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Epidemiological insights into long bone fractures in dogs: A one-year clinical review

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Abstract

A retrospective study was conducted on canine long bone fractures presented to the Department of Veterinary Surgery and Radiology, NTR College of Veterinary Science, Gannavaram, and the SVVU Super Speciality Veterinary Hospital, Visakhapatnam, from January to December 2022. Of 8,644 surgical cases, 326 (3.77%) involved fractures, with long bones accounting for 235 (72.08%). The femur was most frequently affected (33.1%), followed by the radius/ulna, tibia/fibula, and humerus. Mongrels (29.4%) were most affected, with juveniles (39.6%) and males (55.74%) showing higher susceptibility. The right hind limb was involved in 29.9% of cases. Vehicular accidents (44.7%) and falls from height (40.0%) were the major causes. The study concludes that long bone fractures are more common in young, free-roaming male dogs exposed to urban traffic, emphasizing the need for preventive strategies, road safety awareness, and timely orthopedic management to minimize incidence and improve recovery outcomes.

Keywords: Etiology, long bone fracture, incidence, breed, age, trauma

1. Introduction

Fractures of the long bones are among the most frequently encountered orthopaedic disorders in dogs, often leading to intense pain, restricted mobility, and potential long-term complications if not managed properly. These injuries are typically the result of traumatic events such as vehicular accidents, falls, or physical abuse incidents that are increasingly common in areas with large stray dog populations or rising pet ownership (Gadallah *et al.*, 2009; Sharma *et al.*, 2022) ^[11, 28]. The skeletal strength of canines is influenced by both intrinsic and extrinsic factors, making certain breeds, age groups, and anatomical locations more vulnerable to fractures (Reddy *et al.*, 2021; Piermattei *et al.*, 2006) ^[26, 22].

Although diagnostic and surgical techniques in veterinary orthopedics have advanced considerably, limited epidemiological research has focused on the distribution and occurrence of long bone fractures in relation to breed, age, sex, limb, bone affected, and causative factors. Understanding these variables is essential to improving treatment outcomes, implementing preventive measures, and selecting appropriate fixation techniques based on individual patient needs.

The current study aimed to assess the incidence and causative factors of long bone fractures in dogs, considering parameters such as breed, age, sex, affected limb and bone, and related risk factors.

2. Materials and Methods

A retrospective analysis was conducted to determine the frequency and distribution of bone fractures in dogs presented to the Department of Veterinary Surgery and Radiology, NTR College of Veterinary Science, Gannavaram, and the SVVU Super Speciality Veterinary Hospital, Visakhapatnam, over a one-year period from January to December 2022. Clinical records of 8,644 dogs presented for various surgical conditions were reviewed.

Data collection relied on physical examination findings and radiographic confirmations documented at the time of admission. From these, 326 dogs (3.77%) were diagnosed with bone fractures, and 235 of these cases (72.08%) involved long bones specifically the humerus, femur, radius ulna, and tibia fibula representing 2.71% of the total surgical caseload. Fractures were categorized based on anatomical site, fracture configuration (transverse, oblique, comminuted, etc.), and patient factors including age, breed, sex, and body weight to evaluate predisposition trends. Only cases with complete clinical and radiological documentation were included in the study. Data were compiled and analyzed statistically to determine the prevalence and pattern of long bone fractures in the canine population.

3. Results and Discussion

3.1 Incidence of Long Bone Fractures

Out of 8,644 canine surgical cases examined between January and December 2022, 326 (3.77%) involved bone fractures. Among these, 235 dogs (72.08%) sustained long bone fractures accounting for 2.71% of all surgical cases. These figures correspond well with previously published studies, although variations exist. Ali (2013) ^[5] reported a higher overall fracture incidence (17.8%), while Jain *et al.* (2018) ^[21] documented a lower rate (0.69% of clinical and 1.14% of long bone fractures). Similarly, Patil *et al.* (2018) ^[21] noted 2.48% among surgical cases. Such differences may stem from variations in geographic location, case volume, diagnostic protocols, and local dog demographics.

3.2 Breed-wise Distribution

A total of 19 breeds were found to be affected with fractures during the period of study and out of them, non-descriptive (mongrel) dogs showed the highest prevalence (N=69; 29.4%), followed by Pomeranians (9.8%), Spitz (9.8%), mixed breeds (8.9%), Doberman Pinschers (6.0%), and German Shepherds (4.7%). The lowest occurrence was in Belgian Malinois (0.4%).

The higher prevalence of fractures among mongrel dogs aligns with previous studies (Dvorak *et al.*, 2000; Rani *et al.*, 2007; Aithal & Singh, 2012; Priyanka *et al.*, 2019) ^[9, 25, 3, 23], which attributed this trend to their widespread, free-roaming presence in urban areas. In contrast, Kumar *et al.* (2007) ^[17] and Ali (2013) ^[3] observed a greater incidence in Spitz and German shepherd breeds, respectively, likely reflecting the higher local population of these breeds in their study regions. The low frequency in Belgian Malinois may reflect their smaller population size and temperament, which can limit their popularity as pets (Libardoni *et al.*, 2016) ^[18].

3.3 Age-wise Distribution

Higher incidence was noticed in juvenile dogs (N=93; 39.6%), followed by young adults (25.1%), geriatrics (19.6%), and mature adults (15.7%). These results agree with prior research (Balagopalan *et al.*, 1995; Simon *et al.*, 2011; Vidane *et al.*, 2014; Abd El Raouf *et al.*, 2019) ^[7, 29, 32, 2] showing a greater fracture risk in younger dogs. Juveniles possess developing bones with lower mineral density, making them more fragile (Aithal *et al.*, 1999; Tercanlioglu & Sarierler, 2009) ^[4, 30]. Their higher activity levels and poor coordination also contribute to increased trauma susceptibility (Raghunath *et al.*, 2007; Kallianpur *et al.*, 2018) ^[24, 15].

3.4 Sex-wise Distribution

Out of the 235 long bone fractures, 131 (55.74%) occurred in males and 104 (44.26%) in females. The male predisposition

mirrors findings from other studies (Kumar *et al.*, 2007; Jain *et al.*, 2018) ^[17, 21]. Males are typically more active and prone to roaming and fighting, increasing their exposure to trauma (Libardoni *et al.*, 2016; Abd El Raouf *et al.*, 2019) ^[18, 2]. Additionally, the preference for male pets in many households may lead to their over representation (Patil *et al.*, 2018) ^[21]. However, Altunatmaz *et al.* (2012) ^[6] observed a slightly higher incidence in females, though the reason was unclear.

3.5 Limb-wise Distribution

The right hind limb was most commonly affected (N=72; 29.9%), followed by the right forelimb (28.6%), left hind limb (21.6%), and left forelimb (19.9%). Bilateral fractures were recorded in six cases. Hind limb involvement (51.4%) marginally exceeded forelimb fractures (48.5%). These findings align with earlier observations (Jani *et al.*, 2014; Minar *et al.*, 2013; Abd El Raouf *et al.*, 2019) ^[14, 2, 7]. The higher incidence of hind limb fractures may be due to dogs presenting their hindquarters toward the impact during vehicular collisions, resulting in a greater likelihood of injury to the posterior limbs (Ali, 2013; Jain *et al.*, 2018) ^[3, 21]. Moreover, such injuries are less frequently fatal compared to head-on collisions, increasing their clinical presentation rate (Harasen, 2003; Keosengthong *et al.*, 2019) ^[12].

3.6 Bone-wise Distribution

The femur was the most frequently fractured long bone (N=81; 33.1%), followed by the tibia fibula (29.0%), radius ulna (26.1%), and humerus (11.8%). In a few cases, two long bones of the same limb were affected simultaneously. This pattern corroborates previous studies (Unger *et al.*, 1990; Harasen, 2003; Patil *et al.*, 2018) ^[31, 12, 21]. The high prevalence of femoral fractures may be related to the bone's weight-bearing function and the significant biomechanical stress it endures during motion and impact (Patil *et al.*, 2018) ^[21].

3.7 Etiology

The leading cause of long bone fractures was vehicular trauma (N=105; 44.7%), followed by falls from heights (40.0%). Other causes included blunt trauma from objects (5.1%), dog bites (3.0%), and bone tumors (0.9%). In 6.4% of cases, the cause could not be determined. These findings are consistent with prior research (Beale, 2004; Jain *et al.*, 2018; Priyanka *et al.*, 2019) ^[21, 23], which identified road traffic accidents as the predominant cause of orthopaedic injuries in dogs. Increased urbanization and vehicle density likely contribute to this trend (Aithal *et al.*, 1999) ^[4]. Falls from height were especially common in smaller or indoor dogs, as previously noted by Milovancev and Ralphs (2004) ^[19] and Abd El Raouf *et al.* (2017) ^[1]. Less frequent causes included bite injuries (Sharma *et al.*, 2022) ^[28] and unidentified trauma (Rhangani, 2014) ^[27].

4. Conclusion

This study highlights that long bone fractures are most frequently observed in mongrel dogs, particularly in juveniles and males. The femur was identified as the bone most prone to fracture, with vehicular accidents being the leading cause. These results emphasize the importance of implementing preventive measures targeting young, active, and free-roaming dogs, especially in urban settings, to reduce the risk of traumatic fractures.

Conflict of Interest

Not available

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