

REPAIR OF HUMERAL DIAPHYSEAL TRANSVERSE FRACTURE WITH TITANIUM ELASTIC NAIL IN A CAT

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SUMMARY

A six-month old female cat was presented for primary complaint of not bearing weight on left forelimb due to injury with a wooden stick one day back. Radiograph of the limb revealed complete transverse diaphyseal fracture of distal third humerus. The fracture was repaired under general anesthesia using titanium elastic nail with a small stab incision on skin at the cranio-lateral surface distal to proximal metaphysis of the humerus and guiding the nail through the fracture site up to the distal metaphysis by keeping the fractured ends in alignment from outside manually. The animal showed uneventful recovery with partial weight bearing on 3rd post-operative day and complete weight bearing on 15th post-operative day. On 60th post-operative day, radiograph of the humerus (orthogonal views) showed complete bridging of both the cortices along with complete remodeling of the bone.

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Humerus fractures are uncommon in comparison to other long bone fractures in cats. The reported incidence of humeral fractures in cats is 5% to 13% with most occurring in the middle and distal thirds of the bone generally from trauma (e.g., automobile accidents or falls from a height) (Hill, 1977; Phillips, 1979; Abo-Soliman *et al.*, 2020). Internal fixation results in an early return to function and is recommended because of the unstable nature of most humeral fractures and the limitations of external coaptation (Cohen *et al.*, 2012).

A six-month old female cat was presented to the Veterinary Clinical Complex of LUVAS, Hisar, with a primary complaint of not bearing weight on left forelimb due to injury by hitting with a wooden stick one day back. The animal was active, alert weighing 600 gm with normal appetite, defecation and urination. Clinical examination revealed mild soft tissue swelling and pain in left humeral region along with prominent crepitation on palpation of the bone, without any laceration or open wound. Radiograph of the left forelimb shown reducible complete transverse diaphyseal fracture of distal third of humerus with isthmus diameter of 3.09 mm (Fig.1).

It was decided to repair the fracture under general anesthesia with minimal invasive procedure by insertion of single titanium elastic nail without disturbing the metaphysis as it was a growing cat. Anaesthesia was induced with propofol @ 6 mg/kg b. wt. IV after giving butorphanol @ 0.1 mg/kg IV and then was maintained with isoflurane. A single stab incision was given on skin and muscles at the cranio-lateral surface of proximal region of the humerus below metaphysis, and then a hole was

created in the cortex of the bone with the help of bone awl for the nail insertion. A piece of 2 mm (diameter) nail was inserted with the help of cannulated T-handle Jacob's chuck and key into the marrow cavity of proximal fractured fragment of the bone and then guided as sliding over opposite cortex. The fractured fragments were aligned to normal anatomy manually by external manipulation and the nail was passed through the fracture site into the distal fragment of the bone by gentle pushing as like intramedullary pinning till it reached distal metaphysis showing resistance. The remaining extra length of the nail was cut with 0.5-1.0 cm length of nail remaining outside but along the bone at the nail insertion site (Fig. 2). A single simple interrupted skin suture was applied with non-absorbable suture material at the nail insertion site.

Post-operative treatment included syrup Cefpodoxime (100 mg/5 ml) 0.3 ml orally sid for 5 days and syrup meloxicam (1.5 mg/ml) 0.05 ml orally sid for 3 days. Owner was advised to dress the surgical wound antiseptically with 5% povidone iodine solution daily till removal of the skin suture on day 10th postoperatively.

The animal showed partial weight bearing on 3rd post-operative day and complete weight bearing on 15th post-operative day with some limping after few steps. The animal was presented for re-examination and the nail removal on 60th post-operative day. The animal was in good condition with normal appetite, defecation and urination. On clinical examination, there was no pain or swelling at the nail insertion site as well as at the fracture site, no stiffness or crepitation in proximal and distal joints and the animal was completely bearing weight on the limb

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Fig 1. Pre-operative radiograph of the left humerus (medio-lateral view)

Fig. 2. Immediate post-operative radiograph (medio-lateral view)

Fig. 3. Radiograph on 60th post-operative day (medio-lateral view)



Fig. 4. Radiograph on 60th post-operative day (anterio-posterior view)

Fig. 5. Radiograph immediate after removal of the nail (medio-lateral view)

Fig. 6. Radiograph immediate after removal of the nail (anterio-posterior view)

without any sign of lameness while walking. Radiograph of the humerus (orthogonal views) had shown complete bridging of both the cortices along with medullary canal, there was neither prominent periosteal nor endosteal callus present (complete remodeling of the bone) (Fig. 3 & 4). The nail was removed aseptically under general anesthesia by giving a small stab skin incision at the nail insertion site followed by exposing the nail by blunt dissection and then the nail was pulled out with the help of extraction pliers (Fig. 5 & 6). A single skin suture was applied at the nail extraction site followed by antiseptic dressing of the site with 0.2% povidone iodine solution. The recovery was uneventful.

Closed reduction will not be possible in fractures that are not immediately treated (more than 24–48 hours after trauma), because of muscular contraction and adhesions from callus formation (Kim *et al.*, 2012). Titanium elastic nail (TEN) is common method of treatment of long bone fractures in pediatric patients (6-14 yrs.) where preservation of growth plate is important (Mazda *et al.*, 1997; Flynn *et al.*, 2001; Hunter, 2005). Placement of pins in a minimally invasive fashion of elastic titanium nails through small stab incisions may offer significant advantages when compared with traditional open pinning with stainless steel pins, such as

less postoperative pain, accelerated healing, and less iatrogenic trauma to important structures such as the physis and joint capsule (Kim *et al.*, 2012).

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