Biawak, 13(2), pp. 103–106

Pododermatitis Surgical Intervention in a Savannah Monitor (*Varanus exanthematicus*)

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Abstract - A five-year-old *Varanus exanthematicus* weighing 3.4 kg was presented with a solid mass on the palmar surface of its rear left foot. During clinical examination, the monitor had gait movement abnormalities, and radiography revealed the mass was radiopaque. Fine-needle aspiration cytology of the mass revealed some cocci-shaped bacteria. Pododermatitis with an encapsulated abscess was diagnosed after both diagnostic methods were performed. Surgery was performed with the lizard under general anesthesia. Fluid therapy, antibiotics, NSAID and topical ointment was administered post-surgery. The wound healed up well and no further gait abnormalities were noticed two weeks post-surgery. Suture materials were removed six weeks post-surgery.

Introduction

The savannah monitor lizard (*Varanus exanthematicus*) is one of the most popular monitor species kept among reptile keepers (Bennett, 2000; Pare, 2006). Some captive breeding of this species has occurred in private and zoo collections, but most are still collected from the wild to supply the strong demand for the species among collectors (Bennett, 2000; Coiro, 2007). Pododermatitis has been observed in large lizards such as varanids and iguanas, chelonians (Scheelings & Hellebuyck, 2019), chameleons (Schmidt *et al*., 2012), and crocodiles (Emikpe *et al*., 2016). Husbandry-related issues are often the cause of these problems (Scheelings & Hellebuyck, 2019), and if left untreated, osteomyelitis may develop.

Case Report

A five-year-old *V. exanthematicus* weighing 3.4 kg was presented with a mass on the rear left foot that had been growing progressively for the past month. The owner mentioned that a sharp edge was found in the enclosure and suspected that this caused the wound which led to the mass. No changes in appetite were noticed. The animal's body score was normal (3/5). During visual inspection, the monitor showed signs of discomfort in the rear extremity while moving, and during palpation. Physical examination revealed a solid mass on the foot and an ulcerative wound was found at the bottom of the wound (Fig. 1).

Radiographic imaging was performed with the

Fig. 1. Inflammation found on the rear left foot. Arrow shows the encrusted area on the distal side of the foot.

Fig. 2. Radiographic image of the rear left limb.

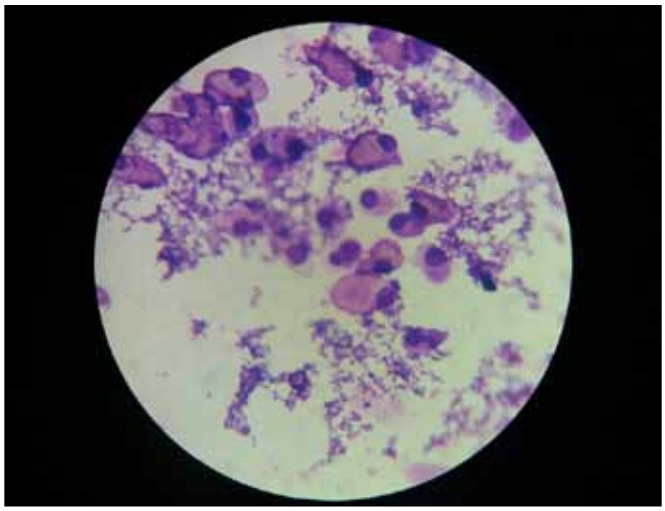

Fig. 3. Diff-Quik staining of the FNA cytology revealing high numbers of heterophil and cocci-shaped bacteria.

monitor in dorsal recumbency. Results showed that the mass was radiopaque (Fig. 2). Tissue aspiration cytology using fine needle aspiration (FNA) directly from the external surface of the mass was performed without anesthesia and with a 23-gauge needle on a 5 mL syringe. The needle was repositioned in several locations with negative pressure (Redrobe & MacDonald, 1999; Alleman & Kupprion, 2007). Aspiration was expelled on a microscopic slide and Diff-Quik staining was used for cytological study. Cytology revealed heterophils, red blood cells and some coccus shaped bacteria (Fig. 3). Cytology also showed some cocci shaped bacteria. Pododermatitis with abscessation was diagnosed based on the results of these techniques.

The *V. exanthematicus* was fasted for 72 hours prior to surgery. The monitor was manually restrained with a gentle, but firm grip on the neck and the hind leg was restrained together with the tail. Acepromazine (15 mg/mL with a dose of 0.1 mg/kg [0.02 mL]) and Ketamine (100 mg/mL with a dose of 30 mg/kg [1 mL]) were injected intramuscularly into both forelimbs separately. Induction took about 25 minutes for the animal to show no righting response. The monitor was then positioned in ventral recumbency, and an endotracheal tube was placed using a sterile 60 drops/mL infusion line. Isoflurane was induced at 4% and maintained at 2%. A fetal Doppler was used to evaluate the heart rate. The monitor was then placed in dorsal recumbency and the infected foot was prepared on a sterile drape. The surgical site was cleaned with diluted chlorhexidine gluconate 4%, and alcohol was applied to the area for sterilization. An incision was performed on the palmar mass, revealing multiple abscesses. All encapsulated abscesses were manually removed with toothed forceps (Fig. 4). Diluted hydrogen peroxide of 1% was then flushed into the surgical site. Saline (physiologic 0.9% sodium chloride) was then flushed into the wound to clear out the hydrogen peroxide. Extra skin was removed before sutures were applied. Absorbable polypropylene 3-0 suture material was used with simple interrupted sutures (Fig. 5). The area was flushed again with saline before topical antibiotic Bioplacenton® ointment (neomycin sulfate) was applied to the wound. Gauze was then applied to the surgical site and wrapped with plaster to minimize infection and gait movements. Enrofloxacin (50 mg/mL with the dose of 10 mg/kg [0.68 mL]) and meloxicam (5 mg/mL with the dose of 0.2 mg/kg [0.13 mL]) were both administered intramuscularly into each forelimb.

Post-surgery treatment included follow-up application of the topical antibiotic ointment, antibiotic injections, NSAID injection and fluid therapy. Enrofloxacin (50 mg/mL at 10 mg/kg) was given daily for seven days and meloxicam (5 mg/mL with a dose of 0.1 mg/kg [taper down dose]) was given every other day for three treatments. Fluids (sodium chloride 0.9%) were administered at 20 mL/kg with a butterfly catheter into the coelomic cavity. Suture material was removed after about six weeks post-surgery.

Discussion

Body condition is a basic consideration of veterinary health assessments. A scoring system of 1 to 5 can be

Fig. 4. Encapsulated abscesses removed from the infected foot.

Fig. 5. Post-surgical sutures.

a useful subjective method, with 1 assigned to animals that are very thin and 5 representing obese individuals (Divers, 2019). The *V. exanthematicus* presented in this case had a normal body score (3/5) based on the normal amount of fat and muscularity around the tail, pelvis and hind legs. The owner reported no changes in the monitor's appetite, which has also been recorded in some other cases of reptiles with abscesses (Jiang *et al*., 2019). The mucosa membrane was pink indicating the monitor was well-hydrated. Abscesses in reptiles are usually detected by the presence of large, swollen or hard masses (Harkewicz, 2001); yet, inflammatory exudates are usually firm in reptiles, indicating neoplasia as a differential diagnosis (Divers & Garner, 2003). The lesion on the distal side of the lump was dried and encrusted, revealing a former puncture wound which could have been the point of entry for the infection. Radiography revealed no bone pathology.

Inflammatory lesions might have decreased pain sensation (Harr & Romagnano, 2015) and present high numbers of heterophils (Alleman & Kupprion, 2007). Abscess treatments in reptiles are best approached with a puncture or surgical removal of the whole infection, continued with antiseptic and antibiotic treatment (Alworth *et* al., 2011; Chaprazov *et al*., 2013). Meloxicam was administered for anti-inflammatory and post-surgery pain management (Rockwell & Mitchell, 2019). Because reptiles have a renal portal system, drugs given intramuscularly are best administered in the cranial half of the body (Mader, 1998); however, fluids can be given intra-coelomically.

Debridement of the wound can stimulate the healing process (Mitchell & Diaz-Figueroa, 2004). Topical antibiotic was given daily to limit opportunistic infections and facilitate wound healing (Fig. 6). During post-surgery, the monitor was placed in a simple tub with clean newspaper as substrate to avoid other infections and to keep the wound area clean. The monitor had a good feeding response two days after surgery, and suture material was removed six weeks post-surgery (Alworth

Fig. 6. Wound seven days after surgical intervention.

et al., 2011; Kubiak, 2019). Inspection after six months showed no reoccurrence.

Acknowledgments - I would like to thank the editorial board of *Biawak* and two anonymous reviewers for reviewing this manuscript. I would also like to thank Danny Gorman, Donald R Wells, Tuti and all those that were involved in this case.

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Received: 20 September 2019; Accepted: 19 December 2019