Successful management of wounds in individuals living with diabetes with a local treatment of polyabsorbent fibres with silver dressings and nano-oligosaccharide factor dressings: a case series from Vietnam

The management of wounds in people living with diabetes presents clinicians with numerous challenges. Due to the nature of the underlying disease, these wounds often take a long time to resolve and can become complicated. Clinicians look for evidence-based and guideline-recommended management protocols to provide the most effective solutions for these wounds. The Ministry of Health in Vietnam recommends the use of polyabsorbent fibre dressings with silver-impregnated lipido-colloid dressings (TLC-Ag) for the management of local wound infection, and the use of lipido-colloid dressing impregnated with sucrose octasulfate (nano-oligosaccharide factor) dressings (TLC-NOSF) to shorten healing times of wounds in people with diabetes. This clinical evaluation presents the management of four cases using TLC-Ag and TLC-NOSF dressings. In all four cases, the results were positive and provided the authors with a clear insight why the recommendations advise the use of these dressings. In all the cases presented, the clinical signs and symptoms of infection were resolved in a short period and progression of healing was rapid, with no adverse events reported.

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- Diabetes-associated wounds
- Evidence-based practice
- Polyabsorbent fibres with silver

Diabetes is a complex metabolic disease that affects an ever-growing number of individuals globally — according to the World Health Organization (2024), the number of people with diabetes rose from 200 million in 1990 to 830 million in 2022, and about 25% of these people develop diabetes-associated wounds (Patel et al, 2018; Dasari et al, 2021). Diabetes has been described as a "silent epidemic", where the body cannot produce any or enough insulin or cannot effectively use the insulin it produces. It can cause blindness, kidney failure, heart attacks, stroke, and lower-limb amputation, among other medical issues (Broom and North, 2024).

The International Diabetes Federation (2021) states that 1 in 11 adults, equating to 90 million people, are living with diabetes in Southeast Asia. In Vietnam specifically, diabetes imposes a significant burden, with a nationwide prevalence of 6.0% (2017), which is approximately 5 million adults diagnosed with diabetes (Ton et al, 2020).

Wounds in people living with diabetes

Wounds, especially complex wounds, are a major determinant for the health-related of quality of life of affected individuals, negatively impacting on the psychosocial aspects of everyday life (Ratliff and Rovnyak, 2021). Wounds in people with diabetes pose a particular problem, because the disease causes several pathological changes that impair almost all the stages of the healing processes (Dasari et al, 2021). Chronic hyperglycaemia damages vasculature, causing ischaemia, and wounds are characterised by excessive inflammation, decreased angiogenesis, disrupted keratinocyte migration and decreased fibroblast proliferation, leading to an increase in the number of wound complications, including infections, wound dehiscence and nonhealing wounds (Dasari et al, 2021).

Infection is a frequently reported key complication in the field of wound management (Vivcharenko et al 2023). Wounds in people with diabetes have an increased tendency to develop infections due to dysregulations in primary surveillance, recognition, activation and neutralisation

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mechanisms within the intrinsic immunity system (Rodríguez-Rodríguez et al, 2022). Metabolic dysfunction caused by diabetes compromises immune cell function, resulting in immune suppression and impaired insulin signalling-induced changes in phagocytic cells (Darwitz et al, 2024). Moreover, hyperglycaemia promotes specific mechanisms of bacterial virulence known to contribute to infection chronicity, including biofilm formation (Darwitz et al, 2024).

High levels of matrix metalloproteinases (MMPs) have been reported in diabetes-related wounds (Fu et al, 2022). This is linked to high glucose levels that may directly stimulate the over production of MMPs and the reduction of tissue inhibitors of metalloproteinases (TIMPs) (Spampinato et al, 2020). MMPs have a primary part in wound healing, with their main function being the removal of damaged extracellular matrix (ECM) during the inflammatory phase, breakdown of the capillary basement membrane for angiogenesis and cell migration during the proliferation phase, and contraction and remodelling of tissue in the remodelling phase (Ayuk et al, 2016). However, upregulated MMPs levels, as found in diabetes-related wounds, cause excessive tissue degradation and digest protein growth factors, cell surface receptors and ECM molecules, leading to impaired wound healing. Consequently, regulation of MMP levels could promote wound healing (Krishnaswamy et al, 2017; Fu et al, 2022).

Wound management products under evaluation

Wound dressings are essential devices in healthcare that promote healing when used appropriately (Shi et al, 2020). The selection of advanced wound dressings for different wounds should be based on the individual conditions, such as wound tissue present and stage of healing, taking into consideration the characteristics and mode of action of the dressing (Shi et al, 2020). Opting for the ideal dressing for the specific wound can reduce the bioburden, reduce healing time, and improve the patient's quality of life (Sussman, 2023).

In 2023, the Ministry of Health (MoH) in Vietnam approved guidelines for the management of diabetic foot ulcers that supported the use of polyabsorbent fibre dressings with silver-impregnated lipido-colloid (UrgoClean Ag®, Laboratoires Urgo; TLC-Ag) in the management of local wound infection. The document states that the TLC-Ag dressings are "clinically effective in treating local infections and promoting wound healing, with rapid broad-spectrum antibacterial activity and anti-biofilm effects".

The polyabsorbent fibres have been shown to be effective in continuous debridement (Percival, 2020). The negatively charged fibres in the dressing bond to positively charged regions in slough, resulting in the binding and trapping of fibrinous tissue, bacteria and other non-adherent or devitalised material within the dressing, which is atraumatically removed when the dressing is changed (Desroche et al, 2016; Grothier et al, 2016; Mayer et al, 2024; Nair et al, 2024). The TLC-Ag dressing is considered to offer a safe and effective method to remove debris from the wound bed (Milne, 2015).

The dressing has been evaluated in a prospective, multicentre, non-comparative clinical trial with patients with wounds at risk of infection (Dalac et al, 2016). Over a maximum period of 4 weeks of treatment, wound surface area, mostly covered by sloughy tissue, was reduced by 32.5%, and 54.1% of wounds were debrided (defined by <30% of sloughy tissue covering the wound bed). Meanwhile, clinical signs of local infection such as local oedema, high level of exudate and malodour, were drastically reduced, and a substantial improvement in the condition of the periwound skin was reported by the final visit.

In a multicentre observational study of 2,270 patients with exuding wounds of different aetiologies, including 545 diabetic foot ulcers, at risk of infection or with clinical signs of local infection, an improvement in the healing process was reported after a mean duration of treatment of 22 ± 13 days in 90.6% of cases, along with a reduction in all clinical signs of local infection, regardless of exudate level and proportion of sloughy tissues in the wound bed at baseline (Dissemond et al, 2020).

Although silver dressings have been shown to be effective antimicrobial solutions, these should be used over a short time and then the wound status should be re-evaluated (Wounds UK, 2021) . However, it should be noted that, while TLC-Ag is an antimicrobial dressing, it has also been described as a dressing that represents a distinct form of provision of continuous autolytic debridement, termed electrostatic charge physical attraction (Mayer et al, 2024).

The MoH guidelines recommend the use

of a lipido-colloid dressing impregnated with sucrose octasulfate (nano oligosaccharide factor; UrgoStart® Treatment Range, Laboratoires Urgo; TLC-NOSF) until the wound heals (MoH, 2023). In the document it is stated that: "this is the first choice that significantly shortens the healing time of ulcers compared to other dressings and is more cost-effective than other granulation tissue restoration treatments". These recommendations echo other guidelines, including the International Working Group on the Diabetic Foot (IWGDF; Schaper et al, 2023), National Institute for Health and Care Excellence (2022) and Diabetes Feet Australia (2021).

These recommendations are based on robust evidence regarding the TLC-NOSF treatment range, as discussed in a systematic review by Nair et al (2021), that identified 21 clinical studies, ranging from double-blind randomised control trials (RCTs) to real-life series, involving more than 12,000 patients. The authors argued that TLC-NOSF treatment range is an evidence-based solution in enhancing wound healing, reducing healing times, and increasing patients' health-related quality of life, while being a cost-effective, and even cost-saving treatment (Nair et al, 2021).

Interestingly, the results of a recent systematic review (Meloni et al, 2024) state that using TLC-NOSF as a first-line treatment for chronic wounds, consistently resulted in significantly higher healing rates, shorter healing times and cost savings compared with standard dressings used under similar conditions.

Sequential treatment with TLC-Ag and TLC-NOSF

Although randomised controlled trials remain the most effective form of evaluation of the efficacy of a therapeutic intervention, real-life studies have become increasingly important in the scientific world in recent years (Harari, 2018), and are gaining increasing attention for their use in regulatory decision-making (Ramagopalan et al, 2020). Case series, although not considered the strongest source of evidence, are particularly important when a treatment becomes available as it provides descriptive information and contributes to building knowledge and generating hypotheses (Torres-Duque et al, 2020). The dressings being evaluated do have high-level evidence behind them, but they are also reviewed in real-life studies as well as case series that evaluated the dressings in sequential management of wounds.

Al Humaidi et al (2024) provided clinicians with such an insight of sequential management of wounds with TLC-Ag dressings followed by TLC-NOSF dressings in a case series of diabetic foot ulcers from the Middle East. The main author describes this protocol as a simple protocol which is easy to implement, and without major contraindications. He advises that, if the wound shows signs of local infection, slough tissue or biofilm and exudate – apply TLC-Ag (UrgoClean Ag). Once progress is observed, for example, a reduction in sloughy tissue, biofilm, or exudate, replace TLC-Ag dressings by TLC-NOSF dressings. The other authors emulated this statement with their testimonials. Although these cases represent a small cohort, the resolution of the local signs of infection, desloughing and fast healing, as well as clinicians' feedback, provide clinicians with real-life evidence that these dressings can be implemented as part of an evidence-based standard of care.

Vaidya et al (2024) also presented cases with wounds in people living with diabetes with the same treatment protocol. The authors stated that the easy-to-use silver dressing that provide continuous debridement, effective antimicrobial protection and has antibiofilm properties, has gained widespread acceptance among patients and healthcare professionals. However, once clinical signs of infection have disappeared, a silver dressing is not required, and switching over to NOSF-impregnated dressing can provide a better option to enhance wound closure. As witnessed from the different cases treated by this continuum of care by experts across India and the personal experience of the authors, this is a very useful combination modality to achieve faster wound resolution.

The cases

Case 1 and case 2 are provided by Le Van Chuong, MD, MSc, from the National Hospital of Endocrinology. Le Van Chuong has more than 8 years of experience in the care and treatment of diabetic foot ulcers at the National Endocrinology Hospital. This hospital is the leading and only specialised facility in Northern Vietnam dedicated to the treatment and care of patients with diabetic foot ulcers.

Case 1

A 61-year-old man, living with type 2 diabetes (T2D) for more than 20 years, managed with oral hypoglycaemics and insulin, with a history of adrenal insufficiency, gout and


Figure 1a


Figure 1b


Figure 1c


Figure 1d


Figure 2a


Figure 2b


Figure 2c

hypertension, presented with two wounds located on the dorsum of the foot and around the malleolus area, that had been present for over 3 months. The wounds started as blisters which eventually burst, and had been managed with different treatments at local hospitals, including gauze dressings, debridement, and negative pressure wound therapy. Both wounds were still highly exuding, and painful, with a numeric pain score of 7/10 (The Australian Pain Society, 2005; Adeboye et al, 2021). The wounds did not show any progress towards healing [Figure 1a]. The larger wound measured 60 mm × 40 mm × 5 mm, mostly covered by friable granulation tissue and slough.

The patient was admitted for further wound management, diabetes management and antibiotic treatment. After wound cleansing with normal saline, the TLC-Ag dressing was applied with a traditional dressing as a secondary layer. The dressing was changed daily for the first 3 days, and thereafter on alternated days. On day 7 (four dressing changes), the wound beds were already showing signs of improvement with reduction in friable granulation tissue and slough, as well as some reduction in size [Figure 1b]. At this point, the TLC-NOSF foam dressing was applied as the primary dressing, with changes on alternate days.

On day 15 (8 days with TLC-NOSF, four dressing changes), further signs of progress towards healing were noted, with the wound bed covered with healthy granulation tissue, wound area was reduced (45 mm × 30 mm × 4 mm), exudate levels decreased, and pain score had reduced to 4/10 [Figure 1c]. At this point, antibiotics were stopped and the patient was discharged home. Education and instructions were provided for the patient and his carer on how to change the dressing at home. As the levels of exudate reduced, the primary dressing was changed from the TLC-NOSF foam to TLC-NOSF contact layer with a traditional secondary dressing.

The patient was seen a final time at the clinic on day 50 (43 days with TLC-NOSF), where the wounds were almost completely healed [Figure 1d].

Case 2

A 48-year-old man with a history of T2D for the past 8 years, currently on oral medications, and significant peripheral neuropathy, sustained a scald burn on the lateral aspect of his left foot. The wound was managed for 3 months at local healthcare facilities and self-care at home, including topical ointments, debridement, and disinfection, without any improvement.

When the patient was referred to the


Figure 3a


Figure 3b


Figure 3c

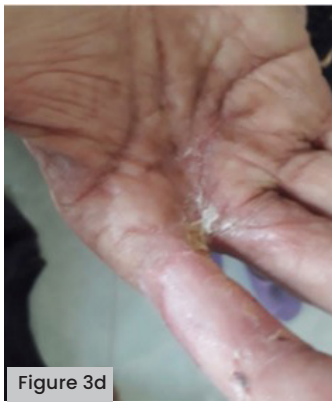
Figure 3d


Figure 4a


Figure 4b


Figure 4c


Figure 4d

clinic, the wound was mostly covered with slough and friable granulation tissue and indurated periwound [Figure 2a]. Systematic antibiotics and subcutaneous insulin were initiated. The wound was cleansed with povidone iodine and the TLC-Ag applied as the primary dressing and covered with a secondary traditional dressing. The dressing was changed daily. On day 11, , the wound bed was visibly healthier, with epithelialisation also noted around the borders [Figure 2b]. The wound was cleansed with normal saline, TLC-NOSF contact layer was applied as the primary dressing with a secondary traditional dressing. The dressing was changed on alternate days.

By day 47 (36 days with TLC-NOSF), the wound surface area was greatly reduced [Figure 2c]. At this point the patient continued self-care and did not follow up at the clinic.

Case 3 and case 4 are provided by Cao Dinh Hung, MD, PhD, from Nguyen Tri Phuong Hospital. Cao Dinh Hung has more than 5 years of experience in diabetic foot care and treatment at the Foot Unit, Endocrinology Department, Nguyen Tri Phuong Hospital. This is a first-class hospital under the management of the Ho Chi Minh City Department of Health and one of the leading facilities in the treatment and care of wounds in diabetic patients.

Case 3

A 67-year-old woman with an eight-year history of T2D and hypertension, managed with oral medications, experienced itching on her right hand and scratched excessively, leading to skin blistering and the formation of vesicles. Subsequently, the wound expanded and became infected. The wound had been present for approximately 7 days before the patient was admitted to hospital. No prior treatment had been administered. On referral, the wound was mostly covered with slough and was moderately exuding, with surrounding cellulitis and exposed tendon [Figure 3a]. The patient was started on systematic antibiotics and subcutaneous insulin. The wound was cleansed with povidone iodine, TLC-Ag applied as the primary layer and a secondary traditional dressing. Dressing was changed daily.

By day 5 (five dressing changes), there was a reduction of sloughy tissue, with granulation tissue starting to form, and a reduction of exudate levels and surrounding cellulitis [Figure 3b]. At this point, the primary dressing was changed to TLC-NOSF foam dressing as the primary dressing and a secondary traditional dressing, with dressing

changes on alternate days.

By day 14 (8 days with TLC-NOSF), further improvement was seen [Figure 3c] and the same management was continued. The patient was provided with education and instructions on how to clean and dress the wound at home.

The wound was reviewed 2 months later (47 days with TLC-NOSF) and it was completely healed [Figure 3d].

Case 4

A 55-year-old man, living with hypertension and T2D for the past 10 years, managed with oral medications, presented with a large wound on the left leg that primarily started with cellulitis, which had developed 11 days prior to hospital admission. The patient was started on systematic antibiotics and subcutaneous insulin. The wound was surgically debrided [Figure 4a]. After the procedure, the wound was cleansed with povidone iodine, TLC-Ag was applied as the primary layer and held in situ with a secondary traditional dressing. Dressing was changed daily.

By day 7 (six dressing changes), the wound bed looked healthier with visible healthy granulation tissue [Figure 4b]. The wound was cleansed with normal saline and, at this point, TLC-NOSF foam dressing was utilised as the primary layer and covered with traditional secondary dressing, with dressing changes on alternate days.

On day 11, the wound bed was clean, with healthy granulation tissue developing well and stabilising [Figure 4c]. The same management continued until day 13 (6 days with TLC-NOSF), when the wound was closed with a skin graft [Figure 4d].

Discussion

Wounds in people with diabetes may be due to numerous risk factors, including physical trauma, microvascular complications, dysregulated pathways, and impaired systemic functions (Patel et al, 2019; Oyebode et al, 2023). Despite the development in wound management technologies, real-world studies report that less than 50% of wounds related to diabetes are healed at 12 weeks (Patel et al, 2019; Al-Jalodi et al, 2022). The selection of an appropriate treatment method for these wounds depends on the hosts' physiological status; however, effective wound care is considered a critical component of diabetic wound management (Oyebode et al, 2023).

Advanced wound dressings help facilitate continuous debridement as they further eradicate dead tissue, inhibit bacterial growth, regulate exudate, and control fluid balance. This plays a key role in effective wound healing, and it involves maintaining a moist and infection-free wound environment (Aderibigbe et al, 2018). Notwithstanding the considerable range of dressing products available, robust evidence regarding the mode of action and effectiveness is available for only few dressings (Vowden and Vowden, 2017).

In this prospective evaluation of the sequential management with TLC-Ag and TLC-NOSF dressings, the clinical decision was based on the broad evidence behind these dressings as previously discussed. These dressings have been already used as part of the evidence-based standard of care in the authors' clinics and hospitals, and this sequential use represent the best solution to implement these effective treatments in these patients. The initial management with the TLC-Ag dressings provided the continuous debridement with the added benefit of the silver component as an antimicrobial, while the TLC-NOSF dressing was started as soon as the clinical signs of wound infection subsided, providing faster healing outcomes. Implementation of the TLC-NOSF as a first line treatment in non-infected wounds was based on the recommendations based on the results of the evidence provided by Meloni et al (2024).

Conclusion

The types of wounds discussed in this article were quite challenging and the implementation of the treatment protocol provided an evidence based, guideline recommended pathways by expert panels and boards, as well as the Vietnam MoH.

The results portrayed in these cases were very satisfactory, with a rapid reduction of slough through continuous debridement, reduction in the clinical signs and symptoms of infection through the added benefit of the local antimicrobial, and rapid wound closure aided by the TLC-NOSF treatment range, with no adverse events reported during the course of treatment.

In view of these results and the evidence behind the dressings, the authors concluded that the consecutive treatment with TLC-Ag and TLC-NOSF may help to reduce morbidity and mortality in people with diabetes with wounds by resolution of the wound related problems in a shorter period.

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