient had a past medical history of type 2 diabetes, significant cardiac hypertension, extensive left subclavian deep vein thrombosis, bilateral non-occlusive pulmonary emboli, previous cardiac arrest following general anaesthetic, non-ST-elevation myocardial infarction and heart failure. Wound swabs showed colonisation of Meticillin-resistant *Staphylococcus aureus* (MRSA), multi-resistant *Pseudomonas* and *Candidemia*. Initially pyoderma gangrenosum was diagnosed but it was ultimately confirmed as non-uremic calciphylaxis (Box 1). The wound had been present for over a year, and at assessment by the Tissue Viability Team, the ulcer covered approximately 75 % of the lower leg and comprised 100 % slough. There were high levels of exudate and it was extremely painful and infected.

Initial progress was made using larval therapy to debride slough while the patient received antibiotic treatment for the infection. After four courses of larvae therapy, progress appeared to stall (*Figure 1*). A below-knee amputation was ruled out due to the patient's medical history and inability to survive general anaesthesia. Therefore, NPWT was considered the most appropriate option for this patient.

Box 1. Non-uremic calciphylaxis

Non-uremic calciphylaxis is a rarer condition than calciphylaxis with uncertain pathophysiology (Gommes et al, 2018). It has a high mortality rate of between 52 % and 81 %, with the main cause attributed to sepsis (Truong et al, 2019).

MANAGEMENT AND OUTCOMES

Before starting NPWTi-d, the patient's tolerance and pain had to be considered. Previously, dressing changes had been undertaken with nitrous oxide (gas and air) and regular analgesia. After discussions with the pharmacy and Plastics Consultant, a saline wash with topical wound anaesthetic was delivered through the 3M™ Veraflo™ Therapy. This gave the benefit of regular pain relief directly to the wound bed. 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing was applied to the ulcerated area and Veraflo Therapy was set to –125 mmHg, 5-hour cycle, 200 mL of fluid with a 5-minute dwell time (1000 mL bag in 24 hours).

Frequency of dressing changes were twice a week — usually every 3–4 days. The wound soak function on the 3M™ V.A.C.® Ulta Therapy Unit made dressing changes less traumatic by lifting the foam from the wound bed (*Figures 2–4*). Dressing changes were carried out initially using nitrous oxide plus oxycodone when needed, but this was not tolerated.

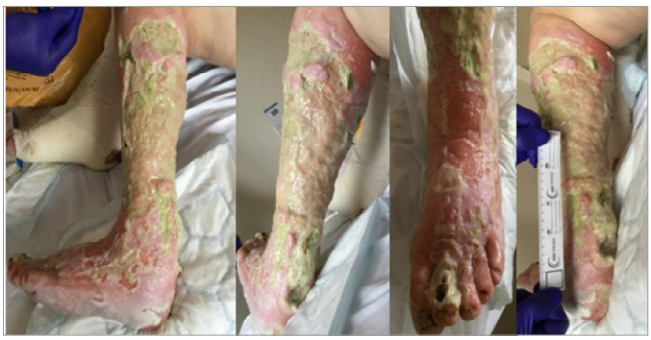

Figure 1. After 3 weeks of larvae therapy

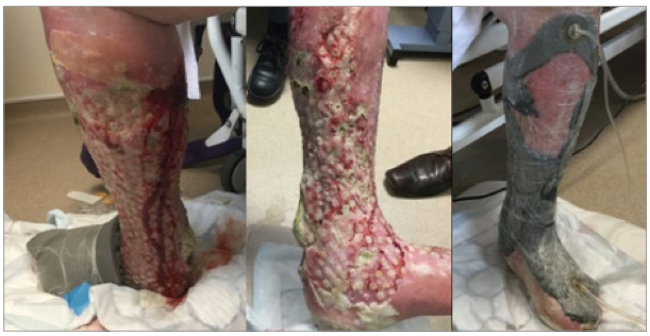

Figure 2. Day 3 of Veraflo Therapy

After seeking advice from the anaesthetic department, a methoxyflurane inhaler was adopted to great effect.

Once the slough was successfully removed, 3M™ V.A.C. Veraflo Cleanse Choice™ Dressing was discontinued and 3M™ V.A.C. Veraflo™ Dressing was commenced. This regimen helped to keep the ulceration clean and dry, and also assisted in flattening the wound bed before grafting (*Figure 5*).

The first skin graft to the upper outer aspect of lower leg was 100% take (*Figure 6*). 3M™ V.A.C.® Granufoam™ Dressing was applied to the skin graft and instillation was discontinued for 1 week before returning to 3M™ Veraflo™ Therapy. The patient reported a significant reduction in pain, which led to increased appetite, the ability to commence physiotherapy and achieving a full night's sleep for the first time in 6 months.

CONCLUSION

It is the authors' opinion that the application of NPWT coupled with instillation of topical anaesthetic ultimately led to the drastic improvement of the patient's condition. The chances of sepsis occurring had been dramatically reduced, quality of life had been increased and life expectancy was potentially extended.

Gomes F et al (2018) Non-uremic Calciphylaxis: a rare diagnosis with limited therapeutic strategies. *Eur J Case Rep Intern Med* 5(12):000986

Truong D et al (2019) Non-ureamic caliphylaxis successfully treated with pamidronate infusion. *Int Wound J* 116(1):250-255

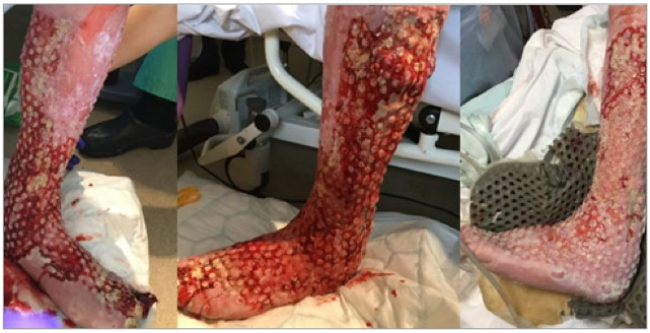

Figure 3. Day 8 of Veraflo Therapy

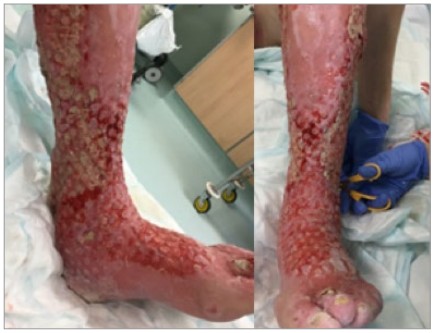

Figure 4. Day 11 of Veraflo Therapy

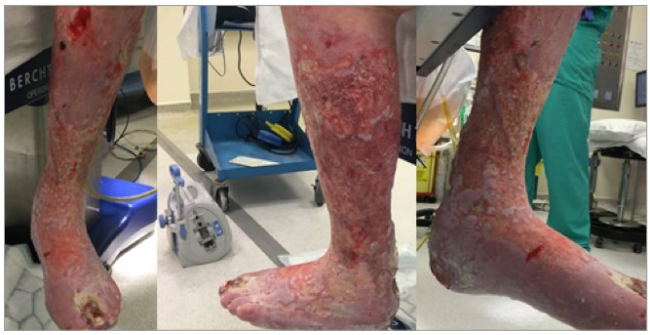

Figure 5. Before the first split-thickness skin graft

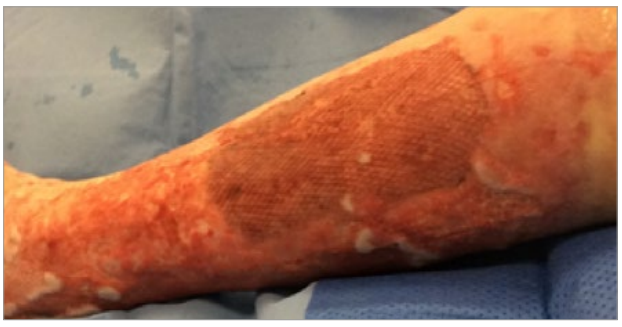

Figure 6. First split-thickness skin graft

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