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Calcaneal fracture of right hind limb and its successful management in a captive Asiatic bull elephant (*Elephas maximus*)

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Abstract

The cases of the fractures, especially involving the bones of the legs, in the elephants are difficult to treat and need intensive therapy and management to avoid further development of severe rheumatic disease. However, the fractures do occur due to various reasons such as accidents, fights or secondary fractures due to other injuries and the veterinarians need to tend to them. Here, we present a case of a fracture in a calcaneus bone in an adult bull elephant that was caused by hitting a metal barrier during musth. The fracture was treated using an efficient combination of allopathic treatments backed by laboratory investigations and aurvedic medications. The fracture was observed to heal completely and the elephant started walking normally on 65th day after commencement of the treatment.

Keywords: Avulsion fracture, aurvedic medications, calcaneus bone, elephant (*Elephas maximus*)

1. Introduction

The elephants are the largest living mammals in the land. The elephant's limbs and articulation were designed in such a way to bear the heavy body weight and providing better locomotion. Long bones of elephant's doesn't have any bone marrow cavity but filled with cancellous bone or red marrow^[3]. Any problem to limbs will cause severe impact on health of these mega herbivores. Trauma is the potential cause of morbidity and mortality in young elephant. However limb fractures are unusual in elephant as it has very thick layer of muscles and tissue around the bones; heavy automobile accident, train hits and uncontrollable aggression of musth elephants will remains the cause for the same. Radiography is the most important imaging modality used in musculoskeletal evaluation of elephant especially its useful for the detection of chronic changes in bones or joints of elephants^[7, 9, 14]. Elephants are semi-digitigrade in the front feet and semi-plantigrade in hind feet. The metacarpal and metatarsal bones of the foot maintain a relative vertical angulation during weight bearing, but the phalanges compress the digital cushion and lie nearly horizontal when supporting the weight of the body^[2]. The hind foot is smaller than the forefoot and has an oval shape, the tarsus consists of seven bones arranged in three rows^[19]. Muscles, tendons, collateral ligaments, synovial sheaths, vascular supply and innervation are similar to those of other multi digit mammals^[12]. There are several reports available about the elephant's bone fractures^[4, 5, 8, 13, 17]. and sprain at carpal joint¹⁴ but no such records were available for avulsion fracture of calcaneus bone and its managements. So author took effort to report this unique case in this article.

2. Case history

An adult bull elephant in elephant care and conservation centre of Wildlife SOS at Mathura presented with severe swelling in the right hind limb at ankle region with open wound, serosanguinous discharge and unable to bear the weight on the affected limb. The interaction with mahout revealed that 10 days before animal showed aggression and not cooperate for mahouts command and kicked the barrier made up of iron angles by its right hind legs as the animal was in the musth and mild swelling noticed in the affected limb after two days and oral non-steroidal anti-inflammatory medication was provided for 5 days but no improvement and mild fluid discharge noticed from skin ulcer at ankle region.

The animal was left in the enclosure without any disturbance to calm down. After a week the animal took for routine exercise walk, the animal walked little bit distance with normal gait after that animal was reluctant to walk by using its right hind limb and limping increased followed by swelling and more pus discharge from the wound.

3. Diagnosis and treatment

On close examination of the affected limb revealed hot painful swelling due to septic abscess and more pus coming out while pressing that swelling. Pus sample were collected from the wound for bacterial culture examination and for Anti-Biotic Sensitivity Test (ABST). The radiographic examination with portable x ray unit with computerised radiography revealed oblique avulsion fracture in the calcaneus bone (fig1). As per the ABST result treatment started with antibiotics along with NSAID, Vitamine D3 and calcium supplements. Open wound was irrigated with

pipracilin mixed normal saline solution and dressed with fly replant ointment topically. The fracture area covered with aurvedic oils (Murvuanna and Myaxyl) and cloth bandage having the paste of egg yolk with ayurvedic chooranam powder which were used to treat the fracture in humans in Kerala state (fig 2). The cloth bandage was changed in alternate days but the oils (Murvuanna and Myaxyl) applied daily on the bandage. The animal was kept in the soft mud floor without chaining and mud bed provided for comfortable resting to improve the healing^{4,5}. The treatment efficacy was monitor by periodical radiographic examination (fig3), evaluate the reduction in swelling by manually measuring the circumference of the ankle region (fig 4), observation of the animal's range of motion, stride and stance while resting¹⁴. The healing progress was more satisfactory and complete healing of fracture noticed on 56th day and animal started walking normally on 65th day.



Fig 1: Elephant standing with swollen right hind limb, Unable to bear the weight and performing Radiographic examination through protected contact wall



Fig 2: Applying cloth bandage which was soaked in ayurvedic oils and chooranam mix with egg white on the affected limb just above the open wound.



Fig 3: Radiograph showing gradual healing of the fractured calcaneus bone



Fig 4: Gradual improvement in wound healing and reduction in swelling on affected area.

4. Discussion

In this case kicking with heavy force on the strong iron barrier is the preliminary cause for this fracture. The secondary bacterial infection, wakening and weight bearing caused further aggravation of this condition. An elephant may strike forward with a forelimb or toward the or rearward with a hindlimb [14]. An avulsion fracture is an injury to the bone in a location where a tendon or ligament attaches to the bone. When an avulsion fracture occurs, the tendon or ligament pulls off a piece of the bone. Therapy for traumatic injuries will depend on severity and location of the lesion. Acute inflammation associated with these injuries can be treated with NSAIDS [14] and antibiotic therapy should be based on culture results or broad-spectrum antibiotics should be used [1, 10, 11, 16, 18]. Generally fracture were fixed by internal or external fixation, POP casting is commonly used for external fixation as it cheaper than the fibre glass casting. Though POP casting is commonly suggested for fracture below the knee and hock [6, 15], it is most suitable in case of large animal; we didn't use such casting because of the open infected wound above the fracture and considering daily dressing. The author

experienced the combination of routine veterinary treatment along with the Ayurvedic medication was well accepted by the animal and revealed good and quick healing and no untoward effects were recorded.

5. Conclusion

Aggressive behaviour of this Bull elephant at the time of musth and kicking the barrier is the preliminary cause for the hairline crack on the calcaneus bone. The further weight bearing, movements and secondary bacterial infection on the affected area caused hindrance for the healing which lead to this complete avulsion fracture of this calcaneus bone.

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