Short Paper

Radiographic findings of digital bones and joints in lame cattle of Shiraz area

Meimandi Parizi, A.¹* and Raddanipour, M.²

¹Department of Clinical Sciences, School of Veterinary Medicine, University of Shiraz, Shiraz, Iran; ²Graduated from School of Veterinary Medicine, University of Shiraz, Shiraz, Iran

*Correspondence: A. Meimandi Parizi, Department of Clinical Sciences, School of Veterinary Medicine, University of Shiraz, Shiraz, Iran. E-mail: meimandi@shirazu.ac.ir

Summary

A radiographic study on bone and joint disorders was carried out on 77 cases of lame cattle in some dairy farms of Shiraz area. Various radiographic findings of digital region were recorded as: osteomyelitis, exostosis, alteration of bone density, calcified soft tissue, rotation of phalanges, arthritis, degenerative joint disease, joint bony ankylosis, luxation and angulation. In 70% of the lame cattle, radiographic findings of bone and joint were observed.

Key words: Lameness, Bone, Joint, Cattle, Radiography

Introduction

Lameness is considered to be a major welfare and economic problem of dairy farms in many countries. Economically, lameness results in lowered milk production, discarded milk, medical expenses and reproductive inefficiency. Musculoskeletal disorders are not noticed well in time, remain unattended and thus become chronic in nature resulting in increased pathological changes. In either instances, a radiographic assessment is often necessary and in most cases, useful to reach to a diagnosis (Murphy et al., 1975; Pharr, 1985; Tulleners et al., 1987; Welker et al., 1989; Bargai et al., 1995; Bezek et al., 1995; O’Brien and Biller, 1996; Trostle et al., 1997). Radiographic diagnosis needs to be emphasised for detection of such changes to provide well-timed management. This study was conducted to detect bone and joint lesions in cattle suffered from digital disorders using radiography in Shiraz area. This is a descriptive radiographic evaluation of bone and joint lesions.

Materials and Methods

This study was carried out on 77 cases of foot disorders in cattle of some dairy farms of Shiraz area in the Fars province in south of Iran. At first, the owners were interviewed using a questionnaire to record informations about the herds. After that, the herds were taken under observation for detecting lame cattle. Some cases that had history of trauma, evidence of pain, obvious lameness, swelling at digital region and overgrown or deformed hooves were chosen for radiography. Radiography was limited only to the foot region. The animals used in this study were at the age of 2 to 8-year-old. In every case at least two radiographs of lateral and dorsopalmar/dorsoplantar views were taken using exposure factors of 10-20 mA, 65-80 KV and 75 cm FFD. A portable radiographic apparatus was used in this study (Acoma Super 80, 80 KV and 20 mA, Japan).

Results

In interpretation of radiographs, various radiographic findings were classified as: osteomyelitis, exostosis, alterations bone density, calcified soft tissue, rotation of phalanges, arthritis, degenerative joint disease (DJD), bony ankylosis of joint, luxation and angulation of joint (Table 1).
Osteomyelitis, rotation of phalanges, arthritis, DJD and calcified soft tissue were observed mostly in the hindlimbs. Exostosis was observed mostly in the forelimbs. Other disorders were relatively the same as forelimbs and the hindlimbs. Soft tissue calcification was observed mainly in the proximal insertion of the cruciate ligament in both proximal phalanges interdigital space (Fig. 2). About 90% of arthritis and DJD were observed in distal interphalangeal joint (DIJ). Rotation was occurred mainly in the third phalanx and diagnosed in animals showing clinical symptoms of overgrown hooves. The affected phalanges were osteoporotic. Most of the lesions were observed in cattle over 5-year-old. No radiographic changes were diagnosed in about 30% of cases with clinical lameness.

Table 1: Radiographical findings of bone and joint lesions in 77 cattle with clinical lameness

<table>
<thead>
<tr>
<th>Type of lesions</th>
<th>Forelimb</th>
<th>Hindlimb</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cases</td>
<td>%</td>
<td>No. of cases</td>
</tr>
<tr>
<td>Osteomyelitis</td>
<td>1</td>
<td>1.30</td>
<td>4</td>
</tr>
<tr>
<td>Exostosis/periosteal reaction</td>
<td>4</td>
<td>5.20</td>
<td>-</td>
</tr>
<tr>
<td>Alteration of bone density</td>
<td>3</td>
<td>3.90</td>
<td>2</td>
</tr>
<tr>
<td>Calcified soft tissue</td>
<td>1</td>
<td>1.30</td>
<td>3</td>
</tr>
<tr>
<td>Rotation of phalanges</td>
<td>3</td>
<td>3.90</td>
<td>10</td>
</tr>
<tr>
<td>Arthritis</td>
<td>2</td>
<td>2.60</td>
<td>4</td>
</tr>
<tr>
<td>DJD*</td>
<td>2</td>
<td>2.60</td>
<td>4</td>
</tr>
<tr>
<td>Bony ankylosis of joint</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Luxation</td>
<td>2</td>
<td>2.60</td>
<td>3</td>
</tr>
<tr>
<td>Angulation of joint</td>
<td>2</td>
<td>2.60</td>
<td>2</td>
</tr>
<tr>
<td>NAD**</td>
<td>6</td>
<td>7.80</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>33.80</td>
<td>51</td>
</tr>
</tbody>
</table>

*Degenerative joint disease
**No abnormality diagnosed

Fig. 1: Dorsopalmar radiograph of digital region showing degenerative joint disease of the pedal joint with abnormal bone formation at the axial and abaxial surfaces of the second and third phalanges due to exostosis
Fig. 2: Dorsoplantar radiograph of foot showing soft tissue calcification in the proximal insertion of the cruciate ligaments both proximal phalanges

Fig. 3: Dorsoplantar radiograph of digital region showing increased joint space and loss of articular surfaces associated with osteoporosis of the second and third phalanges in septic arthritis of pedal joint
Discussion

In this study radiography has been limited to the distal part of the limbs. The portable radiographic apparatus used in this study was not suitable for the proximal parts of the limbs.

Trauma, stress and infection are the major causes of various foot disorders in cattle (Farrow, 1985a, b). It was tried in this study to differentiate both types of bone infection. The prognosis and treatment of periostitis (osteitis) and osteomyelitis are different and it is important to make a distinction between them. The best way of diagnosis of these lesions is radiography. However radiographic signs of foot infection should be interpreted in conjunction with other clinical information. Soft tissue swelling proximal to the hoof wall is a consistent finding in cattle with foot infections (Farrow, 1985a; O’Brien and Biller, 1996). Infection can lead to irregular new bone formation.

Periostitis commonly occurs in the extremities such as phalanges and leading to exostosis (Fig. 1). In the present study, this condition was seen mostly in the forelimbs. There is no obvious reason why exostosis occurred only in the forelimbs.

Soft tissue calcifications are common radiographic findings of ligament and tendon insertions in old cattle. The deep flexor tendon insertion and the common digital extensor tendon insertion on the third phalanx are the most commonly involved structures (Bargai and Pharr, 1989). In this study it was only observed in the cruciate ligaments of the first phalanx. It is probable that the affected cattle were not too old. The best radiographic position for evaluation of the cruciate ligament calcification is dorsopalmar or dorsoplantar view (Bargai and Pharr, 1989).

Radiographic evaluation of joints is an important part of the diagnostic work up for lameness. Joint structures that should be evaluated radiographically include: soft tissue structures, joint margins, subchondral bone, joint space and joint alignment. On the basis of these radiographic findings some joint disorders such as arthritis, bony ankylosis of joint, luxation and DJD were diagnosed in this study. These joint disorders were mostly seen in those cases that had swelling or expanding at digital region. In addition of radiography, a joint can be evaluated by different ways such as gross morphological changes, arthroscopy and synovial fluid analysis (Tulleners et al., 1987; Nuss et al., 1994; Bezek et al., 1995; Trostle et al., 1997; Semevolos et al., 1998).

In this study about 90% of DJD was observe to occur in the distal interphalangeal joint. DJD is a sequel of both traumatic and septic arthritis. In cattle, the most common joint of the foot to be affected by infectious arthritis is DJJ (Farrow, 1985a; Bargai, 1989; Chawla, 1998). On the basis of the history of cases presented in this study, the DJJ had mainly occurred following untreated arthritis (Fig. 1). In post infections DJJ, the radiographic signs may include all or any of the following: (1) collapse in the width of the joint space due to osteomyelysis of the articular bone margins (Fig. 3), (2) calcification of capsular attachment and (3) remodelling of adjacent bones. In the radiographs of this study the calcification of capsular joint was not observed.

The cause of rotation of phalanges (mainly third phalanx) in the present study was hoof overgrown. Rotation of phalanges usually results in joint angulation.

In this study, about 30% of cases that showed lameness, no radiographic abnormalities of bone and joint were diagnosed. Some reasons for this could be as follow: (1) early stage of diseases, (2) may be the causes of lameness have been originated from the upper part of limbs while the radiography has been limited to distal region of limbs and (3) the nature of diseases that only affects soft tissues.

Radiographic changes of bone and joint were observed in about 70% of cases. Therefore, it was concluded that the lesions of bone and joint of the digital region in lame cattle are remarkable. So this should be noted in diagnosis of lameness by radiography.

Acknowledgement

This study was supported by the Research Council of Shiraz University (The
Project Number 75-VE-939-555) and School of Veterinary Medicine, Shiraz, Iran.

References

3- Bezek, DM; Williams, J; Myer, CW and Hull, BL (1995). What is your diagnosis? Radiographic diagnosis: the talocalcaneal joint is luxed, and multiply small chips are evident cranial to the calcaneus. JAVMA 207: 303-304.