INJURIES AT THE ARTICULAR SURFACE OF THE PROXIMAL PHALANX AND THIRD METACARPAL/METATARSAL BONE IN HORSES, DETECTED WITH LOW-FIELD MAGNETIC RESONANCE IMAGING: 13 CASES (2010-2017)

Diagnostic Imaging, Orthopaedics

Corresponding Author: donatella.dezani@unimi.it

Donatella De Zani1, Vanessa Rabbogliatti2, Giuliano Ravasio2, Mauro Di Giancamillo2, Davide Danilo Zani2

1.Centro Clinico Veterinario e Zootecnico Sperimentale, Università degli Studi di Milano, Italy
2. Dipartimento di Medicina Veterinaria, Università degli Studi di Milano, Italy

Introduction

Injuries to the fetlock region are common in horses used for athletic purposes and Magnetic Resonance Imaging (MRI) is diffusely used to diagnose bone injuries (1-3). Despite the classification used in human medicine (4), in the equine practice the terms “short incomplete fracture”, “stress fractures”, “fissure, transchondral fracture” and “osteochondral fracture” are often used interchangeably. The purpose of the study was to report the case details, diagnostic imaging findings and outcomes in sport horses with a diagnosis of traumatic injuries at the articular surfaces of metacarpophalangeal and metatarsophalangeal joint (MCPJ/MTPJ) and verify if it is possibile to differentiate between subchondral, chondral and osteochondral fracture using a low-field MRI under general anesthesia.

Material and methods

Magnetic Resonance examination of horses referred for lameness localised to the fetlock region over a 7-year period were reviewed. Horses were selected for inclusion in the study that had MRI findings suggestive of primary bone lesion involving the articular surface of third metacarpal/metatarsal bone (MCIII/MTIII) or proximal phalanx (P1). Signalment, detailed clinical history, athletic use, MRI findings and follow-up informations were recorded. On the basis of MRI patterns, injuries at the articular surface were classified as osteochondral fractures (OF), chondral fractures (CF), or subchondral fractures (SF) (4). Lesions were identified as an OF when defect of cartilaginous lining and/or signal change of the cartilage layer was observed in association with subchondral bone marrow lesion and arcuate or linear irregular signal change in the subchondral bone. In the SF there was no involvement of the cartilaginous lining, while in the CF there is a displaced fragment and no alteration of the subchondral black line.

Results

Thirteen horses have been included in the study; five horses were used for show jumping, four for flat race, two for monta vaquera and two for eventing and dressage, respectively. The median age was 8.5 years of age, with a range between 2 and 16 yo.

All horses had unilateral lameness, seven horses with acute onset, while six had a chronic lameness (>12 weeks). The degree of lameness varied from grades 2/5 to 4/5. In four horses lameness was localised to the hindlimb. In four horses a subtle, radiolucent, ill-defined line was observed in the radiographic views, suggestive of short incomplete fracture.

Six horses had MRI findings suggestive of OF (impacted type) involving the sagittal groove of P1 in three cases, the medial aspect of P1 in one horse and the medial condyle of MCIII/MTIII in two horses. Seven horses had SF at the medial condyle of MCIII/MTIII in three cases, at the lateral condyle of MCIII/MTIII in two cases and involving the sagittal goove of the proximal phalanx in the last two cases. No MRI findings suggestive of CF were observed in the present study.

In six horses no other abnormalities were detected while in seven cases additional alterations were observed, including mild desmopathy of MCPJ/MTPJ collateral ligaments, desmopathy of the suspensory ligament branches, oblique sesamoidean ligament alteration or adhesions between deep digital flexor tendon and distal sesamoidean impar ligament.
All horses were treated with a period of rest; four horses received a therapy with biphosphonates and one horse was treated with intra-articular jaluronic acid.
Median time of the final follow up was 32 weeks (range: 12 to 40 weeks). Of the 13 horses included in the study, nine (69%) were sound and returned to thier previous athletic use. Three horses were still lame due to MCPJ/MTPJ pain while another one was lame due to pain localised to the suspensory ligament origin.

Conclusion

In equine practice, the terms osteochondral fractures, tranchondral fractures, short fracture and incomplete fracture were used interchangeably. Differentiating between osteochondral and subchondral fractures is mandatory for an accurate prognosis (4).
Even if low-field MRI has a low sensitivity in detecting articular surface damage (3,5), in the present study was possible to discriminate between OF and SF in all cases. Fat-suppressed images had the capability to enhance occult bone lesions like bone marrow traumatic damage. Fat-suppressed and T1-Weighted sequences allowed to detect defect in the overlying articular surface. Despite the results reported by Gold et al. (2017) in the present study 70% of cases returned to previous athletic levels (1). Considering that all horses with a diagnosis of subchondral fracture were sound at the time of re-check while horses still lame had osteochondral fracture, we can speculate that subchondral fracture has a better prognosis.
In our study all horses underwent a period of rest and none received a surgical management.
Differentiating between SF and OF could help the surgeon in the treatment choice, conservative in case of subchondral injuries and surgical when cartilage involvement was detected (6,8). In the report of Smith at all. (2017), of 12 cases with a diagnosis of short incomplete fracture or osteochondral fracture, 11 returned to race after surgical repair.
Even if radiographic examination can, in some cases, identify short incomplete fractures, magnetic resonance examination allows to evaluate the presence of cartilage involvement, bone marrow lesions and simultaneous soft tissue abnormalities (6). The early diagnosis of these lesions is mandatory to prevent repetiteve loading on damaged bone and possible extension to the cortex (7) that can led to catastrophic injuries
In conclusion, MRI has to be considered the best imaging technique in the evaluation of an incomplete fractures, in order to differentiate between osteochondral and subchondral fractures for the elective treatment of a specific pathological entity.

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