

# Management of a Closed, Long Spiral Comminuted Femoral Fracture in the Right Hindlimb of a 6-Month-old Local Dog: A Case Report

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### ABSTRACT

A 6-month-old local breed dog weighing 13.4 kg was presented to the Small Animal Unit of the Veterinary Teaching Hospital, Usmanu Danfodiyo University, Sokoto, with non-weight-bearing lameness on the right hindlimb following a road traffic accident. The dog was weak but responsive, with evident swelling and crepitation on the affected limb. Radiographic and clinical findings confirmed a long spiral comminuted fracture of the right femur. Haematological analysis revealed anaemia and mild eosinophilia. Surgical stabilisation was achieved through open reduction and internal fixation (ORIF). Postoperative management included analgesics, antibiotics, haematinics, and vitamins. Recovery was uneventful, though the patient was not presented for subsequent follow-up evaluations. This case underscores the importance of timely surgical intervention, appropriate fixation methods, and diligent postoperative care in achieving satisfactory outcomes in canine femoral fractures.

**Keywords:** Dog; Femoral fracture; Open reduction; internal fixation; Cerclage wire; IM pin



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### INTRODUCTION

Femoral fractures in dogs and cats account for approximately 20–25% of all fractures, for which surgical intervention is typically the treatment of choice (DeCamp *et al.*, 2016; Lovrić *et al.*, 2020). They represent about 45% of all long bone fractures twice the incidence observed in

any other single bone (DeCamp *et al.*, 2016). The most common cause of femoral fractures is traffic accidents (Tercanlioglu and Sarierler, 2009), although they can also result from gunshot injuries or pathological conditions such as primary or metastatic bone tumors. Nearly 86% of

femoral fractures occur in animals younger than five years, with 48% seen in those less than one year of age (Shiju *et al.*, 2010). Because femoral fractures seldom respond well to conservative management, internal fixation remains the preferred treatment method (Beale, 2004). Traditionally, internal fixation techniques employ pins, wires, screws, or plates to achieve rigid stabilization of fractures that have been anatomically reduced (Stiffler, 2004). Orthopaedic pins serve as a primary means of internal fixation, though they are often used in combination with wires, bone plates, or external skeletal fixation devices to enhance stability (Beale, 2004; Tercanlıoğlu & Sarielerler, 2009). Successful fracture repair requires careful selection of the surgical approach, preservation of soft tissues and their attachments, anatomic or indirect reduction of the fracture; secure stabilisation, appropriate implant choice, and meticulous postoperative management (Stiffler, 2004). The purpose of this report is to present the clinical and radiographic findings of a femoral fracture in a dog and to describe its successful reduction and stabilisation using a combination of cerclage wires and an intramedullary pin.

### Case presentation

A 6-month-old local breed dog weighing 13.4 kg was presented to the Small Animal Unit, Veterinary Teaching Hospital, Usmanu Danfodiyo University, Sokoto, with a complaint of non-weight-bearing lameness on the right hindlimb following a road traffic accident that occurred the previous day. The patient was fed household leftovers and had no history of prior medication or vaccination. On clinical examination, the patient appeared calm but weak and responsive. There was visible swelling and crepitation at the mid-femoral region of the right hindlimb. The dog exhibited pain upon palpation and resisted manipulation of the affected limb. The rectal temperature, pulse, and respiratory rates were 38.4°C, 99 beats per minute, and 78 cycles per minute, respectively (Table 1). The mucous membranes were pink with a capillary refill time of less than two seconds. Haematological analysis revealed the following values: PCV, 26%; Hb, 8.6 g/dL; and RBC,  $4.4 \times 10^6$  cells/mm<sup>3</sup>. The total white blood cell count and differential leukocyte distribution were within the normal reference range, except for a relatively elevated eosinophil count. (Tables 1 and 2).

**Table 1:** Vital Parameters of the Patient on Presentation

Vital parameters	Obtained values	Reference range
Temperature (°C)	38.4	37.5-39.4
Heart rate (Beats/min.)	99	65-90
Respiratory rate (Cycles/min.)	78	15-30

Reference range (Hassan and Hassan, 2003)

### Radiographic Evaluation

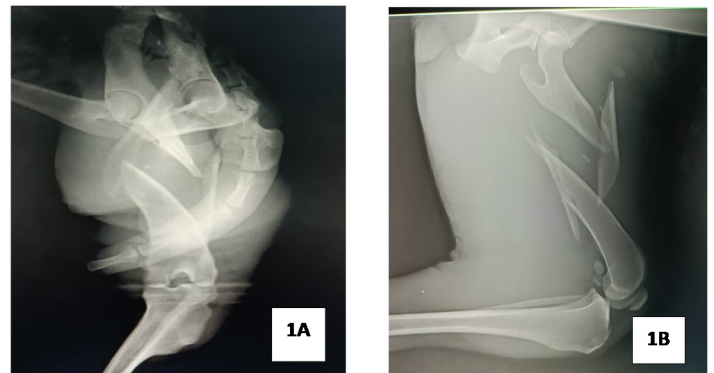
Lateral and Medial radiographs of the affected limb were obtained. The images revealed a long spiral comminuted fracture at the mid-diaphyseal region of the right femur.

**Table 2:** Haematological profile.

PARAMETERS	OBTAINED VALUES	ABSOLUTE VALUES (X10 <sup>3</sup> Cells/mm <sup>3</sup> )	REFERENCE VALUES
PCV (%)	26*		36-55
Hb Conc (g/dL)	8.6*		12.0-20.0
RBC (X10 <sup>6</sup> cells/mm <sup>3</sup> )	4.4*		5.4-8.5
WBC (X10 <sup>3</sup> cells/mm <sup>3</sup> )	16.2		6.0-18.0
Neutrophils	74 (%)	11.99	3.0-12.0
Lymphocytes	12 (%)	1.95	1.0-5.0
Monocytes	8 (%)	1.3	0.2-1.5
Eosinophils	6 (%)	0.97*	0.1-0.8
Basophils	0 (%)	0	0-0.5
Band cells	0 (%)	0	Rare

\*Indicates abnormal Values. Reference range (Hassan and Hassan, 2003).

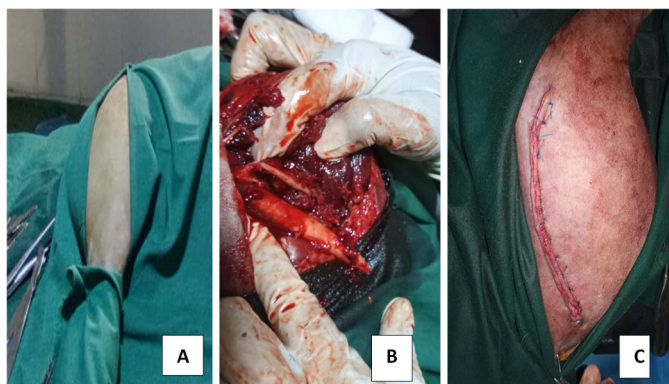
The proximal and distal fragments were displaced and slightly overriding, with multiple small bone fragments visible within the fracture gap. The surrounding soft tissue opacity indicated oedema and mild muscle trauma. No evidence of joint involvement or gross displacement of the femoral head was observed. Based on these findings, a confirmatory diagnosis of long spiral comminuted femoral fracture of the right hindlimb was established (Plate 1).



**Plate 1:** Medial and Lateral radiographs showing long spiral, comminuted fracture at the mid diaphyseal region of the right femur.

### Surgical Management

Pre-surgical evaluation confirmed stable vital parameters. The surgical area was clipped, scrubbed with chlorhexidine solution, rinsed with methylated spirit, and painted with povidone-iodine. The patient was anaesthetized with xylazine (0.5 mg/kg IV) and ketamine (10 mg/kg IV) combination. The dog was placed in left lateral recumbency to expose the right femoral region. A craniolateral approach was employed to access the femur (Plate 2). A longitudinal skin incision was made from the greater trochanter distally to the lateral epicondyle. The fascia lata was incised, and the *biceps femoris* and *vastus lateralis* muscles were separated by blunt dissection to expose the femoral shaft (Piermattei and Johnson, 2004). Surgical management of the long spiral comminuted fracture was performed via Open Reduction and Internal Fixation (ORIF). Following meticulous exposure and



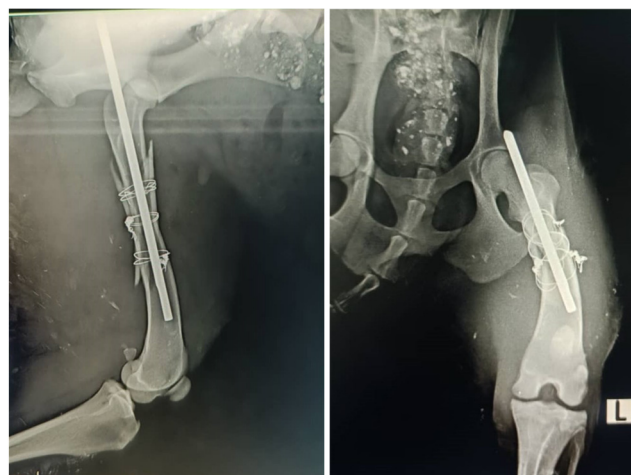
**Plate 2:** A; Showing the draped and prepared surgical site. B; Showing the exposed fractured bones. C; Closure of the skin with 2/0 nylon.

debridement of the fracture site, the fragments were anatomically reduced and aligned. Primary stabilization was achieved using an intramedullary stainless-steel pin, which was introduced into the medullary cavity via a retrograde approach. This fixation was augmented by the application of cerclage wiring to neutralize rotational and bending forces and ensure definitive fragment apposition. Proper anatomical reduction and mechanical alignment were confirmed both visually and by verifying symmetrical limb configuration prior to surgical closure. The muscle and subcutaneous layers were closed with 2/0 chromic catgut in simple continuous pattern, while the skin was sutured using 2/0 nylon in a simple interrupted fashion. The surgical site was cleaned with povidone-iodine and dressed aseptically (Plate 2).

Postoperative medications included 0.5% metronidazole at 20 mg/kg IV, 1% piroxicam at 0.5 mg/kg IM, vitamin B12 (0.05 mg/kg IM for 3 days), iron dextran (10 mg/kg IM for 3 days), and Penstrep® (Procaine penicillin G 200 mg + Dihydrostreptomycin sulfate 250 mg) at 20,000 IU/kg IM for four days. The animal was confined to a restricted area to limit movement and ensure healing. The mediolateral radiographs taken at two weeks post-surgery confirm successful internal stabilisation of the femoral fracture using a combination of an intramedullary pin and cerclage wires (Plate 3). The major fracture fragments were well aligned, with satisfactory apposition of cortical surfaces. No evidence of implant migration, bending, or wire loosening was observed. Mild soft tissue opacity around the fracture site was noted, consistent with postoperative edema or tissue reaction wires (Plate 3).

## DISCUSSION

Femoral fractures are frequently encountered in veterinary orthopedic practice and are predominantly associated with high-impact trauma. The femur, being a strong bone, requires considerable force to fracture, thus most femoral fractures are due to vehicular accidents (Peirone *et al.*, 2002; Hudson *et al.*, 2020). The primary etiology of the observed fracture was a Road Traffic Accident (RTA). This finding is consistent with established veterinary literature,



**Plate 3:** Lateral and Medial Radiographs showing complete reduction and placement of IM pin and Cerclage wiring at 2 weeks post-surgery.

which frequently identifies vehicular trauma as a principal source of traumatic skeletal injuries in companion animals (DeCamp *et al.*, 2016; Lovrić *et al.*, 2020). An initial presumptive diagnosis was formulated based on the clinical presentation and patient history. The definitive diagnosis was subsequently substantiated via radiographic evaluation, adhering to established diagnostic guidelines (Kalang *et al.*, 2025). The fracture pattern observed in this case a long spiral comminuted fracture suggests high-energy rotational and compressive force acting on the femoral diaphysis. Femoral fractures in dogs can be managed using various surgical techniques, each presenting specific advantages and limitations. Conservative (non-surgical) treatment is typically ineffective; therefore, internal fixation is the preferred approach. The primary objective of most surgical techniques is to achieve stable fixation while minimizing strain at the fracture site (El-Husseiny *et al.*, 2012). In the present case, intramedullary pinning combined with cerclage wiring was selected due to the unavailability of bone plates at the time of surgery. The combined use of an intramedullary pin and cerclage wires provided effective stabilization for the comminuted femoral fracture. This fixation technique ensures both axial and rotational stability, allowing adequate load sharing between the bone and implants during the healing process (Beale, 2004; Stiffler, 2004). The satisfactory reduction and stable fixation observed radiographically are favorable for primary bone healing. This technique provides effective stabilization, is economical, and has a low complication rate (Scott *et al.*, 2022). Intramedullary pinning offers good biomechanical balance for long bones such as the femur, enhancing callus formation and reducing muscle atrophy and joint stiffness. However, it provides limited rotational stability and may allow fragment displacement if postoperative movement is not adequately restricted (Worth, 2007).

Pre-surgical haematology revealed a statistically non-significant reduction in the Packed Cell Volume (PCV),

Haemoglobin (Hb) concentration, and Red Blood Cell (RBC) count. These erythroid parameter reductions, coupled with the presence of relative eosinophilia, are consistent with a diagnosis of mild to moderate non-regenerative anaemia. The anaemia is presumably secondary to acute blood loss resulting from the trauma associated with the road traffic accident (RTA); however, the contribution of other potential etiologies, such as parasitic infestation or underlying chronic disease, cannot be conclusively excluded. The therapeutic regimen, encompassing antibiotics (to mitigate infection risk), analgesics (for pain management), and supplementary haematinics and vitamins (to support erythropoiesis and general recovery), collectively contributes to optimizing the biological environment for fracture healing and significantly minimizing the incidence of post-operative complications.

## Conclusion

This case report demonstrates that open reduction and internal fixation remains an effective and reliable technique for the management of long spiral comminuted femoral fractures in dogs. Early surgical intervention combined with aseptic technique and diligent postoperative care enhances the chances of successful recovery. Owner compliance and regular follow-up are critical for optimal long-term outcomes and evaluation of healing progress.

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