



## Clinical management of maggot wounds in Asiatic Black Bear (*Ursus thibetanus*)

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### Abstract

Like most other species, the Asiatic black bear is vulnerable to a wide range of diseases, including infection, inflammation, parasitic infestation, and degenerative disease. The study reported the surgical and conservative management of maggot wounds, including anesthetic protocol and postoperative care in Himalayan Black Bear (*Ursus thibetanus*). Anesthesia was performed successfully by administering Xylazine and Ketamine intramuscularly (IM) by remote injection using a tranquilizing gun with a 10CC anesthetic dart. The animals' clinical evaluation showed an induction time of 4.5 minutes, duration of anesthesia was 72.0 minutes, and recovery time of 38.0 minutes. All the physiological parameters were within normal limits.

**Keywords:** Anesthesia, myiasis, Physiological parameters

### Introduction

Zoos are an ex-situ form of conservation where animals are displayed in cages or enclosures for esthetic, educational or research, and conservation purposes (Thawait et al. 2014) In captivity the health status of the animals depends on many factors, like feeding, keeping conditions, animal management and environmental conditions such as temperature and humidity.

The Asiatic black bear is distributed throughout the Himalayan ranges in the northwest (Jammu and Kashmir; Himachal Pradesh), west (Himachal Pradesh and Uttaranchal), Central Sikkim, and Northern



West Bengal) and east (Arunachal Pradesh) (Sathyakumar 1999). The Asiatic black bear, like most other species, are vulnerable to a wide range of diseases, including infection, inflammation, parasitic infestation, and degenerative disease. Myiasis is the parasitic infestation of tissue of a live mammal by dipterans larvae (maggots) that grow inside the host while feeding on its tissue, causing more or less every traumatizing injury (Hall and Farkas 2000). This infestation eventually turns into a maggot wound, which annoys animals and disrupts regular feeding and resting habits. Left untreated, maggot wounds are fatal as the animal may die due to the maggots tunneling into vital organs (depending on the wound's site), blood loss, or secondary infections. The most affected hosts for myiasis are cattle (46.4%) followed by dogs (15.3%), humans (14.7%), pigs (6.0%), horses (4.0%), and sheep (1.0%) (Sergio *et al.* 2007). Myiasis causes a reduction in the production of meat, milk, and wool in livestock species, but in the case of wildlife, it leads to wild animals' death in captivity and the free-ranging wildlife (Kumar and Raj 2012).

There is a shortage of information about the management of maggot wounds in wildlife. This case report describes the medicinal management of maggot wound in Asiatic Black Bear (Fig. 1 and 2).



**Figure 1:** Maggot wound in Himalayan Black Bear



**Figure 2:** Maggots recovered from wounds



## Materials and Methods

Five years old male Asiatic black bear (weighing about 120 kg) was observed to be listless, tended to be isolated, inappetence, restlessness, frequent head shaking, and used to vigorously rub his back regions against wall or stones in the enclosure area. This all necessitated clinical investigation and treatment. The animal had a history of infighting with other males in the enclosure.

### Anesthesia, Surgical procedure, and Postoperative care

The sick bear was chemically immobilized for closer examination, sampling, and treatment. The bear was moved to an indoor den with good lighting and ventilation to allow a quiet induction and recovery. The feed and water were withheld for 24hrs and 8hrs, respectively, before immobilization. The animal was anesthetized by combined injection of Xylazine hydrochloride (Ilium Xylazil<sup>®</sup>, Troy Laboratories Pvt. Ltd., Australia) dosed at 2 mg/kg body weight (*bwt*), and Ketamine hydrochloride (Vetalar<sup>®</sup>, Boehringer Ingelheim Vetmedica, Inc. St. Joseph, MO64506 USA) dosed at 5mg/kg *bwt* intramuscularly (IM) by remote injection using a tranquilizing gun with 10CC anesthetic dart. The anesthesia was reversed with Yohimbine dosed at 0.3mg/kg *bwt* intramuscularly (IM) (Reverzine<sup>®</sup> Bayer Australia Ltd (Animal Health)) (Fig. 3). Physiological parameters like body temperature, respiration rate, heart rate, and mucous membrane color were monitored throughout the anesthesia at frequent intervals.



**Figure 3:** Anaesthetized Asiatic Black Bear

After immobilization, multiple maggot wounds with whitish/creamy maggots were observed streaming out from the wounded parts, on his back and neck region area. The skin over and around the wound was seen red, swelled, and inflamed indeed. The wounds were evaluated for the spreading and depth of tissue involved. Some of the scars have formed pockets with the length, width, and depth varying between 2.5-4.0 cm, 2.0-3.0 cm, and 1.2-1.8 cm. At the same time, other wounds did not form pocket instead passed beneath the skin and formed a tract wound of 4.0-5.5 cm in length. Hairs around each wound were clipped using curved scissors. The operative site was then painted with sterile gauze soaked in tincture iodine for disinfection of the skin. Superficial maggots were removed from the wound pocket using sterile tissue forceps. The wound pocket was also packed with a gauze dipped in medicinal turpentineoil for 10 minutes to remove the deep-seated maggots. The live and dead maggots that came out to the surface of the wound were removed using simple tissue forceps. After removal of all maggots present in



wound sterile gauze soaked in tincture, iodine was used to clean out the dead tissue debris and to induce inflammation. Thereafter, maggoticidal and bacteriostatic wound dressing powder (Negasunt powder<sup>®</sup>) was sprinkled into the wound pocket. Then to prevent flies from sitting and laying eggs on this wound site, a layer of *Himax* (Ayurvet Ltd.) and *Lorexane* (Virbac India) mixed in the proportion of 1:5 was applied together. Postoperatively a subcutaneous injection of 1% Ivermectin (HITEK<sup>®</sup>, VirbacIndia) at 200 micrograms /kg *b.wt* was given. A broad spectrum antibiotic *viz.*, Single application Enrofloxacin (Fortivir<sup>®</sup>, Virbac India) dosed at 3ml/40kg *b.wt.* was injected IM at the time of operation and then repeated once at 72 h interval. Antihistaminic preparation (Chlorpheniramine maleate, Cadistin<sup>®</sup>, Zydus animal health Ltd., India) at 1 mg/kg *b.wt* was administered IM once daily for three consecutive days. The treated wounds were observed on the third day of operation, and no maggots were found. The wounds wholly healed after two weeks following the operation.

## Results and Discussion

Anesthesia was performed successfully by administering Xylazine (3mg/kg body weight) and Ketamine (5mg/kg body weight). Bears are monogastric and may vomit during induction or recovery, or regurgitate while anesthetized, therefore feed and water was withheld for 24hrs and 8 hrs, respectively, before immobilization.

The induction of anesthesia was smooth with good muscle relaxation throughout the surgical procedure. The induction time was observed to be 4.5 min, adequate depth of anesthesia was maintained for 72 min without the need for supplementation. The recovery time was 38 min after Reversine. In wildlife cases, wound treatments require general sedation or anesthesia. This is particularly true if extensive cleaning and debridement (surgical removal of dead and severely damaged tissue) are necessary.

During the immobilization period, the animal was monitored with great caution. The vital health signs like heart rate, respiratory rate, temperature, and color of mucous membranes were monitored and recorded at 15 min intervals (Morris 2001).

Bears are prone to hyperthermia because of their thick fat layer; close monitoring of body temperature during anesthesia is essential. Physiological parameters on an average basis revealed {heart rate (48±12 /min), respiration rate (12±7/min), and rectal temperature (37±1.5°C)} normal values.

Infighting injuries during the breeding season and resultant abrasion/lacerations on the skin surface or open wound is a predisposing factor for cutaneous myiasis. Myiasis is a parasitic infestation. Its incidence rate is higher in tropics, South–East Asia, and subtropics of Africa, where the causative predisposing factors are exposed to myiasis–causing flies and their increased aggressiveness (Bologna *et al.* 2008). The efficacy of oil of turpentine in the treatment of myiasis has been reported earlier as turpentine oil creates an anoxic condition in the wound pocket, and as a result, the maggots crawl out of the pocket within three to five minutes (Bowe *et al.* 1977).

In this case study, the application of medicinal turpentine oil to the maggots wound helped in removing maggots from the wound. Moreover, the oil of turpentine enhances ceruloplasmin activities that inhibit inflammatory injury by its antioxidant property (DiSilvestro 1989). Ivermectin injectable solution is a highly active, broad-spectrum parasiticide for parenteral administration; however, and data is minimal regarding the efficacy and safety of Ivermectin in wild animals. In this study, Ivermectin was administered dosed at 200 µg/kg *bwt* like domestic animals. Single application Enrofloxacin was



administered to avoid secondary bacterial infection. The antihistaminic drug was used to counteract the histamine released by damaged tissue. Ascorbic acid (vitamin C) was given orally once daily for one week to promote the healing of a wound by promoting keratinocyte differentiation (Savini et al. 2002, Duarte et al. 2009) and stimulating the formation of an epidermal barrier (Boyce et al. 2002).

In this case report, maggot wounds completely healed in 14 days (2 weeks) post-operation. Similarly, (Rahman et al. 2009) reported that 90.3% wound areas were healed by day 17 of operation for maggot wounds in cattle treated with Ivermectin and broad-spectrum antibiotic. Early wound healing, in this case might be due to species variation and an additional supplement of ascorbic acid. All these factors might have promoted the recovery of the wound.

## Conclusion

It can be concluded that surgical management using oil of turpentine and tincture iodine and topical dressings with maggotocidal and bacteriostatic along with parenteral administration of Ivermectin, Single application of Enrofloxacin and chlorpheniramine maleate is sufficient for successful management of maggot wounds in Himalayan black bear in captivity.

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