

Management of diabetic foot ulceration with honey

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On average the authors treat 100 patients per year for diabetic foot ulcers at their clinic. Common challenges faced include ischemia, osteomyelitis and infections. Treating this type of wound is usually a time-consuming and expensive process, in which the prevention of further degradation of the wound, which might lead to amputations, is of primary concern. Unfortunately, amputation can sometimes not be prevented, and (due to the presence of diabetes) postoperative wound healing still poses the same challenges as pre-operative treatment. This report describes such a case.

Case report

This 48-year-old male patient had been diagnosed with type 1 diabetes at the age of 21. He had sensitive, motor and autonomic diabetic neuropathy. On December 9, 2009 he underwent a transmetatarsal amputation of the right foot due to necrosis of the toes.

The patient uses insulin glargine and lispro to control his diabetes, and pentoxifylline to improve blood flow through peripheral blood vessels. Nifedipine and valsartan are used for his hypertension and rosuvastatine for cholesterol levels.

A resection of the fifth metatarsal bone of the right foot took place on April 14, 2010, as after the transmetatarsal amputation wound healing was very slow. The resection left the bone exposed as well as a surgical wound on the lateral side of the right foot (10x4x3cm). The surgeon decided to leave this to heal by secondary intention (*Figure 1*).



Figure 1. Wound three days postoperatively (17/04/2010), measuring 10x4x3cm deep.



Figure 2. Fourteen days postoperatively, the start of honey treatment (28/04/2010).

Odour was not a significant consideration at this time.

Method/treatment

The authors considered negative pressure wound therapy (NPWT) — a standard protocol with venous insufficiency — as well as alginate and absorbent dressings as a treatment regimen. However, NPWT is complicated in patients with more complex underlying neuropathy, as too

much pressure can be applied with damaging consequences. In addition, the other dressings were costly and, would not, in the authors' opinion, promote the necessary patient compliance and efficacy.

On 28 April, 2010 the authors introduced a honey-based gel (L-Mesitran® Soft, Triticum, NL), which was applied twice-weekly (*Figure 2*). Being a gel that is applied as a thin

layer on the wound surface, it would not be invasive. Furthermore, the authors had seen the results that the product could achieve and wanted to evaluate it in their own practice.

The sutures were left in place by the surgeon to achieve primary closure of the wound. However, after 48 hours they were removed without being used, as it was thought that this posed less risk of (extra) tissue damage, tissue necrosis and abscess formation.

After impregnation with honey gel, the wound was covered with an absorbent charcoal dressing as malodour had developed which needed to be controlled.

Due to diabetic neuropathy, the patient did not complain of any pain, nor was he uncomfortable during dressing changes.

Results

The wound produced small amounts of exudate, which were absorbed by the secondary dressing. Within 16 days since the start of treatment, the wound had reduced in size and granulation tissue was observed (Figure 3). Thereafter, the wound continued to progress to healing, and became superficial (Figure 4) with firm edges. The wound had completely healed by 1 July 2010 (Figure 5), two months after the start of the honey therapy.

Glycaemia evaluation was performed by the patient three times a day. His glycaemic level ranged from 90mg/dl to 250mg/dl and his HgA1C was 6.4%, all within acceptable parameters. Thus, the honey dressing did not influence the patient's glycaemic levels and no adverse events were reported or antibiotics used.

Discussion

Large epidemiologic studies indicate that the incidence of type 1 diabetes



Figure 3. After 16 days of honey treatment (14/05/2010), the wound had reduced in size and granulation tissue was present.



Figure 4. The condition of the wound improved and was now seen to be superficial (10/06/2010).



Figure 5. Fully healed wound (01/07/2010).

mellitus has been increasing by 2–5% worldwide, and that its prevalence is approximately one in 300 in the United States by 18 years of age (Maahs, 2010). The total number of people with diabetes worldwide is projected to rise from 171 million in 2000 to 366 million in 2030 (Wild, 2004).

This situation places a considerable (economic) burden on society and on individual patients in particular. Compared with diabetic patients without foot ulcers, the cost of care for patients with a foot ulcer is 5.4 times higher in the year after the first ulcer episode, and 2.8 times higher in the second year (Driver et al, 2010).

Patients with diabetic foot ulcers require more frequent emergency department visits, are more commonly admitted to hospital, and require longer length stays. However, implementation of a multidisciplinary team approach to manage diabetic foot ulcers — involving vascular and podiatric surgeons, diabetologists, tissue viability nurses, interventional radiologists and radiology coordinators — has been reported to reduce long-term amputation rates from 82% to 62% (Driver, 2010; Mehta, 2010).

In this case, the patient had already undergone amputation of all the toes on his right foot. As he was a high-risk patient this could not be avoided, despite efforts to treat the necrosis as a result of sudden infection with debridement. Delayed wound healing occurred after amputation, leading to the final amputation of the last metatarsal toe.

In a study by Moghazy (2010), 30 infected diabetic foot wounds were randomly selected, and honey dressings were applied for three months until healing, grafting or failure of treatment. Complete healing was significantly achieved in 43.3% of ulcers. Significantly, a decrease in size and healthy

granulation was observed in another 43.3% of patients. The bacterial load of all ulcers was reduced after the first week of applying the honey dressing. Failure of treatment was observed in only 6.7% of ulcers.

Honey-based products can play a vital role in the management of diabetic foot ulcers. In this case, the deep postoperative wound healed in two months, without adverse events.

In another evaluation study of six patients with diabetes with infected ulcers (HariKrishna, 2009), honey based products (L-Mesitran) demonstrated that wound infections were rapidly cleared, additional antibiotics were not necessary, eminent (partial) foot amputations were prevented, wounds were quickly debrided and wound size rapidly reduced. These findings corroborate with the case presented in this article.

Conclusion

This case report reaffirms previous findings in the literature (Blokhuys et al, 2005; HariKrishna et al, 2009; Moghazy et al, 2010; Kegels, 2011). Honey-based products can play a vital role in the management of diabetic foot ulcers. In this case, the deep postoperative wound healed in two months, without adverse events, after twice-weekly applications of the honey-based gel. **WUK**

Declaration of interest

The authors declare no conflicting interests.

References

Blokhuys MHE, van Det RJ, Van der Sluis TL, Van der Palen J, Geelkerken RH (2005) The effect of medicinal honey vs. conventional treatment on the healing of

Key points

- ▶▶ Honey-based products can play a vital role in the management of diabetic foot ulcers.
- ▶▶ The use of honey products in diabetic ulcerations does not influence glycaemic levels.
- ▶▶ Honey-based products can possibly prevent amputation in patients with diabetes.
- ▶▶ Honey-based products promote patient compliance.

diabetic foot ulcer. A randomised, reviewers blinded, pilot study. *NVvH* 5

Driver VR, Fabbi M, Lavery LA, Gibbons G (2010) The costs of diabetic foot: the economic case for the limb salvage team. *J Vasc Surg* 52(3 Suppl): 17S–22S

HariKrishna R, Shahanisah Ahmad, Noor Hayati Arbi (2009) Reducing antibiotics and avoiding amputations in diabetic foot ulcers with honey based products. Poster presentation November 25, 2009, HKL, Kuala Lumpur, Malaysia

Kegels F (2011) Clinical evaluation of honey-based products for lower extremity wounds in a home care setting. *Wounds UK* 7(2): 46–53

Maahs DM, West NA, Lawrence JM, Mayer-Davis EJ (2010) Epidemiology of type 1 diabetes. *Endocrinol Metab Clin North Am* 39(3): 481–97

Mehta SK, Breitbart EA, Berberian WS, Liporace FA, Lin SS (2010) Bone and wound healing in the diabetic patient. *Foot Ankle Clin* 15(3): 411–37

Moghazy AM, Shams ME, Adly OA, et al (2010) The clinical and cost-effectiveness of bee honey dressing in the treatment of diabetic foot ulcers. *Diabetes Res Clin Pract* 89(3): 276–81, Epub 2010 Jun 19

Wild S, Roglic G, Green A, Sicree R, King H (2004) Global prevalence of diabetes. *Diabetes Care* 27: 1047–53