

Eagle Plantar Pododermatitis: A Surgical Case Report and Management Approach

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Received on: October, 2024

Revised and Accepted on: November, 2024

Published on: December, 2024

ABSTRACT

Plantar pododermatitis, also known as bumblefoot, is an inflammatory condition frequently associated with infection, impacting the plantar surface of the foot, including the ball or toes. This report details a case of plantar pododermatitis in an adult eagle, treated using surgical intervention. The procedure entailed excising caseous material with artery forceps and scissors, leaving the wound open to heal naturally through granulation. Neoceryl antibiotic was prescribed for five days via drinking water, and a mixed cage management system was introduced to facilitate recovery.

Keywords: Pododermatitis; Bumble foot; Eagle; Surgery; Neoceryl[®] antibiotic, Blended Cage.

1.0 INTRODUCTION

The eagle is one of the world's special birds, especially for military intelligence, and a vulnerable species that could become endangered if the concerned authorities do not afford real protection. Plantar pododermatitis, commonly referred to as bumblefoot, is a condition characterized by inflammation and often infection of the plantar surface of the foot, typically affecting the ball of the foot or one or more toes (Javed *et al.*, 2021). This condition is prevalent among birds in captivity, often becoming chronic, progressive, invasive, and eventually disabling. It is frequently resistant to medical treatment or prone to recurrence (Samour *et al.*, 2021). Bumblefoot manifests through symptoms such as swelling, redness, and a distinct black or brown scab on the foot's underside. The condition is most commonly associated with the bacterium *Staphylococcus aureus*, which has a complex pathogenic mechanism involving the production of endotoxins or exotoxins that act as virulence factors (MDPI, 2021).

Bumblefoot typically develops when an injury or abrasion on the foot allows the bacteria to enter, resulting in an abscess filled with pus. The entry point for bacteria can be a cut, scrape, injury, or skin breakdown from walking on wet, dirty bedding. Lesions can occur on the toes, hocks, and pads of the feet. Turk and Stamm, 1970 reported that introducing *S. aureus* into the skin can initiate a hypersensitization reaction with considerable tissue damage. This hypersensitivity is likely an Arthus Type III reaction, causing thrombosis and vasculitis (Prevalence of Bumble Foot Disease, 2024).

The infection progresses from the plantar surface when the integrity of the integument is impaired. Predisposing factors include excessively dry or abraded feet in water

birds; heaviness and inactivity, unhygienic condition, constant standing on the same diameter perches, and the puncture of the metatarsal pad by an overgrown claw of the first or hind digits (Barbaza *et al.*, 2020). Most chronic cases are treated by complete surgical removal of Caseous accumulation of necrotic debris from the affected tissue.

This case report represents the first recorded case of eagle plantar pododermatitis in the Northwestern region of Nigeria. It details the pathological features, diagnostic approach, and treatment strategy employed.

1.2 Chronological Record

An emergency phone call was made from the Nigeria Army 8 Division Headquarters, Sokoto requesting an ambulatory medical intervention for one of their adult male eagles that was seen limping for almost a week. On visitation, a massive swelling was observed on the ball of the foot (Figure 1). History has revealed that the eagles are reared for military reasons and are being kept in a customized cage under a neem tree. On clinical examination, reluctance to walk, lameness, and rock-hard swelling with a black scab on the pad of the foot were palpated and observed with one of the right claws amputated as shown with an arrow.

2.0 FRAMEWORK / ACTION PLAN

- i. To hospitalize the affected eagle in the clinic for proper handling and treatment.
- ii. To collect appropriate samples for laboratory analysis
- iii. To combine surgical and medical management



Figure 1. Hard Swelling with a Scab on the Pad of the Paw

3.0 SURGICAL MANAGEMENT

The affected sites were vigorously scrubbed with hydrogen peroxide followed by Savlon. It was then rinsed with povidone-iodine. The eagle was anesthetized using Ketamine- xylazine combination at 15: 5 mg/Kg (Figure 2). The black scabs on the plantar aspect of the feet were removed gently with the help of a scalpel blade and artery forceps (Figure 3). This exposed the white gritty necrotic mass/ pus from inside the cavity (Figure 4). All the exposed caseous material was removed carefully and the blood vessels around the surgical site were ligated (Figure 5). The cavity was flushed with hydrogen peroxide to clean out all the pus and debris (figure 6). Suturing back the skin was not possible in this case and the wound was left to heal by granulation. The foot was sufficiently bandaged to pad/cushion the ball of the foot (Figure 7). Antiseptic dressing with povidone-iodine and oral Neoceryl antibiotic® solution was suggested for 5 days.



Figure 2: The Eagle Under Anesthesia Immediately Prior to Surgery



Figure 3: Removal of Caseous Necrotic Debris/Pus



Figure 4: The Removed Necrotic Debris



Figure 5: The Exposed Live Tissues with Major Blood Vessels Ligated



Figure 6: Flushed Cavity with Hydrogen Peroxide to Clean Out all the Pus and Debris



Figure 7: The Foot Sufficiently Bandaged to Pad/Cushion the Ball of the Foot



Figure 8: The eagle perfectly dressed and fully recovered from anesthesia post-surgery

4.0 DISCUSSION

Plantar pododermatitis, commonly known as (bumblefoot) is a degenerative and infectious condition that affects the digital pads of birds, particularly on the plantar surface of their feet. This condition can lead to painful abscesses, and if left untreated, the infection can spread to joints and other parts of the body, resulting in systemic complications. There are different but correlated causes for bumble foot and these include unsuitable perching or walking surfaces, nutritional deficiencies, and infections.

Unsuitable perching conditions are a significant contributing factor to the development of pododermatitis, commonly known as bumblefoot, in birds. Perches made from materials such as plastic, sharp-edged substances, uniform diameters, or wire flooring create excessive pressure points on the plantar aspect of the feet. These pressure points lead to mechanical trauma and chronic stress, predisposing the tissue to damage and secondary infections (Doneley, 2016). Nutritional deficiencies further compound the issue by impairing immune defenses and compromising skin integrity, increasing susceptibility to infections (Bibyan *et al.*, 2023). Bacterial pathogens, including *Staphylococcus aureus*, exploit these vulnerabilities by invading through minor injuries and causing abscess formation and inflammation (Greenacre and Morishita, 2023).

The management of bumblefoot depends on its stage and severity. Early-stage bumblefoot, characterized by minimal swelling and localized infection, can often be treated conservatively. Treatment typically involves the use of systemic and topical antibiotics to control the infection, combined with vitamin therapy to enhance the immune response (Bibyan *et al.*, 2023). Additionally, environmental modifications, such as replacing unsuitable perches with ergonomically designed alternatives, play a crucial role in preventing recurrence and further damage (Coles, 2007).

In advanced cases, where necrosis and extensive infection are present, surgical intervention is necessary. Surgical treatment focuses on removing caseous necrotic debris and infected, fibrotic tissue to reduce the antigenic load and establish a clean, vascularized wound bed. While the standard surgical approach often involves a stab incision, a ligature technique may be employed to manage excessive bleeding, as in this case. The complete removal of necrotic material is crucial to prevent recurrence and promote effective healing (Zhao *et al.*, 2022).

Post-surgical recovery is generally marked by the formation of healthy granulation tissue at the wound edges, typically within two to five weeks, signaling a favorable healing trajectory (Bibyan *et al.*, 2023). Close monitoring and supportive care during this period are essential to prevent complications and ensure optimal outcomes.

5.0 CONCLUSION

The case of Plantar Pododermatitis (bumble foot) in the adult eagle shows the significance of timely surgical and medical intervention in managing such conditions effectively. The surgical removal of necrotic debris, coupled with appropriate postoperative care, successfully mitigated the infection and promoted healing by granulation.

Preventing bumblefoot requires a proactive and holistic approach that addresses the condition's root causes. This includes providing birds with well-designed perching systems that distribute weight evenly across their feet, avoiding sharp edges, slippery materials, or perches of uniform diameter. We recommend a blended cage construction management system that will allow the eagles to have big space and access to a controlled natural environment.

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