SHORT COMMUNICATION

Epidemiological Evaluation of Femoral Fractures in Cats Presented to Veterinary College Hospital, Bengaluru, Karnataka

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Abstract

Femoral fractures are among the most common appendicular skeletal injuries in cats and are frequently associated with traumatic events. The present study evaluated the occurrence, anatomical distribution, and epidemiological characteristics of femoral fractures in cats presented to the Teaching Veterinary Clinical Complex, Veterinary College, Hebbal, Bengaluru, over a 12 month period. Hospital records were retrospectively analyzed to assess fracture distribution based on anatomical location, age, breed, sex, seasonal trend, and etiology. In addition, 6 clinical cases of femoral fractures were surgically managed using the Fixin® conical coupling plate (CCP) system. Out of 2985 feline cases, 201 cats were diagnosed with bone fractures, of which femoral fractures were most common (73 cases; 36.32%). Distal diaphyseal fractures (38.73%) and closed fractures (94.52%) predominated. Femoral fractures occurred most frequently in Domestic Short Hair cats (67.12%), males (54.79%), and cats younger than one year of age (73.98%). The highest incidence was recorded in November, and fall from height was the leading etiological factor (46.58%). The study provides valuable epidemiological data on femoral fractures in cats and highlights the influence of age, management practices, and environmental factors on fracture occurrence.

Key words: Cats, Epidemiology, Femoral fractures, Etiology, Long bone fractures.

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Introduction

Fractures are among the most frequently encountered traumatic conditions in cats presented to veterinary hospitals, with long bones being commonly affected due to their anatomical position and exposure to external forces. Several epidemiological studies have reported that femoral fractures constitute a major proportion of appendicular skeletal injuries in cats, often resulting in high energy trauma such as falls from height, road traffic accidents and animal attacks (Cardoso *et al.*, 2016). Femoral fractures in cats present considerable clinical challenges owing to the wide variation in fracture configuration, involvement of surrounding soft tissues, and the requirement for stable fixation methods that provide adequate stability while minimizing disruption to the biological environment essential for fracture healing (Chandler and Beale, 2002).

Epidemiological evaluation of fracture occurrence is essential for understanding risk factors related to age, breed, sex, and etiology, thereby aiding clinicians in developing appropriate preventive strategies and selecting optimal treatment modalities. Previous studies have consistently reported a higher incidence of fractures in younger cats, which has been attributed to increased activity levels, immature skeletal structure, and limited awareness of environmental hazards (Das *et al.*, 2010; Libardoni *et al.,* 2018). Environmental factors such as urban living conditions and exposure to multistorey housing have also been recognized as important contributors to traumatic injuries in cats (Bennour *et al.*, 2014; Cardoso *et al.*, 2016). Advances in fracture management, particularly the development of locking plate systems, have significantly improved outcomes in feline orthopedics by providing angular stability, maintaining fracture alignment, and reducing periosteal disruption. Locking plate technology has been shown to be especially advantageous in small

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animal patients by enhancing construct stability while supporting biological fracture healing (Voss *et al*., 2009; Elzomor *et al*., 2014). The Fixin® conical coupling plate (CCP) system represents a newer internal fixation method designed to optimize biomechanical stability and preserve vascular supply at the fracture site.

However, despite numerous international reports on feline fracture epidemiology, comprehensive clinical and epidemiological data on femoral fractures in cats from the Indian subcontinent remain limited. Therefore, the present study was undertaken to evaluate the occurrence and distribution of long bone fractures in cats presented to a Teaching Veterinary Clinical Complex, Bengaluru, with particular emphasis on epidemiological aspects of femoral fractures, along with the clinical application of the Fixin® CCP system in selected cases.

Materials and Methods

The present retrospective study was conducted using hospital records of feline fracture cases presented to the Veterinary Clinical Complex and Department of Veterinary Surgery and Radiology, Veterinary College, Hebbal, Bengaluru, KVAFSU, Karnataka (India) over a period of 12 months to determine the occurrence, anatomical distribution, and epidemiological characteristics of femoral fractures. In addition, six clinical cases of femoral fractures in cats were surgically managed using the Fixin® conical coupling plate (CCP) system during the same study period.

Results and Discussion

Occurrence of Appendicular Fractures in Cats

During the study period, a total of 50,385 animal cases were presented to the Veterinary College Hospital, Hebbal, Bengaluru. Of these, 2985 cases were feline patients presented to the Department of Veterinary Surgery and Radiology. Among the feline cases, 201 cats were diagnosed with fractures involving various long bones. Femoral fractures constituted the highest proportion with 73 cases (36.32%), followed by humeral fractures in 47 cats (23.38%), radius-ulna fractures in 20 cats (9.95%), metacarpal fractures in 7 cats (3.48%), and metatarsal fractures in 6 cats (2.99%). This finding is consistent with previous reports by Nolte *et al*. (2005), Bennour *et al*. (2014), Cardoso *et al*. (2016), Abo Soliman *et al*. (2020) and Vasileva and Chaprazov (2022), all of whom identified the femur as the most frequently fractured long bone in cats, followed by the tibia. The high incidence of femoral fractures may be attributed to the femur's role as a primary weight bearing bone and its exposure to high bending and torsional forces during traumatic events.

Anatomical Location and Nature of Femur Fractures

In this cohort of 73 femur fracture cases, closed fractures (n=69, 94.52%) were more commonly encountered than open fractures (n=4, 5.48%). This observation aligned well with previous reports by Cardoso *et al*. (2016), and Gülaydin and Alkan (2024). The predominance of closed fractures in cats may be related to their muscle coverage around the femur, and the nature of traumatic force encountered, which often results in blunt rather than penetrating injuries.

Proximal femur fractures were observed in 23 cases (31.5%), mid-diaphyseal fractures were observed in 21 cases (28.77%) and distal diaphyseal fractures were observed in 29 cases (39.73%). The distal diaphyseal fractures were the most common. Similar predominance of distal femoral fractures in cats has been reported by Voss *et al*. (2009) and Elzomor *et al*. (2014). However, Chandler and Beale (2002) reported the femoral diaphysis as the most common fracture site. These variations may be influenced by differences in study population, trauma mechanisms and regional environmental factors.

Age, Breed and Gender wise Occurrence of Femur Fractures

Femoral fractures were predominantly observed in younger cats. Cats aged between 0-6 months accounted for the highest number of cases (32, 43.84%), followed by those ages 6-12 months (22, 30.14%). Cats aged 1-2 years represented 8 cases (10.96%), while 9 cases (12.33%) were observed in the 2-4 year age group. Only 2 cases (2.74%) occurred in cats older than 4 years. This finding is in agreement with earlier studies by Das *et al*. (2010), Cardoso *et al*. (2016), Libardoni *et al*. (2018), and Vasileva and Chaprazov (2022). The increased susceptibility of young cats may be attributed to their high activity levels, playful behaviour, lack of coordination, and immature skeletal development, making them more vulnerable to traumatic injuries.

Analysis of breed predisposition revealed Domestic Short Hair (DSH) cats accounting for 67.12% (n=49) of cases. Persian cats were involved in 24 cases (32.88%). Similar findings were reported by Cardoso *et al*. (2016), Abo Soliman *et al*. (2020), and Cebeci and Karsli (2021). However, this distribution likely reflects the higher population density of Domestic Short Hair cats in the study region rather than a true breed predisposition. Supporting this interpretation, Vasileva and Chaprazov (2022) reported that European short hair cats accounted for the majority of cases in their study, highlighting the influence of regional breed popularity on future statistics.

Male cats were more frequently affected than females, with 40 cases (54.79%) recorded in males and 33 cases (45.21%) in females. Similar male predominance has been reported by Libardoni *et al*. (2018), Keosengthong *et al*. (2019), Abo Soliman *et al*. (2020), and Vasileva and Chaprazov (2022). Increased roaming behaviour, territorial aggression, and risk-taking tendencies in male cats may contribute to their higher exposure to traumatic events. However, some studies such as those by Reddy *et al*. (2020), Cebeci and Karsli (2021), and Gülaydin and Alkan (2024) have reported a higher incidence in females, indicating that gender predisposition may vary depending on study design, sample size and owner preferences.

Monthly Trend of Femoral Fractures

Analysis of the monthly distribution revealed the highest incidence of femoral fractures in November (12 cases; 16.22%), followed by July (9 cases; 12.16%), August (7 cases; 9.56%), and January (7 cases; 9.46%). Moderate numbers were observed during October, December, February and March (5 cases each; 6.76%). The lowest incidence was recorded in September (3 cases; 4.05%). This seasonal peak may be associated with feline reproductive patterns, as cats are long day breeders and kittens born earlier in the year reach an age of increased mobility and risk taking behaviour by late autumn. Vasileva and Chaprazov (2022) similarly reported a higher frequency of long bone fractures during summer and autumn months, suggesting a seasonal influence on fracture occurrence.

Etiology of Femoral Fractures

Trauma due to falls from height was identified as the most common etiological factor, accounting for 34 cases (46.48%). Animal attacks, including dog and cat bites, were responsible for 16 cases (21.92%), while road traffic accidents accounted for 6 cases (8.22%). In 17 cases (23.29%), no specific cause could be determined based on the history provided by the owners. Similar findings were reported by Bennour *et al.* (2014), Cebeci and Karslı (2021), and Ruchika (2024). The high incidence of fall related injuries may be explained by the increasing prevalence of urban living and high rise housing, which exposes cats to the risk of accidental falls. The relatively low incidence of road traffic accidents in the present study may reflect the indoor lifestyle of many pet cats, limiting their exposure to vehicular trauma. In contrast, earlier studies by Scott (2005), Vidane *et al.* (2014), Cardoso *et al.* (2016), and Lovrić *et al.* (2020) reported vehicular accidents as the leading cause of femoral fractures, emphasising the role of environmental and lifestyle differences across regions and time periods.

In six clinical cases, the Fixin® conical coupling plate (CCP) system provided stable fixation with progressive callus formation, early functional limb use and complete radiographic union by day 60. Apart from a single screw pull-out complication that was successfully managed, all cats achieved normal ambulation, indicating reliable biomechanical stability and favourable clinical outcomes (Ramana *et al.,* 2026).

In brief, the present study highlights that femoral fractures constitute the most common long bone fractures in cats. Younger cats were predominantly affected, with a higher occurrence observed in male and Domestic Short Hair cats. Distal diaphyseal fractures and closed fractures were the most frequent. Falls from height emerged as the primary etiological factor. The observed variations in fracture distribution emphasize the importance of understanding regional and environmental factors influencing fracture occurrence. Epidemiological assessment of femoral fractures provides valuable insight for clinicians in terms of risk identification, preventive strategies, and appropriate case management. Furthermore, the findings of this study contribute baseline data on femoral fracture patterns in cats from the Indian subcontinent and may aid in improving clinical decision making and future comparative studies in feline orthopedics.

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