Sonographic Diagnosis of Exostoses of the Caudal Distal Radius

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Ultrasonographic evaluation of the caudal distal radius for exostoses in horses of any age and breed with palmar pericarpal pain is warranted since radiographs may be negative. Author’s address: Rood and Riddle Equine Hospital, PO Box 12070, Lexington, Kentucky 40580-2070; email: jreimer@roodandriddle.com. © 2010 AAEP.

1. Introduction
Exostoses of the caudal perimeter of the distal radius resulting in lameness accompanied by intermittent effusion of the carpal synovial sheath have been described. Such exostoses are categorized as either solitary osteochondromas, which are typically located 2–4 cm proximal to the physeal scar, or physeal remnant spikes, which originate directly over the physeal scar. Osteochondromas typically affect young horses, whereas physeal remnant spikes may affect older horses as well. Radiography has been routinely used for the detection of these exostoses. Radiographic recognition of small physeal remnant spikes can be more difficult because of superimposition over the physeal scar, and some osteochondromas are small and difficult to detect. However, not all exostoses are clinically important.1,2

Arthroscopic removal of clinically important exostoses is the treatment of choice.1–3 The procedure can also be used to examine the carpal sheath in which an exostosis is not radiographically apparent but lameness has been isolated to the carpal synovial sheath. Sonographic detection of distal radial bone spikes and osteochondromas has been mentioned in the literature, but the procedure and sonographic features were not described in detail.1–3 Ultrasonography can be used to diagnose exostoses that are not radiographically apparent as well as aid in determining their significance by imaging their extension into the carpal sheath and/or associated structures.1

The purposes of this paper are to describe the sonographic appearance and location of clinically important caudal radial exostoses, highlight the importance of using ultrasonography to identify exostoses that are not evident radiographically, and increase awareness of caudal distal radial exostoses as a potential cause of lameness in the absence of carpal sheath effusion.

2. Materials and Methods
Horses in which a diagnosis of a caudal radial exostosis was made and an ultrasound study of the carpal synovial sheath was performed before diagnosis were included in the study. A diagnosis was made either by the sonographic demonstration of a clearly demarcated bone spike or large exostosis into the carpal sheath accompanied by synovial effusion in the proximal aspect of the sheath or at the time of surgery. The procedure for sonographic evaluation of the carpal synovial sheath was performed as de-
scribed in the literature using a 7- or 8-MHz linear array transducer and was amended to include evaluation of the surface of the caudomedial distal radius in transverse and sagittal planes from the most proximal visible extent of the superior check ligament to the level of the physeal scar. The ultrasound beam was fanned across the surface of the radius in a sagittal plane to enable evaluation of as much of the surface of the palmar radius as possible. The locations of any exostoses in relation to the superior check ligament, deep flexor muscle, and/or physeal scar were noted.

3. Results

Fourteen cases of caudal radial exostoses in which an ultrasound study was performed before diagnosis were identified between 2001 and January 2010. All horses were Thoroughbreds, ranging in age from 2 to 4 yr. Thirteen of the horses presented for mild to moderate effusion of the carpal sheath. Three of these horses had recurrent effusion after a transient response to intrathecal corticosteroids and hyaluronic acid. Mild lameness present in two other horses was isolated to the carpal sheath by intrathecal infiltration of local anesthetic. One horse with no effusion in the carpal sheath was examined to determine the cause of a 4- to 5-degree lameness (on a scale of 1–5) that had been abolished with perineural anesthesia of the median and ulnar nerves.

An exostosis protruding into the carpal sheath was identified at the time of the ultrasound examination in 12 of 14 horses (Figs. 1–4). Retrospective scrutiny of the sonograms of one horse in which the diagnosis was confirmed during arthroscopy revealed a spike-shaped exostosis that was poorly delineated and partially obscured by the deep digital flexor muscle. The majority (11 of 13) of exostoses identified with ultrasound in this study were spur- or spike-like projections. Two horses had large knobby protrusions into the carpal sheath that were subsequently readily identifiable radiographically and typical in appearance for most osteochondromas. Ten exostoses were discovered in a location encompassing the superior check ligament and the deep flexor muscle 2–4 cm above the physeal scar. Exostoses were discovered at the level of, or in close proximity to, the physeal scar in three horses. Grossly visible tearing of the superior check ligament...
ment associated with the exostosis was present in two horses, impingement without gross fiber tearing of the superior check ligament was identified sonographically in three horses (Figs. 3 and 4), and im-

Fig. 2. (A) Sagittal image of the distal medial radius showing a small exostosis (arrow) just proximal to the edge of the physeal scar in a 2-yr-old Thoroughbred colt presented for moderate synovial effusion of the carpal sheath. The horse was sound at the time of the examination. Radiographs were negative. Note that the exostosis is similar in appearance to that affecting the horse depicted in Figure 1, but the clinical presentation of each case was remarkably different. The exostosis in this case was located just slightly more axially and slightly more proximally than Figure 1. The exostosis illustrated here impinged on the abaxial edge of the deep digital flexor tendon as determined by ultrasonography and was confirmed during arthroscopic removal of the exostosis. Proximal is to the right. MA, median artery; SC, superior check ligament. (B) Transverse view of the exostosis. Lateral is to the right. Notice the exostosis protruding between the superior check ligament (SC) and the deep digital flexor muscle (DD). SD, superficial digital flexor tendon. Dorsal is to the right.

Fig. 3. (A) Sagittal image of a 6-mm-long exostosis (arrow) of the distal radius of a 2-yr-old Thoroughbred with intermittent lameness associated with recurrent carpal sheath effusion. SC, superior check ligament. Proximal is to the right. (B) Transverse image of the exostosis showing impingement on the superior check ligament. SC, superior check ligament; arrow, exostosis.
Pingement into the deep flexor tendon or an accessory tendon (Fig. 1B) was identified in five horses during the ultrasound examination. The remaining exostoses protruded into the carpal sheath and were surrounded by synovial fluid. One horse had tearing of the deep flexor tendon into the proximal palmar metacarpal region.

Radiographs were obtained in 13 of 14 cases and considered diagnostic in five cases. One horse with recurrent carpal sheath synovitis and in which radiography and ultrasonography were negative underwent magnetic resonance imaging, at which time an exostosis was identified.

Thirteen horses underwent arthroscopic removal of the exostoses, and one horse was lost to follow-up. Surgery reports were available for 12 of the horses, and all described damage to a tendinous structure opposite the exostosis.

4. Discussion

The results of this report illustrate the value of ultrasonography for the detection of clinically important exostoses of the caudal distal radius in horses. The majority of these exostoses were not detected with radiography. It was also a vital tool in the diagnosis of a physeal remnant spike that resulted in severe lameness in the absence of carpal sheath effusion. The exostosis in this case was at the medial edge of the carpal sheath and enveloped by an accessory tendon. This may have not only contributed to the profound lameness in this horse but also limited the development of synovitis. In light of this recent case, the author now incorporates a cursory evaluation of the surface of the caudal distal radius into the ultrasound evaluation of horses with lameness suspected to be originating from the proximal metacarpal region or palmar carpus as well as those with carpal synovial sheath effusion. Sonographic evaluation of the proximal lateral aspect of the carpal sheath may be informative, even in the absence of palpable abnormalities or synovial abnormalities in the metacarpal region.

Although the horses of this report were relatively young (2–4 yr of age), lameness resulting from physeal remnant exostoses has been confirmed in horses from 3 to 12 yr of age, with an average age of 6 yr. All horses in this report were Thoroughbreds, which is reflective of our hospital population. Physeal remnant exostoses were identified in Thoroughbreds, Warmbloods, and mixed breed in a previous report. Ultrasonographic evaluation of the caudal distal radius for exostoses in horses of any age and breed with palmar peri-carpal pain and negative or equivocal radiographs may be warranted. Intra-thecal local anesthesia can be used to confirm the significance of any sonographic findings. It is important for sonographers to familiarize themselves with the varied appearance of the caudal distal radius in sound limbs to avoid the potential for false-positive diagnoses, because some exostoses may not be clinically important.

References