



Clinical Outcome of Topical Propolis Treatment in a Feline Cutaneous Wound: A Case Report

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Abstract

A female domestic cat was found with a large wound on the right hind leg, around lateral knee region. The cat was cared for by the rescue team for about two weeks before being taken to the clinic, but they admitted there were no significant changes in the healing process of the wound during self-care. Clinical observation showed that the patient's condition was stable, but the wound was completely covered with granulation tissue and pus. Open wound care was decided as a treatment based on the location of the wound and the presence of necrosis. The therapy given was oral medication in the form of cefixime trihydrate (10 mg/kg BW), dexamethasone (0.1 mg/kg BW), and vitamin B12 (50 mcg/day) for 10 days. Topical propolis was then applied to the wound twice daily for a total 14 days during inpatient to accelerate wound healing. The wound was monitored and showed improvement within 5 days. The reduction in wound surface area was clearly visible after 10 days of treatment, without excessive granulation tissue formation and with minimal scarring. This case report concludes that topical treatment with propolis, as additional therapy, can be considered safe and beneficial for healing wounds in cats.

Keywords: Cat, Propolis, Therapeutic Agents, Wound Healing

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Introduction

The skin is usually exposed to many injuries and traumas including chronic unhealed wounds, burns, and ulcers that do not heal at all or do so very slowly. The healing process often requires a long recovery time, especially for large wounds on the limbs and in any other anatomical region that is prone to movement, which may lead to chronic wounds or excessive tissue granulation (Iacopetti et al., 2012). Moreover, secondary bacterial skin infection can negatively influence the wound healing process. Wound healing is an important physiological process consisting of overlapping stages, including coagulation, inflammation, new tissue growth, and tissue remodeling (Abu-Seida, 2015). These healing processes are influenced by several factors such as size of wound, tension and mobility of wound margins, susceptibility to infection, and condition of underlying tissue (Iacopetti et

al., 2012). Additionally, advanced age, stress, malnutrition, and disease (such as diabetes) can lead to a significant increase in the therapy duration (Rojczyk et al., 2020).

Recently, the use of natural substances has been widely suggested as a new strategy and alternative medicine for the treatment of skin disorders. Propolis, or bee glue, is one of such natural therapeutic agents that has been used since ancient times around 300 BC as a medicine for human disease, applied for both internal and external purposes in many parts of the world. The Egyptians, Greeks, and Romans documented its use for its broad healing properties (Abu-Seida, 2015). Initial research on the healing effects of propolis on animals was conducted in the 1990s by researchers from Bulgaria. In this study, propolis was applied topically to skin wounds caused by burns and then its healing effect was evaluated histologically. Finding indicated that propolis therapy enhances the normal reorganization of injured tissues (Rojczyk et al., 2020; Troshev et al., 1990). It is claimed to act as a free radical scavenger and potentially have anti-inflammatory and antimicrobial properties (Martinotti and Ranzato, 2015; Afkhamizadeh et al., 2018). There were also reports of synergistic effects between propolis chemistry and antibiotics which can sometimes increase the antibacterial effect several times (Takzaree et al., 2016).

Propolis has a complex mixture consisting of at least 180 different compounds, of which the main pharmacologically active compounds identified as beneficial are flavonoids, phenolic acids, and esters (McLennan et al., 2008). Clinical application for propolis are quite numerous nowadays, especially for the treatment of wound healing due to its potential therapeutic effects (Oryan et al., 2018; Jaldin-Crespo et al., 2022). Skin wounds are relatively common in animals such as cats, mostly caused by fights. Therefore, wound healing agents are usually needed in veterinary practice to accelerate the healing of wounds in animals (Abu-Seida, 2015). The aim of this clinical case is to describe the potential therapeutic effects of propolis on wound healing in the domestic cat. Moreover, this study is addressing an alternative or an addition to general treatment that could be considered in similar clinical cases to accelerate a proper mechanism of wound healing.

Materials and Methods

Signalment and Anamnesis

A female, domestic short-haired cat weighing 3.3 kg with a large wound on the right hindlimb was brought to Gemi Pet Clinic Semarang. The age and medical history of the cat is unknown, because it was a stray cat and rescued recently. The rescuer explained that the cat had been taken care for approximately two weeks and its wounds were treated with povidone-iodine purchased from a local pharmacy. There were no problems with its appetite, urination, and defecation.



Fig. 1 Patient: a female domestic cat

Clinical Examination

On presentation, the cat was active, alert, and responsive. General clinical examination revealed the cat's condition as follows: normal rectal temperature (38.7°C), normal capillary refill time (< 2 seconds), heart rate was within normal limits (174 beats/minute), and she was tachypneic (48 breaths/minute). On physical examination, a large wound on the right hind leg were observed. An over-granulation wound with pus measuring approximately 7 cm in diameter was visible on the skin around the distal of *m. biceps femoris*. The cat was still alert and able to walk with a slight lameness in her right hind leg. There was no laboratory examination due to limited funds from the rescue team.

Diagnosis

The cat was diagnosed with vulnus stage II with secondary infection. Vulnus was categorized as stage II due to the partial thickness loss of the skin and showing part of the dermis presenting as a shallow open wound. The disease prognosis is considered good (fausta) if the wound is treated properly.

Treatment

A non-surgical approach i.e. open wound care was decided based on the location of the wound and the presence of necrosis. The area around the wound was shaved and disinfected using alcohol 70%. A mixture of normal saline solution, hydrogen peroxide 3%, and povidone-iodine was used to disinfect the wound. About 0.3 ml of propolis was gently applied manually to the surface of the wound with a cotton bud and no bandage was used to cover it. Disinfection and application of topical propolis was done once a day for two weeks during inpatient and then continued during outpatient care. Pet collar was always attached to prevent the cat from biting the wound during treatment. Oral medication in the form of antibiotic (cefixime trihydrate at a dose of 10 mg/kg body weight [BW]), analgesic (dexamethasone at a dose of 0.1 mg/kg BW), and vitamin B12 (50 mcg/day) formulated as a powder in capsules was given orally twice a day. This medication was administered for 10 days during inpatient.

Results and Discussion

When the cat first came to the clinic, the surface of the wound appeared to be filled with granulation tissue, pus, and dried blood with a pink wound bed. Disinfection and topical treatment were carried out since day 0, where the wound became slightly exudative after that. Sterile gauze was used to clean excess serous secretions by gently patting it onto the wound. This condition occurred during 3 days of treatment. On day 5, the wound showed significant clinical improvement marked by better skin structure as shown in Figure 2. Granulation tissue and pus began to diminish with decreased production of serous secretions. Moreover, the newly formed tissue was clearly visible thus the size of the wound also appeared to have reduced slightly. The reduction in wound surface area was very noticeable after 10 days of treatment. On day 11, only normal saline solution was used to clean the wound because there was no more pus.



Fig. 2 Progression of wound healing after treatment: (A) day 0; (B) day 5; (C) day 10

The patient was discharged after two weeks of treatment in the clinic due to the request of the rescuer. The patient's body temperature, capillary refill time, heart rate, and respiratory rate were all within normal limits before being discharged. Topical treatment was continued and the patient was scheduled for control a week after patient discharge. At the time of control i.e. a week after outpatient care, the patient's wound had not yet fully healed. The rescue team who cared for the cat said that sometimes the cat licked/bitten the wound when the pet collar was removed during feeding time. However, the wound looked much better as there was no more granulation tissue and the size of the wound had shrunk. Considering that the wound was still not healed, the veterinarian suggested that topical propolis should be continued until the wound has completely closed while the oral medication was not prescribed anymore.



Fig. 3 The wound's condition at the time of the patient's scheduled check-up

Treating of skin wounds on the extremities is a challenge for veterinarians and can also lead to considerable expenses for pet owners (Oros et al., 2023). For all these reasons, there is an urgency for veterinarians to develop effective methods to treat skin trauma in animals. This study demonstrated that treating wound in domestic cat with propolis led to improved clinical outcomes and a faster reduction in wound size. This finding is consistent with previous research showing that propolis can relieve inflammation and speed up wound healing process (Yang et al., 2022). Wound healing is the body's natural reaction that begins immediately after injury. This process consists of a series of molecular and cellular events which occur after the onset of a tissue lesion to repair the damaged tissue (Gonzalez et al., 2016). The complete wound healing process takes a few weeks for acute wounds, but could take years for chronic wounds (Jaldin-Crespo et al., 2022). Chronic wounds are characterized by a stage of extensive inflammation that inhibits healing, a prolonged disease course, and susceptibility to bacterial infection (Yang et al., 2022). Therefore, the management of some complicated wounds such as chronic, infected, and large-sized wounds is technically difficult (Oryan et al., 2018).

A

B

C

In recent decades, propolis has attracted the interest of researchers due to its several biological and pharmacological properties (Hananeh et al., 2015). Propolis is a resinous beehive product that is collected by the bees from plant resin and exudates, to protect and maintain hive homeostasis (Zulhendri et al., 2022). It was discovered and used by the ancient Egyptians, Greeks, and Romans for its medicinal properties. Indeed, propolis is a kind of mixture, which contains a variety of chemical components. Main composition of crude propolis is resin (50%), wax (30%), essential oils (10%), pollen (5%), and other organic components (5%) (Martinotti and Ranzato, 2015). It possesses several biological properties, including antimicrobial, antioxidant, antiviral, analgesic, antitumor, anti-inflammatory, and immunomodulatory agent (Abu-Seida, 2015; Jaldin-Crespo et al., 2022; Yang et al., 2022). The biological properties of propolis is mainly due to some substances such as flavonoids, terpenes, caffeic acids, phenolic acids, and esters. Moreover, it also contains high amounts of vitamins and minerals, especially vitamin B complex, vitamin C, vitamin E, provitamin A, copper, iron, calcium, zinc, cobalt, and potassium (Takzaree et al., 2016; Cao et al., 2017).

Numerous studies have described the beneficial role of propolis in promoting tissue repair. It supports the healing process by stimulating epithelial regeneration, regulating extracellular matrix components such as collagen, and providing antioxidant effects that help protect against skin disorders (Cao et al., 2017). In particular, propolis is commonly used in the treatment of wounds and ulcers in the form of ointments, powders, and sprays. Furthermore, propolis has been shown to provide clinical benefits not only in treating skin wounds but also in managing various skin conditions unrelated to injury, such as acne, psoriasis, and herpes virus-induced lesions (Rojczyk et al., 2020). Propolis, as a natural product with useful biological properties and no recorded side effects, is also reported to be able to treat chronic wounds by reduced the healing time. It has even been reported that the size of ulcers in diabetics was reduced after the addition of topical propolis ointment to the conventional wound treatments (Afshamizadeh et al., 2018). It is also considered very helpful in preventing bacterial resistance that occurs due to the long-term use of topical antibiotic without veterinary supervision (Yang et al., 2022). In addition to its safety and effectiveness, propolis is also a cost-efficient option for topical wound treatment. Therefore, propolis may serve as a good alternative to various synthetic topical wound treatment products (Abu-Seida, 2015).

Conclusion

Wounds on animal skin with secondary infection by bacteria could be a challenge for veterinarians, especially in cases of delayed wound healing and long-term nonhealing wounds. Therefore, there is a continuous need to develop wound healing agents and effective methods as treatments for animals. In this case, topical propolis was used to treat a large wound in the domestic cat. It was proven to provide good healing with significantly minimal scabbing. In conclusion, this case report suggests that topical treatment with propolis as additional therapy can enhance wound healing process and is suitable for use in clinical cases in the field. However, further research is needed on the effectiveness of topical propolis on various types of wounds and other clinical conditions in animals, not only cat, as well as comparative studies with other wound healing agents to gain a more comprehensive understanding.

Conflict of Interest

The authors certify that there is no conflict of interest with any financial, personal, or other

relationships with other people or organization related to the material discussed in this case report.

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