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A open reduction and intramedullary pinning for diaphyseal femoral fracture stabilization in a canine patient

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Abstract

A two-year-old, non-descript male dog presented to the Small Animal Orthopedics Unit at the Veterinary University Peripheral Teaching Hospital with non-weight-bearing lameness in the left hind limb. Clinical examination revealed pain, swelling, and crepitus in the left thigh, with radiographic imaging in lateral and craniocaudal views confirming an unstable diaphyseal femoral fracture. Hematological evaluation showed values within normal ranges, indicating suitability for surgical intervention via open reduction and internal fixation (ORIF). Preoperative planning, using the AO/ASIF small animal planning guide, enabled precise alignment. The surgical site on the left lateral thigh was aseptically prepared and incised, allowing realignment and stabilization of the proximal and distal fracture fragments using an intramedullary pin (IMP), trimmed to fit the site. A hand drill facilitated accurate positioning of the IMP. Wound closure was completed with a simple continuous subcutaneous suture using 1/0 polyglycolic acid (PGA) and a simple interrupted pattern for skin suturing. Postoperative radiographs confirmed satisfactory alignment and stabilization, providing an optimal environment for bone healing and functional recovery.

Keywords: Lameness, ORIF, Intramedullary pin, femur diaphyseal fracture

Introduction

Femur fractures are common in both young and adult animals, often resulting from automobile accidents. Most fractures occur in the diaphysis or metaphysis of the femur, while physeal fractures are more frequent in young animals due to the vulnerability of their growth plates. Most femur fractures are closed fractures because the femur is surrounded by thick muscle layers that help prevent the bone from breaking through the skin. The intramedullary pinning method is an effective treatment for femur fractures because it is readily available, cost-effective, and functions as an internal splint within the medullary canal of the long bone. It shares the load with the bone, maintains axial alignment of the fracture, and resists bending forces from all directions applied to the bone.

Case History and Observations

A two-year old male non descriptive dog was presented with the history of non-weight bearing lameness in the left forelimb. The animal elicited pain on palpation of midshaft femur and crepitation noticed. Radiograph revealed unstable midshaft diaphyseal fracture

Surgical Operation

- **Anaesthetic protocol:** Animal was premedicated with Butorphanol @ 0.2 mg/kg, Ketamine @ 5mg/kg and Diazepam @ 0.25 mg/kg and induction was done using Propofol at the dose rate of 3mg/kg and intubated with 6mm size cuffed endotracheal tube. Maintenance was done with Isoflurane.
- **Surgical Procedure:** The animal was placed on the right lateral recumbency. Lateral aspect of left thigh region was shaved and surgical site was cleaned with chlorhexidine and disinfected with 95% ethyl alcohol and povidone iodine. Entire body was covered with surgical drape except surgical site (Figure 1).

A 10 cm incision was made from the greater trochanter to the level of the patella. The underlying subcutaneous tissue and fascia lata were dissected, and the vastus lateralis and biceps femoris muscles were separated using blunt dissection. The fracture site was identified, and the proximal and distal fragments were aligned correctly (Figure 2). A 3.5 mm intramedullary pin was then inserted through the trochanteric

fossa using a Normograde approach (Figure 3). Intramedullary pin occupies 60-70% of the medullary canal. Excess pin was trimmed by pin cutter. Muscle and fascia lata were closed using polyglycolic acid 1-0 by continuous suture pattern (Figure 4) and the skin was closed using polyamide 2-0 by cross mattress (Figure 5). Dressing was done on the surgical site.

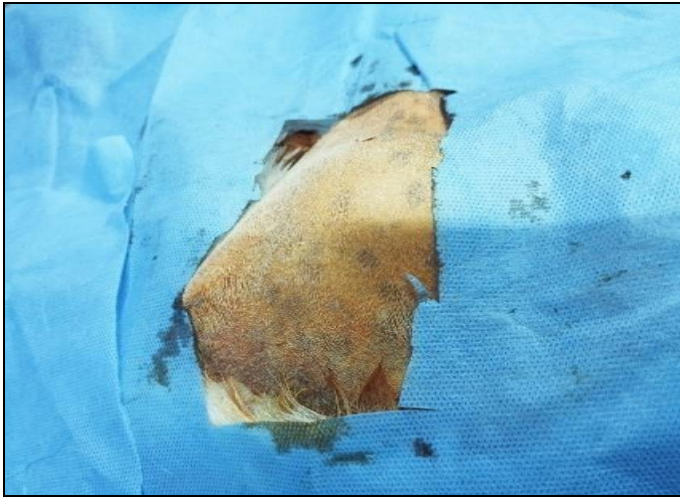


Fig 1: Surgical site preparation



Fig 2: Identify fractured site



Fig 3: Drilling of Intramedullary pin



Fig 4: Muscle closure



Fig 5: Skin closure



Fig 6: Postop X-Ray

Post Operative Care: Post-operative radiography was done (Figure 6). Post-operative care was done by using antibiotics

(ceftriaxone @ 20mg/kg) for 7 days and analgesic (meloxicam @ 0.2 mg/kg) for 5 days. Surgical site was

cleaned with antiseptic solution. Exercise was limited for 3-4 weeks in dog. Sutures were removed after 14 days.

Discussion

Uddin *et al.* (2017) ^[6] reported that the femur fracture was occurred frequently by trauma (50%), road accident (40%), and jumping from top places (10%). Beale *et al.* (2004) ^[2] stated that proximal or distal physis fractures are more common in immature dogs and Metaphyseal and diaphyseal fractures are more common in mature animals. Normograde placement is mostly preferred method for pinning because it is easier to locate the pin in a more lateral position, close to the greater trochanter and away from the femoral head. If pin diameter is less, it will cause non-union and delayed union of fractured bone. Intramedullary pin migration in diaphyseal fractures causes fragmentation in the fracture (Libardoni *et al.*, 2016) ^[4]. In this case, gradual periosteal callus formation occurred in second weeks, it getting dense at the 5th week. Intramedullary pin was removed after complete fracture healing, it was confirmed by radiography.

Conclusion

The study revealed that the use of intramedullary pinning in femur fracture is more economical and it gives more stability with minimal complications. So intramedullary pinning gave good alignment and proper rigid fixation of the fractured bone

Conflict of Interest

Not available

Financial Support

Not available

Reference

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