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Clinical Report

Surgical Management of Complete Transverse Radioulnar Fracture in Congo African Grey Parrot

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ABSTRACT

A 10-month-aged male Congo African grey parrot (*Psittacus erithacus*) weighing 400 gm, with a history of collision with a ceiling fan, was presented to the Shahedul Alam Quadary Teaching Veterinary Hospital, Chattogram Veterinary and Animal Sciences University. On presentation, the bird was unable to fly and dropping off the left wing. On physical examination, soft tissue swelling with reddish discoloration and crepitus was felt on palpation at the radioulnar region. Radiographic examination revealed a complete overriding transverse diaphyseal fracture of the left radius and ulna. Under general anesthesia with diazepam and ketamine, retrograde intramedullary pinning was performed to stabilize the ulnar fracture. Intramedullary pinning and application of bandage results in bone healing on the 65th postoperative day. The bird recovered with a loss of flying ability due to a slight malunion of fracture. The study suggests that postoperative management is very essential for the successful outcome in radioulnar fracture management in birds with intramedullary pinning.

Introduction

Fracture is a common incidence in avian species, during flying accidental injuries are common in wings with collusion with obstacles or wire. Fracture of humerus, radius, and ulna are common findings in wing injuries.[1] There are, 30% incidence of fracture in ulna, 10% in radius and 60% in both bone.[2] The bones of avian species contain large medullary cavity, fragile with thin cortices.[3] The amount of calcium is much higher in birds than mammalian bone, which creates more fragile condition and prone to injuries.[4] Successful avian fracture management should be considered with momentary surgery and anesthetic period, negligible interruption at site of fracture, rigid stabilization and use of appropriate size of implantation endured by bird.[5] Birds have small body size, inadequate soft tissue, and site of fractures proximal to joint are other problems associated with fracture management. Use of external skeletal fixators, intramedullary pins, ESF-IM Pin tie-in fixation and plates are common managemental techniques in avian orthopedics. Although, there are several disadvantages are present to use intramedullary pins like as, paresis of wing, injuries to the tendons and ligaments, pin migration,

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rotational instability and disturbance of the endosteal blood supply.[5] Birds with only ulna or radius fracture with minimal displacement can be managed by supportive or unsupportive cage rest.[2,6] Supportive cage rest includes a figure-8 bandage on wing used the primary flight feathers as a splint.[6] Intramedullary pin fixation technique is the more convenient, inexpensive method in avian orthopedics.[6] Considering the level of surgeon's expertise, size of birds and the availability of equipment, the current radioulnar fracture was managed by intramedullary pining. The case study describes, surgical management of complete overriding transverse diaphyseal fracture of left radius and ulna of a companion Congo African grey parrot (*Psittacus erithacus*) by retrograde intramedullary pinning.

Case Description

A young male Congo African grey parrot (*Psittacus erithacus*) weighing 400 g, age 10 months, was brought to the Shahedul Alam Quadary Teaching Veterinary Hospital, Chattogram Veterinary and Animal Sciences University with a history of collision with celling fan and unable to fly.

On presentation, the companion bird was active, alert and responsive. Both body condition and hydration status were in physiological benchmark, the bird has ability to stand, dropping of left wing, the pectoral muscles were symmetrical and the carina was palpable. Physical examination manifested soft tissue injury at medial aspect of radioulnar region in left wing, which was swollen and become visible with reddish discoloration (Figure 1). The bone was unstable and crepitation found on palpation. Acceptable neurological response obtained in orthopedic examination.

Radiographs in mediolateral projections of the left wing revealed, complete overriding transverse diaphyseal fracture of radius and ulna (Figure 2). After assessing the fracture, surgical repair was considered with intramedullary pinning of the fractured bone.

Treatment and Outcome

The general anesthesia was induced by combination of diazepam and ketamine. Diazepam (Sedil, Square Pharmaceuticals Limited, Bangladesh) at 2.5 mg/kg and immediate after that ketamine (Ketalar, Popular Pharmaceuticals Limited, Bangladesh) at 25 mg/kg were administered intramuscularly. After initiation of general anesthesia, the breathing and heart rate were checked. The surgical site was prepared for aseptic surgery by plucking off the feathers. The bird was

Figure 1. Reddish discoloration and swelling of affected wing of the male Congo African grey parrot.

Figure 2. X-Ray view of complete overriding transverse diaphyseal radioulnar fracture.

restrained and positioned on ventrodorsal recumbency, limbs and right wing were secured. Body temperature was maintained with a heating pad (EickWarm Heating pad, Eickemeyer, Germany) maintaining 45° C and monitored throughout the surgery. The skin was surgically prepared with 10% povidone-iodine solution (Povin, Opsonin Pharma Limited, Bangladesh) and covered with sterile field drapes. A linear skin incision was made on medial aspect on radio-ulna. The muscles were transected and exposed the fractured fragments (Figure 3). The ulnar fracture was fixed with 1.5 mm Kirschner wire (K Wires, Bombay Ortho Industries, India) by retrograde intramedullary pinning method. The proximal part of the implantation exits close to the humero-ulnar joint. The fracture of radial bone left untouched. After stabilization of bone fragments (Figure 4), muscles, subcutaneous tissue and skin were sutured in simple continuous pattern using chromic catgut No. 2–0 (Conley, Chromic Catgut, Huaian Wanjia

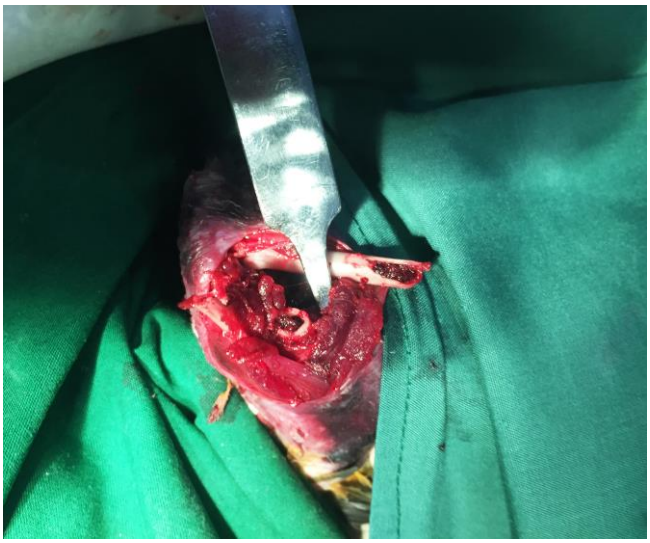

Figure 3. Both fracture ends exposed.

Figure 4. Apposition of fracture ends.

Wanjia Medical Device CO., Ltd., China). After closing of surgical wound, 5% povidone iodine ointment (Viodin, Square Pharmaceuticals Ltd., Bangladesh) was applied on the surgical site and covered the wound with a sterile gauze. After surgery, radiograph was taken to observe the implant position (Figure 5) and a figure-eight bandage was applied to immobilize the wing.

Post operatively, ceftriaxone antibiotic (Ceftron IM, Square Pharmaceuticals Ltd., Bangladesh) at 50 mg/kg, IM, q24h for 7 days, meloxicam analgesic (Mel-Vet, ACME Laboratories Ltd.) at 0.5 mg/kg, SC, q24h for 3 days, and 5% povidone iodine ointment q12h for 10 days on surgical site were administered. The owner of the bird was advised to keep the bird in confinement.

The whole surgical procedure lasted for 20 minutes, in that time no maintenance dosage of anaesthetic was required and bird have smooth recovery after 25-30 minutes of surgery. After surgery, 90% alignment of

Figure 5. Post-operative X-Ray immediate after surgery.

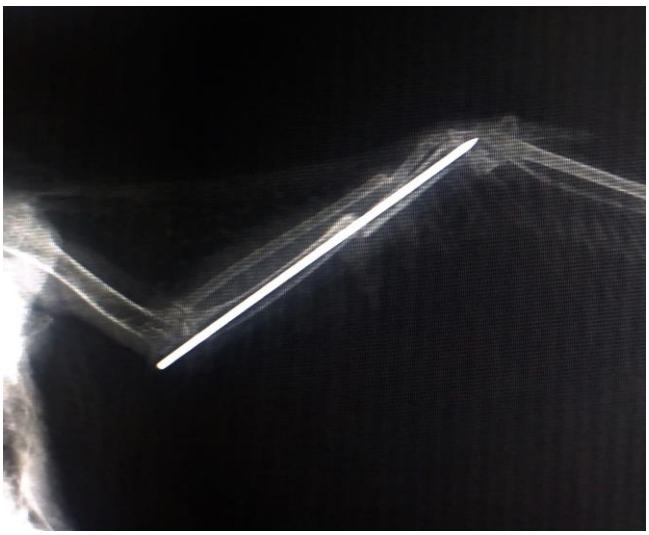

Figure 6. Post-operative X-Ray at 45th day.

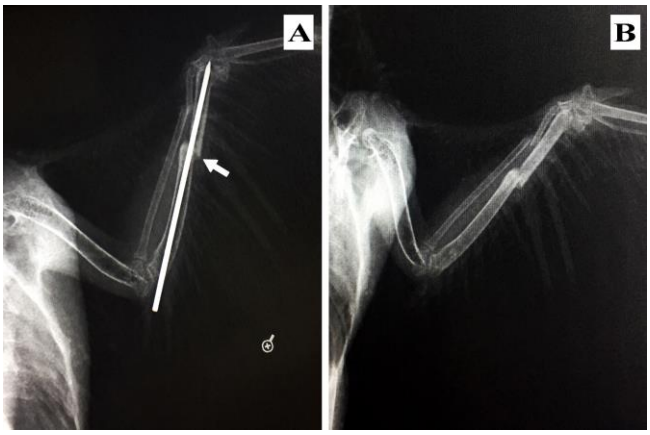

Figure 7. X-Ray at 65th post-operative day; (A) bridging callus formation at fracture site (arrow); (B) after removal of implantation.

ulnar fracture was obtained in radiography. On the 7th post-operative day, the surgical wound heals without complications, but radiographic image showed slight

malposition of ulnar fracture. The figure-eight bandage was unable to maintain after 20th post-operative day due to lack of cooperation of owner and uneasiness of the bird. At 45th post-operative day mild calcification observed on radius and ulnar fracture ends (Figure 6). At 65th post-operative day, slight malunion and satisfactory physical stability obtained on palpation. On radiograph, satisfactory bridging callus formation obtained at the radius and ulnar fracture site (Figure 7 A). After considering physical stability and satisfactory callus formation the implantation was decided to remove that day (Figure 7 B). Furthermore, loss of flying ability of the bird was noticed with perfect health condition.

Clinical Relevance

Surgical management of fractures in birds often presents a significant challenge to the veterinary surgeon. Wing injury due to collusion with electric fan is also challengeable in the study. Factors include, degree of contamination in case of open fracture, severity of soft tissue damage, stress management, suitable orthopedic management, use appropriate weight of orthopedic appliance in relation to body size of birds etc. can take exception in surgical management.[6] Light weight orthopedic appliances and less-invasive techniques result in better healing of long bone fractures in birds.[7] Orthopedic intervention in birds require general anesthesia and proper muscle relaxant.[8] The current study supports that, diazepam and ketamine combination facilitate good muscle relaxant and smooth general anesthesia in short time surgery of birds.[9]

The radial bone can shift back and forth along the length of the ulna. The ulnar bone and radial bone articulate with each other, which creates a submissive communication between the elbow and the wrist, results physiologic synchronization of wing flexion and extension and facilitate circumduction motions of the wing at the time of flight.[10] For the management of ulnar fracture, normograde or retrograde method is suitable. Retrograde method pinning in ulna produce soft tissue injury and periarticular fibrosis results in loss of range of motion, also the method is useful to proper visualization and precise alignment of fracture ends.[6,11] In both radial and ulnar bone fracture, intramedullary pinning is indicated only in ulnar bone.[12] Radial fracture and rotational force managed by external coaptation.[13] In the study, light weight 1.5 mm K-wire was chosen to stabilize the ulnar fracture and application of figure-eight bandage till 20 days ensures immobilization. In avian bone healing period, most of the callus tissue is originated from the periosteal surface and the vasculation to the periosteum from surrounding soft tissues is more important than intramedullary circulation.[14] Avian bone heals faster than mammalian bone. With proper stability and fracture alignment, avian bone heals within 21 days.[6] In our study, lack of post-operative care and management, we obtained optimum calcification at 45th post-operative day with satisfactory physical stability.

Proper alignment of bone is very important in avian orthopedics. A few degrees bending rotation or slight malunion can cause extreme damage of flying ability.[6] Loss of archivable alignment results imperfect flying ability of the bird in our study. Though, a certain degree of bony alignment is required for routine bone healing in the event of a viable nonunion fracture.[15] The companion and zoo birds may not exhibits flying with precision, anatomical stability and aesthetic appearance is more important in companion birds.[6] The bird was unable to maintain external coaptation and proper cage rest during the postoperative time due to the absence of owner care and the bird's discomfort. Despite few degrees of malunion, the physical stability and wing movement were noted and the owner was satisfied with the inadequate flying capabilities. The radioulnar bone and metacarpal are the part of distal wing, which is necessary for aero dynamic control at the time of flying. Additionally, retrograde pinning approach in humero-ulnar joint space causes postoperative joint ankyloses and results to damage flying ability.[16] It is challenging to reduce rotational and bending forces along with retrograde pinning without damaging humero-ulnar joint.[6,16] Successfully, there were no obtainable proximal and distal joint ankylosis and pin migration in current study. The present case report suggests that, postoperative management is very essential for the successful outcome in surgical correction of radioulnar fracture by intramedullary pinning in birds.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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