Sonographic Abnormalities of the Dorsal Tarsal Region

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Ultrasound of the dorsal tarsus in horses with generalized swelling, dorsal swelling only, tarsocrural joint distension, or wounds to that region can show abnormalities of structures in addition to those described previously. Recognition of such findings may ultimately provide information on the etiology of the pathology seen and enable improved management and prognostication. Authors' address: Rood and Riddle Equine Hospital, PO Box 12070, Lexington, Kentucky 40580-2070; e-mail: jreimer@roodandriddle.com.

1. Introduction

The tarsal region is a frequent site of injury in the horse. Radiographs are an invaluable diagnostic tool in such cases; however, the information obtained is limited. Ultrasonographic imaging of the tarsal region provides important additional information regarding the integrity of soft tissue structures, joint contents, and bone surfaces, but can be daunting because of the complicated anatomy of this region. Detailed descriptions of the sonographic anatomy of the equine tarsus and a review of the types of soft tissue injuries that can be encountered have been described previously. The peroneus tertius, long digital extensor tendon and sheath, cranial tibial tendon, and dorsal aspect of the tarsocrural joint were specifically included in those reviews.[1,2]

It is not unusual in the authors' experience for horses to present for evaluation of swelling limited to the dorsal tarsal region, yet there is little in the literature describing pathologic conditions in this location. Based on our experience, there are several abnormalities in addition to those detailed in previous reports that may be discovered during the sonographic evaluation of the dorsal tarsal region in horses with dorsal swelling as well as generalized swelling. Recognition of these injuries or abnormalities may result in improved prognostication and treatment. The purpose of this study is to describe the abnormalities discovered during sonographic evaluation of the dorsal tarsal region in horses presented to the first author over a 3-yr period.

2. Materials and Methods

The sonographic findings of all horses presenting to the first author over a 3-yr period for an ultrasound study of the entire hock region and/or the dorsal hock region were reviewed. The procedure was performed using a 10.0-MHz linear array transducer as previously described.[1,2] The sonographic evaluation also included examination of the subcu-

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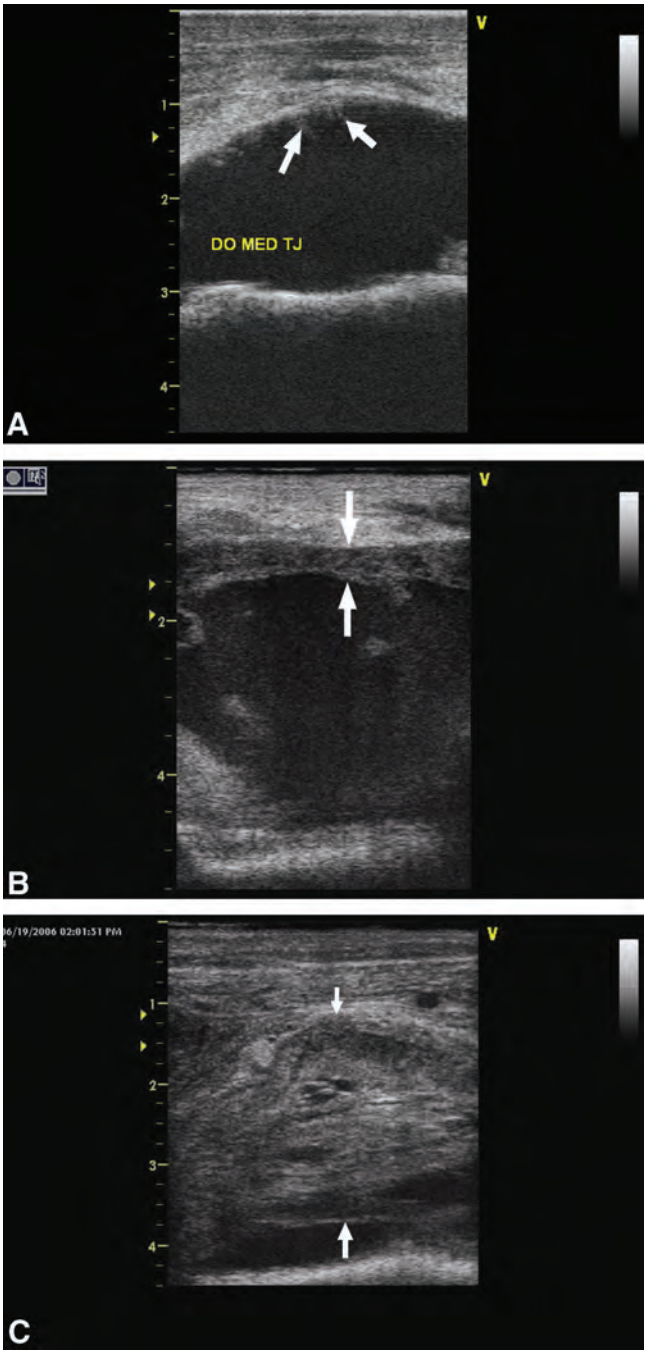

Fig. 1. (A) Longitudinal view of a distended dorsal pouch of the tarsocrural joint in a horse with generalized tarsal swelling. Notice the subcutaneous edema, the large anechoic synovial effusion, and the synovial fronds (arrows) along the joint capsule lining (proximal is to the right). (B) Longitudinal view of the dorsal tarsocrural joint in a yearling with septic synovitis. Notice the echogenic effusion and pronounced synovial thickening (between arrows). Proximal is to the right. (C) Marked synovial thickening (between arrows) in the tarsocrural joint of a foal with septic arthritis. Longitudinal view, proximal is to the right.

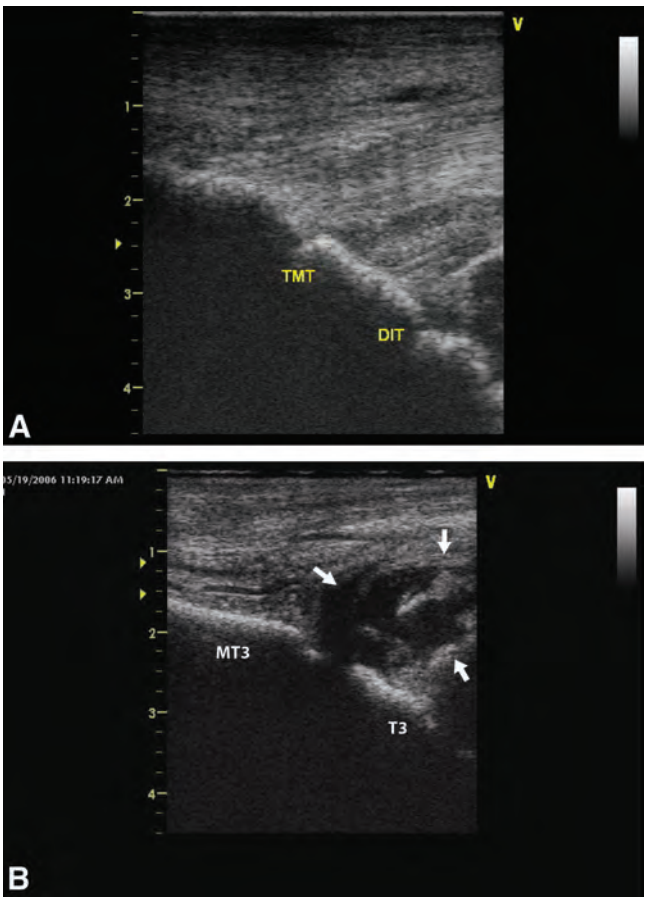

Fig. 2. (A) Longitudinal view showing the normal appearance of the dorsal aspects of the tarsometatarsal (TMT) and distal intertarsal (DIT) joints. Proximal is to the right. (B) Longitudinal view of the dorsal aspect of a distended tarsometatarsal joint capsule (arrows) in a horse with sterile synovitis. Notice the large effusion and synovial thickening compared with A. Proximal is to the right.

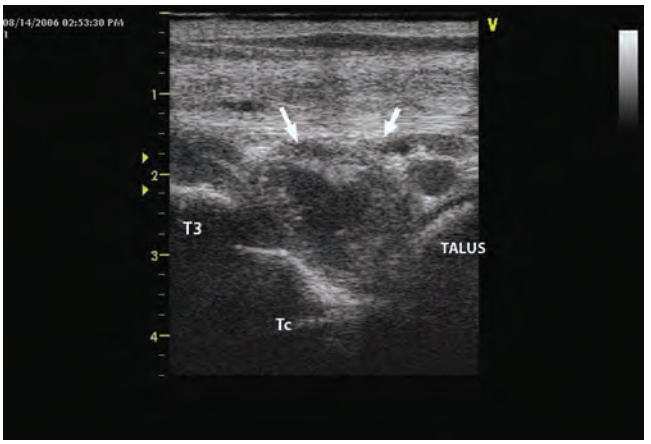

Fig. 3. Longitudinal view of an effusion and synovial thickening of the proximal intertarsal joint (arrows) in a horse with septic synovitis. Proximal is to the right. T3, third tarsal bone; Tc, central tarsal bone.

taneous tissues, connective tissues, vasculature, and bone surfaces.

3. Results

A total of 56 horses were presented for evaluation. Three of the 56 horses were presented for a second episode of tarsal swelling because of a different cause, resulting in 59 primary ultrasound evaluations. Horses presented for an ultrasound evaluation because of generalized swelling of the hock region (24 cases), swelling involving the dorsal hock region only (15 cases), distension of the tarsocrural joint (12 cases), wounds involving the dorsal hock region (5 cases), or prior radiographically documented pathology including fractures of the lateral malleolus (2 cases) or distal tibial physeal infection (1 case).

Abnormal sonographic findings are categorized below. In 16 of the 59 (27%) examinations, at least two sonographic abnormalities in the dorsal hock region were discovered.

Dorsal Articulations

Synovial thickening and/or effusion of the dorsal pouch of the tarsocrural joint (34 horses; Fig. 1, A–C), dorsal aspects of the tarsometatarsal or distal intertarsal joints (9 horses; Fig. 2), and proximal intertarsal joint only (1 horse; Fig. 3) were found. Pathology involving the fibrous portion of the tarsocrural joint capsule was discovered in seven horses and included erosion of the tarsocrural joint capsule in association with extensive granulating dorsal wounds (two horses; Fig. 4) or a markedly irregular bone surface at the dorsomedial distal tibia in the region of attachment of the tarsocrural joint capsule (five horses; Fig. 5). The distal dorso-

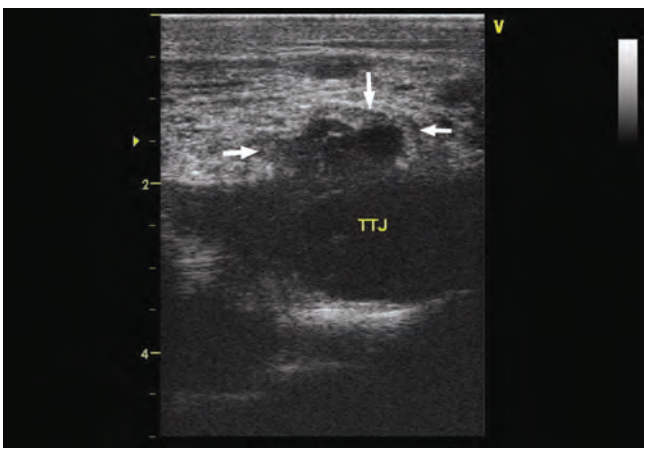

Fig. 4. Herniation of a portion (delineated by arrows) of the synovial layer of the dorsal tarsocrural joint into the overlying soft tissues in a horse with a large granulating wound and erosion of the fibrous portion of the joint capsule. Notice the synovial thickening and fine fibrin strands within the herniated synovium. Longitudinal view, proximal is to the right.

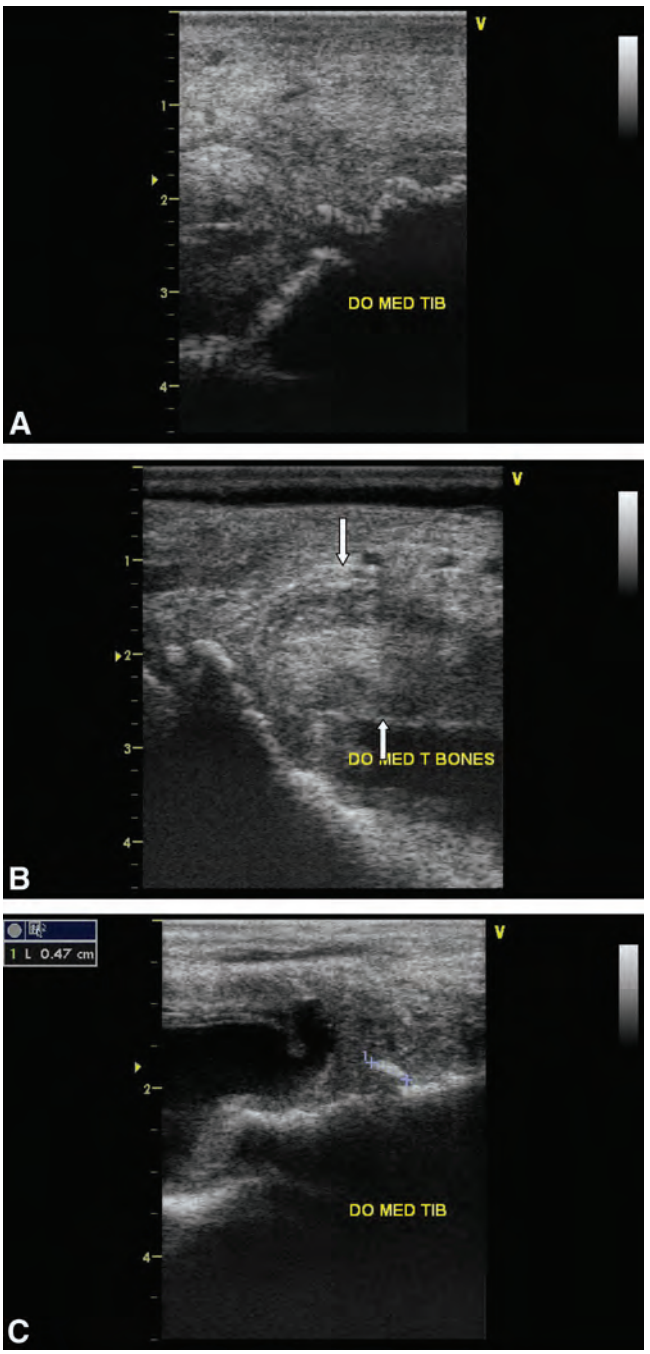

Fig. 5. (A) Irregular bone surface of the dorsomedial tibia in the region of attachment of the tarsocrural joint capsule. Longitudinal view, proximal is to the right. (B) Irregular bone surface in the region of the distal attachment of the tarsocrural joint capsule to the central tarsal bone in the same horse as in Fig. 6A. Notice the markedly thickened and echogenic joint capsule (between arrows). Long axis view, proximal is to the right. (C) Bone fragment (between calipers) and irregular bone surface of the dorsomedial distal tibia in the region of attachment of the dorsal tarsocrural joint capsule. Notice the thickening of the joint capsule in the region of attachment. Long axis view, proximal is to the right.

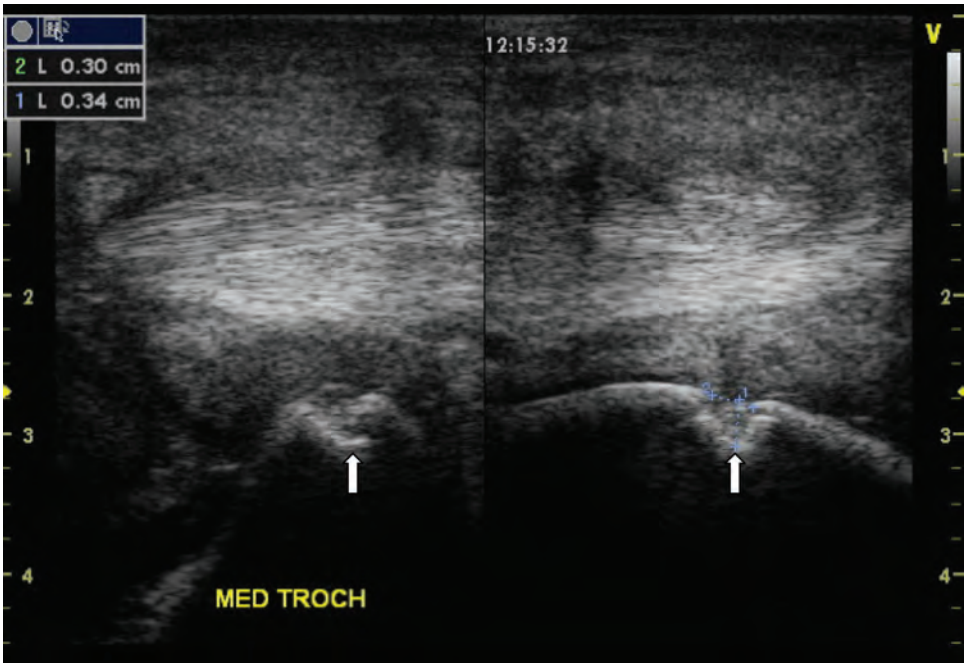

Fig. 6. Defect in the subchondral bone of the medial trochlear ridge (arrows), resulting from trauma, in a horse with generalized swelling over the hock region. (An osteochondritis dissecans (OCD) lesion may appear similarly on ultrasound; however, at arthroscopy, there was tearing of the cartilage and injury to the subchondral bone.) Irregular bone surfaces were also discovered during the sonographic evaluation, at the dorsomedial tarsocrural joint capsule attachments (same horse as in Fig. 5, A and B). Left image transverse view, right image longitudinal view.

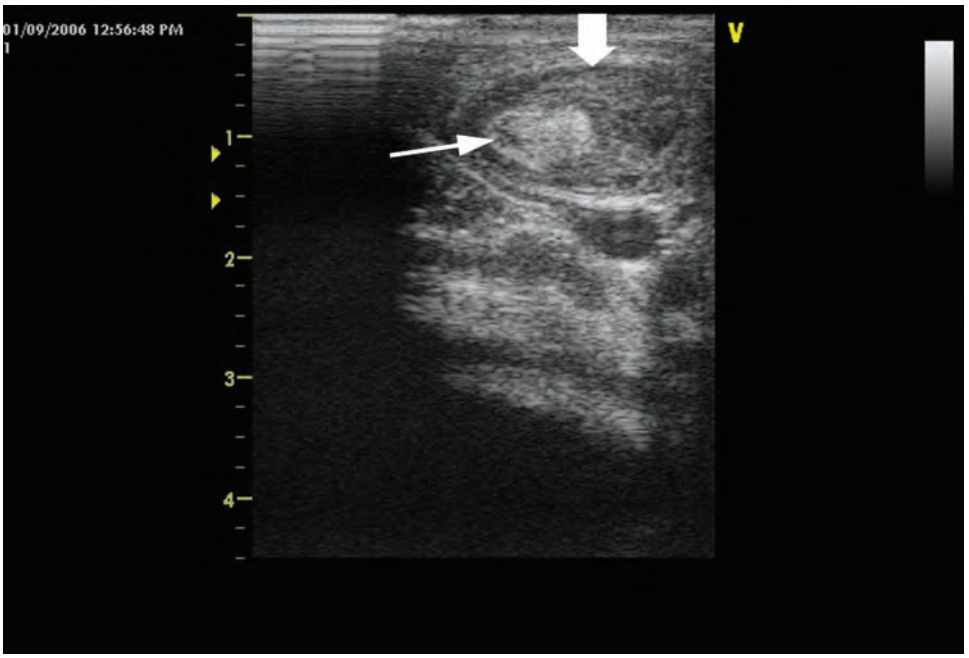

Fig. 7. Synovial thickening and probable fibrin accumulation in the long digital flexor tendon sheath (fat arrow) accompanied by an ~15% hypoechoic lesion within the tendon (thin arrow) in a 9-day-old foal. Transverse view, lateral is to the right.

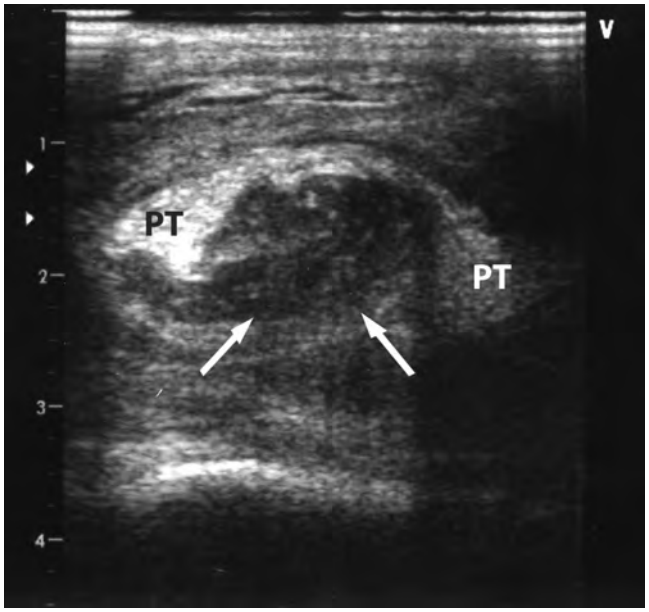

Fig. 8. Transverse view of an injury to the cranial tibial musculotendinous junction at the level of the bifurcation of the peroneus tertius (PT) in a horse with dorsal tarsal swelling. Notice the hypoechoic tissue beneath the peroneus tertius (arrows) and the loss of the normal tendon and muscle demarcation; compare with Fig. 12A. There is also a thin anechoic fluid layer in the thickened tissues overlying the peroneus tertius.

medial surface of the talus in the region of attachment of the talometatarsal ligament and tarsocrural joint capsule was found to be irregular in two horses, which had been treated for septic arthritis, and a defect in the subchondral bone of the medial trochlear ridge was found in one horse with a known history of trauma (Fig. 6).

Dorsal Tendinous Structures

Pathology of tendinous structures was discovered in seven horses and included synovitis of the long digital extensor tendon sheath (four horses), localized fiber disruption within the long digital extensor tendon with concurrent tenosynovitis (one horse; Fig. 7), injury to the junction of the cranial tibial tendon at the musculotendinous junction (one horse; Fig. 8), and rupture of distal branches of the peroneus tertius (one horse; Fig. 9).

Connective Tissue and Vasculature

Edema of dorsomedial deep connective tissue between the crural extensor retinaculum and the tarsocrural joint capsule attachment was noted in five horses (Fig. 10), and focal thrombosis of the perforating tarsal vein over the dorsal hock region was found in three horses (Fig. 11).

Crural Extensor Retinaculum Region

An anechoic fluid pocket and/or granulation-like tissue was found overlying the muscles and tendons of the dorsal distal tibia in the region of the crural extensor retinaculum in six horses (Fig. 12, A and B). Irregular bone with or without periosteal edema was discovered at the point of attachment of the crural extensor retinaculum in two of these horses (Fig. 13).

Miscellaneous

Unusual fluid accumulations were found in the dorsal tarsal region in three horses with dorsal tarsal swelling and included an anechoic fluid pocket between the tibia and cranial tibial muscle (Fig. 14), a large synovial-like outpouching suspected to be arising as a diverticulum from an extensor tendon sheath, and a localized fluid accumulation in the intertendinous tissue. Subcutaneous or suture abscesses were found in two horses.

Sonographic Findings Excluding Those in the Dorsal Tarsal Region

Of the 15 horses that presented for dorsal hock swelling, the entire hock region was evaluated in six

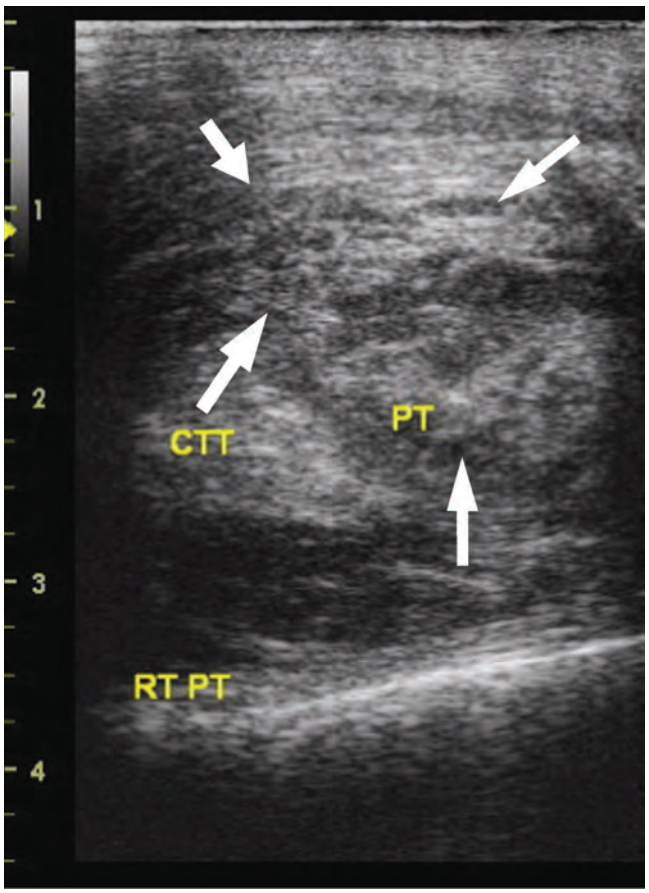

Fig. 9. Transverse view of the distal peroneus tertius (compare with the normal peroneus tertius in Fig. 8) toward the lateral aspect at the point of bifurcation, showing diffuse disruption of fibers in a horse with swelling in the dorsal tarsal region. PT, lateral lobe of the peroneus tertius; CTT, cranial tibial tendon. Lateral is to the right.

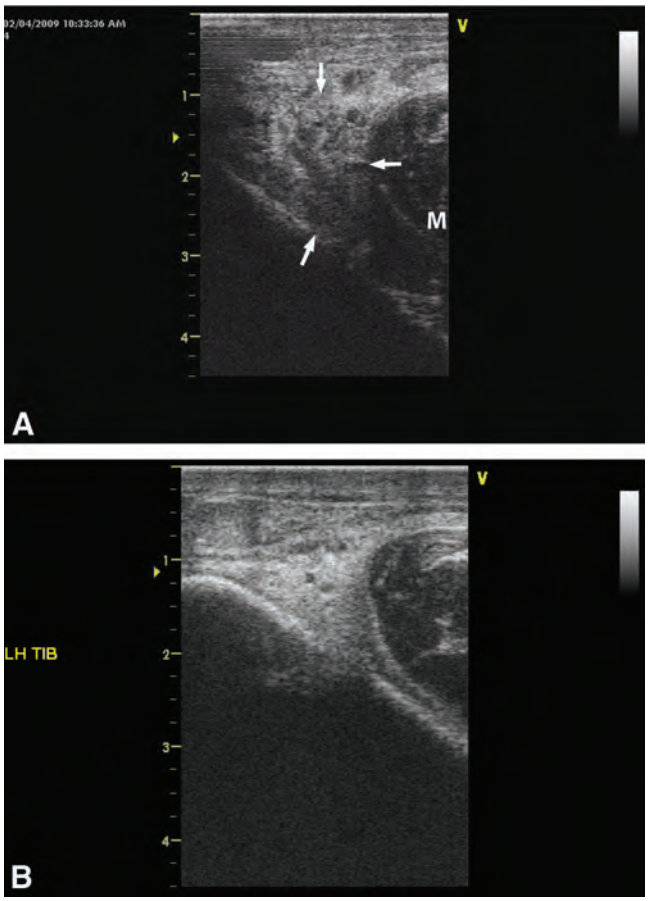

Fig. 10. (A) Transverse view of edematous connective tissue (arrows) found dorsomedially between the crural extensor retinaculum and the proximal aspect of the tarsocrural joint capsule in a horse with dorsal hock swelling. Compare with Fig. 10B. M, cranial tibial muscle. (B) Transverse view showing the normal sonographic appearance of the connective tissue found dorsomedially between the crural extensor retinaculum and the dorsal tarsocrural joint capsule attachment in a horse with subcutaneous thickening. Compare with A.

horses, and no other abnormalities were found. Of the remaining examinations of the entire hock region, collateral ligament desmitis and/or irregular bone at their attachments was found in 16 horses. Slight widening of the medial distal tibial physis (Fig. 15) in comparison to the opposite limb was discovered in two horses with abnormalities of the superficial medial collateral ligament. Marked widening and irregularity to the medial tibial physis was found in a foal with a diagnosis of a physeal abscess detected radiographically. Additional abnormalities included irregular bone at the distal attachment of the lateral tarsometarsal ligament accompanied by desmitis of the plantar ligament (one horse), disruption of the cuneantendon (one horse), and bone fragments within the synovium of the lateral plantar tarsocrural joint pouch (one horse).

4. Discussion

The results of this study showed the additional information that can be obtained during the sonographic evaluation of the dorsal aspect of the equine tarsal region. Tarsocrural and distal tarsal synovitis, long digital extensor tenosynovitis, and injuries to the peroneus tertius and cranial tibial tendon have been discussed previously[1,2] and were further illustrated sonographically in this report.

Injury to the crural extensor retinaculum was suspected by the first author in 6 of the 59 examinations, based on the presence of granulation tissue and/or fluid between the retinaculum and the underlying muscular and tendinous structures, and, in some cases, the additional presence of irregular bone at the attachment to the lateral or medial side of the tibia. Thrombosis of the perforating tarsal vein, suspected avulsion-like trauma to the tarsocrural joint capsule attachment, edema of the deep connec-

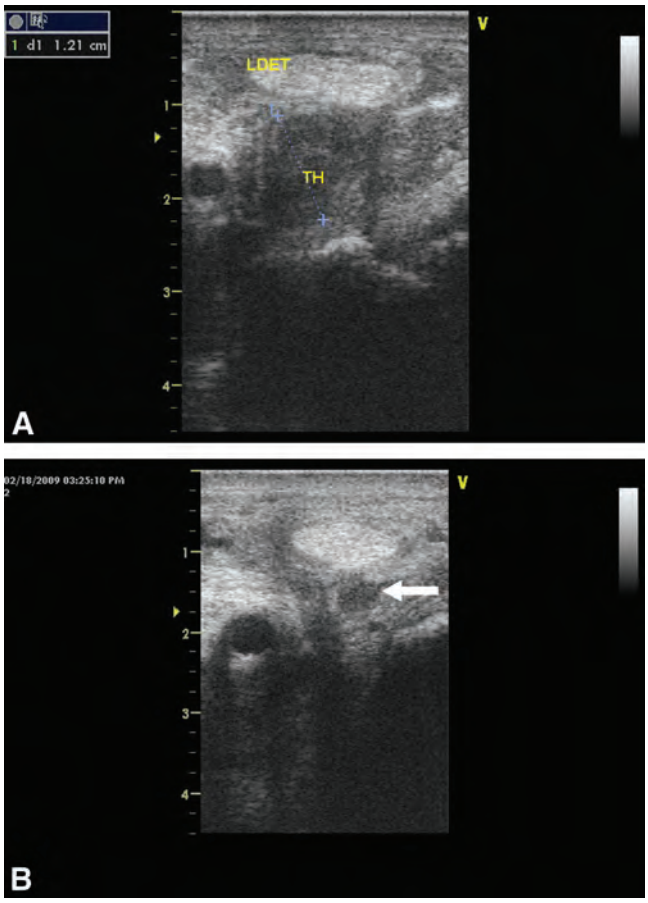

Fig. 11. (A and B) Thrombophlebitis of the perforating tarsal vein in a horse with dorsal tarsal swelling. This is the same horse as in Fig. 10A. (A) Transverse view of the vein at the time of diagnosis (between calipers), located beneath the long digital extensor tendon (LDET). (B) The same vein (arrow) after 2 wk of antimicrobial and aspirin therapy showing marked reduction in the diameter of the thrombosed vessel.

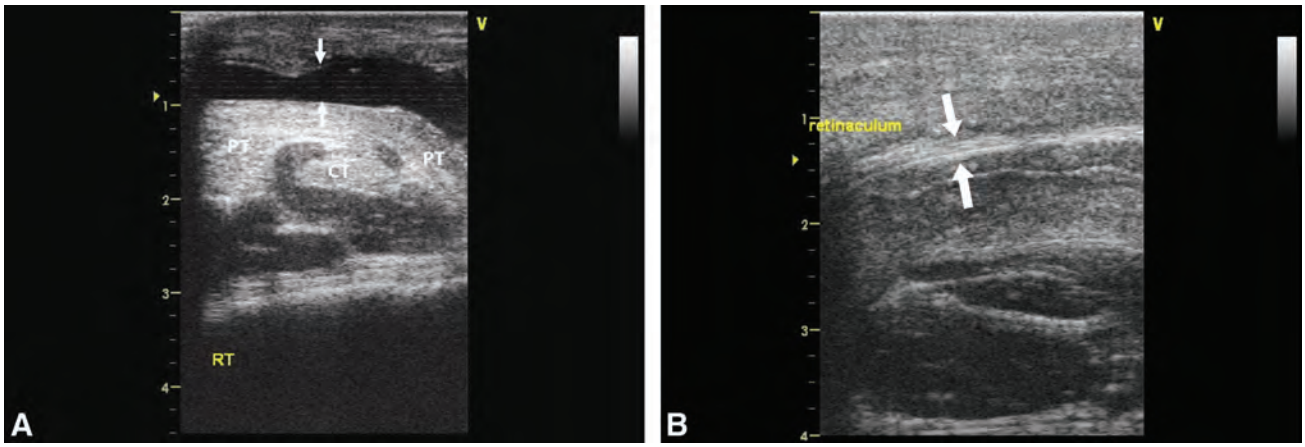

Fig. 12. (A) Anechoic fluid layer (between arrows) overlying the peroneus tertius at the level of bifurcation in a yearling with dorsal tarsal swelling. Disruption of the tibial extensor retinaculum was suspected. (B) Crural extensor retinaculum (longitudinal view of the retinaculum between arrows, obtained in a transverse plane over the distal tibia) in a yearling with dorsal hock swelling (same horse as in Fig. 13). Notice the large amount of subcutaneous thickening over the retinaculum and the thick granulation-like tissue beneath the retinaculum.

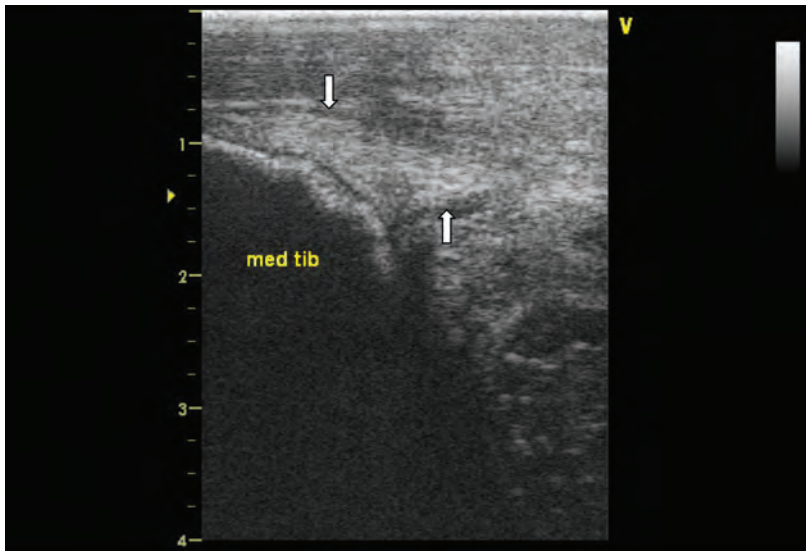

Fig. 13. Irregular bone surface and periosteal edema of the medial tibia at the point of attachment of the tibial extensor retinaculum (between arrows) in a yearling with dorsal tarsal swelling (transverse view over medial distal tibia). Hypoechoic granulation–like tissue with a thin central layer of anechoic fluid was also found between the retinaculum and underlying muscle (see Fig. 12B).

tive tissue over the distal dorsomedial tibia, and unusual fluid accumulations were some of the additional interesting findings discovered during the sonographic examination of horses in this study. The etiology of these findings is speculative, but trauma possibly resulting from hyperextension of the tarsal region could be involved.

It is not uncommon for multiple abnormalities involving ligamentous, tendinous, synovial, osseus, and/or vascular structures to exist in the same case. For example, thrombosis of the perforating tarsal vein was discovered along with edema of the deep connective tissue between the crural extensor retinaculum and tarsocrural joint capsule attachment in some of the horses. Although a specific etiology was not identified in these cases, trauma was suspected by the first author to be the inciting cause.

Horses that present with lameness and tarsal swelling, without evidence of tarsocrural synovitis or ligamentous injury, are often treated empirically with antimicrobials for suspected cellulitis. By recognizing some of the additional causes of dorsal tarsal swelling described in this report, the practitioner may be able to withdraw initial empiric antibiotics or completely forego such treatment. It must be kept in mind, however, that opportunistic infections

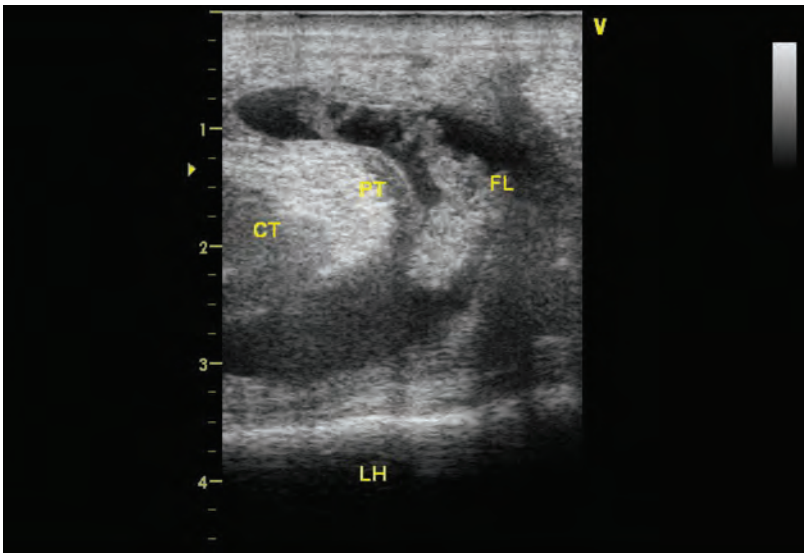

Fig. 14. Anechoic fluid accumulation with fibrin-like material (FL) between the peroneus tertius and cranial tibial tendon bundle (PT, CT) and the tibia, with accumulation of fluid to the lateral side of the tendinous tissues in a horse with dorsal tarsal swelling. The hypoechoic appearance to the CT is an artifact.

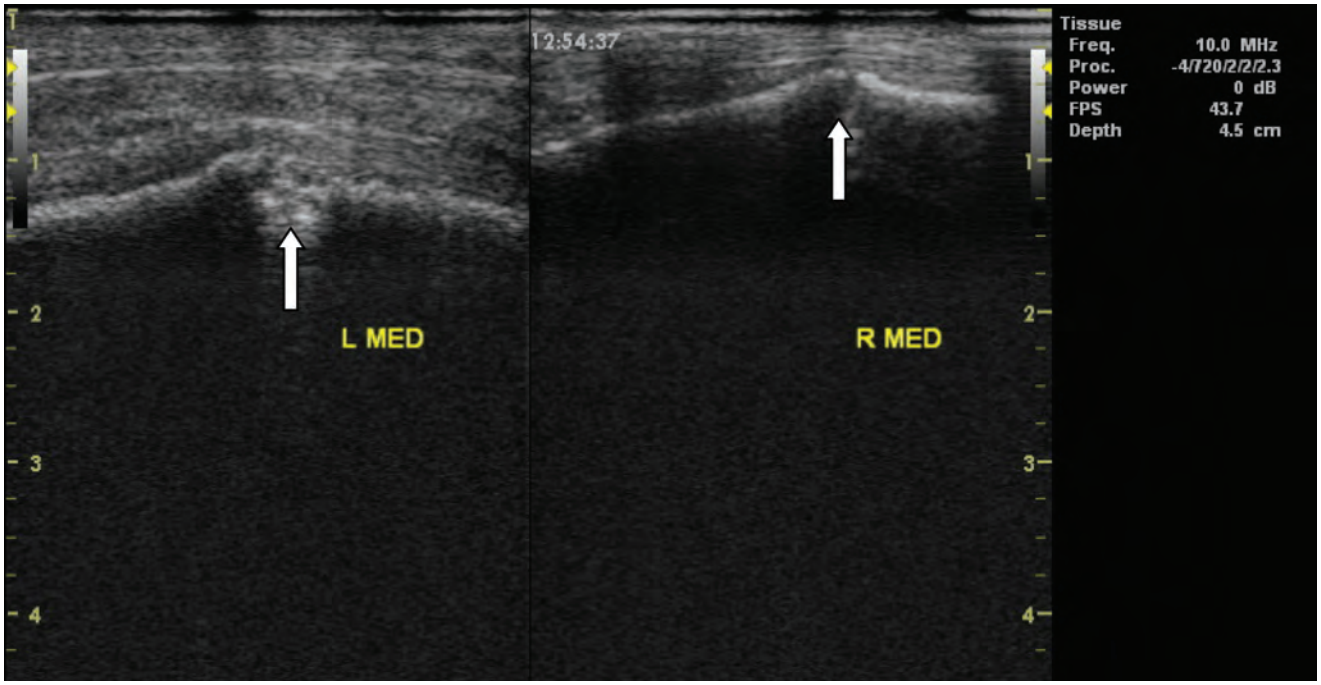

Fig. 15. Longitudinal view of a widened medial tibial physis (left image), suspected to be associated with trauma, in the left hind limb of a yearling with generalized swelling, distension of the tibiotarsal joint, and mild desmitis of the medial collateral ligaments. Notice the difference in the appearance of the affected physis (left image) compared with the opposite limb (right image) at the same location. The physes are identified with arrows.

can occur after trauma. Indeed, this was strongly suspected in one of the three cases of thrombosis of the perforating tarsal vein and two horses were diagnosed with traumatic tarsal injury that were represented 7–9 wk later for sepsis of the tarsocrural joint.

The outcome of horses with specific lesions, such as those involving the crural extensor retinaculum, the deep connective tissue overlying the dorsomedial distal tibia, or the dorsomedial tarsocrural joint capsule attachment, deserve further study. With improvements in the resolution of ultrasound

equipment and with greater understanding of the sonographic anatomy of the dorsal tarsal region, it is likely that the lesions described in this report will be better defined, and the practitioner's ability to diagnose, prognose, and appropriately manage horses with tarsal region swelling will be enhanced.

References

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2. Denoix JM. Ultrasonographic examination of joints in horses, in *Proceedings*. 47th Annual Meeting of the American Association of Equine Practitioners 2001;366–375.