

The Use of Hydrocolloid Dressing in the Management of Open Wounds in Big Cats

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Abstract—Felines, such as *Panthera tigris*, *Panthera leo* and *Puma concolor*, have become common residents in animal parks and zoos. They often sustain injuries from other felines within the same, or adjacent enclosures and from playing with items of enrichment and structures of the enclosure itself. These open wounds, and their treatments, are often challenging in veterinary practice, where feline-specific studies are lacking. This study is based on the author's clinical experience gained while working at local animal parks in the past five years, and current evidence of hydrocolloid dressing applied to other species. Hydrocolloid dressing is used for secondary healing of chronic and acute wounds, where there is a considerable amount of tissue loss. The patients included in this study were sedated using medetomidine and ketamine every three to four days, for wound treatment and bandage change. Comparative studies of different techniques of open wound management will improve the healing process of exotic felines in the future by decreasing the time of recovery and incidence of other complications. Such studies will also aid with treatment of injuries sustained in wild felines, such as foot hold trap and bite wounds, found in natural conservation areas and wild animal sanctuaries.

Keywords—Felines, hydrocolloid dressing, open wound, secondary healing.

I. INTRODUCTION

WILD cats such as *P. tigris*, *P. leo* and *P. concolor* are subject to serious injuries that may require veterinary interventions and rehabilitations in sanctuaries. Such traumas may be caused by bites and foothold trap wounds, which often present as lacerative, pressure, shear and friction wounds, leading to skin layer separation, lack of circulation and subsequently, necrosis [1]. Due to the loss of tissue and increased incidence of secondary infections, these cases have a better prognosis with open wound treatments. The aim, when treating wild felines, should be to find the most effective wound management, with the fastest rate of healing and the largest gap between dressing changes. It is imperative to keep in mind that the felines must be sedated during every procedure, and should hopefully be returned to the wild, or at most, kept in a conservation area for rehabilitation.

Although wound management is a common occurrence in the veterinary field, there are very few studies describing the results of different types of wound dressings in felines. Wound management is important, when taking into consideration that wound healing in felines, is different and more challenging than in canines and other species [2]. The first stage - inflammation- in primary healing of wounds in felines, is weaker than in canines. This means that there is less formation

of granulation tissue, which is also poorer in vascularization, and more fibrotic when compared to canines. The rate of contraction and epithelialization is also slower, especially in the extremities (forelimbs and tails) [2]. Therefore, one must not assume that a specific technique that works well in other species would give the same results in felines. Due to the lack of evidence supporting the effects of different dressings in felines, we selected the hydrocolloid dressing, based on previous clinical experience and studies carried out by Tsioli et al. on the use of hydrocolloid dressings on open wounds in domestic cats [8], [9].

II. CASE HISTORY

A. Case 1

A nine-month-old Bengal tiger (male) presented with a severe bite wound after being attacked by an adult Bengal tiger from the adjacent enclosure, which occurred through a small hole in the metal cage mesh, that was damaged by the victim itself. The injury consisted of lacerations and shear wounds, exposing muscle tissue, ligaments and bone. Besides the substantial loss of muscle and skin tissue on the medial aspect of the lower forelimb, the skin necrosis extended down to the dorsal surface of the proximal phalanges.

B. Case 2

A 3-year-old lioness presented with multiple, deep wounds on the tail after getting trapped under a metal structure within the enclosure. These pressure and friction wounds resulted in a loss of tissue that were best treated as an open wound.

C. Case 3

A 6-year-old puma (male) presented with a lacerative wound on the dorsal surface of the metacarpals. This was caused after struggling to pull the limb free after being impaled by a small metal rod, that came loose from one end in(delete) the metal structure of the enclosure.

III. TREATMENT AND MANAGEMENT

A. Sedation Protocol

All three felines were anesthetized with a combination of medetomidine and ketamine, intramuscularly, using a dart gun or tranquilizer gun. In some cases, an extra supplement of ketamine was needed for deeper sedation. The sedation was reversed with atipmazole, given intramuscularly, at least 40 minutes after induction [4].

B. Systematic Treatments

An oral analgesic, such as meloxicam, was administered to

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manage the pain as necessary in each case. A ten-day course of a broad-spectrum antibiotic, such as marbofloxacin, was also given orally, as the nature of the wounds meant there was a high possibility of secondary infections. Since there was a substantial amount of blood loss in case no. 1, the feline was given a subcutaneous, injectable supplement, containing vitamin B1, vitamin B12, iron and cobalt, and intravenous fluid therapy (lactated Ringer's solution) while under sedation.

C. Wound Debridement

This action is necessary to remove all infected, necrotic or non-viable tissue, foreign debris, and even remnants of the previous dressing. This stimulates wound healing by encouraging proliferation of granulation tissue, especially in deep wounds. Surgical or excisional debridement was initially applied using a size 10 scalpel blade and surgical scissors to ensure a more selective technique [6]. In between subsequent bandage changes, autolytic debridement was often noted.

D. Wound Lavage

This is the action of cleaning the wound by irrigation using

a fluid. Generally, saline or lactated Ringer's solution was used, unless the wound was infected. In such cases, a diluted betadine (povidone iodine) 1% solution was also chosen.

E. Application of Dressing and Bandage

Before applying the hydrocolloid dressing, the wound was debrided and lavaged. The area around the wound and the wound itself were blotted well using Gauze swabs. A minimum two-inch border around the wound was shaved and the area was cleaned again when necessary. The hydrocolloid dressing used was in the form of a self-adhesive sheet, which is able to adhere to shaved dry skin and stay in place until the next dressing change. This hydrocolloid dressing was applied carefully to ensure an air-tight seal. Following application, a layer of soft bandage was used before covering with multi-purpose cohesive bandage. This was followed by a layer of soft bandage before finishing off with a multi-purpose cohesive bandage. The dressing was changed every three to four days under deep sedation.



Fig. 1 Acute open wound healing over time on a Bengal tiger (Case no.1): (a) Lateral aspect of the wound on day 12 of treatment; (b) Dorsal aspect of the wound on day 12 of treatment; (c) Dorsal aspect of the wound on day 33 of treatment; (d) Lateral aspect of the wound on day 53 of treatment



(a)

(b)



(c)

(d)

Fig. 2 Acute open wound healing over time on a lion: (a) Untreated wound, 24 hours after the injury; (b) Lateral aspect of the wounds on day 13 of treatment; (c) Lateral aspect of the wounds on day 23 of treatment; (d) The wounds are in the stage of maturation, 36 days after the start of the treatment

IV. DISCUSSION

Since every wound is unique it is important to evaluate each case when first presented, in order to come up with the right treatment plan that allows optimal wound healing while causing the least distress to the patient [1].

The dressing is a critical part of open wound management, since its role is to help control oncotic and thermal stability and keep the wound hydrated, while supporting the three phases of healing: inflammation, proliferation and maturation. Thus, it is important to use 'interactive' wound dressing techniques, such as hydrocolloid dressing, polymer foam

dressing and negative pressure wound therapy (NPWT), as opposed to passive dressings, such as impregnated gauze or bandage [5].

Hydrocolloid dressings have been used for chronic pressure wounds and also a variety of acute open wounds. The valuable qualities include, but are not limited to, the induction of autolytic debridement and absorption of excess fluid, which in turn promotes granulation [7]. This is crucial in the open wound management of felines since proliferation of new tissue is slower, along with rate of contraction and epithelialization, as demonstrated by Bohling et al. [2]. The ability to act as a

barrier to pathogenic micro-organisms and external moisture (such as urine and rain water) is ideal, especially in big cats which are recovering in large open-air enclosures. When choosing this type of dressing it was also taken into

consideration that the felines undergoing treatment need to be anaesthetized during change of bandage, and so, daily bandage change was not ideal.

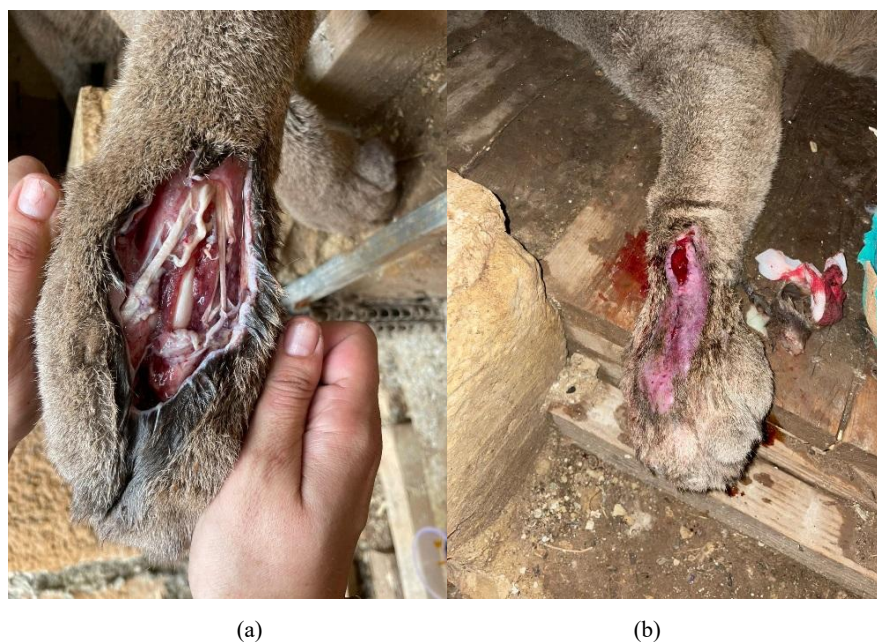


Fig. 3 The result of the treatment of an acute open wound on a puma: (a) Dorsal aspect of the wound on the day of the injury; (b) Dorsal aspect of the wound on day 13 of treatment

There have only been a few documented studies about wound management in felines. In a controlled experiment, Tsioli et al. compared the healing of 3 wounds treated with two different occlusive hydrocolloid dressings and one semi occlusive pad on ten cats [8], [9]. Another interesting study was carried out by Nolf, whose literature review addresses the indication and action of NPWT in feline patients. Well-designed wound management studies comparing different dressing techniques will provide more valuable information, which is essential for improving the healing process of felines in the future [5].

Case studies on disease management of zoo animals and wild animals in captivity, are of utmost importance, as they will provide guidance for successful rehabilitation and release of animals back into the wild [3].

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