Using honey to heal a chronic wound in a patient with epidermolysis bullosa

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Abstract

This case study details the healing of a chronic wound (20years' duration) in a patient with dystrophic epidermolysis bullosa (EB). Many different dressings and creams had been used, and on occasions the wound began to heal but never progressed to closure. A honey impregnated dressing was used and the wound healed in 15 weeks. A brief overview of the dystrophic form of EB is given and some evidence for the efficacy of honey is presented.

Key words: Dressings ■ Wounds ■ Infection control

The blanket term epidermolysis bullosa (EB) refers to spontaneous blistering of the skin caused by trauma and shearing forces (Dunnill and Eady, 1995). It covers a wide spectrum of disease severity but all types of EB are caused by extreme fragility of the skin with severe blistering. In the dystrophic form, healing is also abnormal, forming a contracted scar, and is often delayed. It is not uncommon for patients to endure chronic lesions of several years duration. This may have a severe impact on the patient's quality of life, including work prospects, relationships, self-image and continual pain. It certainly has a huge financial, and sometimes human resource, impact for the primary care provider. Additionally, there is a high incidence of squamous cell carcinoma in patients with the recessively inherited form of dystrophic EB. The cause of this is not clear but may in part be linked to the length of time chronic wounds remain unhealed (Trent and Kirsner, 2003).

Dystrophic epidermolysis bullosa

The inheritance of dystrophic EB (DEB) may be autosomal recessive or dominant. Blisters form, which are not self-limiting, and sufferers are encouraged to lance them with a sterile needle rather than cutting away the roof of the blister which increases the risk of infection. Fingernails and toenails are dystrophic and many sufferers have no nails at birth or lose them shortly afterwards. In recessive DEB, blisters between the fingers commonly cause webbing from early childhood. Over time continuous blistering and contracting of the skin causes the functional loss of fingers and a state descriptively known as mitten–glove syndrome (Hon, 2003). Toes may be lost in a similar way but with less functional impact. Plastic surgery to open the hand contractures is often undertaken but must be regularly repeated as damage is ongoing and adult patients may opt to discontinue the painful process if they are able to meet their 'activities of daily living' with just one or two digits.

Other problems may include: blistering on the cornea which can lead to ulcers and damage to sight, blistering in the mouth leading to microstomia, blistering in the throat and oesophagus leading to swallowing difficulties and nutritional compromise and anal fissures causing extreme pain on defecation. Dental problems are also common owing to difficulties maintaining good oral hygiene. Pain is an ongoing feature of life for most EB sufferers, especially those with the dystrophic form, and for many, resisting the extreme pruritus is a constant battle. Antihistamines and creams have limited benefit. Odour or the fear of it has a huge psychological impact. Additionally, infections are common and it is the author's experience that even applying water to the skin can be intolerably painful for some sufferers, discouraging bathing. Continuous use of topical antibacterials is discouraged and, where used, application of antiseptic creams on a rotational basis is advised to decrease the risk of resistance (Molan, 1999). Systemic antibiotics are prescribed when swab results determine appropriateness or when the patient is systemically unwell.

Because of increased resistance to antibiotics, practitioners are now looking towards alternative therapies for the resolution of infection and advancement of the wound healing process (Molan, 2002). Kingsley and White (2004) stated that while caring for patients with chronic wounds, 'practitioners sometimes stumble across a good outcome using a novel approach.' Certainly, as a specialist nurse caring for patients with the inherited skin condition epidermolysis bullosa, the author is constantly searching for novel therapies to enhance the wound healing process.

Honey has been used as a curative for wounds for centuries (Fox, 2002) but, with the onset of antibiotics, fell into disuse (Molan, 2002). With this in mind, the author undertook a literature review to investigate the evidence for using honey on any EB wounds.

Literature review

The author searched Medline, CINAHL and Cochrane databases, restricting the articles accessed to English language publications. As honey is such an old treatment it was felt unnecessary to restrict the search to particular

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years. Initially the key words used were honey and wounds (separately). These elicited huge numbers of articles and a further more specific search was required to narrow the amount of information found. Key words then used were 'honey and wounds' and 'wounds and honey dressings'. Because the initial search had shown 'infection' and 'anti-bacterial' to be commonly mentioned in respect of honey as a wound treatment, these were also used in the second full search. Websites accessed included Internurse.com; Worldwide Wounds; Journal of Community Nursing online; and Medihoney.com. For these sites, inputting 'wounds' was sufficient to access the required information.

When conducting the literature review, it became apparent to the author that there is a dearth of high-quality research available on this subject in relation to chronic wounds. Much of the research has been done in the laboratory or on acute surgical or burn patients. Research that has been undertaken on chronic wounds tends to be in the form of case studies. Many other papers are reviews of the current literature. The author could find nothing recorded about the use of honey by EB patients.

Honey as a curative

Historically, honey has been linked to wound healing as long ago as 2600 BC. Zumla and Lulat (1982) state that the ancient Egyptians mentioned the use of honey 500 times in 900 remedies. They also state that Hippocrates acknowledged the value of honey as part of the diet, given with vinegar for pain, water for thirst, and water plus various other medicinal substances for acute fevers. Bibbings (1984) confirms the use of honey by the Egyptians stating that instructions have been found for the care of a head wound. It was to be wrapped in meat the first day and thereafter treated with honey, grease and lint. Rund (1990) also points out that Sashrata, the 'Father of Hindu Surgery' used honey on ulcers. More recently, from 1951–1967, Tovey (1991), a podiatrist, reported successfully using honey on leprosy patients in India, where the main disadvantage of the treatment was that it attracted flies.

Honey is made by bees from nectar collected from flowering plants. Rund (1997) describes how the enzyme inhibin from the pharyngeal glands of the bee begins to break the nectar down into hydrogen peroxide and gluconolactone. Namias (2003) gives more detail of this process as it occurs and explains that the warmth within the hive is responsible for the water reduction by evaporation. The hydrogen peroxide and gluconolactone are destroyed by heat in the production of honey for consumption (Namias, 2003) but preserved in honey made specifically for wound healing as it is sterilized by gamma radiation (Lusby et al, 2002). Properties that have been ascribed to honey in the management of wounds include: resolution of infection, control of the bacterial load and deodorization (Molan, 1999). Willix et al (1992) acknowledged that previous studies had attributed the anti-bacterial effect of sugar and honey used in wounds to the high osmolarity created, and undertook laboratory tests to compare the antibacterial activity of Manuka honey (so named because the bees collect the pollen from the Manuka Bush) compared with other unspecified samples of New Zealand honey. Among the 14 strains of bacteria used were *Escherichia coli*, pseudomonas, *Staphylococcus aureus* and *Streptococcus pyrogenes*. When prepared, each species was tested for inhibition with honey solution of concentrations between 1% and 9%. A good response to both Manuka and other honey was recorded but the rank order of sensitivity was completely different. *Pseudomonas aeruginosa* was the least sensitive to both types of honey yet *Escherichia coli* and *Staphylococcus aureus* were most sensitive to Manuka honey and least sensitive to the other types of honey. Willix et al (1992) state that this clearly illustrates a different type of activity in Manuka honey.

Ten years later Cooper et al (2002), also seeking to demonstrate that inhibition of bacteria in wounds was not due exclusively to the osmotic effect, undertook *in vitro* tests to determine the sensitivity of gram-positive cocci to honey. They isolated 18 strains of Methicillin-resistant *Staphylococcus aureus* (MRSA) and 7 strains of Vancomycin-sensitive *enterococci* from hospital environmental surfaces. Artificial honey solution was used in the test and, as in the earlier study, two natural honeys (pasture and Manuka). On this occasion MRSA was found to be equally sensitive to both the pasture and Manuka honeys. It is now clear that not all Manuka honey has the same level of active ingredient (www.manukahoney.co.uk) and this is likely to be why clinical results have been so varied (Molan, 2001). Minimum inhibitory concentrations were measured for each one and were found to be much higher in the artificial honey. The authors suggest this provides evidence that the anti-bacterial effect of honey is not exclusively due to its sugar content (Cooper et al, 2002). Molan and Betts (2004) explain that hydrogen peroxide, which is released by the glucose oxidase and other phytochemicals from the nectar, also have an antimicrobial role. The glucose provides a food source for the bacteria without the malodour associated with the breakdown of amino acids, thereby deodorizing the wound (Molan, 1999).

Lawrence (1999) queries the antiseptic value of hydrogen peroxide, citing it as unstable and suggesting that dilution with exudate will deactivate the honey. Molan and Betts (2004) refute this, stating that honey specifically produced for wound care is still effective against bacteria when diluted by 45–60 times its volume. This paradox occurs because the anti-bacterial activity in honey produced specifically for wound care, is due not only to the osmolarity of the wound but also the effect of hydrogen peroxide and phytochemicals from the nectar of some plant species. As exudate dilutes the honey, the anti-bacterial effect due to high osmolarity is reduced but glucose oxidase becomes active and produces hydrogen peroxide. However, the osmotic and antiseptic effects last only 2–3 days when exudate progressively dilutes the honey (Molan and Betts, 2004), hence the need to discern the frequency of dressing change appropriate for the level of exudate. The phytochemical factor is active in full strength honey and this potent anti-bacterial action invades deeply infected tissues (Molan and Betts, 2004).

Only honey from the Leptospermum tree (including the Manuka species) which has been specifically produced for wound care should be used for wounds. As previously stated,

honey produced for consumption has had any antibacterial properties destroyed by heat during the production process. In addition, any raw honey which is not sterile may carry the risk of being contaminated by Clostridium spores (Molan, 2001). In order to rate the antibacterial activities of different samples of honey being sold for wound care, each is rated with a Unique Manuka Factor (UMF) number (Molan and Betts, 2000). Until recently there were no honey products for wound care available on the hospital formulary or community drug tariff. Patients who heard about the healing properties of honey were forced to purchase their own supply from health stores and nurses were, quite rightly, reluctant to apply an unlicensed product. Where it has been used on chronic wounds, it has been applied in most cases as a last resort when all else has failed and has lead to total or partial healing (Dunford, 2001; Kingsley, 2001).

Although results from laboratory tests were positive and evidence from case studies encouraging, there was no study available for the efficacy of using honey on EB skin.

However, with the honey dressing Activon Tulle becoming available on prescription the author decided to offer this modality to an EB patient with a chronic lesion.

The case study

Andy has lived with recessive DEB for nearly 31 years and, in common with other patients with a genetic condition, is an expert on his particular disease. He is aware of subtle changes in his skin which are undetectable to the eye and usually knows if he is developing an infection before the symptoms are apparent. During his lifetime he has tried a wide variety of dressings. As an adult he cares for his own wounds and uses Mepitel (Molnlyke), a silicone-coated mesh dressing, on open areas as it does not adhere and cause further damage to peri-wound skin.

Andy damaged his left knee 20 years ago and has used many different dressings and creams during this period including Betadine, Bactigras and Melolin, to name but a few, but it has remained open and unhealed (*Figure 1*). Additionally, the area is extremely itchy and he often scratches in his sleep, causing further damage. For the past 4 years he has been dressing his knee with Mepitel covered with gauze and a light bandage. From time to time he becomes aware of infection and applies Flamazine or takes oral antibiotics if he is systemically unwell. During the past 4 years the wound has occasionally shown some signs of healing, small islands of epithelial tissue appear, but the healing never progresses to maturation. Although Andy resigned himself some time ago to the possibility that the wound might never heal, earlier this year he became very low in mood and physically lethargic following two courses of antibiotics.

Figure 1. Prior to treatment being commenced.

Figure 2. After 2 weeks of treatment.

The author shared with Andy the research evidence for the efficacy of honey in wound healing but also advised him that there is no documented evidence for its use on EB wounds. He felt that all else had been tried and stated he would be willing to apply the Activon Tulle provided it could be applied over Mepitel as a precaution against adherence. This was checked with the manufacturer and it was confirmed that it would not effect the efficacy of the honey. (Note: honey should not be applied over paraffin impregnated dressings as it will not be able to dissolve into the wound.)

Method

As Andy usually cares for his own wounds at home, it was decided that he would continue to do so to avoid introducing any unnecessary variable. The author would visit regularly to assess the wound and collect photographic evidence of any change in its appearance. Honey can be soothing and relieve

Figure 3. After 6 weeks of treatment.

Figure 4a. After 9 weeks of treatment.

pain (Subrahmanyan, 1993) but Andy was warned that some patients experience a stinging sensation when honey is applied to a wound. This may be caused by the acidity (normally pH3 to pH4) of the honey (Dunford et al, 2000). Also, increased exudate may occur as the honey dilutes and an osmotic reaction takes place (Molan, 1999). To cope with the additional fluid, Eclypse dressing has been developed for application as a secondary dressing over the Activon Tulle. Eclypse is a soft, highly absorbent dressing with a waterproof backing. Andy dressed his wound with 10 x 8 cm Mepitel; 10 x 10 cm Activon Tulle, 15 x 15 cm Eclypse and secured this with a light bandage and Tubi-gauz. It was agreed that he would change this on alternate days, as per his usual dressing regime, although the manufacturers advised that it could be left in place longer.

From the first application, Andy noticed that the wound became less itchy and he was able to resist scratching. While welcome, this was unexpected as there is no documented evidence that the application of honey resolves pruritis, however, the placebo effect must be considered. No pain and no increase in volume of exudate occurred. Nevertheless, the Eclypse dressing was extremely comfortable to wear and provided added protection, so Andy decided he wished to continue applying it.

Within 2 weeks of the first application, a noticeable shrinkage in the size of the wound occurred (*Figure 2*).

Figure 4b. After 9 weeks of treatment.

Figure 5. After 11 weeks of treatment.

This was the most significant change to the wound in many years and Andy was greatly encouraged at this point. Psychologically he became more positive and physically he was less lethargic. Again, this was undoubtedly because of the hope he now felt, rather than any physiological effect that the dressing was having.

Figure 4 shows the extent of healing at 9 weeks after commencement of the treatment. Some overgranulation then occurred and the rate of healing slowed. It is not yet known whether the exact mechanism of healing in EB skin differs from normal wound healing. Certainly, some wounds do heal while others become chronic. Overgranulation often occurs, but this is usually resolved with the short-term application of a topical steroid, and some wounds then progress to healing while others do not. In this case Dermovate was used for 2 days. Deep infection may be present even when wound swabs appear negative. Wound biopsy could confirm this but is usually thought inappropriate in these patients.

At this point Andy was confident enough that the dressing would not dry out and adhere to the wound to reduce changes to every third day. Healing recommenced but more slowly as the surface of the wound was very uneven. In common with many EB patients, Andy does not normally wash his wounds because th e skin is so fragile. Therefore, although the skin around the wound was flaky and heavily stained

Figure 6. Healed wound after 15 weeks of treatment.

with honey he declined to wash it or apply any emollients. As it continued to heal over the following 6 weeks, he gradually manually removed the dry flaky skin, as was his normal practice. Healing was considered complete at 15 weeks when closure of the wound was achieved and the epithelial layer was intact (Dealey,1994). Maturation may continue for up to 2 years (Collins et al, 2002), during which time Andy will take great care to protect this vulnerable area.

Conclusion

As the first reported case study using a honey dressing on an EB lesion this result is extremely encouraging. The wound had been open for 20 years yet complete healing occurred within 15 weeks from commencement of the treatment. Andy found the dressing easy to apply and comfortable to wear. The pruritus resolved early on in the treatment and he felt physically less lethargic.

The limitations of such a study are recognized by the author, although owing to the rare nature of this condition and the geographic isolation of many sufferers, undertaking a randomized control trial would be extremely difficult. Blinding of either staff or patients to the type of dressings used would be impossible.

It is accepted that it was impossible to control for all variables or account for all the outcomes. However, the methods of wound care were deliberately kept the same as with use of previous products, and therefore any variables are unlikely to be of any real significance. Whether the additional benefits experienced can be attributed to the honey may not be provable. What is important is the clinical end-point which was complete healing that had never been achieved before and a much improved quality of life. For Andy this has definitely been a success story.

Encouraged by this result, the EB nursing team are now using this dressing with many more patients with promising results and we look forward to publishing our findings and adding to the growing evidence for the use of honey with EB in the near future. BJN

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Useful websites

www.debra.org.uk
www.advancis.co.uk

KEY POINTS

- Dystrophic epidermolysis bullosa is a genetic condition which causes spontaneous blistering to occur.
- Chronic wounds are a common problem in patients with dystrophic epidermolysis bullosa.
- Infection is a constant problem.
- Embarrassing odour from wounds has a detrimental effect on a patient's quality of life.
- The honey dressing used on this patient may have helped heal a wound of 20 years duration.