

V.A.C VERAFLU CLEANSE CHOICE™ therapy for a chronic non-healing foot wound after ray amputation for gangrene of the big toe



Presented here is the case of a 65-year-old patient with arteriopathy whose foot wound failed to heal even after successful revascularization of her leg by angioplasty and several weeks of V.A.C VERAFLU™ Therapy (Acelity). However, the application of the V.A.C. VERAFLU CLEANSE CHOICE dressing in conjunction with V.A.C VERAFLU therapy yielded good results.

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There is no single, succinct or accepted definition of a “complex foot wound” and, at present, the term appears to be a mixed-basket catch-all for difficult-to-heal foot wounds complicated by large surface areas, persistent infections, excessive exudate, prolonged healing durations, comorbidities or polypharmacy (Vowden, 2005). Most clinicians are familiar with the frustration when, after using conventional wound therapy, wounds fail to heal and patients appear to be destined for inexorable limb loss. Despite the plethora of dressings, sprays, creams and devices available to clinicians and multidisciplinary teams, the management of complex wounds remains immensely challenging, and all too often turning the tide in favour of healing feels more like a win for trial-and-error than modern medicine. Often the end result is limb amputation after a prolonged course and multiple expensive “fringe” therapies. This journey is an emotional rollercoaster for patients who often end up depressed, especially after losing a limb (Pedras et al, 2018).

V.A.C. VERAFLU CLEANSE CHOICE is a relatively new foam dressing, which was launched globally in March 2017, and replaces the standard VERAFLU foam dressing (V.A.C.® GranuFoam™). The dressing is used in conjunction with the V.A.C.Ulta™ machine for negative pressure wound therapy with instillation and dwell time. There have been a few favourable reports describing success with its use in the treatment of complex wounds.

V.A.C VERAFLU CLEANSE CHOICE

The dressing, which at first appears deceptively similar to other V.A.C. foams, has a novel three-layered design, using reticulated open-cell foam. The first layer, which is in direct contact with the wound, is perforated with 1 cm holes with 5 mm spacing, followed by two cover layers [Figure 1]. Acelity states that the design of the foam promotes wound cleansing and facilitates the removal of fibrin, slough, thick wet exudate and other infectious material, in order to allow continued wound cleansing when surgical debridement is not possible or must be delayed.

Literature on CLEANSE CHOICE is scarce. Most papers are case reports detailing positive results in complex wounds. Hall et al (2017) described a patient with a chronic, 4-year-old deep stage 4 pressure ulcer of the sacrum that responded well to debridement, a colostomy and 10 (discontinuous) days of V.A.C VERAFLU with CLEANSE CHOICE dressing.

Eguare et al (2016) described the outcomes of CLEANSE CHOICE in three patients: one was a patient with significant comorbidities who had a sloughy, partial-thickness abdominal wound dehiscence after laparotomy, small bowel resection and ileocaecal anastomosis; one had a deep tissue injury to the buttock that was unsuitable for formal debridement in the operating theatre; and one had a diabetic heel ulcer and developed postoperative wound infection after debridement. Modest improvements appeared to occur in all three wounds, with reduced slough and exudate



Figure 1. The multi-layered reticulated open cell foam, or 'Cleanse Choice' (KCI, 2018)

and initiation of granulation, after one or two cycles of CLEANSE CHOICE.

The largest study to date detailing CLEANSE CHOICE is by Téot et al (2017). The authors claimed the distinction of being the first to report on the use of V.A.C. VERAFLU Therapy with CLEANSE CHOICE dressing. They retrospectively studied 21 patients with large, complex pressure ulcers or burns and necrosis after skin excision. The wounds reportedly contained substantial areas of devitalised tissue and/or yellow fibrinous slough. They found that 20 out of 21 wounds displayed rapid granulation tissue formation under the portion of the foam directly in contact with the wound bed, and that most of the non-viable tissue was removed at the first dressing change after 3 days of therapy. The technique for the application of CLEANSE CHOICE dressing is well described by Téot et al (2017).

Case report

Mme T is a 65-year-old Chinese female with a past medical history of type 2 diabetes, end-stage renal failure (for which she was receiving haemodialysis), a previous cerebrovascular accident with good functional recovery, hypertension and hyperlipidaemia. She presented with gangrene of the right big toe several days after hitting her toe against a chair, after which the toe became increasingly discoloured [Figure 2]. She was anorexic and had been eating poorly.

On examination, she was febrile and the big toe was gangrenous and non-viable. Her white cell count was 24 and her blood glucose was 30 mmol/L. Her ketones were not elevated.

An arterial duplex scan showed subacute or chronic occlusion of the right superficial femoral artery (SFA) [Figure 3a] with multifocal

moderate to severe stenoses of the anterior tibial artery (ATA) [Figure 4a] and a few moderate stenoses of the peroneal artery; the posterior tibial artery (PTA) was occluded. Toe pressures were poor at 28 mmHg.

The toe was dressed with twice-daily povidone iodine gauze dressing and Mme T was listed for an emergency right big toe ray amputation and early angioplasty.

Ray amputation was performed uneventfully the next day, followed by leg angioplasty the day after.

This was done via an antegrade approach through a 6F sheath. The SFA occlusion was crossed with a V-18 0.018" wire (Boston) and angioplasty performed using a 5 x 150 mm Mustang balloon with good result [Figure 3b]. Angiography demonstrated a segmental severe proximal stenosis with a moderate focal distal stenosis of the ATA, which was treated with a Mustang 3 x 100 mm balloon [Figure 4b]. The run-off to the plantar arch was via an attenuated deep plantar artery, which was also treated with a Mustang 2 x 120 mm balloon [Figure 5a]. The peroneal artery was patent, while the PTA was chronically occluded; both were left alone. The final angiogram showed straight-line flow to the foot via the ATA [Figure 5b].

At wound inspection the next day, there was a large swathe of what appeared to be dermal gangrene ascending to the ankle with severe bullae formation [Figure 6]. Debridement done at the bedside showed that the underlying tissue was ischaemic but somewhat viable [Figure 7a; b]. There were now notably two wounds separated by a hyperaemic, unhealthy skin bridge.

The patient underwent further debridement of the wounds and was initiated on V.A.C



Figure 2. Extent of gangrene of the big toe

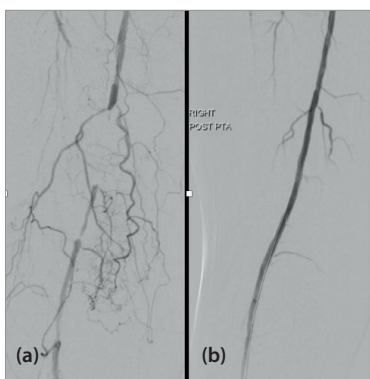


Figure 3. Distal SFA segmental complete total occlusion (CTO) and stenoses [a] reopened after wire crossing and angioplasty [b]

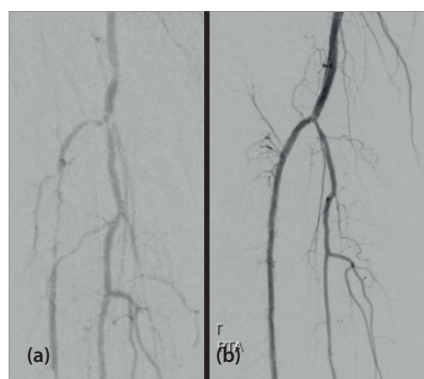


Figure 4. Segmental proximal anterior tibial artery near-CTO [a], which was much improved after wire crossing and angioplasty [b]

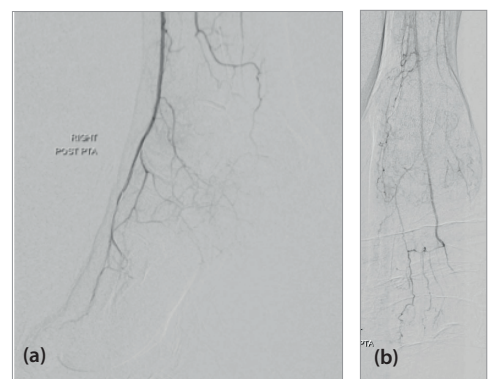


Figure 5. Post angioplasty of the severely attenuated deep plantar artery, there was a good result with flow to the second toe [a] and to the forefoot [b]



Figure 6. The wound showed extensive discolouration and bullae formation after big toe ray amputation and angioplasty

therapy with standard V.A.C.[®] GRANUFOAM[™]. Regular bedside debridement was performed with each dressing change. However, the wound remained fairly static with poor granulation and persistently heavy slough and eschar after a week [Figure 8a; b]. Wound cultures from both the index and the second operation returned penicillin-sensitive group-B *Streptococcus*, and antibiotics were tailored accordingly.

The patient underwent a further debridement in the operating theatre. Intraoperatively, the second toe metatarsal-phalangeal joint capsule was found to be involved and a second toe ray amputation was performed. Wound therapy was escalated to V.A.C. VERAFLOR[®] therapy with normal saline as the irrigant. After a further 2 weeks of VERAFLOR[®] therapy, there was some small improvement in the proximal wound at the ankle [Figure 9a] but the foot wound remained largely static with only slight granulation proximally and with a persistently heavy slough and biofilm burden [Figure 9b]. Overall progress was disappointing. The arterial duplex scan was repeated and showed that the SFA and ATA were still patent; toe pressures were fair at 68 mmHg. The magnetic resonance imaging scan did not show any evidence of osteomyelitis.

The patient was offered a below-knee amputation *versus* a high-risk angioplasty to recanalize the PTA via a round-the-arch approach but declined both options as she had a strong desire to continue ambulating on her own limb.

At this point, the CLEANSE CHOICE dressing became available in Singapore and the patient was commenced on V.A.C. VERAFLOR[®] CLEANSE CHOICE therapy.

After one cycle of CLEANSE CHOICE there was slight improvement, with the appearance of a thin diffuse layer of granulation across the superior half of the foot wound, most densely in the proximal half [Figure 10a; b]; however, wound interpretation with the CLEANSE CHOICE is somewhat challenging as the wound bed takes on an unfamiliar “nodular, papular, topographical” appearance.

After a further cycle of CLEANSE CHOICE the improvement became more evident, with a thickening of the granulation over the proximal half of the foot wound [Figure 11a; b]. One of the unexpected benefits of the CLEANSE CHOICE dressing was that surface desloughing of the raised “hillock-like” papules was extremely simple to perform at the bedside with a blade – the slough could be skimmed off with a single hand.

The patient underwent a further month of therapy with CLEANSE CHOICE in conjunction with hyperbaric oxygen therapy. Her wound improved steadily, with granulation marching across the wound surface and a marked reduction in slough production. After a month, the patient’s entire wound surface had granulated over and her therapy was downgraded to the ActiV.A.C.[™] Therapy System. After another week, her consultant arranged for an index operation 3 months later and a plastic surgery consultation was obtained for definitive skin cover.

Discussion

In this case report, the authors used CLEANSE CHOICE as a last resort after the patient failed to respond adequately to conventional VERAFLOR[®] with GranuFoam. It is unclear why CLEANSE CHOICE outperformed conventional



Figure 7a and b. After bedside deblistering, the underlying tissue appeared to be unhealthy but was not overtly necrotic. There were two wounds separated by an unhealthy skin bridge at this time



Figure 8a and b. After a week of Vac therapy and bedside debridement the wounds remained unhealthy with rapid reaccumulation of slough and eschar over the bulk of the wound surface

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Figure 9a and b. After an additional 2 weeks of V.A.C.VERAFLO therapy with normal saline therapy, progress was extremely slow

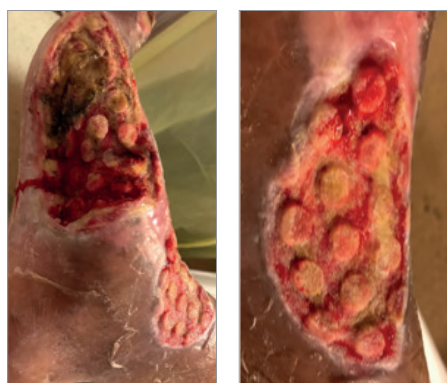


Figure 11a and b. After a second cycle of CLEANSE CHOICE, the improvement was much more evident



Figure 10a and b. After a single cycle of CLEANSE CHOICE there was a suggestion of improvement in the dorsal half of the wound



Figure 12a and b. After a month of CLEANSE CHOICE and an additional week of ActiV.A.C Therapy, the wound was doing well enough to consider definitive skin coverage

VERAFLOW with GranuFoam. The authors postulate that it could be due to the stated mechanism of continued mechanical debridement during NPWT and NPWTd-i (dwelltime and instillation), preventing the build-up and establishment of slough and eschar and keeping the wound bed clean of infection, necrosis and associated metalloproteinases and other factors impeding healing, or else due to the ease of desloughing previously described where unhealthy sloughy areas are literally raised up as discrete hillocks and presented to the clinician for sharp debridement.

This is the first reported use of CLEANSE CHOICE dressings in Singapore, in a patient with extensive comorbidities including diabetes mellitus, end-stage renal failure and critical limb ischaemia. She had a particularly challenging wound to treat, which was faring poorly after conventional wound care, with excessive slough and eschar and minimal granulation despite NPWT and NPWTd-i. She

underwent a much longer duration of CLEANSE CHOICE compared to the other patients described in the literature, possibly in part due to her wound being in the foot and less well vascularized due to existing critical limb ischaemia. She was fortunate to receive therapy and has made unprecedented progress to the point of consideration for skin coverage.

While this is only one case report, the evidence for CLEANSE CHOICE remains low-level and there are not as yet any randomized controlled trials, this paper adds to the accumulating body of evidence supporting its use in complex wounds. The authors are hopeful that this newest addition to their armamentarium may represent the transformation of complex wound healing from a poorly understood “art” to a highly replicable science in the near future. As an addendum, by the time of submission our patient had undergone successful split skin graft coverage of both wounds with 100% graft take. **WAS**