INCIDENCE OF CATASTROPHIC DISTAL LIMB FRACTURES OF RACEHORSES IN KENYA- A RETROSPECTIVE STUDY

Varma V. S., Samiullah M. H., Nguhiu-Mwangi J. A. and Mogoa E. G. M.

Department of Clinical Studies,
Faculty of Veterinary Medicine,
University of Nairobi

Presented at the 50th KVA Annual Scientific Conference 2016 in Meru
INTRODUCTION

• Catastrophic distal limb fractures often result in an immediate end of a racehorse’s career (Boden et al., 2006).

• No studies reporting the occurrence of these fractures have been documented in Kenya.

• This is a retrospective study carried out over a 10 year period (2005-2014).

• Total of 543 radiographs were examined out of which 387 (71.3%) showed at least one significant bone lesion.

• Fractures accounted for 23.5% (91/387) of the cases with orthopedic involvement.
Figure 1: Schematic diagram and radiograph of a normal equine foot
A- Schematic diagram of the equine foot viewed from the lateral (Sourced from Disorders of the Foot in Horses, Merck Veterinary Manual Online, 2015); B- Lateral radiograph of a normal horse foot (Sourced from archives at the Jockey club of Kenya).
COMMON DISTAL LIMB FRACTURES

- Distal limb fractures accounted for 56.0% (51/91) of the total number of fracture cases.

<table>
<thead>
<tr>
<th>Bones affected</th>
<th>Proportions out of radiographs showing distal limb fractures (n=51)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Phalangeal fractures</td>
<td>47.1</td>
</tr>
<tr>
<td>Sesamoid fractures</td>
<td>27.4</td>
</tr>
<tr>
<td>Metacarpal fractures</td>
<td>19.6</td>
</tr>
<tr>
<td>Navicular fractures</td>
<td>3.9</td>
</tr>
<tr>
<td>Metatarsal fractures</td>
<td>2.0</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1: Occurrence of distal limb fractures.
PHALANGEAL FRACTURES

• Phalangeal fractures accounted for 47.1% (24/51) of the distal limb fracture cases.

• P1- 25.0% (6/24).

• P2- 20.8% (5/24).

• P3- 54.2% (13/24).
• P1 fractures can result due to compression or rotational forces such as twisting. Chip fractures occur when there is hyperextension and stress imparted on the fetlock. Avulsion fractures occur when hyperextension exerts excessive pull on the suspensory ligament (Gore et al., 2008; Baxter, 2011; Ross and Dyson, 2011).

• P2 fractures occur from direct trauma or avulsion of soft tissue structures. Sudden stops, starts and short turns may cause comminuted fractures (Stashak, 2002; Baxter, 2011).

• P3 fractures occur due to repeated trauma such as knocking, racing at high speeds and treading on hard surfaces (Stashak, 2002; Gore et al., 2008; Baxter, 2011; Ross and Dyson, 2011).
Figure 2: Radiographs of the foot in racehorses suffering from phalangeal fractures
A- An oblique single line fracture of first phalanx (Bold arrow); B- A single line fracture of distal phalanx extensor process (Dotted arrow); C- A saucer fracture of middle phalanx (P2) (Dashed arrow); D- A chip fracture of distal phalanx extensor process (Dash-dot arrow)
SESAMOID FRACTURES

- Accounted for 27.4% (14/51) of the distal limb fracture cases.

<table>
<thead>
<tr>
<th>Type of sesamoid fractures</th>
<th>Occurrence of different sesamoid fractures (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Apical</td>
<td>71.4</td>
</tr>
<tr>
<td>Basilar</td>
<td>14.3</td>
</tr>
<tr>
<td>Mid-body</td>
<td>7.1</td>
</tr>
<tr>
<td>Full body</td>
<td>7.1</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: The different types of sesamoid fractures.

- Limbs undergo hyperextension during the loading phase, thus putting stress on the suspensory ligament and the distal sesamoidean ligament resulting in fractures (Schnabel et al., 2006).
Figure 3: Radiographs of the fetlock in racehorses suffering from sesamoid fractures. 
A- Lateral view showing a basilar sesamoid fracture (Bold arrow); B- Lateral view showing a mid-body sesamoid fracture (Dotted arrow); C- Lateral view showing a comminuted sesamoid fractures (Dash-dot arrow); D- Lateral view showing an apical sesamoid fracture (Dashed arrow)
Metacarpal fractures accounted for 19.6% (10/51) while, metatarsal fractures accounted for only 2.0% (1/51) of the distal limb fracture cases.

- MC II - 10% (1/10).
- MC III - 40% (4/10).
- MC IV - 50% (5/10).

There was only one metatarsal fracture which involved MT IV.
• MC III and MT III fractures most commonly occur due to trauma or high-speed exercise which induces micro-damage within the bones (Riggs, 1999; Zekas et al., 1999a; Stepnik et al., 2004; Morgan et al., 2006; Parkin et al., 2006).

• The remaining MC and MT bone fractures also result due to direct trauma (Stashak, 2002; Gore et al., 2008; Baxter, 2011; Ross and Dyson, 2011).
Figure 4: Radiographs of metacarpal fractures in racehorses
A- Dorsopalmer-Lateromedial view showing a single line fracture of metacarpal IV (Bold arrow); B- Dorsopalmer-Lateromedial view showing a comminuted fracture of metacarpal III (Dotted arrow)
• Navicular bone fractures accounted for only 3.9% (2/51) of the cases with distal limb fractures.

• Concussions to the foot result in simple and comminuted fractures while (Stashak, 2002; Gore et al., 2008).

• Avulsion fractures are associated with navicular disease or trauma (Baxter, 2011; Ross and Dyson, 2011)
Radiographs of the foot in racehorses suffering from navicular bone fractures

A- Dorsopalmer Proximal-distal oblique view showing a single line fracture of the navicular bone (Bold arrow). A horseshoe is visible as the radiodense arc; B- Dorsopalmer Proximal-distal view showing a single line fracture of the navicular bone (Dotted arrow).
REFERENCES


• Dyson S. (2007): Diagnosis and Management of Common Suspensory Lesions in the Forelimbs and Hindlimbs of Sport Horses. *Clinical Techniques in Equine Practice* 6: 179-188


THANK YOU
Distal femur fractures occur at approximately one-tenth the rate of proximal femur fractures and make up 6% of all femur fractures. There is a bimodal distribution of fractures based on age and gender. Full Text. An emphasis on indirect reduction techniques to restore limb alignment has improved the rate of fracture healing and decreased infection rates, fixation failure, and the need for bone grafting. In clinical series, this “biological plating” technique lowered the incidence of infection and implant failure, decreased the need for secondary bone grafting procedures, and led to earlier fracture callus formation, perhaps due to improved preservation of the periosteal blood supply. The incidences of femoral shaft fractures caused by different injuries vary from 1.5:100 000 person-years to 9.9:100 000 person-years. Most traumatic femoral shaft fractures are isolated without concomitant injuries. The art of femoral fracture care is a constant balancing of the often conflicting goals of anatomic alignment and early functional rehabilitation of the limb. The distal end of the femur has medial and lateral condyles. The proximal and distal parts widen into metaphyseal subtrochanteric and supracondylar regions. The designation femoral shaft fracture denotes that the fracture situates entirely on the femoral diaphysis. Self-reported fractures were confirmed, where possible, by review of the radiographs, medical record, or subject interview. The age- and gender-adjusted incidence of falls was calculated by center using Poisson regression. Poisson regression was also used to assess the extent to which between-center differences in the incidence of limb fractures could be explained by differences in the age- and gender-adjusted incidence of falls at those centers. There was also between-center variation in the occurrence of upper limb, lower limb, and distal forearm fractures.