Osteochondral Fragments From the Medial Malleolus in Horses: A Comparison Between Radiographic and Arthroscopic Findings

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The low incidence of lesions affecting the medial malleolus reported in the literature can have been influenced by lack of specific radiographic views. The absence of fragmentation radiographically visible but the presence of abnormal pattern of radiolucency on the medial malleolus associated with joint effusion represent an indication for diagnostic arthroscopy. Author’s address: Clinica Equina Bagnarola, Via Armiggia 25, 40050 Bagnarola, Bologna, Italy. © 1999 AAEP.

1. Introduction
In the last two decades, several studies and surveys have focused on incidence and distribution of equine OCD among different breeds and the most common locations of lesions have been identified.1–5 The tibiotarsal joint is considered a predilection site for OCD, especially in the Standardbred,2,4,6–8 and lesions of the intermediate ridge of the distal tibia (IRT) represent the most common feature of OCD in horses of different breed and age.1–4 Other locations include the lateral troclear ridge of the talus (LTR), the medial malleolus (MM) and, more rarely, the medial troclear ridge of the talus (MTR). Fragments originating from the lateral malleolus (LM) more likely represent the result of avulsion fractures.

Influence of osteochondral fragments in the tibiotarsal and metacarpo/tarso-phalangeal joints on racing performance has been investigated.9,10,11 The presence of osteochondral fragments in joints of race horses has received special attention by surgeons after the advent of arthroscopy, which dramatically improved prognosis and reduced morbidity of selected lesions.9,12,13

The MM represents the third most common reported location of tibiotarsal OCD.13 In the literature, lesions of the MM are minimally represented when compared with the IRT, but when methods of investigation are considered, one can support the hypothesis that MM lesions are underrepresented because of absence of specific views.5,8,10,11

Horses affected by MM lesions usually present with synovial effusion, variable degree of lameness or poor performance, and some lesions can be difficult to characterize radiographically.13,14

In some radiographic surveys, the standard protocol of radiographic investigation did not include the dorso-lateral/plantarо-medial oblique view, which is crucial in evaluating the dorsomedial aspect of the tibiotarsal joint, and consequently no lesions have been reported involving the MM. Alvarado et al.6 reported 41% of lesions involving the hock joints in a group of Standardbred yearlings: in the tibiotarsal joint, 90% of the lesions involved the IRT and 10%
the LTR. Hoppe in a large series of cases found a single lesion on the MM in a Standardbred as well as in a Swedish Warmblood horse: Hoppe’s radiographic protocol included dorsoplantar, lateromedial and plantarolateral-dorsomedial oblique radiographic projections of the hock. Sandgren routinely examined tibiotarsal joints using a single view (plantarolateral-dorsomedial oblique) and only 0.4% of lesions were classified as “other than IRT.” Grondahl as well as Storgaard Jorgensen et al. did not consider lesions in the tibiotarsal joint other than IRT and LTR. Carlsten et al. found 10.4% OCD lesions in the tibiotarsal joints in a group of Standardbred yearlings but for practical and economic reasons did not perform the dorso-plantar view, having been aware that this could have led to leave lesions of the MM undetected. Lesions affecting the MM and LM have also been reported as rare.

Some authors, on the other hand, reported more data about MM lesions. De Moor et al., using routinely 4 radiographic views, found 5 cases of fragmentation of the MM in a group of 28 horses with 46 tibiotarsal joints affected by OCD. In the cases described by De Moor et al., 36 lesions were located in the IRT, 3 in both IRT and MM and 2 in the LTR. Stroemberg and Rejno performed a clinical and radiological investigation on equine stifte and tibiotarsal joints. They routinely performed lateromedial, dorsoplantar and one oblique view and found 43 lesions of the IRT in 43 joints of 34 horses, 16 lesions of the LTR and 3 of the MTR and one lesion of the MM. Sonnichsen and Hansen identified a single case of fragmentation of the MM in a series of 43 horses affected by hock OCD, similarly to the early report by Stroemberg and Rejno, which found a single case in a study in which 50 horses were affected by tibiotarsal OCD. Peremans and Verschooten quantified the incidence of MM lesions as 1% in Standardbreds and 3% in Warmbloods, using a lateromedial and two oblique views. Torre and Fadiga, in a survey on 491 Standardbred yearlings, reported 45 cases of OCD of the IRT, 5 in the LTR and 2 lesions of the MM. In a survey on cases treated by arthroscopic surgery, in 12 joints out of 318, fragments originating from the MM were identified and removed. In this series, a complete radiographic examination (including dorsoplantar, lateromedial and dorsolateral-plantaromedial and plantarolateral-dorsomedial oblique views) was performed on each horse.

The study by McIlwraith et al. clarified that fragments originating from the MM appeared not always well delineated at surgery, and manipulation was needed in order to identify the fragment. This can suggest a poor degree of correlation between radiographic and arthroscopic findings.

The purpose of the present study is to investigate a group of horses in which lesions affecting the MM were identified during arthroscopic examination. The preoperative radiograms of each joint were subsequently compared with arthroscopic findings in order to verify the relationship between some subtle radiographic aspects of the MM and the corresponding arthroscopic appearance.

2. Materials and Methods

The study includes 62 horses examined radiographically and submitted to arthroscopic surgery in which fragmentation of the MM was identified. Most of the patients were examined at the Clinica Equina Bagnarola, Budrio, Bologna, Italy. In some cases, the horse was referred for surgery having been previously examined by the referring veterinarian.

The basic radiographic examination included two views: dorsolateral-plantaromedial oblique and plantarolateral-dorsomedial oblique. Most of the cases had more projections, especially the dorso-plantar or a dorsolateral-plantaromedial 30° oblique view in order to better highlight the medial aspect of the distal tibia, and the flexed lateromedial view.

Arthroscopy was performed with the horse in dorsal recumbency using a 30° arthroscope connected to a videocamera and a video recorder; the joint distention was maintained by an automatic flushing apparatus. The arthroscopic portal was located dorsomedially between the saphenous vein and the extensor tendons, and the instrument portal was medial to the saphenous vein when lesions were located on the abaxial aspect of the MM. In cases of OCD of IRT and/or LTR, a second instrument portal was used laterally. The surgery resulted in a straightforward procedure in most of the cases. The presence of one or more fragments was considered as a single lesion.

Minor pathologic aspects of the MM, including areas of fibrillation of the cartilage or small defects (frequently located on the abaxial aspect of the MM) were not considered in the present study.

Each lesion recorded arthroscopically was compared with the pre-operative radiographic features.

Results of both radiographic and arthroscopic investigations were recorded and analyzed using the Student t-test.

3. Results

A total of 460 horses were admitted for arthroscopic surgery in 633 tibiotarsal joints.

In 69 joints (10.9%) of 62 horses (13.5%), one or more fragments from the MM were removed arthroscopically. In 32 cases the left and in 37 cases the right MM was involved.

The group included 27 intact males, 32 females, 1 gelding; in 2 horses the sex was not recorded. The breed distribution was the following: 60 Standardbreds, 1 Thoroughbred, 1 Show Jumper. In this breed distribution, Standardbreds (96.7%) were overrepresented in comparison with the normal Clinic’s population (83.7%).

The age ranged between 9 months and 7 years (mean age 1.9 years; median age 1.5 years). The
Mean age of the group was significantly lower than the average age of the Clinic's population (3.7 years).

Based on radiographic patterns of the MM, joints were divided in 4 groups:

2. Presence of areas of radioluency, irregular profile or change in the radioopacity pattern with loss of radioopacity in the most distal aspect of the MM: 19 joints (Figs. 1 and 2).
3. Radiographic evidence of fragmentation of the MM: 25 joints (Fig. 3).

In a single case (1 joint), radiograms were not available anymore for the retrospective analysis. In 7 cases, lesions of the MM were bilateral. In 28 joints, OCD lesions affecting different sites of the tibiotalarsal joint were concomitant with lesions of the MM: in 26 joints, lesions affected the intermediate ridge of the distal tibia, whereas in 2 joints the lateral trochlear ridge of the talus was affected. Furthermore, 16 joints contralateral to the joint in which the MM lesion was located, showed OCD lesions (13 intermediate ridge of distal tibia, 2 lateral trochlear ridge of the talus, 1 joint with a free-floating osteochondral fragment). In one tibiotalarsal joint, the arthroscopy was performed for treatment of septic arthritis and the fragmentation of the MM was an incidental finding.

At surgery, lesions of the MM, as observed by McIlwraith et al., usually manifested as well delineated fragments, but in some cases the osteochondral fragment could only be defined with manipulation and elevation. In particular, in some

Fig. 1. Radiographic appearance of a medial malleolus showing focal areas of abnormal radiolucency in a case of fragmentation identified arthroscopically.

Fig. 2. Well-defined loss of radioopacity in the most distal part of the medial malleolus in a case in which arthroscopy revealed evidence of fragmentation.
cases the most axial portion of the fragment, articulating with the talus, was more difficult to visualize and elevate, and careful manipulation was needed, in order to avoid iatrogenic damage to the cartilage of the talus.

4. Discussion

The low incidence previously reported for lesions affecting the medial malleolus of the distal tibia is probably influenced by the standard radiographic protocol of several studies, in which most of the lesions affecting the MM and the MTR have been missed.4–8,10

The incidence of lesions affecting the MM is considered marginal in some studies.17,18

Results of 9 surveys based on radiographic or surgical reports2,4–8,12,17,19 in which OCD lesions of the tibiotarsal joint were recorded, showed that in 2992 joints of 1595 horses examined, OCD was located in the IRT of 660 joints, in the LTR of 59 joints and the MM of 25 joints, whereas other locations were found in 41 joints (Table 1). A further study18 was not included in the table because the authors recorded percentages but not absolute values of lesions.

The symptoms associated with fragmentation of the MM have been reported to range from synovial effusion to lameness12 or disturbances in the gait balance. Fragmentation of the MM seems to be characterized by higher morbidity than OCD of the IRT and better post surgical prognosis than lesions affecting the LTR.12

Radiographically, lesions of the MM have been described as accurately depicted,13 but the same author reported 13 cases in which OCD lesions were identified at arthroscopy but not radiographically: in 4 of these cases, there was synovial effusion without radiographic change in the joint contralateral to one with the radiographic lesion (3 on IRT and 1 on MM); in the 9 other cases, the lesions (4 MM, 3 LTR, and 2 MTR) were found during arthroscopy of a joint with other radiographically apparent lesions. In the same study, it was observed that cartilaginous flaps can appear radiographically as defects in the contour of the IRT or MTR.

Our comparison between radiographic and arthroscopic findings suggests that the MM is an area predisposed to discrepancies between the two diagnostic modalities and that subtle lesions must be suspected in the presence of joint effusion and irregularities in the radiographic pattern of the MM. The latter findings in our radiographic reports were described as “areas of radiolucency, irregular profile, or change in the radioopacity pattern with loss of radioopacity in the most distal aspect of the MM.”

![Fig. 3. Radiographic aspect in a case of multiple fragmentation of the medial malleolus.](image)

<table>
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<tr>
<th>Study</th>
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<th>No. of Joints Examined</th>
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Table 1. Results of 9 Surveys Based on Radiographic or Surgical Reports in Which Tibiotarsal Joint Lesions Were Reported
The clinical significance of radiographic findings in the tarsocrural joint have been disputed, but most authors believe that lesions negatively affect the athletic performance.1,2,4,16 Surgical treatment by arthroscopic removal of fragment(s) has been associated with excellent results and a good prognosis can be anticipated for most lesions,9,12 whereas poor results have been reported in Standardbreds after conservative treatment.18

McIlwraith et al.12 reported the results of surgical treatment of selected lesions affecting the tibiotarsal joint. In 12 joints of the 318 investigated, a fragment was located in the MM (dorsal aspect) of the tibia. Lesions of the MM were described as well depicted by radiographs. The success rate relative to location of lesion was 78.5% for IRT, 72.7% for LTR, 77.8% for MM, and 77.3% for multiple lesions: no significant differences were observed. The outcome for synovial effusion resolution was significantly inferior for lesions of the lateral trochlear ridge of the talus and MM versus IRT. It was observed that lack of resolution of joint effusion did not influence the performance.

In conclusion, the present study suggests that a complete radiographic examination is mandatory in the presence of clinical symptoms referable to the tibiotarsal joint, including a dorsolateral–plantaromedial 30° oblique view. The presence of irregular radioluencies or abnormal pattern of radiopacity on the MM may refer to fragmentation of the MM and represents an indication for diagnostic arthroscopy.

References