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Osteitis of the axial border of the proximal sesamoid bones in horses: eight cases (1993–1999)

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Objective—To determine clinical, radiographic, and scintigraphic abnormalities in and outcome of horses with septic or nonseptic osteitis of the axial border of the proximal sesamoid bones.

Design—Retrospective study.

Animals—8 horses.

Procedure—Data collected from medical records included signalment; history; horse use; severity and duration of lameness; results of perineural anesthesia, radiography, ultrasonography, and scintigraphy; and outcome following surgery.

Results—Five horses did not have any evidence of sepsis; the other 3 had sepsis of the metacarpophalangeal or metatarsophalangeal joint or the digital synovial sheath. All horses had a history of chronic unilateral lameness. Three of 5 horses improved after diagnostic anesthesia of the metacarpophalangeal or metatarsophalangeal joint; the other 2 improved only after diagnostic anesthesia of the digital synovial sheath. Nuclear scintigraphy was beneficial in localizing the source of the lameness to the proximal sesamoid bones in 4 horses. Arthroscopy of the palmar or plantar pouch of the joint or of the digital synovial sheath revealed intersesamoidean ligament damage and osteomalacia of the axial border of the proximal sesamoid bones in all horses. All 5 horses without sepsis and 1 horse with sepsis returned to their previous uses.

Conclusions and Clinical Relevance—Results suggest that osteitis of the axial border of the proximal sesamoid bones is a distinct entity in horses that typically is associated with inflammation of the associated metacarpointersesamoidean or metatarsointersesamoidean ligament and may be a result of sepsis or nonseptic inflammation. Arthroscopic debridement may allow horses without evidence of sepsis to return to their previous level of performance. (*J Am Vet Med Assoc* 2001;219:82–86)

Proximal sesamoid bone injuries in racehorses have been well documented, with sesamoid bone fractures and sesamoiditis being the most commonly recognized conditions.[1] Osteitis of the axial border of the proximal sesamoid bones is apparently rare in horses, and to our knowledge only 8 horses with this condition have previously been described in the veterinary literature.[2,3] In 1 report,[2] 7 horses with osteitis of the axial border of the proximal sesamoid bones were described. Four of these horses were suspected to have developed the condition as a result of sepsis of the metacarpophalangeal or metatarsophalangeal joint or the digital synovial sheath.[2] All 7 horses had a progressive intermittent lameness associated with a radiographically apparent lesion, and all were treated with antibiotics systemically and lavage. All horses had an increase in severity of lameness and were eventually euthanatized. In the other report,[3] a single horse with aseptic osteitis of the axial border of the proximal sesamoid bones was described. The horse was treated with antibiotics, anti-inflammatory drugs, and lavage of the affected joint, but the horse could not return to normal use because of chronic lameness. The purpose of the study reported here was to determine clinical, radiographic, and scintigraphic abnormalities in and outcome of horses with septic or nonseptic osteitis of the axial border of the proximal sesamoid bones.

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Criteria for Selection of Cases

Medical records of all horses with radiographic evidence of lysis or fragmentation of the axial border of the proximal sesamoid bones admitted to the Texas A&M University Veterinary Medical Center or the Marion duPont Scott Equine Medical Center between January 1993 and June 1999 were reviewed.

Procedures

Information obtained from the medical records included signalment; horse use; affected limb; severity and duration of lameness; diagnostic tests performed; radiographic, ultrasonographic, and scintigraphic findings; and outcome of medical or surgical treatment. Diagnostic tests performed to locate the site of lameness consisted of perineural anesthesia, using a 2% solution of mepivacaine, intra-articular anesthesia of the metacarpophalangeal or metatarsophalangeal joint, and intrathecal anesthesia of the digital synovial sheath. In all horses, radiographs of the affected area were obtained, using high-detail radiographic film[a] and a portable radiographic machine.[b] Four radiographic views were obtained: a dorsoproximal-palmarodistal or **dorsoproximal-plantarodistal oblique (DP)** view made at 20° proximal to the supporting surface, a **lateromedial (LM)** view, a dorsoproximolateral-palmarodistomedial or dorsoproximolateral-plantarodistomedial oblique view made at 20° proximal to the supporting surface and 45° lateral to the dorsopalmar or dorsoplantar line, and a dorsoproximomedial-palmarodistolateral or dorsoproximomedial-plantarodistolateral oblique view made at 20° proximal to the supporting surface and 45° lateral to the dorsopalmar or dorsoplantar line. Radiographs were produced using 70 kVp and 0.16 mAs for the DP view and 64 kVp and 0.16 mAs for the other views; the film-focal distance was 28 in.

Ultrasonography of the palmar or plantar aspect of the affected area was performed to evaluate the metacarpointersesamoidean or metatarsointersesamoidean ligament and soft tissue structures in the digital synovial sheath. Ultrasonography[c] was performed, with a 7.5 MHz fluid stand-off transducer[d]; transverse and sagittal views of the proximal sesamoid bones and ligament were obtained.

Arthroscopy was performed to evaluate the palmar or plantar pouch of the metacarpophalangeal or metatarsophalangeal joint[4] and the digital synovial sheath.[5] Briefly, horses were positioned in lateral recumbency with the affected limb up. The joint was distended, a skin incision was made in the proximal aspect of the palmar pouch of the joint at a site close to the apices of the proximal sesamoid bones, and the arthroscope was inserted. The arthroscope was advanced distally by flexing the joint. An instrument portal was created approximately 1.5 cm distal to the arthroscopic portal, and a blunt probe was used to evaluate the metacarpointersesamoidean or metatarsointersesamoidean ligament and the axial surfaces of the proximal sesamoid bones. A No. 2 angled curette and an up-angle pituitary rongeur were useful in debriding the axial surfaces of the proximal sesamoid bones; osseous fragments and malacic bone were removed. A tourniquet was used in horses that had excessive hemorrhage. If a communication was evident between the palmar pouch of the affected joint and the digital synovial sheath, tenoscopy was performed as described[5]; discolored, frayed, and detached portions of the ligament were debrided. Samples of joint and synovial sheath fluid were obtained and submitted for cytologic evaluation and microbial culture. Samples from the affected sesamoid bones and ligament were submitted for histologic evaluation and microbial culture. The joint and associated digital synovial sheath were lavaged with approximately 5 L of sterile lactated Ringer's solution after debridement. Amikacin sulfate was then instilled in the affected joint and digital synovial sheath (250 mg/structure). Horses without evidence of sepsis were treated with potassium penicillin G (22,000 U/kg [10,000 U/lb] of body weight, IV, q 6 h), gentamicin sulfate (2.2 mg/kg [1 mg/lb], IV, q 8 h), and phenylbutazone (2.2 mg/kg [1 mg/lb], PO, q 12 h) before and for 3 days after surgery. Horses that had evidence of sepsis were initially treated with potassium penicillin G and gentamicin for 7 days; treatment was then changed to enrofloxacin (2.5 mg/kg [1.1 mg/lb], PO, q 12 h) for an additional 10 days. In these horses, arthroscopic and tenoscopic incisions were left open, and the metacarpophalangeal or metatarsophalangeal joint and digital synovial sheath were lavaged once daily for 5 days with 5 L of lactated Ringer's solution each by inserting a sterile teat cannula into the incisions. Horses were sedated for this procedure; the limb was bandaged after each daily lavage. After the final lavage procedure, the skin incisions were closed with 2-0 nylon. In all horses, the affected limb was bandaged until suture removal 10 to 14 days after surgery.

Horses were confined to a stall for 4 to 6 weeks after surgery, except for daily hand-walking beginning 2 to 14 days after surgery. Owners were instructed to turn the horses out in a small paddock for the subsequent 6 to 8 weeks and in a pasture for an additional 4 to 6 weeks.

Follow-up information was obtained a minimum of 1 year after injury. Follow-up consisted of examination at the hospital or telephone communication with the owner or trainer. Outcome was considered successful if the horse returned to its previous performance level.

Results

Signalment—Eight horses fulfilled the criteria for inclusion in the study. There were 2 mares, 4 geldings, and 2 sexually intact males. Mean age was 8.6 years (median, 9.0 years; range, 1 to 14 years). Four were Quarter Horses, 2 were polo ponies, 1 was a Thoroughbred, and 1 was an Appaloosa. Two horses were used for show jumping, 2 were used for polo, 1 was used for dressage, 1 was used in a therapeutic riding program, and 2 were untrained.

History—Duration of lameness prior to examination at the teaching hospital ranged from 1 to 4 weeks (mean, 3.1 weeks). In all horses, only 1 limb was affected. The right forelimb was involved in 1 horse, the left forelimb in 2 horses, the right hind limb in 2 horses, and the left hind limb in 3 horses. Two horses were suspected of having a traumatic accident prior to becoming lame, and 1 of these had a wound over the dorsal surface of the affected area. Six horses reportedly came in from pasture with an acute onset of lameness without any known traumatic episode.

Four horses had effusion of the metacarpophalangeal or metatarsophalangeal joint, and radiographs had been obtained by the referring veterinarians at the onset of lameness. Radiographs were reviewed by one of the authors (RMD) and did not have any evidence of lesions. In these 4 horses, 20 mg of sodium hyaluronate[e] and 6 mg of triamcinolone acetonide[f] had been injected into the affected joint by the referring veterinarian at the onset of clinical signs; horses had been confined to a stall or small pen area prior to referral to the teaching hospital approximately 3 weeks later.

Clinical findings—Six horses had effusion of the metacarpophalangeal or metatarsophalangeal joint, and 2 had diffuse cellulitis of the lower portion of the affected limb. Effusion of the digital synovial sheath was suspected in the 2 horses with diffuse cellulitis. Signs of pain were elicited with palpation of the proximal sesamoid bones in 4 horses. Five horses were grade 3 of 5 lame,[6] and 3 horses were grade 4 of 5 lame.

In 5 horses, diagnostic anesthesia was used to locate the source of lameness. None of the horses improved after a posterior digital or abaxial sesamoid peripheral nerve block. Three of the horses improved substantially after anesthesia of the affected metacarpophalangeal or metatarsophalangeal joint. The remaining 2 horses did not improve with anesthesia of the joint but did improve after anesthesia of the digital synovial sheath, a low palmar or plantar nerve block, or a palmar metacarpal or metatarsal nerve block.

Radiographic, ultrasonographic, and scintigraphic findings—All horses had osteolysis of the axial borders of the proximal sesamoid bones **(Fig 1)**. In 7 horses, the medial and lateral sesamoid bones appeared to be equally affected. In the remaining horse, 1 sesamoid bone was more severely affected than the other and had a small sequestrum **(Fig 2)**. Four horses had involvement of the midbody of the sesamoid bones, 3 had involvement of the proximal third of the sesamoid bones, and 1 had involvement of the distal third of the sesamoid bones. The degree of boney involvement ranged from 30 to 50% of the axial border of the affected sesamoid bones. Lesions were best seen on the DP radiographic view but could also be seen on the oblique and LM views.

Ultrasonography was performed in 5 horses. A moderate amount of echoic effusion was observed in the digital synovial sheath in 2 horses. Disruption of the metacarpointersesamoidean or metatarsointersesamoidean ligament with detachment from the sesamoid bones and an irregular margin of the sesamoid bones was seen in 3 horses **(Fig 3)**.

Nuclear scintigraphy was performed in 4 horses. Three horses had moderate to severe focal uptake of the radioisotope in the proximal sesamoid bones in the affected limb. One horse had a diffuse increase in radioisotope uptake surrounding the affected joint. None of the 4 horses that underwent scintigraphy had evidence of sepsis.

Clinical laboratory findings—In 5 horses, joint fluid was orange or dark yellow with a total protein concentration ranging from 3.2 to 5.6 g/dl (mean, 3.5 g/dl), nucleated cell count ranging from 1,305 to 17,160 cells/µl (mean, 5,688 cells/µl), and RBC count ranging from 5,100 to 39,631/µl (mean, 23,210/µl). Fifty to ninety percent of cells seen during cytologic examination of the joint fluid were nondegenerative neutrophils, and aerobic and anaerobic microbial cul-

Figure 2—Dorsoproximal-palmarodistal oblique view (made at 20° proximal to the supporting surface) of the metacarpophalangeal joint in a horse with osteitis of the axial borders of the proximal sesamoid bones. Notice the sequestrum in the medial proximal sesamoid bone (arrowheads).

Figure 1—Dorsoproximal-palmarodistal oblique view (made at 20° proximal to the supporting surface) of the metacarpophalangeal joint in a horse with osteitis of the axial borders of the proximal sesamoid bones.

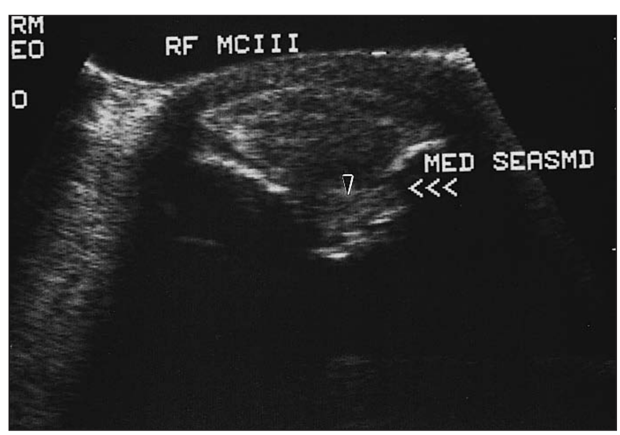

Figure 3—Ultrasonogram of the palmar aspect of the metacarpophalangeal joint in a horse with osteitis of the axial borders of the proximal sesamoid bones. Notice the echoic pattern of the metacarpointersesamoidean ligament (arrowhead) and irregular contour of the medial proximal sesamoid bone.

ture of joint and digital synovial sheath fluid did not yield any growth. For these 5 horses, a diagnosis of nonseptic suppurative inflammation consistent with chronic inflammation of the affected joint was made.

In the other 3 horses, total protein concentration of the joint fluid ranged from 4.6 to 6.0 g/dl, and nucleated cell count ranged from 42,000 to 131,500 cells/µl (mean, 70,554 cells/µl), with > 95% being degenerative neutrophils; results of cytologic examination of digital synovial sheath fluid were similar. Aerobic and anaerobic microbial culture of joint and digital synovial sheath fluid yielded a single bacterial species in each horse (*Pseudomonas* spp, *Enterobacter* spp, or *Actinobacillus equi*).

Surgical findings—In 5 horses, arthroscopy of the palmar or plantar pouch of the metacarpophalangeal or metatarsophalangeal joint and of the digital synovial sheath was performed. In the remaining 3 horses, only the palmar or plantar pouch of the metacarpophalangeal or metatarsophalangeal joint was examined. In 1 horse with sepsis, annular ligament desmotomy was also performed, using an arthroscopic beaver blade to transect the ligament through the proximal tenoscopic instrument portal. Damage to the metacarpointersesamoidean or metatarsointersesamoidean ligament was seen in all horses and consisted of discoloration, fraying, and detachment from the associated proximal sesamoid bone (**Fig 4**). Osteochondral fragmentation and osteomalacia involving the axial border of the proximal sesamoid bones was also seen in all joints. After debridement, the palmar or plantar pouch of the affected joint communicated with the digital synovial sheath through the disrupted ligament.

Histologic findings—Biopsy specimens were collected from the axial surface of the proximal sesamoid bones and the affected metacarpointersesamoidean or metatarsointersesamoidean ligament in 7 horses. Histologically, the ligament consisted of dense fibrous connective tissue with multifocal areas of necrosis, neutrophilic inflammation, and proliferation of fibroblasts with capillary infiltration consistent with chronic degenerative inflammation. Specimens from the sesamoid bones were composed of necrotic bone fragments, granulation tissue, and a mixed inflammatory cell infiltrate composed of lymphocytes, macrophages, and neutrophils consistent with chronic inflammation. Histologic findings in horses with sepsis were similar to those for horses without sepsis.

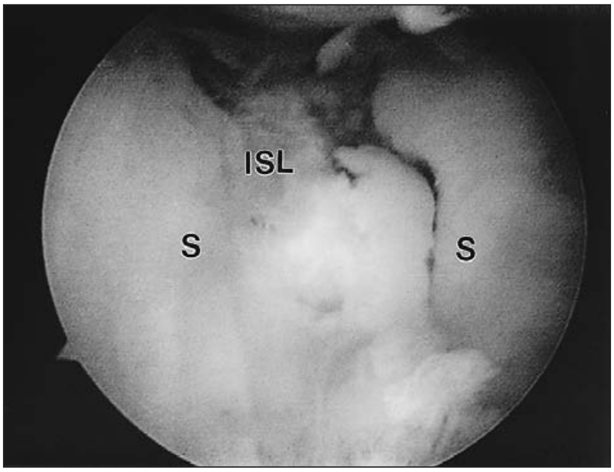

Figure 4—Arthroscopic view of the palmar pouch of the metacarpophalangeal joint of a horse with osteitis of the axial borders of the proximal sesamoid bones. Notice the fraying of the metacarpointersesamoidean ligament (ISL) and detachment of the ISL from the axial borders of proximal sesamoid bones (S).

Outcome—Follow-up information was obtained for all horses. All 5 horses without evidence of sepsis returned to their previous use. Median recovery time was 9 months (range, 7 to 12 months). However, 1 of these horses remained grade 1 of 5 lame, and radiographs obtained 1 year after surgery revealed secondary osteoarthritis of the affected metacarpophalangeal joint. Two horses were radiographed 12 months after surgery revealing remodeling of the sesamoids with a smooth contour to the axial margins of the sesamoid bones.

Only 1 of the 3 horses with sepsis returned to its previous use. One horse remained unsound and was retired as a broodmare; the other was euthanatized because of failure to resolve the sepsis and secondary osteoarthritis of the affected metatarsophalangeal joint.

Discussion

Results of the present study suggest that osteitis of the axial margins of the proximal sesamoid bones is a distinct entity in horses that typically is associated with inflammation of the associated metacarpointersesamoidean or metatarsointersesamoidean ligament, and may be a result of sepsis or nonseptic inflammation.

Five horses in the present report did not have evidence of sepsis. These horses also did not have any history of trauma; however, horses returned from pasture lame, and it is possible that a traumatic accident occurred without knowledge of the owner. All 5 of these horses were used for performance events and reported by the owner to be free of lameness when turned out to pasture, and none of these horses had a history of lameness involving the affected limb. We speculate that a traumatic event occurred that resulted in excessive or abnormal forces within the metacarpophalangeal or metatarsophalangeal joint. Axial sesamoid bone injuries have previously been associated with lateral condylar fractures in horses,[7] and progressive axial sesamoid bone demineralization was found in 4 of 18 racehorses that sustained a fracture of the lateral metacarpal condyle, although the radiographic lesion did not manifest itself until 15 days after fracture fixation. Dorsiflexion of the metacarpophalangeal and metatarsophalangeal joint puts severe stresses on the palmar and plantar supporting structures, especially the sesamoid bones and metacarpointersesamoidean and metatarsointersesamoidean ligaments,[8] and it seems possible that such stresses could lead to tearing of the metacarpointersesamoidean or metatarsointersesamoidean ligament. The blood supply to the proximal sesamoid bones arises from branches of the medial and lateral palmar digital arteries.[9] The vessels enter the sesamoid bones on the palmar or plantar abaxial surface and travel in an abaxial-to-axial, proximal-to-distal, and palmar- or plantar-to-dorsal direction,[9] so that the axial border of

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the proximal sesamoid bone is perfused last. Thus, avulsion of the metacarpointersesamoidean or metatarsointersesamoidean ligament may disrupt the blood supply to the proximal sesamoid bones, resulting in bone resorption along their axial borders. However, we do not have any proof that this is the case, and the true cause of nonseptic osteitis of the axial borders of the proximal sesamoid bones is currently unknown. Furthermore, it is not clear what role sepsis plays in the development of this lesion.

In 4 horses described in the present report, the referring veterinarian had obtained radiographs of the affected area shortly after the onset of clinical signs. All of the radiographs were reviewed by one of the authors (RMD) and were considered to be of diagnostic quality, similar to the quality of radiographs taken at the referral hospital. Therefore, if a lesion had been present, it likely would have been detected. Lesions were not evident on radiographs from any of these horses at that time, even though radiographic lesions were apparent 3 to 4 weeks later. A 30 to 70% loss or gain in bone density is required before changes are apparent radiographically.[10] Therefore, it is not surprising that radiographically apparent lesions were not seen shortly after the onset of clinical signs.

Similarly, there is a 7- to 10-day latent period between the onset of clinical signs and the earliest radiographically detectable bone changes in horses with acute osteomyelitis.[11] The 3 horses with sepsis all had radiographic lesions at the time initial radiographs were obtained, 3 or 4 weeks after the onset of clinical signs. It seems likely, however, that radiographic lesions may have been present before this time. Because the outcome of horses with sepsis may have been better if the diagnosis had been made and treatment had been instituted earlier, we do not recommend radiographic evaluation at weekly intervals for horses with sepsis of the metacarpophalangeal or metatarsophalangeal joint or septic tenosynovitis of the digital synovial sheath.

It was not surprising that posterior digital and abaxial sesamoid nerve blocks did not result in improvements in these horses but that low palmar or plantar and palmar or plantar metacarpal nerve blocks did in the 5 horses without sepsis. Only 3 of these 5 horses improved after anesthesia of the metacarpophalangeal or metatarsophalangeal joint, whereas the other 2 improved after anesthesia of the digital synovial sheath. The difference in response could be attributable to variations in the communication between the palmar or plantar pouch of the joint and the digital synovial sheath.

Initially, we were not certain that the radiographic lesions involving the proximal sesamoid bones were the source of pain, particularly because some horses did not respond to anesthesia of the joint. For this reason, we chose to perform additional diagnostic procedures such as nuclear scintigraphy and ultrasonography. Focal uptake of radioisotope by the proximal sesamoid bones suggested that this was the source of pain. More importantly, ultrasonography confirmed damage to the metacarpointersesamoidean or metatarsointersesamoidean ligament.

Arthroscopy of the palmar pouch of the metacarpophalangeal or metatarsophalangeal joint allowed access to the axial borders of the sesamoid bones. In 5 horses, we also elected to examine the digital synovial sheath arthroscopically. In many instances, tenoscopy was performed to confirm that the ligamentous and boney lesions had been completely debrided. In horses with sepsis, tenoscopy was performed to allow thorough lavage of the sheath.

All horses had discoloration and fraying of the metacarpointersesamoidean or metatarsointersesamoidean ligament, and a communication was established between the palmar or plantar pouch of the metacarpophalangeal or metatarsophalangeal joint and the digital synovial sheath as a result of detachment of the ligament from the axial surfaces of the proximal sesamoid bones. Debridement of the damaged ligament and curettage of the sesamoid bones resulted in a return to soundness in 6 of the 8 horses in this study. None of the horses were reexamined arthroscopically or at necropsy to determine whether the ligament reattached to the sesamoid bones after surgery.

As expected, outcome for the 3 horses with sepsis was not as good as for the 5 horses without, all of which returned to their previous uses. Outcome for the horses without evidence of sepsis in the present report was better than the outcome reported for horses that underwent medical treatment alone, all of which remained unsound or died.

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[a]Kodak Ektascan Ed-RA-1, UltraDetail Plus, 3M Co, St Paul, Minn.
[b]HF80 Plus, MinRay Inc, Northbrook, Ill.
[c]VPI Impact, Ausonics, Sydney, Australia.
[d]Sector transducer, Ausonics, Sydney, Australia.
[e]Legend, Bayer Corp, Shawnee Mission, Kan.
[f]Vetalog, Fort Dodge Corp, Fort Dodge, Iowa.

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