Diabetic foot ulcer healing with a silver dressing combined with soft silicone technology

Diabetic foot ulcers present a wound-healing challenge; infection, exudate, and pain need to be managed appropriately, preferably with a dressing that can manage one or more factors to prevent delayed healing and reduced quality of life. This case report outlines the management of a man presenting with a diabetic foot ulcer at a clinic in Abu Dhabi, United Arab Emirates. Wound healing was successfully achieved 7 weeks after the initial clinic visit with Mepilex® Ag dressing (Mölnlycke Health Care) combined with Safetec® (Mölnlycke Health Care) soft silicone technology.

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People with diabetes present a wound management challenge; in particular, foot ulcers are slow to heal and prone to infection. Mismanaged ulceration may lead to extensive tissue destruction, amputation, and impaired quality of life[1]. Most lower limb amputations are preceded by a foot ulcer, generally resulting from peripheral neuropathy, foot deformities, minor foot trauma, or peripheral arterial disease[2]. Lower limb amputation carries a 50% mortality within 5 years[3]. Even when ulcers are healed, >50% will have a recurrence after 3 years[1].

While the cost of diabetic foot ulcer management is estimated to be £13.75 billion a year in the UK[4], according to Benbow[5] the true prevalence of diabetic foot disease is unknown, which makes the potential economic and personal burden of diabetes treatment and complications inestimable.

This article presents a case report outlining the management of an individual with a diabetic foot ulcer who presented to the author's clinic in Abu Dhabi, United Arab Emirates.

THE CLINIC

The wound care unit at the Sheikh Khalifa Medical City, Abu Dhabi, is run by four nurses and is supported by members of the multidisciplinary team, including a plastic surgeon, a vascular surgeon, a pain nurse specialist, a nutritionist, a general surgeon, a physician, and a dermatologist.

Approximately 570 patients with wounds are seen each month. Wound types include pressure ulcers, diabetic foot ulcers, and surgical wounds. Wound care nurses are responsible for the selection of dressings and ongoing wound management and, as such, are responsible for providing the correct dressing at the correct time to ensure that wound management is both cost efficient and clinically effective.

Wound dressing choice is based upon clinical knowledge, ensuring that the ideal requirements for a dressing are met[6] and that the dressing is the most appropriate one for the individual and the wound, with consideration of any comorbidities that the individual may have *[Box 1]*.

THE PATIENT

Mr W is 65 years old, retired, and mostly stays at home. He has had diabetes for 20 years and has triple-vessel disease, high cholesterol, hypertension, retinopathy, renal impairment, and neuropathy. He had also been a heavy smoker. Medications included clopidogrel and bisoprolol for hypertension. When he presented to the clinic on 18 April, he had an ulcer on the planter side of the foot, which had been present for 4 weeks. As with many of the clinic's patients, Mr W walked barefoot most of the time; however, as a result of his neuropathy, he did not feel the burn that eventually led to the ulcer.

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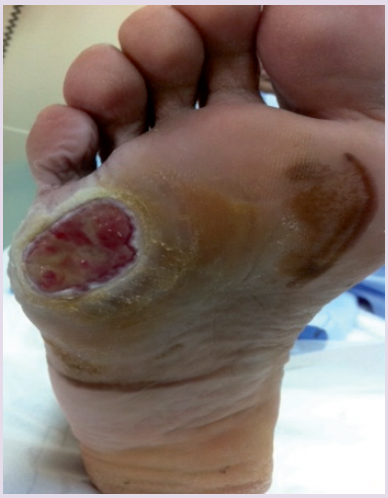


Figure 1. Wound after debridement on the first wound clinic visit (4 weeks after injury).

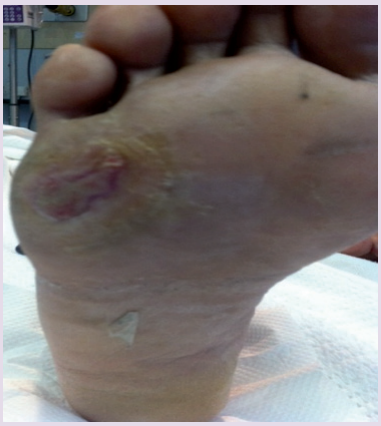


Figure 2. Wound 2 weeks after initial clinic visit (6 weeks after injury).

Box 1. Characteristics of an ideal wound dressing[6].

- Creates microclimate for rapid healing
- Prevents dehydration (of the wound)
- Permeable to oxygen
- Absorption of blood and exudate
- Protects against secondary infection
- Offers sufficient mechanical protection to wound but is non-adherent
- Is non-toxic, non-allergenic, and non-flammable
- Does not shed material into wound
- Conforms to anatomical contours and resists tearing
- Its properties remain constant in a range of temperatures and humidities
- Accepts and releases medication
- Is cost effective

Mr W had been treated initially at a local primary healthcare clinic with Polyfax® ointment (Teva UK), gauze, and a retention bandage. Polyfax contains polymyxin B sulphate and bacitracin zinc – both of which are antibiotics – and is indicated for use on infected wounds[7]. Dressings had been changed every other day, although they had caused some trauma to the wound.

THE WOUND

At the first visit to the clinic, the wound measured 4 cm x 4.5 cm, appeared to be infected, and was producing large amounts of exudate. Areas of necrotic tissue were also noted and the periwound skin was macerated. Sharp debridement was undertaken before commencing the dressing regimen *[Figure 1]*.

INVESTIGATIONS

Based upon the clinical appearance of the wound, a swab was taken to determine whether or not the wound was infected and to determine the causative organisms. Mr W's blood glucose level was 19.4 mmol/L.

DRESSING

After the wound was debrided, it was dressed with Mesalt® (Mölnlycke Health Care) and Mepilex® (Mölnlycke Health Care), and secured with a bandage. Mesalt is indicated for use on heavily discharging infected wounds in the inflammatory phase. It is a gauze dressing impregnated with sodium chloride, which helps stimulate the cleansing of moist necrosis; the wound exudate releases the sodium chloride from the dressing, which then stimulates cleansing by absorbing exudate, bacteria, and necrotic material from the wound, thereby facilitating the natural wound-healing process[8]. The Mepilex dressing is a soft and conformable foam dressing that absorbs exudate and maintains a moist wound environment. Safetac® (Mölnlycke Health Care) technology prevents Mepilex from sticking to the wound bed. The Safetac layer ensures that the dressing can be changed without damaging the wound or surrounding skin, thus enabling pain- and trauma-free removal; it also absorbs exudate effectively to ensure a low risk of maceration[9].

TREATMENT PROGRESS

One week after initial clinic visit

As Mr W lived 300 km from the clinic, his wife changed the dressing at home on alternate days. He returned to the clinic on 25 April; the wound dimensions remained the same, although the periwound maceration had improved slightly. The results of the wound swab indicated a *Pseudomonas* infection. It was decided to use Mepilex® Ag (Mölnlycke Health Care) instead of Mepilex to manage the infection and exudate. Mepilex Ag, according to Barrett[9], incorporates the rapid and sustained antimicrobial action of ionic silver with the benefits of Safetac soft silicone adhesive technology. The combined attributes of each component of this dressing enable the control of pain and infection to be achieved simultaneously. The patient was advised to use this dressing regimen every third day.

Two weeks after initial clinic visit

When Mr W returned to the wound care unit on 2 May, the wound measured 3.5 cm x 4 cm and the periwound area was free of maceration. The exudate level was low, so it was decided to continue with this regimen, except the dressing change took place every 5 days *[Figure 2]*. Mr W stated that the dressing was easy to apply.

Four weeks after initial clinic visit

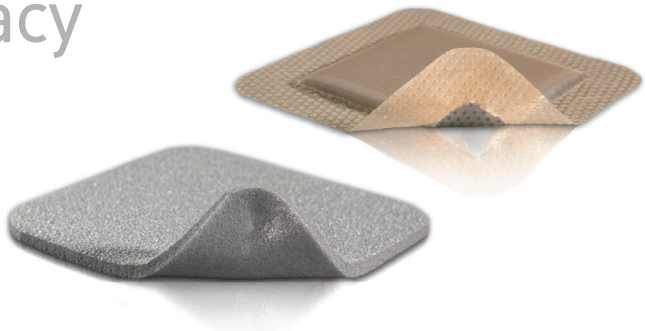
By the 16 May, the wound measured 2.5 cm x 3.5 cm. The wound had been present for a total of 8 weeks (with 4 weeks' treatment at the clinic). The periwound skin remained dry and the appearance of the wound had significantly improved; exudate had reduced and the wound showed no signs of infection. Mepilex Ag was discontinued and Mepilex was reinstated. At this point, we recommended that the dressing be changed every 5 days.

Clear & significant efficacy

A recently published large case series in France has confirmed the effectiveness of the Mepilex range of Ag silver wound dressings.

With a focus on infection and healing rates, the study reports that in 794 home care patient cases, the use of Mepilex Ag lead to clear and significant improvements in wound status.

To learn why this was the case, scan the QR code or go to: www.molnlycke.com/Study-confirms



Mepilex Ag and Mepilex Border Ag are wound care dressings where an absorbent polyurethane foam pad contains a silver sulphate compound. In the presence of fluid such as wound exudate, silver ions are rapidly released which sustainably repress a wide range of wound-related pathogens including bacteria and fungi. Each product in the Mepilex Ag range -Mepilex Ag, Mepilex Border Ag, Mepilex Border Sacrum Ag and Mepilex Heel Ag - contains the same type of silver, and Safetac technology.

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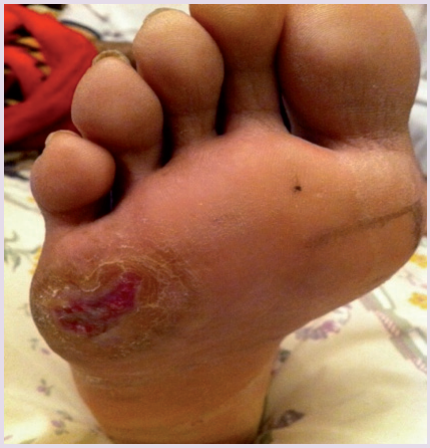

Figure 3. Wound 6 weeks after initial clinic visit (10 weeks after injury).

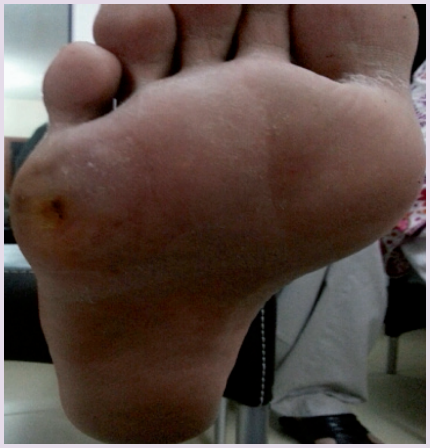

Figure 4. Wound healed by 7 weeks after initial clinic visit (11 weeks after injury).

Six to seven weeks after initial clinic visit

By week 6 (10 weeks post-injury), the wound measured 1.5 cm x 2.5 cm and had low levels of exudate *[Figure 3]*. The dressing regimen remained the same. At week 7, 11 weeks after initial trauma, the wound was healed *[Figure 4]*.

DISCUSSION

The "diabetic foot"is a group of syndromes in which neuropathy, ischaemia, and infection lead to tissue breakdown, resulting in morbidity and possible amputation[10]. A diabetic foot ulcer is a full-thickness wound below the ankle in a person with diabetes, irrespective of duration[11]. Diabetic foot ulcers may be caused by neuropathy (neuropathic ulcers) or as a result of neuropathy and ischaemia (neuroischaemic ulcers). Approximately 60% of all diabetic foot ulcers result from neuropathy; of these, half are related to peripheral arterial disease[12]. When people with diabetes have neuropathy, trauma and ulceration are often unnoticed by the individual until quite late, making management harder than if the person presented at the initial time of trauma. Alternatively, vascular disease or ischaemic blood flow can lead to both ulceration and, importantly, impaired wound healing. Neuropathic ulcers are found on the plantar surface of the foot, whereas ischaemic ulcers are usually found on the margins of the foot, over the toe joints, the tips of the toes, or under the toenails[5].

Clearly, diabetic foot ulcers present wound-healing challenges centring predominantly on the management of infection, exudate, and pain[13]. Offloading also has to be considered if the ulcer is caused by footwear trauma. Management approaches need to address each factor, preferably with a dressing that can manage one or more factors to quicken the healing process and improve quality of life for the individual.

Dressings with Safetac technology employ a soft silicone that does not adhere to the wound bed, therefore preventing trauma and pain upon removal[14,15]. Such dressings also form a seal with the intact skin, inhibiting movement of exudate from the wound onto the periwound skin[16] and thus avoiding skin maceration. Numerous studies have demonstrated the effectiveness of these dressings in the care of diabetic foot ulcers[17,18]. In addition, the use of Mepilex Ag in the management of diabetic foot ulcers showing signs of infection was studied and found to be effective against methicillin-resistant *Staphylococcus aureus*[19].

CONCLUSION

Mepilex Ag clearly demonstrated its effect on diabetic foot ulcers with signs of infection. In addition, the dressing performance in terms of exudate management – fewer= dressing changes (for more cost-effective wound management), less risk of maceration, trauma, and ease of use – was rated high by the author. ■

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