Honey for wound care: myth or science?

Part 2: clinical cases with dogs

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SUMMARY
Various properties with a positive effect on healing wounds are ascribed to the use of honey. In this case report the results of the use of honey dressings for dogs with skin wounds are illustrated on the basis of a few clinical cases. It clearly shows that the wound healing occurs quickly, that resistant bacterial infections are controlled successfully, that necrotic wounds require less surgical intervention and that honey dressings and redressing is very well tolerated by the patient.

ABSTRACT
Honey is believed to have several positive effects on wound healing. In this case report the clinical outcome of the use of honey dressings is described in several clinical cases of dogs with skin wounds. The findings confirm that wounds treated with honey heal quickly, that bacterial contamination is well controlled, debridement is effective and that the dressings are well tolerated in all patients.

INTRODUCTION

Honey has been used for its wound healing properties for a long time already. In small pets the effects of honey for wound care has only been documented by clinical observations instead of by prospective studies. In part 1 about honey for wound care the various characteristics of honey for wound care were discussed on the basis of an extensive literature study (De Rooster *et al.*, 2008). The intention of the previous article was to illustrate the personal experiences of the authors on the basis of a few specific clinical cases in dogs with various types of skin wounds. Of course there is a lot of overlap between the various wound healing capacities of honey. Some of the patients were treated with therapeutic honey, while in others culinary honey was used.

CASE REPORTS

Case number 1

A 12-year old Mechlin Shepherd was presented with extensive myiasis. The treating veterinarian had applied a pour-on for sheep (Butox®, deltamethrin) a day and a half before in order to kill the larvae. The dog was put under general anaesthesia. He was shaved and all larvae were removed manually. On the back and base of the tail large crater-shaped injuries were present and the surrounding skin was severely inflamed (Figure 1A). The dog was treated with antibiotics (Kefzol®, 22mg/kg TID), analgesics (Methadon®, 0.1mg/kg QID) and infusion (Sterofundin®, 1 time maintenance). The wounds were cleaned twice daily with a sterile physiological solution. Although the general condition of the dog clearly improved, a mild extension of the skin necrosis and dehydration at the site of the wound were visible (Figure 1B). Therefore the back was completely covered with compresses drenched in culinary honey starting day 3. After that a closing layer was applied in the form of a large bed-underlay, kept in place by a mesh bandage. The next day the bandage was changed (Figure 1C). The remaining honey was removed with a sterile physiological solution before a new dressing was applied. The day after this the necrotic tissue had separated and could be easily rinsed off with a physiological solution without any curettage (Figure 1D). The following day the dog was discharged without antibiotics or analgesics, but with the recommendation to apply a new honey dressing on a daily basis. When the dog was presented for follow-up 5 days later all superficial injuries were pretty much completely healed while the deep injuries had become smaller and were filled with healthy granulation tissue (Figure 1E). From that time on only

therapeutic honey ointment was applied to the granulating wounds. The interval between the dressing changes was initially prolonged to 48 hours and after 1 week to 72 hours. One month later the dog was again presented with a hernia perinealis. The injuries on the back were completely healed and the back had normal hair growth.

Figure 1A. Case 1. A 12-year old Mechlin Shepherd with extensive myiasis after shaving and manually removing of all larvae. Crater-shaped injuries with marked inflammation of the surrounding skin.

Figure 1B. Case 1. Three days after the removal of the larvae. The wound was cleaned twice daily with a sterile physiological solution. There is additional necrosis and dehydration is present at the site of the wound.

Figure 1C. Case 1. First change of dressing after the application of culinary honey. A demarcation of the necrotic tissue occurs.

Figure 1D. Case 1. Second change of dressing after the application of culinary honey. The necrotic material spontaneously separated.

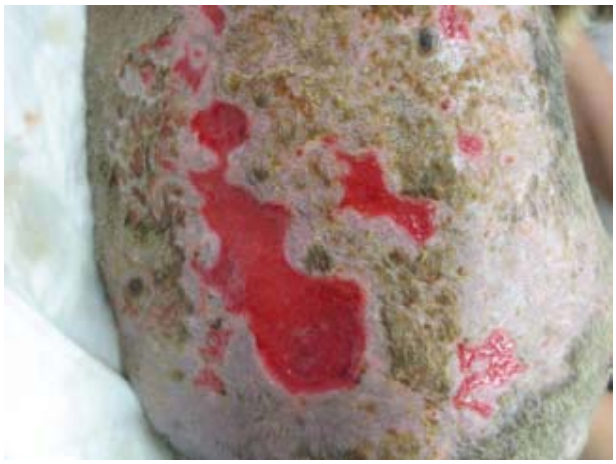

Figure 1E. Case 1. One week after treatment with honey dressings. The superficial injuries had pretty much completely disappeared and the deeper injuries are already mostly filled with granulation tissue.

Case number 2

A 9-year old Sharpei with a bad general condition was referred for ulcerations on the tongue and a marked swelling on the medial side of the left heel with discolouration of the skin (Figure 2A). As underlying cause a vascular pathology (thrombosis) was thought of. The continuing necrosis rapidly resulted in a major skin defect around the tibia and the heel. The owner did not opt for a surgical treatment and cleaning and debridement was done. The only treatment applied was a daily honey dressing with culinary honey (Meli). The necrotic tissue had rapidly demarcated and separated and on day 7 a clear granulation layer was visible (Figure 2B). Six weeks later the defect was nearly completely healed with relatively little scarring (Figure 2C).

Figure 2A. Case 2. A 9-year old Sharpei presented with a necrotic swelling at the level of the heel after an episode of a bad general condition.

Figure 2B. Case 2. One week after treatment with honey dressings. The necrosis spontaneously separated and a clear granulation layer is present.

Figure 2C. Case 2. Six weeks after treatment with honey dressings. The defect has pretty much completely healed with relatively little scarring.

Case number 3

A 7.5-year old Rottweiler was presented with an eosinophilic granuloma between the support toes of the left front paw 3 weeks after a topical treatment with an immune suppressive ointment (Protopic® 0.1% ointment). The dog was limping very badly, the granuloma pushed the toe nails extremely far apart and there was a strong odour as a result of a central necrosis (Figure 3A). The granuloma was probed with a short probe in order to rule out the existence of a fistula. A large surgical biopsy was done and the diagnosis could be confirmed. The site of the biopsy was sutured with non-absorbable suture material (nylon) and a web wrap bandage was applied after the administration of therapeutic honey ointment. With the change of dressing the next day the unpleasant odour had already mostly disappeared. The dog was discharged. An oral cortisone therapy (Prednisolone®, 0.5mg/kg BID) was prescribed and a daily refreshing of the honey dressing was advised. After 14 days the dog was again presented. The dog put weight on the paw well, although the site of the biopsy showed wound dehiscence (Figure 3B). The odour had completely disappeared, just like the necrosis. With a follow-up visit 4 weeks later, after the biopsy, the wound appeared pretty much healed, although the eosinophilic granuloma had increased in size (Figure 3C). The treatment with honey ointment was discontinued and the oral cortisone therapy was doubled. Due to a further expanding of the eosinophilic granuloma the dog was ultimately euthanized.

Figure 3A. Case 3. A 7.5-year old Rottweiler with eosinophilic granuloma in the area between the toes. The granuloma shows an extensive central necrosis. At the level of the bloody exsudate the granuloma was probed in order to rule out a fistula.

Figure 3B. Case 3, Two weeks after the biopsy. Necrosis is no longer present; there is a wound dehiscence at the level of the biopsy site.

Figure 3C. Case 3. Four weeks after the biopsy. The defect has completely healed but the granuloma had increased in size.

Case number 4

A 9-month old Boxer was burned on all four paws when playfully biting through a plastic bottle of toilet clog remover on the basis of sodium hydroxide in powdered form. The dog trampled through the fluid for quite some time. The owner rinsed the paws for a long time with tap water and a veterinarian called in for the emergency initiated a treatment with daily antibiotic injections (Synulox®) and NSAID's (Metacam®) for 3 days. On day 4, considering the severe progression of the injuries, a second opinion was requested. The dog showed an exsudative, foul smelling necrosis on all four paws with loss of digital

and inter-digital skin and exposure of tendons and defects in the large foot pads. Due to self-mutilation also five distal digits of the toes and the nails were missing (2 left front, 2 left back and 1 right back), which exposed bone (Figure 4A). The initiated antibiotic and inflammation inhibiting treatment was continued for one week. On the wounds fluid culinary honey was applied, covered with gauze compresses and on top of that a covering bandage was applied. The bandages were changed once daily. In the beginning the animal showed pain after the application of the honey for a short period of time. After 7 days the necrotic tissue as well as the odour had disappeared and a clear granulation layer was present at the level of the paws (Figure 4B). On day 25 the toes had strongly adhered and the bones were partially covered (Figure 4C). After 5 weeks the dog was discharged with healed paws (Figure 4D). The bone had been covered at all sites. The toes on the 4 paws had been fused together but the dog did not limp.

Figure 4A. Case 4. A 9-month old Boxer after contact with toilet clog remover. Injuries at the level of the foot pads of both hind legs. There is exsudative necrosis with exposure of the tendons (open arrows) and digits of the toes (regular arrow) and a loss of nails and defects at the level of the paw pads.

Figure 4B. Case 4. Seven days after treatment with honey dressings. The necrotic tissue has disappeared and there is new granulation tissue.

Figure 4C. Case 4. Twenty-five days after treatment with honey dressings. The granulation tissue fills the complete defect. The toes have strongly adhered.

Figure 4D. Case 4. Five weeks after treatment with honey dressings. The foot pads have completely healed.

Case number 5

A 9.5-year old male intact Berner Sennen underwent a celiotomy and a marsupialization of the prostate at the treating veterinarian's. In connection 2 surgeries were performed because of dehiscence of the abdominal fascia. When the wound burst open again the dog was referred. There was penetration of a large part of the small intestines through the paramedian celiotomy wound. The visible suture material was removed and the abdomen was copiously rinsed with a sterile physiological solution. The abdominal fascia was closed with a combination of horizontal U-points and an additional continuous suture with slow absorbable suture material (PDS II® 1). The dog recovered well but parapreputially a fistula developed, probably as a result of the initially performed marsupialization. Despite the initiated intravenous broad spectrum antibiotic therapy (enrofloxacin combined with amoxicycline) a positive culture with deep sampling in the fistula was obtained 5 days after the last surgical intervention. A resistant *Enterobacter cloacae* was isolated, which was only sensitive to amikacin and chloramphenicol. Because the general condition of the dog was very satisfying, the antibiotic therapy was not adjusted but a topical therapy was initiated. A 1 ml syringe was filled with therapeutic honey ointment and used as an applicator in order to apply the honey ointment into the fistula as deeply as possible. During the first week the drainage from the fistula opening was reduced drastically. A new bacteriological study was done at which no *Enterobacter cloacae* were observed any more. It took approximately one month before the fistulation had disappeared completely.

DISCUSSION

For as long as people can remember honey has been applied to wounds in humans and animals for its healing properties. The cases that have been discussed are only a grip from the numerous applications of honey dressings by both authors. Although in theory there is a clear distinction between therapeutic and culinary honey, the authors have clinically established that very favourable results can be obtained with either type of honey. Also Mathews and Binnington (2002) reported similar findings about the use of unpasteurized honey in pets and a lot of clinical successes have also been described in human medicine after the use of honey from the food chain as wound dressings (Enzlin, 2001; Molan, 2002). Case 2 and case 4 were only treated with culinary honey. In case 1 initially culinary honey was applied. Once the surface that had to be treated became smaller, honey ointment was used.

In case 3 and 5 only therapeutic honey was used. Registered honey ointments contain other components in addition to guaranteed honey, which reduces the stickiness of the substance and the honey will stick to the wound better. Additives are also added to commercial honey ointments, which among others must divert the free oxygen radicals, which especially in difficult to heal or non-healing wounds offers an important added value with respect to culinary honey (Enzlin, 2001). Another benefit is the strong selection criteria with which the used honey in therapeutic honey ointment must comply (Enzlin, 2001). With culinary honey there are also no indications about the levels of hydrogen peroxide or about the non-hydrogen peroxide activity. With the use of culinary honey it is best to use cold whipped and unheated packaged honey (honey of Meli and of Weyn's honey company comply with these requirements). The heat treatment of honey destroys the antibacterial activity owed to the formation of hydrogen peroxide, because the enzyme that has to make sure of this formation, is destroyed (White and Subers, 1964).

Disease causing vegetative bacteria normally do not survive in honey, but bacterial spores could possibly survive (Snowdon and Cliver, 1996). Indeed, the risk of *Clostridium* spores is smaller with heated honey types, but the expected activity of such a honey dressing is then solely based on the osmotic properties of the sugar fraction (Molan and Allen 1996). At large honey companies all raw materials are checked for the presence of sulphite reducing anaerobes, to which the *Clostridium botulinum* belongs. Although neither author has ever caused iatrogenic wound infection due to the use of cold processed honey, it is indicated to inform owners sufficiently about the possible negative effects of the use of unprocessed honey with respect to commercially available preparations.

With very large skin defects, like in case 1, the choice of culinary honey was obvious because a complete tube of ointment initially would have been insufficient for one single dressing. Local pain and an excessive loss of body fluids were reported after the application of culinary honey in cases of extensive burns in humans (Osman *et al.*, 2003). The dog in case 4, who was treated with culinary honey, showed pain the first few days after the application of honey. The experience of the authors is that such reactions are exceptional. So far reactions of pain had never been established after the application of therapeutic honey.

For fighting the resistant bacterial infection in case 5 therapeutic honey ointment was applied under pressure into the deep wound. No negative effects of this application were experienced and ultimately the fistulation dissolved.

In humans foul smelling wounds are a frustrating problem for the patient (Lee *et al.*, 2007). Although animals are less bothered by this, processes with extensive necrosis will, among others, spread a bothersome odour for the owners. In case 3 and 4 the deodorising effect of the treatment with honey ointment was enormously appreciated by the owners.

Myiasis can take on extreme proportions and lead to horrible wounds. The maggots and their breakdown products cause a marked inflammatory cascade (Anderson and Huitson, 2004). In case 1 these anti-inflammatory properties of the topical use of honey were already evident at the first change of the dressings.

In the small pet sector there are innumerable indications for the use of honey or honey preparations as wound covering. The cases that have been discussed here show that effectively a very good healing of the wound can be obtained and that such treatment of skin wounds is evidently more efficient and cheaper than other classic ointments and/or wound dressings.

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