Atypical Presentation of a Subchondral Sequestrum in a Thoroughbred Racehorse

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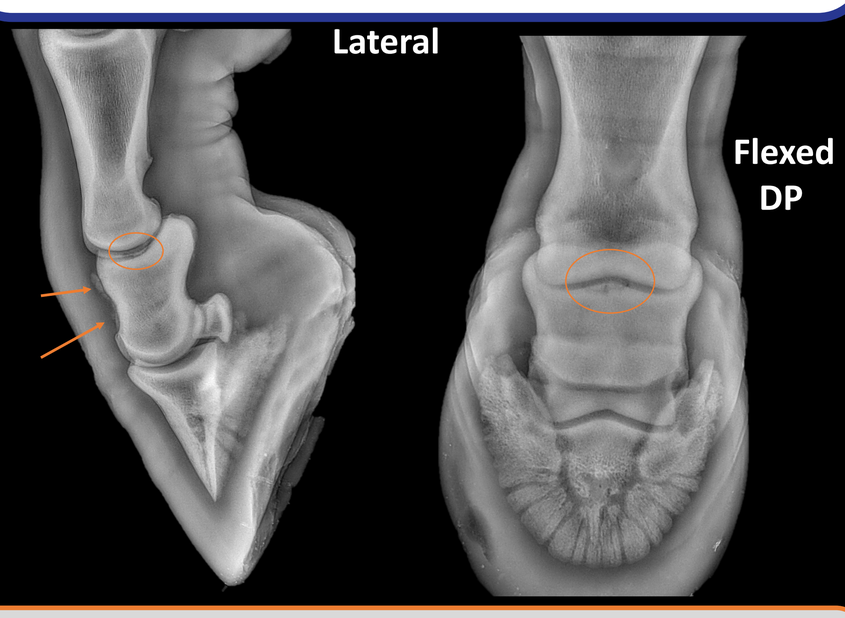
Case Presentation

A two-year-old Thoroughbred colt with two successful preparations was evaluated in the field after developing an acute left hind lameness (5/5).
Initial evaluation showed mild digital pulses negative reaction to hoof testers but pain on palpation of the pastern region. Mild effusion was present in the proximal interphalangeal joint; therefore, radiographs were taken.



The lateral view of the pastern shows an area of periosteal new bone formation over the dorsal aspect of the second phalanx (arrows).
In both the flexed DP and lateral view, there is an area of sclerosis surrounded by a radiolucent ring at the central portion of the proximal articular surface of the second phalanx (circle).

Case Management

The horse was then referred to the hospital, placed in a robert jones bandage and started on phenylbutazone (2.2mg/kg orally twice a day) which improved the lameness at the walk after 5 days of treatment. However, when the horse was trotted out, it became acutely non-weight bearing lame after two trot steps.

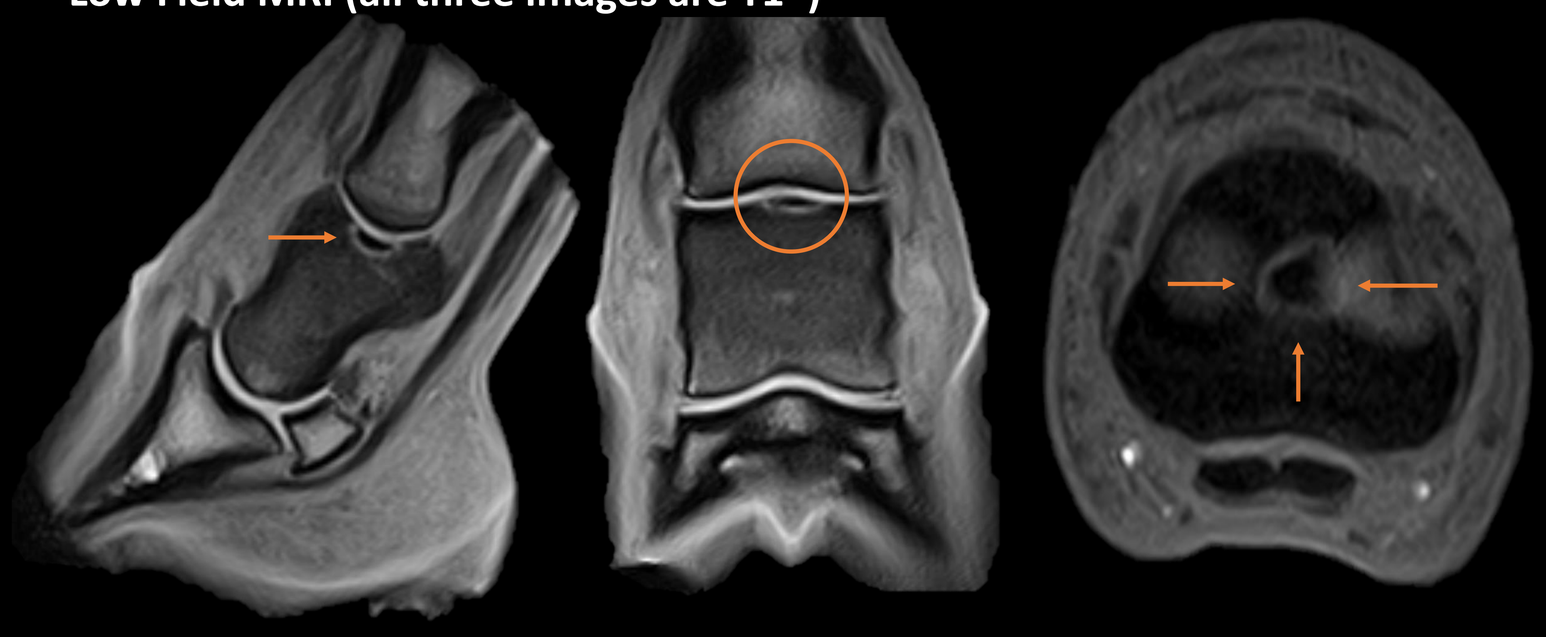
Two days after the presentation, arthrocentesis of the proximal interphalangeal joint was performed to rule out a septic process. But results revealed only a mild inflammatory process (table below).

The horse was then started on a 5 days course of antibiotics (procaine penicillin and gentamicin), which made no further improvement in the lameness. Haematology and biochemistry were unremarkable, with only minimal elevation of SAA: 12 µg/ml.

Based on these findings, it was decided to perform an MRI for further diagnosis.

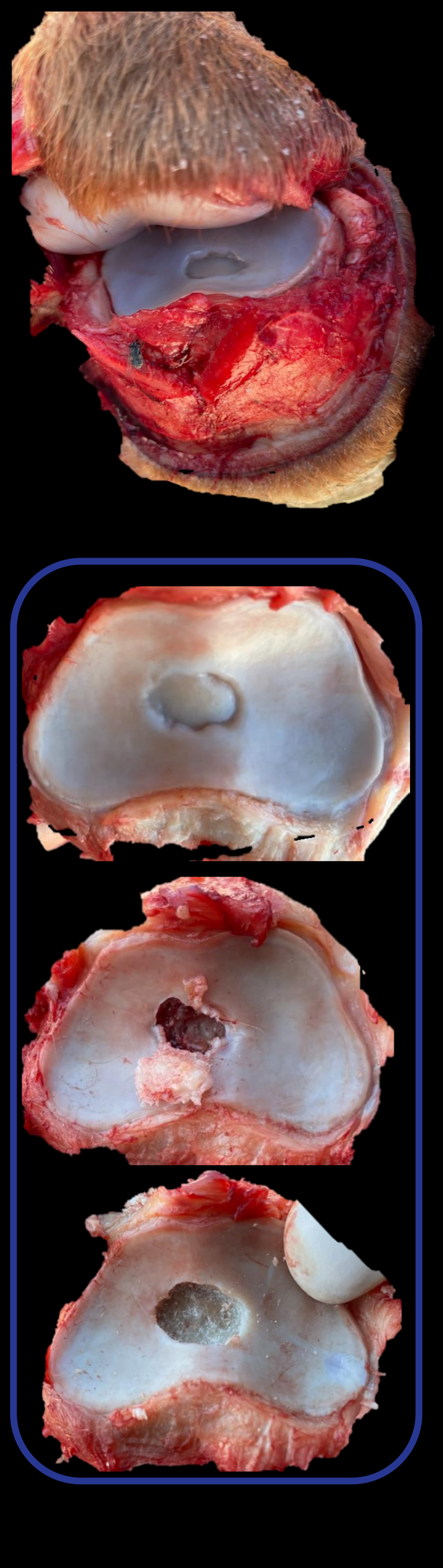
Total nucleated cell count	2,100 X 10^6 Cells/L
Neutrophils	6%
Macrophages	93%
Total Protein	**8 g/L**

Low Field MRI (all three images are T1*)



Sagittal Plane | Frontal Plane | Transverse Plane

A clearly marginated, roughly hemispherical hypointense lesion is located centrally in the proximal subchondral bone of the second phalanx measuring approximately 9mm dorsal to plantar and 3mm proximal to distal and 13mm medial to lateral surrounded by a well rim of hyperintensity and consistent with a sequestrum and involucrum within the proximal articular margin of the second phalanx



Differential Diagnosis

1. **Aseptic bone sequestrum secondary to stress-induced injury**
2. Developmental ischemic lesion (osteochondrosis)
3. Septic sequestrum

Treatment options

Based on the clinical picture and the imaging findings the following options were considered:

1. Pastern arthrodesis: Considered the "gold standard", allowing a complete evaluation of the articular surface for debridement of the lesion (left 3 images). Then fusing the joint would eventually eliminate pain for a better prognosis of soundness.

2. **Proximal interphalangeal joint arthroscopy:** This option was ruled out as the lesion was quite central, making it impossible to visualize and debride properly.

A study in Standardbreds and Thoroughbreds showed 60% of horses returned to soundness following pastern arthrodesis (Nixon, 2019). An arthrodesis in the hindlimb was a favourable prognostic indicator in the study.

However, the owners were not willing to take the risk of having a horse that might not race; therefore, elected euthanasia.

Discussion

A bone sequestrum is defined as a piece of devitalised bone that has become detached from the surrounding bone via necrosis (Jennin et al., 2011). Bone sequestrum formation is most often associated with skin trauma and then bacterial contamination resulting in ischaemia and bone necrosis (Clem, 1988), rarely haematogenous bacterial spread can result in osteomyelitis and sequestrum formation (Valentino et al., 2000). However, any area of bone that loses its blood supply can become a sequestrum (Moens et al., 1980).

There was no history of a wound or sepsis within the joint. Therefore, a traumatic aetiology leading to focal aseptic ischaemic damage to the area would be the most likely cause. The piece of devitalised bone drove inflammation within the joint (represented in the cytology), resulting in clinical signs of severe lameness (Wright, 2022-personal communication).

Another differential is osteochondrosis (OC), considered one of the most important, common developmental orthopaedic conditions in racehorses (McIlwraith, 2013). In this case, the changes seen on radiographs were absent at a yearling sales series, making it unlikely for this pathology to have a developmental origin.

The gross post-mortem (Left 3 images) findings helped to rule out septic aetiology, confirming trauma as the most likely cause.

Clinical Relevance

This case demonstrates that it is essential for clinicians to include subchondral lesions as a differential in a horse that presents with acute onset severe lameness and an effused joint.

Limitations

- **Inability to achieve a successful treatment plan after the diagnostic work up**
- **Histopathology was not performed to confirm the aetiology**

References:
1. Clem, M.F., DeBowes, R.M., Yovich, J.V., Douglass, J.P. and Bennett, S.M., 1988. Osseous sequestration in the horse a review of 68 cases. *Veterinary Surgery*, *17*(1), pp.2-5.
2. Jennin, F., Bousson, V., Parlier, C., Jomaah, N., Khanine, V. and Laredo, J.D., 2011. Bony sequestrum: a radiologic review. Skeletal radiology, 40, pp.963-975.
3. McIlwraith, C.W., 2013. Surgical versus conservative management of osteochondrosis. *The Veterinary Journal*, *197*(1), pp.19-28.
4. Moens, Y., Verschooten, F., Moor, D. and Wouters, L., 1980. Bone sequestration as a consequence of limb wounds in the horse. Veterinary Radiology, 21(1), pp.40-44.
5. Nixon, A.J., 2019. Phalanges and the Metacarpophalangeal and Metatarsophalangeal Joints, in Auer, J.A., Stick, J.A., Kummerle, J. M. and Prange, T., (5th ed). *Equine Surgery.* Missouri: Elsevier, pp. 1595
6. Valentino, L.W., Jean, G.S., Anderson, D.E., Desroches, A., Kersting, K., Lopez, M.J., Adams, S.B., Huhn, J., Mueller, P.E. and Cohen, N.D., 2000. Osseous sequestration in cattle: 110 cases (1987–1997). Journal of the American Veterinary Medical Association, 217(3), pp.376-383.