

The use of honey to treat an ulcer on the heel of a person with diabetes

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The occurrence of a deep neuropathic ulcer on the heel of a person with diabetes can lead to severe consequences, including infection of the wound and underlying bone which could result in amputation. There is still a reluctance to use honey on diabetic foot wounds due to the sugar content, despite the advice that it is safe to do so with close observation of blood glucose levels. Five per cent of all people suffering from diabetes can anticipate developing a foot ulcer in any one year (NICE, 2004). Papanas et al (2007) identified that people with diabetic foot lesions and renal disease have an increased amputation risk of 6.5–10 times that of people with diabetic foot lesions alone. The case presented here demonstrates that a neuropathic ulcer in a person with diabetes and renal impairment can be healed within 3 months using topical honey with no adverse effect on glycaemic control.

The use of medical honey in the treatment of diabetic foot ulcers has been approached with caution as practitioners have been anxious as to the effect of topical honey on blood glucose levels of people with diabetes because it contains a range of sugars that may be considered substrates for yeast formation. Honey is approximately 80% sugar and 20% water and removes debris from the wound through osmosis. There are an increasing number of case reports on the use of honey on diabetic foot wounds (Eddy and Gideonsen, 2005; Remmen et al, 2005).

Honey has been shown to be effective in the treatment of chronic leg ulcers when the prolonged inflammatory stage of healing was resolved by the use of honey dressing (Kingsley, 2001). Molan (2001) stated that honey has a direct anti-inflammatory effect resulting in the removal

of bacteria which cause the inflammation. Honey is also known to cause rapid cell stimulation (Dunford and Hanno, 2004), which helps wound healing.

Medihoney Antibacterial Medical Honey (Medihoney, Australia; the medical honey used in this case) is a predominantly *Leptospermum* species honey blend which has been proved to have antimicrobial properties, be effective in debriding necrotic tissue, deodorise malodorous wounds and encourage granulation and epithelialisation (Dunford and Hanano, 2004; White and Acton, 2006).

Case study

Mr M is 43 years old and was diagnosed with type 2 diabetes in 1999. By 2003 he was on a twice-daily insulin regimen and multiple drug

Article points

1. The use of honey in the treatment of diabetic foot ulcers is approached with caution.
2. Honey has been shown to be effective in the treatment of chronic leg ulcers.
3. Involvement of the multidisciplinary team ensured that the wound was treated holistically and, in this case, healing, pain relief and mobility were achieved within 3 months with the use of honey.

Key words

- Topical medical honey dressing
- Neuropathic ulcer
- Glycaemic control

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Figure 1. The wound at presentation to the tissue viability nurse.



Figure 2. The wound post-debridement.



Figure 3. The wound after 1 week of Medihoney treatment.



Figure 4. The wound on referral for callus removal.

therapy (see *Box 1*). He rapidly began to suffer from peripheral neuropathy, impaired renal function, essential hypertension and loss of vision. Mr M was not considered to be neuroischaemic as his foot was well perfused and warm.

The wound was first noted in July 2005 and was caused by ill-fitting shoes, which were rubbing on the sole of his foot near the heel. It became so painful due to its depth that Mr M was no longer able to bear weight and was issued with a wheelchair, however, there were no clinical signs of infection so antibiotics were not prescribed. His HbA_{1c} was 5.9%. Mr M was reluctant to keep dressings on his foot and the district nurses experienced difficulty gaining access to give treatment. Treatment with hydrogel and foam had been pursued for at least 2 months with no success as the patient kept removing the dressing and refused to use a pressure-relieving device while in bed as he did not believe it was working.

In September the staff on the Renal Haemodialysis Treatment Unit were becoming very worried about the possibility of infection being passed to other users of the unit as Mr M's suppurating wound was frequently uncovered. Therefore, it was decided to enlist the help of the tissue viability nurse to coordinate treatment by the multidisciplinary team in September 2005.

20 September 2005

The wound was assessed and found to be 80% necrotic, 15% sloughy and 5% granulating; the wound was wet, painful and malodorous. It measured 6cm by 1.5cm; depth could not be ascertained (see *Figure 1*). A wound swab was taken which revealed no signs of infection. Two layers of Vacutex (Protex Healthcare Ltd, Wokingham) sealed with Opsite (Smith and Nephew, Hull) were applied to the wound and

covered with a pad and bandage to protect it. Mr M's HbA_{1c} was 6.3%.

22 September 2005

Sharp debridement of necrotic tissue was performed and Medihoney Antibacterial Medical Honey was applied with a physiotulle, pad and bandage, secured by tubifast (see *Figure 2*, wound post-debridement).

27 September 2005

After 5 days the odour had reduced considerably and the wound was rapidly debriding (see *Figure 3*). After two weeks the treatment was changed to Medihoney Antibacterial Wound Gel. Aquacel was used as a secondary dressing to absorb the exudate and as it would not leave fibres in the wound, and adhesive foam was applied twice weekly (Tuesdays and Fridays) by the tissue viability nurse in the Renal Unit and at the weekend by the district nurses. Mr M was not so reluctant to keep his dressing on as he could see the immediate results, was pain-free and believed that it was healing. He also had increased confidence attributable to having a dedicated nurse.

7 November 2005

In November a referral was made to the diabetes specialist podiatrist for removal of callus at the wound edge, which was delaying complete healing (see *Figure 4*).

23 December 2005

On 23 December the wound was completely healed and an adhesive foam pad was applied to protect the area over the Christmas holiday (see *Figure 5*). Mr M's HbA_{1c} was 4.3%.

Discussion

It was decided that medical honey should be used instead of other antimicrobials due to its multiple effects on infection, malodour and debridement.

This case study demonstrates how the use of honey, in combination with care from the multidisciplinary team, achieved patient concordance which resulted in complete healing of the ulcer.

Glycaemic control

Mr M's HbA_{1c} at the commencement of treatment was 5.9% and remained below 6.5% for the duration of the study (see *Table 1*). On

Box 1. Mr M's medications.	
Isophane insulin	10–15 units od (self-titrating)
Paracetamol	500mg as required
Aspirin	75mg daily
Valsartan	160mg daily
Calcium salts	2 tablets qds
Omeprazole	20mg bd
Sevelamer	800mg bd
Darbepoetin alfa	60 µg injected
Isosorbide mononitrate	60mg daily (am)
Doxazosin	4mg daily (2 tablets)
Bisoprolol	10mg daily
Amlodipine	10mg daily
Alfacalcidol	0.25 µg tds

completion of treatment the average HbA_{1c} was 5.5% indicating that Mr M's blood sugar levels had remained within safe limits.

Poor renal function and his failure to adhere to his dialysis affected Mr M's wound healing. Low Hb levels are known to affect wound healing (Keast and Fraser, 2004). Mr M refused to accept delivery and administration of erythropoietin (EPO) which helps to control the red blood cell count. EPO is made in normally functioning kidneys, but levels in people with impaired renal function are low and can be increased by injection (Locatelli et al, 2004; Smyth et al, 2006). He also refused to have blood transfusions on several occasions even though his Hb was extremely low.

Diabetes can affect wound healing in a variety of ways including susceptibility to infection (Khan, 2005). The initial wound swab showed the presence of *Pseudomonas* but there was no evidence of cellulitis, and as the patient did not feel unwell it was decided not to prescribe antibiotics. Mr M had previously taken antibiotics that were found to affect his glycaemic control so the decision was taken to use the antimicrobial action of honey to treat the colonisation of the wound.

Rationale

Medical honey was chosen because of its antibacterial quality (Blair, 2000; Alcaraz and Kelly, 2002; George, 2004; Lusby et al, 2005). Medical honey also rapidly reduces bacterial burden, clears infection and reduces inflammation (Robson, 2004). The debriding effect helps reduce malodour and stimulates tissue regeneration. The rapid debriding action, the reduction in the severe malodour and the reduction in the size and depth of Mr M's wound confirmed all these properties.

In relation to fungal infections, Medihoney has been shown to have antifungal properties in relation to *Candida* species (Irish et al, 2006). Similarly, it has been identified that the honey within Medihoney products has significant antimicrobial properties through the production of hydrogen peroxide and specific non hydrogen peroxide activity, only related to honey from certain plants of the *Leptospermum* species (Cooper, 2005). As a precautionary measure, companies promoting medical honey tend to advise clinicians to monitor blood glucose levels when undergoing honey treatment.

Conclusion

Involvement of the multidisciplinary team ensured that the wound was treated holistically and in this case healing, pain relief and mobility were achieved within 3 months with the use of honey-based dressings. Concordance with these dressings resulted in complete healing of the ulcer, which could have resulted in amputation. The honey did not adversely affect blood glucose levels and achieved complete healing which has remained unchanged at the time of writing. ■



Figure 5. The healed wound.

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Table 1. Mr M's HbA_{1c} throughout the study.

Date	HbA _{1c}
July	5.9%
September	6.3%
December	4.3%