

Management of wounds with antibacterial medical honey (*Leptospermum* sp) and topical negative pressure (TNP)

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The presence of dead tissue, bacteria, and foreign matter disturbs the delicate balance of a wound, which can lead to delayed healing, increased inflammation and potential infection (Flanagan, 1997). Necrotic tissue also prevents epithelial cells migrating over the wound bed (Boyle, 2006).

A low bacterial load, removal and management of exudate, absence of necrotic tissue and a moist environment which promotes granulation tissue are all needed for the wound bed to heal. Debridement of necrosis from the wound assists with all these elements and is essential for wound bed preparation (Brill, 2008). However, necrotic wounds in terminal patients with ischaemic limb disease may be left dry to prevent further complications, such as infection (Leaper, 2002).

Topical negative pressure (TNP) has been proven to be successful in the preparation of the wound bed by removing bacteria, exudate and supporting the debridement of necrotic tissue, while stimulating angiogenesis and promoting granulation tissue (Smith, 2008). The author has found that combining TNP with antibacterial medical honey (Medihoney™) can support rapid resolution of necrotic tissue, prevent wound infection and prepare the wound bed for healing. This is demonstrated through the following clinical case reports.

Case report one

A 54-year-old female patient, who had been visited by the district nurse, presented with sustained skin damage after a fall in the garden. She had one wound to the upper thigh area (Figure 1) and one to the side (Figure 2). Radical debridement had taken place on the mainland when the district nurses first visited the patient

before she had moved to live with her daughter on the Isle of Wight.

At the initial assessment the wound to the thigh consisted of 20% sloughy and 80% granulation tissue. The wound was chronic and showing no signs of healing. Likewise, the wound to the side consisted of sloughy (70%) and chronic (30%) tissue. There was moderate to high levels of exudate. After discussion between the tissue viability nurse and the district nursing team it was decided to start topical negative pressure (TNP) with Medihoney medical grade honey applied to the wound bed underneath as an interface between the wound bed and the TNP therapy.

During treatment

Care needed to be taken during dressing changes as if the honey touched the edge of the wound or the periwound skin, the subsequent greasiness of the skin made it difficult, if not impossible, to attach the film dressing. The wound was redressed every two to three days.

Outcome

Four days after starting treatment, the wounds had reduced in size (Figures 3 and 4). Following 24 days of therapy, the sloughy tissue on the thigh wound had been debrided (or removed) and the sloughy area on the outer aspect was also reducing in size. The condition of the granulation tissue had improved considerably and it now appeared red and well perfused. Epithelial cells were evident to the margins of the wounds. The most significant finding in this case of the use of honey with TNP was that the wounds were dramatically cleaner and the depth had improved by approximately 5mm during treatment across the whole wound bed. The periwound area was better perfused and epithelialising. The wounds continued to heal along the same trajectory and were continuing to improve at time of discharge.

Case report two

This 48-year-old male patient who



Figure 1. Wound at the front of the mid-right thigh at first presentation.



Figure 2. Adjoining wound on the outer aspect of the patient's right thigh.

was suffering from type II diabetes and peripheral vascular disease (PVD) was being nursed in a rehabilitation ward. He had undergone a below-knee amputation because of PVD. The wound was along the suture line of the stump area following the below-knee amputation (Figure 5). At initial assessment, the wound measured 7x4cm, with a depth of 10mm at the deepest point, and consisted of 10% sloughy and 90% granulating tissue. There was a small cavity in the top right of the wound. There was no evidence of infection. Exudate levels were moderate, as defined by the World Union of Wound Healing Society (WUWHS, 2007) consensus document. Treatment with Medihoney medical grade honey was introduced together with TNP therapy.

During treatment

By day six the wound bed had desloughed and healthy, red granulation tissue was



Figure 3. Wound on the front of the mid-thigh after treatment with TNP and honey. Debridement has occurred and the quality of the granulation tissue has improved.



Figure 5. Non-healing below-knee amputation wound on patient with diabetes at first presentation before the application of TNP and honey.



Figure 7. Inner ankle/thigh right leg of the patient with rheumatoid arthritis which had been damaged in a road accident showing a sloughy, wet wound at first presentation before the application of TNP with honey underneath.



Figure 4. Adjoining wound on the outer aspect of the right thigh after treatment with TNP and honey. Again, debridement has occurred and the quality of the granulation tissue has improved.



Figure 6. Below-knee amputation wound after treatment with TNP and honey. The wound is now cleaner and shallower than before.



Figure 8. Same wound on removal of TNP and honey. The TNP and honey have helped to debride the wound and improve the quality of the granulation tissue underneath.

evident. There were also signs that the cavity was starting to get shallower. The dressing was changed three times a week for the first two weeks and then twice-weekly on discharge by district nurses under the supervision of the tissue viability team.

Outcome

At day 13 (Figure 6) the wound bed had improved and there was an abundance of healthy granulation tissue. The exudate had decreased considerably and the granulation tissue was now level or flush with the surrounding skin with evidence of revascularisation. The treatment regimen was changed to conventional dressings, i.e. a hydrofiber and absorbent pad. The patient died of a cardiac event unrelated to their wound care before the wound had completely resolved.

Case report three

Patient three was a 45-year-old male patient who was in prison. He presented with ulceration to his right leg, which had been persistent for two years. (His left leg had been amputated after a road accident.) The wound bed was sloughy with high levels of exudate (Figure 7). There was rheumatoid arthritis present on the underlying bone structure. Earlier treatments of conventional antimicrobial/antibiotic dressings had not cleaned the wound. Therefore, treatment was started with Medihoney with TNP therapy three times a week in the prison clinic.

Outcome

At day 18 the wound bed had improved and there was evidence of granulation tissue. The key focus for this patient was to manage the exudate which was

causing maceration to the peri-wound area. Figure 8 shows that this was successfully resolved. Honey and TNP achieved a cleaner wound and managed the exudate effectively, thus improving the state of the wound bed so that it was cleaner and the periwound skin was less macerated.

Conclusions

The author has found that using medical grade honey under TNP has led to:

- ▶ Improvements in wound perfusion
- ▶ Reduction in wound depth
- ▶ Reduction in the amount of necrosis and slough in the wound bed
- ▶ Notable increase in time to healing due to the more effective management of this phase of wound healing
- ▶ A cost-effective reduction in dressing changes.

During the initial phase of wound management using honey and TNP, usual practice needed to be adapted slightly because if the honey went onto the surrounding skin, it interfered with the adhesion of the film dressing making it difficult to get the vacuum seal around the dressing.

Medical grade honey has demonstrated its efficacy to promote debridement under TNP and, in the author's opinion, has clearly demonstrated an improvement of the wound bed, supporting the antimicrobial function of TNP dressings. The outcomes of using honey on debridement varies according to the type of honey used, the percentage of honey within a dressing and the frequency of dressing changes (Molan, 2002). Honey, as a moist wound healing product, assists the natural autolytic debridement of wounds. Its osmotic action draws out lymph fluid from the deeper tissues providing a continuous supply of proteases at the wound bed, therefore quickening the debriding action (Molan, 2005). This has been demonstrated by Gethin and Cowan (2008) in a recent randomised clinical trial in which they compared the effectiveness of *Leptospermum* (Manuka) dressings to a hydrogel to reduce wound slough, where the reduction of slough in the honey group was down to 29%, compared to 43% in the hydrogel group after four weeks, and there was a correlation with slough and alkalinity. A reduction in the pH of wounds after using Manuka honey for two weeks reduced the wound size and there appeared to be an improvement in both the quality of granulation tissue and the degree and amount of slough removed (Gethin and Cowan, 2008).

Chronic wounds often have a high bacterial load, and the presence of slough and necrosis can create an environment conducive to bacterial proliferation, thereby increasing slough and necrosis (European Wound Management Association [EWMA], 2004). Not all honey should be viewed as having

the same efficacy. It is not a generic product and the antimicrobial activity can vary 100-fold (Molan, 2002). The use of medical grade *Leptospermum* honey as an antibacterial agent has been examined against a range of organisms (George and Cutting, 2007). The osmotic action of honey helps to clean the wound and lift debris into the antibacterial micro-environment of the dressing, and, as such, may impact on the amount of slough within a wound (George and Cutting, 2007).

There is a theory that honey also contains an enzymatic element which converts inactive plasminogen to active plasmin. Plasmin is an active enzyme which can break down fibrin clots holding slough and necrosis (Molan, 2005). It has been documented that devitalised tissue separates easily from the wound bed after the application of honey (Molan, 2005). Alternatively, it may be the anti-inflammatory action of honey that helps prevent the abnormal cell process occurring during chronic inflammation, which can cause slough and necrosis. The National Institute for Health and Clinical Excellence (NICE) guidelines recommend that the choice of debriding agent should be based on comfort, odour control and patient acceptability (NICE, 2001). Medihoney has been seen to reduce slough, odour and pain, as well as being acceptable to patients (Bateman and Graham, 2007; Acton and Dunwoody, 2008).

These case reports suggest that the use of honey as a debriding agent may be considered as a first-line therapy option for fast, effective debridement of sloughy and necrotic tissue. **WUK**

This article was supported by Medihoney Europe Ltd.

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