Retrospective-case series study

INJURIES AT THE ARTICULAR SURFACE OF BONE IN HORSES DETECTED WITH LOW-FIELD MAGNETIC RESONANCE IMAGING: 13 CASES (2010-2017)

Diagnostic Imaging, Orthopaedics

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Aim of the study
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 (osteochondral, chondral and subchondral fractures) at the articular surfaces of metacarpophalangeal and metatarsophalangeal joint (MCPJ/MTPJ).
Material and methods
Magnetic Resonance (MRI) 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) (1). 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.
All horses had unilateral lameness, 12 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 radiographic findings suggestive of short incomplete fractures were observed.
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 2 horses. Seven horses had SF at the medial condyle of MCIII/MTIII in 3 cases, at the lateral condyle of MCIII/MTIII in 2 cases and involving the sagittal goove of the proximal phalanx in the last two cases. 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 (1).

Even if low-field MRI has a low sensitivity in detecting articular surface damage (2, 3), in the present study was possible to discriminate between OF and SF in all cases. Despite the results reported by Gold et al. (2017) in the present study 70% of cases returned to previous athletic levels (4). All horses with a diagnosis of SF were sound at the time of re-check while horses still lame had OF.

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 (5).

Even if radiographic examination can identify short incomplete fractures, magnetic resonance examination allows to evaluate the presence of cartilage involvement, bone marrow lesions and soft tissue abnormalities (5).

In conclusion, MRI has to be considered the best imaging technique in the evaluation of an incomplete fractures, in order to differentiate between OF and SF and opt for the elective treatment of a specific pathological entity.

1. Bohndorf K. Injuries at the articulating surfaces of bone (chondral, osteochondral, subchondral fractures and osteochondrosis dissecans). Eur J Radiol 1996;22:22-29
2. Smith MA, Dyson SJ, Murray RC. Reliability of high- and low- field MRI systems for detection of cartilage and bone lesions in the equine cadaver fetlock. Equine Vet J 2012;44:684–691
3. Gold SJ, Werpy NM, Gutierrez-Nibeyro SD. Injuries of the sagittal groove of the proximal phalanx in warmblood horses detected with low-field MRI: 19 cases (2007–2016). Vet Radiol Ultrasound 2017;58:344-353
4. Dyson S, Nagy A, Murray R. Clinical and diagnostic imaging findings in horses with subchondral bone trauma of the sagittal groove of the proximal phalanx. Vet Radiol Ultrasound 2011;52:596–604
5. Kuemmerle JM, Auer JA, Rademacher N, et al. Short incomplete sagittal fractures of the proximal phalanx in ten horses not used for racing. Vet Surg 2008;37:193–200