

**INCIDENCE, CLASSIFICATION AND MANAGEMENT
OF APPENDICULAR BONE FRACTURES IN DOGS IN
NAIROBI COUNTY, KENYA: A RETROSPECTIVE
STUDY OF 402 CASES (2007-2013)**

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INTRODUCTION

Pet Ownership/ Household Dogs are important demographic features in all communities in Kenya

Orthopaedic conditions constitute a major proportion of surgical/medical caseloads globally (Appari, et al, 2013)

Appendicular bone fractures, especially long bones are major issue in SAP (Gadali, 2009)

Etiology and Classification

Etiological factors:

- Traumatic injuries and pathological processes (neoplasia, mineral deficiencies) Fossum, 2019)

Classification of bone fractures has been extensively discussed by numerous authors (Harari, 2002, Lanz, 200, Piermattei, et al 2006, Shales 2008a and Shales, 2008b)



Classification of Bone Fractures

- Open/Closed
- Direction: Transverse, Oblique, Comminuted
- Number and Position of Fracture Lines:
 - Simple, Segmental or Comminuted
- Direction of fracture location:
 - **Diaphyseal** (proximal, mid-shaft or distal), **metaphyseal**, **articular**,
 - **Condylar** (Unicondylar/Biconcylar/ Y-Fracture/T-Fracture) and
 - **Physeal** (Salter-Harris System –TI-T-VI)

Continued

- Forces Acting on the Fracture Site:
 - Avulsion, Impaction, Compression, Displacement)
- Stability:
 - Interlocking fragments or unstable fragments
- Age:
 - Recent fractures (sharp edges on radiographs or surgical site) or
 - Old (rounded edges 10-14 days, with callus formation)

Diagnostic approach

- History of traumatic injuries or pathology
- Clinical features consistent with orthopaedic disease
- Orthopaedic Examination
 - Visual observation, physical examination, palpation, flexion/extension
- Diagnostic Imaging:
 - Digital radiography, ultrasound,
 - Histopathology for fracture healing assessment (Research)

Management & Treatment

- Closed or Open Reduction
- External Fixation: Coaptation Splint;
 - Robert Jones/Modified Robert Jones
 - Plaster of Paris, Fiberglass or Synthetic Resin Cast
 - External Skeletal Fixators
- Internal Fixation
 - Bone Plates and Screws
 - Intramedullary Pins/supplementary Orthopaedic Wires

Research Problem

- Retrospective and prospective studies are important:
 - To determine trends in etiology, type and frequency, classification, diagnostic features of bone fractures,
 - To aid in decision-making for management and
 - To establish outcomes (success or complications) of TX options
 - Baseline database for future studies (Hobbs, 2012)
- Presentation is based on the findings by Rhangani (2014) on the clinical epidemiology of bone fractures in dogs in selected practices in Nairobi County, Kenya
- Current citations and emerging research agenda are discussed

Study Objectives

- A retrospective study conducted to determine the incidence, associated risk factors, type, management and outcomes of appendicular bone fractures in dogs in small animal practices in Nairobi County between 2007 and 2013

MATERIALS AND METHODS

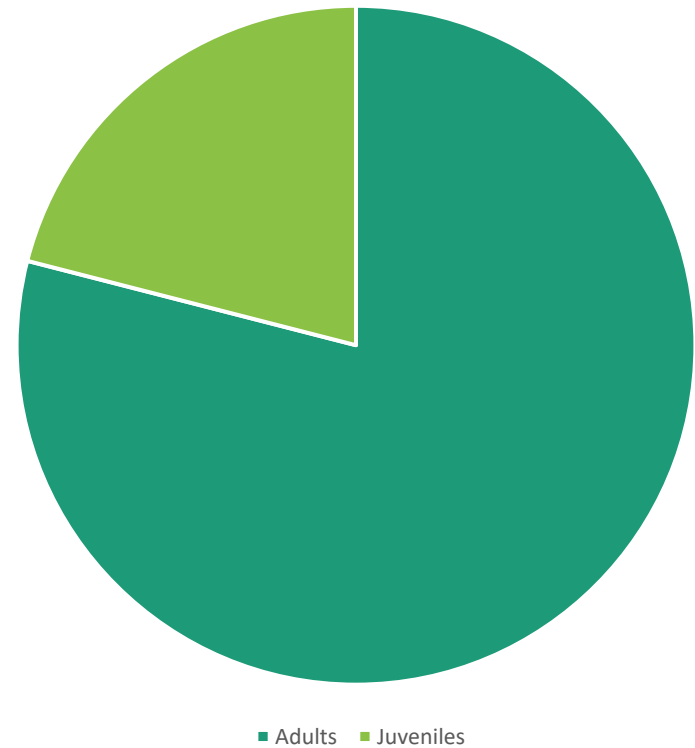
- Retrospective study using secondary data retrieved from 402 Medical Records for dogs diagnosed with fractures and accessed from selected veterinary practices in Nairobi County (2007-2013)
- Demographic data analysis based on age, gender, breed, bone fracture characteristics:
- Frequency, etiology, classification, diagnostic features, management and outcomes
- Descriptive statistics used for data analysis

RESULTS

- Incidence of appendicular bone fractures **14.7%** (**n=59**)
- GSDs (**31%**) and **Cross-breeds** (**31%**) were the most frequently affected breeds, followed by Terriers (**10.2%**), and Japanese Spitz (**10.2%**)

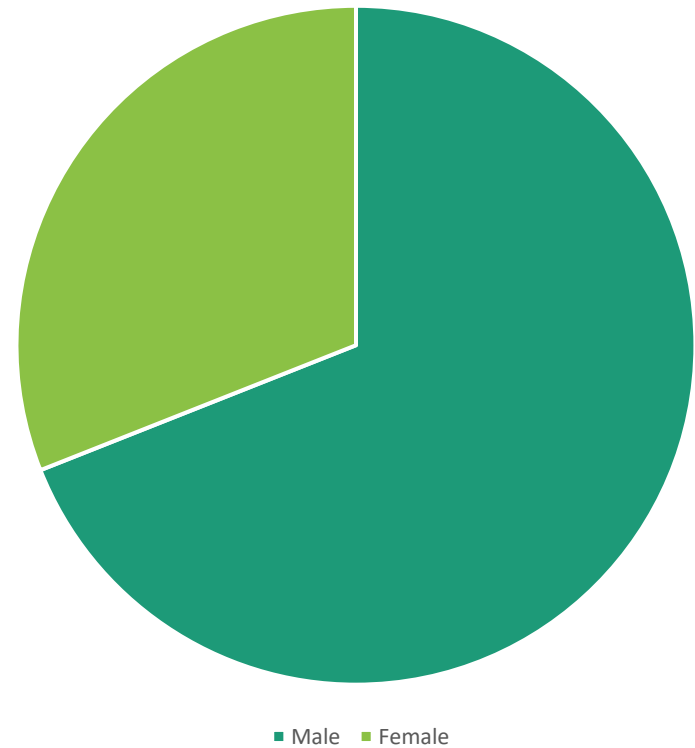
- Most fractures were diagnosed in adult dogs (79%) than in puppies (21%)

Distribution of Fractures Based on Age
Category: Retrospective Study



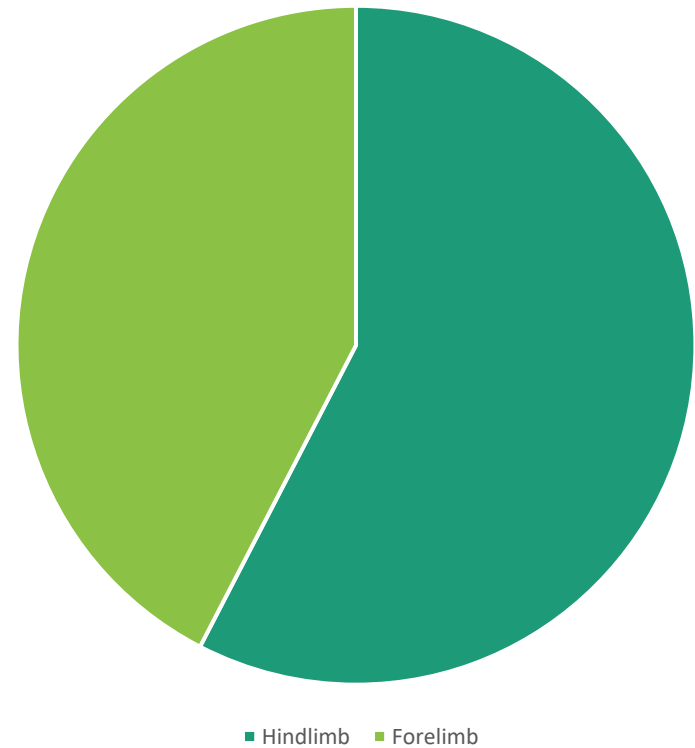
- Male dogs were more affected (69%) than females (31%)

Distribution of Fractures based on Gender: Retrospective Study



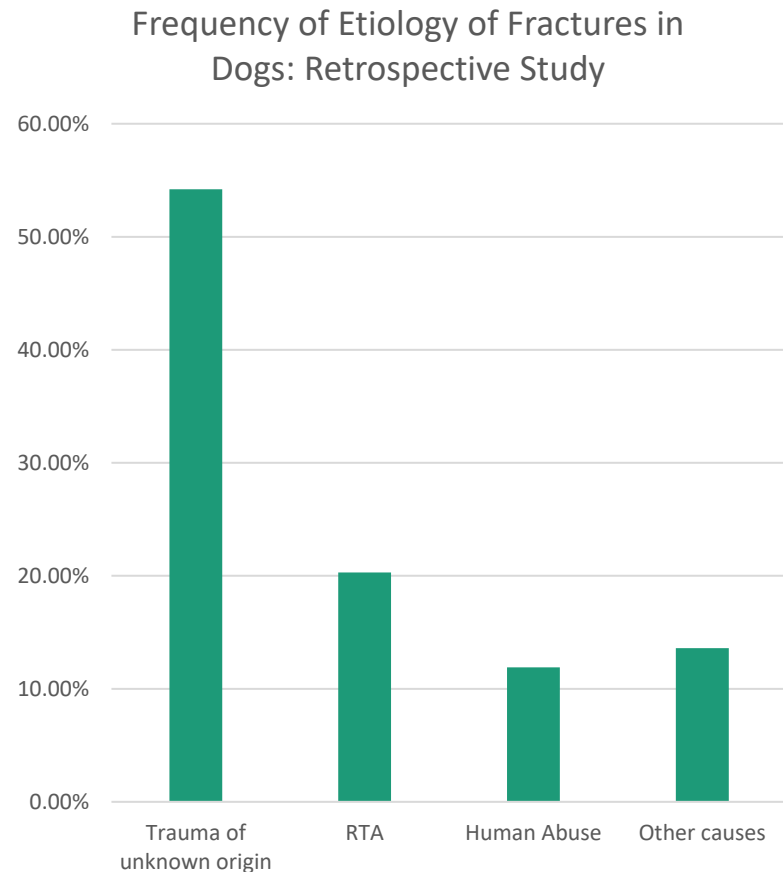
- More fractures occurred in the hind limbs (57.6%) compared to the forelimbs (42.4%)

Distribution of Fractures Based on Anatomic Location: Retrospective Study



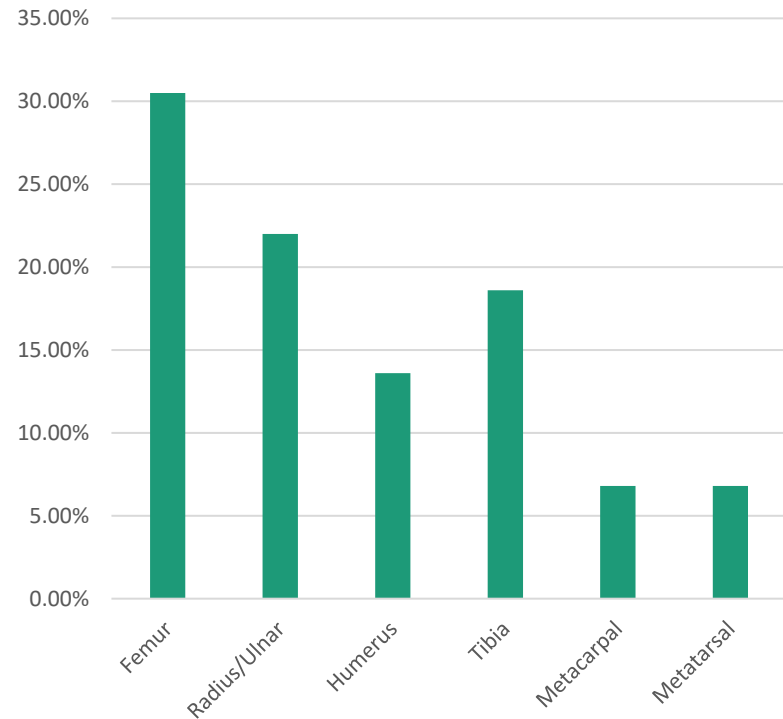
Most common causes of fractures were:

- Trauma of unknown origin (54.2%)
- RTA (20.3%)
- Human abuse (11.9%)
- Other causes 13.6%



- Most commonly affected bones were the **femur** (30.5%), **radio-ulnar bones** (22%), **humerus** (13.6%), **tibia** (18.6%), as well as metacarpal and metatarsal bones (6.8% each).
- Most bone fractures were complete simple transverse (64.4%), while others were oblique (15.3%), comminuted (6.8%), incomplete (6.8%) and multiple (6.8%).

Distribution of Fractures Based on Location on the Bone: Retrospective Study



Management Options

- Majority of veterinary practitioners managed fractures using internal fixation devices including
- IM pins and cerclage wires (28.8 %),
- Bone plates and screws, supplemented with cerclage wires and Robert Jones Bandage (27.1%),
- Bone plates and screws (11.9%).

- The outcome of fracture management was
 - Good (48%),
 - Satisfactory (11%) and
 - Unsatisfactory (41%) of cases.
-
- Wound infection, osteomyelitis, pin migration, implant failure, non-union, muscle atrophy, arthritis and delayed union were notable postoperative complications of fracture management.

Discussion and recommendations

- The first report of a retrospective study of appendicular bone fractures in dogs in selected veterinary practices in Nairobi County, Kenya
- The findings formed the basis for future studies and priorities for veterinary training and continuing professional development

- **Ben Ali (2013)** reported a retrospective study on 650 cases of dogs in Tripoli (2005-2010)
- Mostly due to RTA, Juvenile, Femoral fractures
- **Minar et al 2013:** retrospective study reported on 80 cases of fractures (2005-2011) Chungbuk National University
- RTA (43%), falling (28.5%), juvenile (50%), male (54%), HL (37%), Femur, tibia/fibula, radius/ulna, humerus

- **Bennour et al (2014)**; a retrospective study on appendicular fractures in dogs and cats in Tripoli
- **Uwagie et al 2018**); a retrospective evaluation of canine fractures in Southern Nigeria (2006-2016)
- N=3212 cases in which 2.77% had fractures;
- RTA (66.3%), adults (66.3%), mongrels (43.8%), males (71.9%), femur (41.6%), humerus (22.3%), external fixation

- Raouf, Ezzeldeen and Eisa (2019) retrospective study on 129 dogs at Zagazig University, Egypt
 - RTA, Juvenile (80.6%), GSD (74.4%), male (57.4%), HL (48%), FL (28%), pelvis 20%), femur(27%, tibia (15.5%) radius/ulna (11.6%) humerus (10%)
 - Mostly treated with Gypsona (42.7%), cross-pins (22%), plates and screws (18.5%), IM Pins (14.5%), wiring (1.9%)

- **Eyarafe and Oyetayo (2016)** retrospective study on 618 orthopaedic cases over 20yr period VTH, University of Ibadan, Nigeria
 - Fractures (61.4%), CHD (14%) Hip luxation (6.3), juveniles, femur (57.7%), tibia/fibula (10.3%), humerus (6.4%), radius/ulna (5%)

- **Abo-Soliman et al (2020)**; retrospective study in Egypt, revealed mostly due to RTA, males, juvenile, mongrel, HL, femur, open fractures
- **Serem and Mande (2020)**; retrospective study on 220 cases of fractures;
 - Incidence of fractures was 15%, RTA (40%), Males (62%), Juveniles (33%), Femur

- **Libardoni et al (2016)**: reported a retrospective study (n=1,200 cases of suspected trauma) reo Degrande
 - Incidence of appendicular fractures was 79.6%)
 - Mostly due to MVT (72%), males (52.5%), Juvenile (42%), mixed breed (51%), small sized breed (42.7%);
 - Femur (23.5%), pelvis (23.4%), tibia/fibula (22%) and humerus (7.5%)

Conclusions & recommendations

- Fractures remain a major cause of pain and compromised welfare in dogs, mainly caused by man-made factors, affecting juvenile-male dogs on hindlimbs
- Retrospective study data quality faced with serious challenges due to lack of standardization and consistent format, diligence/system
- Prospective, multicenter study design proposed involving all stakeholders including households

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