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Intralesional methylprednisolone injection as an adjunct treatment for peri-cloacal pyogranuloma in an African penguin (*Spheniscus demersus*)

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ABSTRACT. An African penguin (*Spheniscus demersus*) presented with a large peri-cloacal mass. The mass was diagnosed as a pyogranuloma histologically, with multifocal to coalescing inflammatory responses in the subcutis and keratinized simple stratified squamous epithelium overlying the surface. The patient was prescribed 125 mg/kg oral clavulanic acid/amoxycillin twice a day and 20 mg/kg oral terbinafine once a day for 14 days, but there was no change in the size of the mass 4 days after therapy, so a decision was made to administer 1 mg/kg of intralesional methylprednisolone. Fourteen days later, the mass resolved with no further recurrence. This case demonstrated that intralesional methylprednisolone used with antibiotic and antifungals was effective in resolving a peri-cloacal pyogranuloma and without any side effects.

KEY WORDS: African penguin, intralesional corticosteroid, pyogranuloma

African penguins have been listed as endangered by the International Union for Conservation of Nature since 2010 and is currently classified as Appendix II by the Convention on International Trade in Endangered Species of Wild Fauna and Flora with only an estimated 50, 000 birds left in the wild [3].

Many zoos around the world house colonies of African penguins for conservation and education. However, African penguins in captivity are prone to certain diseases such as malaria, pododermatitis, preen gland infections and other infections, especially fungal infections caused by Aspergillus [15]. These are exacerbated by stress and poor husbandry conditions in captivity leading to decreased immunity [15]. Stressors may include poor air quality or ventilation, high density of penguins, inappropriate environmental temperatures, restraint of birds, introduction of new birds to the exhibit and changes to the environment such as maintenance works [10]. Restraint has been shown to cause a significant increase of corticosterone [1].

Poor husbandry may also lead to certain problems in a captive colony of penguins. Increased breeding success was influenced by the density of captive penguins and age distribution of the colony [8]. Ulcerative pododermatitis occurred more commonly with increase in sedentary habits, hard abrasive surfaces, reduced time in water and poor drainage systems [6, 12].

In this case report, we describe an African penguin that developed pericloacal pyogranuloma in captivity, which has not been previously reported, and successful treatment using intralesional methylprednisolone, clavulanic acid/amoxycillin and terbinafine.

A 14-year-old, male African penguin (*Spheniscus demersus*) from Jurong Bird Park (Singapore) was presented for a physical examination after its zookeepers observed a large mass around its cloaca. They also thought it was incontinent and would leak urates and feces around the exhibit. On examination, it weighed 2.78 kg and was otherwise healthy. There was a large mass cranial to its cloaca, resulting in mild prolapse of the cloaca. The mass was covered in dried urates and feces, so its actual size was unable to be measured (Fig. 1). It also had a history of a swollen and infected uropygial gland 5 months prior to its current presentation, which resolved with a 10-day course of 125 mg/kg oral clavulanic acid/amoxycillin (GSK, Rochester Park, Singapore) twice daily and 5 day course of 0.5 mg/kg oral meloxicam (Boehringer Ingelheim, Ridgefield, CT, U.S.A.) once daily.

It was hospitalized and fasted overnight so that the mass could be cleaned and properly assessed the next day. After 24 hr of fasting, it was anesthetized with isoflurane (Abbot Laboratories, North Chicago, IL, U.S.A.) in oxygen administered by face mask initially, intubated with a size 3 endotracheal tube, and maintained on isoflurane in oxygen via the endotracheal tube. Plain and contrast radiographs post-administration of barium contrast (Bracco Diagnostics, Monroe Township, NJ, U.S.A.), per cloacal were taken to identify any coprodeum involvement with the mass. These radiographs revealed that there was no coprodeum involvement with the mass, and that the mass was of soft tissue radiographic density (Fig. 2). The mass measured 70 mm by 70 mm after the

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Fig. 1. Pericloacal mass with mild cloacal prolapse on initial presentation.

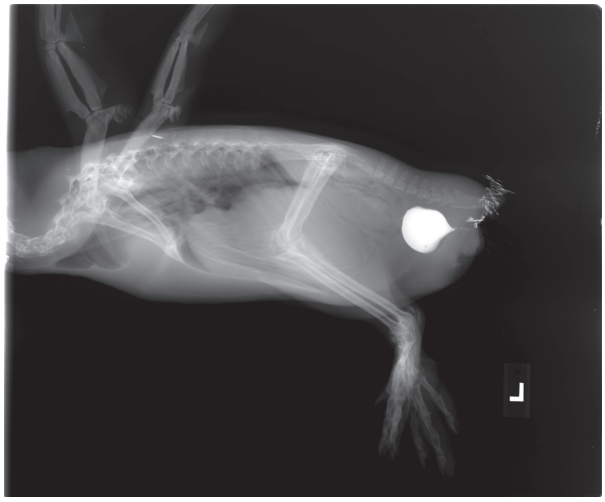

Fig. 2. Left lateral radiograph with barium infused intracloacal demonstrating no association of the mass with the coprodeum.

dried material were cleaned off using water. The mass was then surgically prepped and a full thickness wedge biopsy was taken. The biopsy was immediately fixed in 4% neutral buffered formalin. The defect was closed in a simple continuous pattern using 3/0 polydioxanone sutures (Braun Vet Care, Am Aesculap Platz, Tuttlingen, Germany). Recovery from anesthesia was smooth and uneventful. Sixty m*l* of lactated Ringer's solution (Baxter Healthcare Corp., Deerfield, IL, U.S.A.) was given subcutaneous and 0.5 mg/kg meloxicam was given intramuscularly in the pectoral muscles. It was discharged back to its exhibit but instructed to be kept out of the water until a further treatment plan was decided upon.

The formalin-fixed tissue was embedded in paraffin, cut at 3 μm and stained with hematoxylin and eosin for histologic examination. Histologically, the submitted sample showed keratinized simple stratified squamous epithelium overlying on the surface (Fig. 3a). There were multifocal to coalescing inflammatory responses noted in the subcutis. The aggregates of inflammatory cells arranged mostly vasocentric and some were found around the adipose tissue. The inflammation was mainly composed of abundant epithelioid macrophages and some heterophils (Fig. 3b). Scant bacterial colonies were noted on the surface of the skin as well as in the follicles (Fig. 3c). A primary bacterial infection as the cause of the pyogranuloma was considered unlikely due to the scant nature of the bacterial colonies.

After the diagnosis of pyogranuloma histologically, the animal was prescribed with 125 mg/kg oral clavulanic acid/amoxycillin twice a day and 20 mg/kg oral terbinafine (GSK, Rochester Park, Singapore) once a day for 14 days. There was no change in the size of the mass 4 days after the start of antibiotic and antifungal therapy, so a decision was made to administer intralesional corticosteroid to speed up the healing process. It was anesthetized with isoflurane in oxygen administered by face mask. The mass measured 70 mm by 70 mm and was surgically prepped. One mg/kg of methylprednisolone (Zoetis, Parsippany, NJ, U.S.A.) diluted with lactated Ringer's solution to a final volume of 1.0 m*l* was injected into the cloacal mass at 5 locations (0.2 m*l* at each of the 12, 2, 4, 6 and 9 o'clock sites). The recovery was again smooth and uneventful. Thirty m*l* of lactated Ringer's solution was

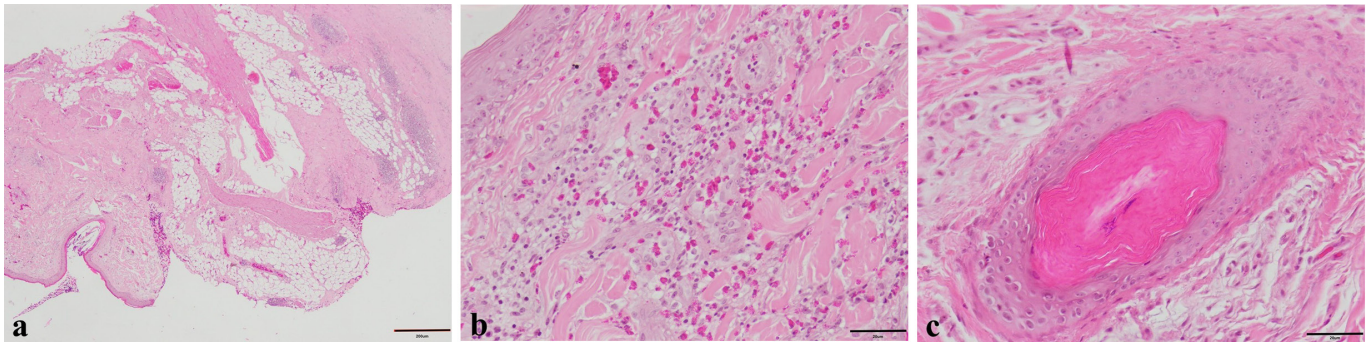

Fig. 3. Histology of pericloacal mass: a. keratinized simple stratified squamous epithelium overlying on the surface. b. inflammation mainly composed of abundant epithelioid macrophages and some heterophils. c. scant bacterial colonies on the surface of the skin as well as in the follicles. Bars: a, 200 μm; b and c, 20 μm.

given subcutaneously post-anesthesia. It was again discharged to exhibit with instructions to keep out of water.

Fourteen days later, the animal was anesthetized with isoflurane in oxygen administered by face mask. Upon cleaning of the mass with water, it became obvious that the mass was no longer present and has been replaced by a dry scab that could be peeled off. The skin underneath the scab appeared inflamed (Fig. 4). Silver sulfadiazine cream was applied to the raw skin and the animal recovered uneventfully from anesthesia. It was discharged back to exhibit and kept out of water for a further 3 days. The dried tissue was examined histologically and confirmed to be made up of fibrinous tissue and abundant eosinophilic necrotic cellular debris with no active inflammatory cells (Fig. 5). Rechecks performed 17 days later confirmed that the skin healed well and there was no recurrence of the mass.

This report described the diagnosis and resolution of a peri-cloacal pyogranuloma in an African penguin. In this case, intralesional methylprednisolone injection, clavulanic acid/amoxycillin and terbinafine were used to treat the peri-cloacal pyogranuloma and appeared effective without any observable side effects. A bacterial and fungal culture was not performed, but the terbinafine and clavulanic acid/amoxycillin may have prevented any secondary infections that corticosteroid use may have resulted in, as well as resolved any primary infections that may have caused the pyogranuloma.

Pyogranulomas refer to localized tissue reactions that consist of heterophils, occasional lymphocytes and at least 15% macrophages [9]. They can be caused by bacteria, fungi, parasites or foreign bodies that penetrate the skin [9]. Other metabolic or immune diseases may be predisposing factors [9]. Pyogranulomas can appear as nodular or diffused lesions and histopathology of the mass or lesion is required for diagnosis [9].

Treatment of pyogranulomas should focus on resolution of the underlying cause with drugs such as antibiotics, antifungals, antiparasitic drugs. Surgical removal of the foreign body is required if that is the primary cause. In some cases, especially those where the cause is unknown, corticosteroid therapy at an immunosuppressive dosage may encourage or speed up treatment [4].

Corticosteroid therapy is not commonly recommended in birds due to the potentially serious side effects. Complications that may arise due to steroid use include immunosuppression, suppression of the adrenal glands, slower wound healing times and ulceration of the gastrointestinal tract, especially at higher doses and longer duration of treatments [11]. One common concern with avian patients would be the increased risk of aspergillosis whilst on glucocorticoid therapy [13]. The administration of corticosteroids interrupts the proinflammatory signaling pathway causing reduced function of respiratory macrophages that would normally mediate the early immune defense against aspergillus fumigatus, thus predisposing the bird to aspergillosis [13]. Corticosteroids may also impair wound healing as it suppresses cellular response by antagonizing multiple growth factors and cytokines and thus interferes with fibroblast proliferation, deposition of granulation tissue, wound contraction and epithelialization [2]. Amazon Parrots with prolonged treatment (1–2 weeks) of oral prednisolone for smoke inhalation were reported to develop signs of dyspnea and three of them did not survive [14]. Post-mortem results indicated that the cause of death was aspergillosis pneumonia [14], attributed to the immunosuppression from corticosteroid therapy [14]. However, as smoke inhalation itself could have been a predisposing factor for aspergillosis, the correlation between corticosteroid use and aspergillosis may not be definitive.

Intralesional corticosteroid therapy is not uncommon in veterinary medicine. For example, in dogs, intralesional corticosteroid injections as a treatment for lipomas resulted in complete regression or at least significant reduction in size post treatment with only 6 out of the 15 dogs displaying polyuria and polydipsia as a side effect [7]. In dogs with mast cell tumours, intralesional triamcinolone has been used and results post treatment were similar to dogs receiving intralesional and/or oral chemotherapy drugs [5]. Although the use of intralesional corticosteroid therapy has not been previously reported in African penguins, our case series

Fig. 4. Pericloacal skin inflammation of post intralesional methylprednisolone injection.

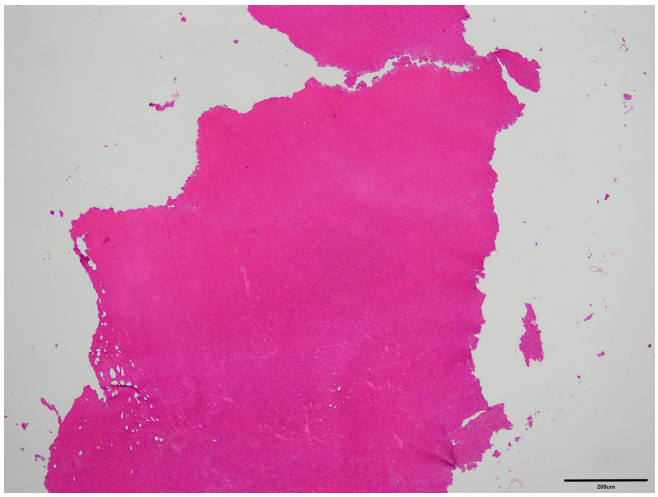

Fig. 5. Pericloacal mass post intralesional methylprednisolone injection: fibrinous tissue and abundant eosinophilic necrotic cellular debris with no active inflammatory cells. Bar: 200 μm.

demonstrates that it could be an effective treatment for pericloacal pyogranulomas, and potentially other types of masses, in birds. The side effects should be considered likely in birds and precautions taken to prevent these side effects. The severity of side effects is likely to be dose and duration dependent, and more studies need to be done to determine the safe dose and duration for each avian species. In this case, a once off intralesional methylprednisolone used together with antibiotic and antifungals was effective in resolving the peri-cloaca pyogranuloma and did not result in any side effects.

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