CASE REPORT

# Locking Reconstruction Plate for the Management of Diaphyseal Femoral Fracture in a Dog

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Fracture of the long bone is a commonly encountered orthopaedic problem in canine practice (Aithal *et al.*,1999). Femur fractures are one of the most common orthopaedic affections encountered in dogs comprising 35 % of hind limb fractures and 24 %of all fractures in dogs (Johnson *et al.,* 1998). Proximal and distal epiphyseal fractures happen in young animals, whereas diaphyseal and metaphyseal fractures are more frequent in older animals(Guiot *et al.,* 2012*;* Abd El Raouf, 2017*).* They are difficult to repair due to the fact that such dogs are recumbent and need early rehabilitation to establish speedy recovery. The closeness of the abdominal wall to the proximal femur and surrounding heavy muscles limits the use of coaptation and external skeletal fixation for femoral fractures.

## Case History and Observations

A 2-year-old non-descript dog weighing 17 kg was presented to the Small Animal Orthopaedic Unit of Madras Veterinary College Teaching Hospital with non-weight bearing lameness of left hind limb after an automobile accident. On clinical examination the animal was apparently healthy and all the vital paraments were within the normal ranges. Physical examination revealed grade 4 lameness, pain and crepitus at the proximal femur region. Confirmatory diagnosis was performed by lateral and cranio-caudal views of radiography. Radiography showed a transverse proximal diaphyseal fracture of the femur (Fig. 1). Bone architecture showed reduced cortical diameter and thinning. The preoperative plan included complete blood profiling, lameness grading and clinical evaluation.

## Treatment and Discussion

The dog was pre-anesthetized using injection of Butorphanol-3.4 mg (@ 0.2 mg/kg) 10 min followed by injection Diazepam- 3.4 mg(@ 0.2 mg/kg) by intravenous route. Propofol @3mg /kg was used for induction through intravenous route. The patient was maintained under gaseous anaesthesia using 2% isoflurane. Aseptically an incision was made from the trochanter major to the stifle region. The tensor fascia lata was resected between the vastus lateralis and biceps femoris to facilitate maximum exposure of the lateral aspect of the femur. The incision was extended up to the lateral aspect of the stifle to visualize the fractured site. The fractured fragments were opposed to normal alignment, minimally disturbing the soft tissues following principles of biological osteosynthesis. A 2.0 mm intramedullary pin was inserted in a normo grade manner to maintain fracture alignment. A 7-holes 3.5 mm Locking Reconstruction Plate (LRCP) was applied on the tension surface of femur (Fig.2) and stabilize the fracture by placing 2 screws proximally and 4 screws distally. Plate was pre-stressed to contour the caudal bowing of femoral shaft. Using a 2.7 mm drill bit the holes were made and measured using a depth gauge and designated length screws were applied using a screwdriver. The fracture site was compressed using cortical screws from both sides. Suturing was done by opposing tensor fascia lata and subcutaneous tissue followed by intradermal sutures using PGA 2-0 in a simple continuous fashion. The skin was apposed in cross-mattress manner using polyamide 2-0. Sterile dressing was done to prevent the mutilation of sutures. Standard postoperative radiographic examination was done immediately after surgery and postoperative days to assess fracture healing (Fig 3). Skin sutures were removed on the 14$^{th}$ postoperative day.

Femur fractures are most commonly reported among all long bones (Singh *et al*., 2011). The femur has the

**Fig. 1:** Dog – radiography showing proximal diaphyseal transverse, over-riding left femoral fracture.

**Fig. 2:** 7-Hole LRCP in position

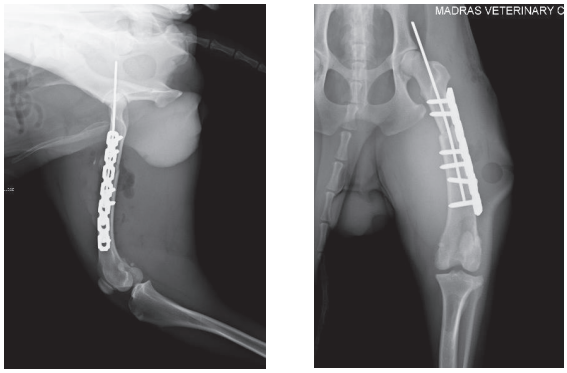


**Fig. 3:** Cranio-caudal and lateral views of radiography showing implants in position and adequate alignment

highest frequency among long bone fractures (Sran *et al.*,2016). The present fracture was stabilized using a 3.5 mm locking reconstruction plate, and the implant was placed on the lateral surface of the femur which provided adequate exposure to bony shaft and fragments apposition. An intramedullary pin of size 2.0 mm was used in this study to facilitate alignment of fractured fragments and ease of fracture stability as suggested by Stiffler (2004). Incorporation of an intramedullary pin reduced strain on the plate by a factor of two. Limb function near to normal on immediate postoperative day, with the improvement of gait in successive reviews. The surgical site healed in 10 days and sutures were removed. Normal gait was observed, lameness grade 0, range of motion of joints and muscle mass were near normal following 2$^{nd}$ week postoperatively. Radiographic examination revealed healing of fracture under gap healing which involves filling of fracture gap. Partial healing was noticed around 45 days with the disappearance of the fracture line radiographically. 60$^{th}$ day postoperative radiography revealed fainting of the fracture line and early remodelling changes. Callus formation and obliteration of fracture line was noticed on 45$^{th}$ to 60$^{th}$ postoperative days, which was in accordance with the results of De Camp *et al.* (2016). On the 60$^{th}$ postoperative day lameness grade and pain score were 0. Locking reconstruction plate was ideally suited for the management of unstable diaphyseal fractures of long bones with curvature. It was primary counteracted compression, tension, torsion and shearing but was less effective in countering the bending force. In the present case bending force was countered by the insertion of 2.0 mm intramedullary pin. The animal had an uneventful recovery.

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## References

Abd El Raouf M., Mekkawy N. H. M., & AbdEl-Aal A.M., (2017). Femur fractures and treatment options in 20 dogs admitted to our clinic from January 2013 to December 2015. *Iraqi Journal of Veterinary Sciences,31*(2),117-122.

Aithal, H. P., Singh, G.R., & Bisht, G.S. (1999). A study on incidence of fractures in animals and management of supra-condylar femoral fractures in dog. *Indian Journal of Veterinary Surgery 20*(1),15-21.

DeCamp, C., Johnston, S.A., Dejardin, L.M., & Schaefer, S.L. (2016). *Handbook of Small Animal Orthopedicsand Fracture Repair.* 5th edition. Elsevier, Missouri. p:880.

Guiot, L. P., Demianiuk, M., & Dejardin, L.M. (2012). Fractures of the Femur. In: Tobias K. M., Johnston S. A, In *Veterinary Surgery Small Animal*, 1st ed. St. Louis: Saunders Elsevier, pp. 865-905.

Johnson, L., Smith, C.W., David, J., & Schaefer, S.L. , (1998). Fragment reconstruction and bone plate fixation versus bridging plate fixation for treating highly comminuted femoral fracture in dogs. *Journal of the American Veterinary Medical Association.,213*,1157 – 1161.

Singh, K., Thakur, N., Mohindroo, J., Gopinathan, A., & Mahajan, A. (2011). Repair of supra-condylar fracture of femur in dogs. *Indian Veterinary Journal 88*(3),85-87.

Sran, T. K., Singh S.S., Mohindroo, J., & Saini, N.S. (2016) Frequency of long bone fractures in dogs:A retrospective study. *Indian Journal of Veterinary surgery 37*(1),1-5.

Stiffler, K. S., & Kevin, (2004). Internal fracture fixation. *Clinical Techniques in Small Animal Practice ,3*,105–113.