

# What Is Your Diagnosis?

In cooperation with

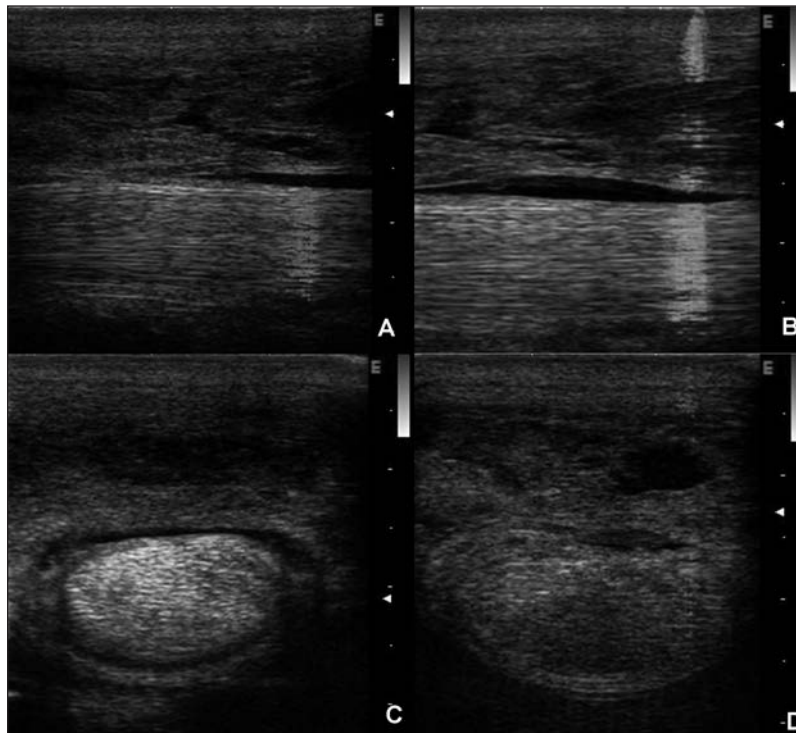


Figure 1—Ultrasonographic images of the palmar metacarpal region approximately 24 to 28 cm distal to the accessory carpal bone in a 9-year-old Standardbred mare with intermittent fever, reluctance to move, and prolonged recumbency. Longitudinal (A) and cross-sectional (C) ultrasonographic views of the left forelimb digital flexor tendons and longitudinal (B) and cross-sectional (D) ultrasonographic views of the right forelimb digital flexor tendons are shown.

## History

A 9-year-old Standardbred mare with intermittent fever, reluctance to move, and prolonged recumbency was evaluated at the Large Animal Hospital at Tufts University. During the 5 days prior to evaluation, the horse had developed a reluctance to walk and attempted to shift its body weight away from the forelimbs and onto the hind limbs. These signs had progressed in severity, despite NSAID administration and application of frog (cuneus ungulae) support pads to the forefeet.

Pertinent history included dystocia and caesarian section to remove a dead, full-term fetus 40 days earlier. After surgery, the mare received gentamicin IV, ceftiofur IV, and metronidazole PO for 10 days. After discontinuation of antimicrobial treatment, the mare developed complications associated with the abdominal and uterine incisions, which were treated with several antimicrobial treatment regimens, including enrofloxacin IV, ceftiofur IV, and rifampin PO for 14 days and amikacin IV for 14 days.

During physical examination, extreme signs of pain were evident when the horse was standing, walking, or turning, despite abaxial sesamoid nerve blocks in both forelimbs. Pulse character at the digital arteries was within reference limits. In all limbs, swelling was evident in the distal one-third region of the metacarpal and metatarsal bones. This swelling was severe in the forelimbs and only slight in the hind limbs, and palpation of these regions triggered severe signs of pain. It was subjectively noted that the application of leg wraps to the lower portion of the forelimbs made the mare appear more comfortable. High palmar nerve blocks resulted in an 80% improvement in the severity of the forelimb lameness. Ultrasonographic examination of the soft tissue structures in the region of the metacarpus was performed with a 10-MHz linear transducer (Figure 1).

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page →

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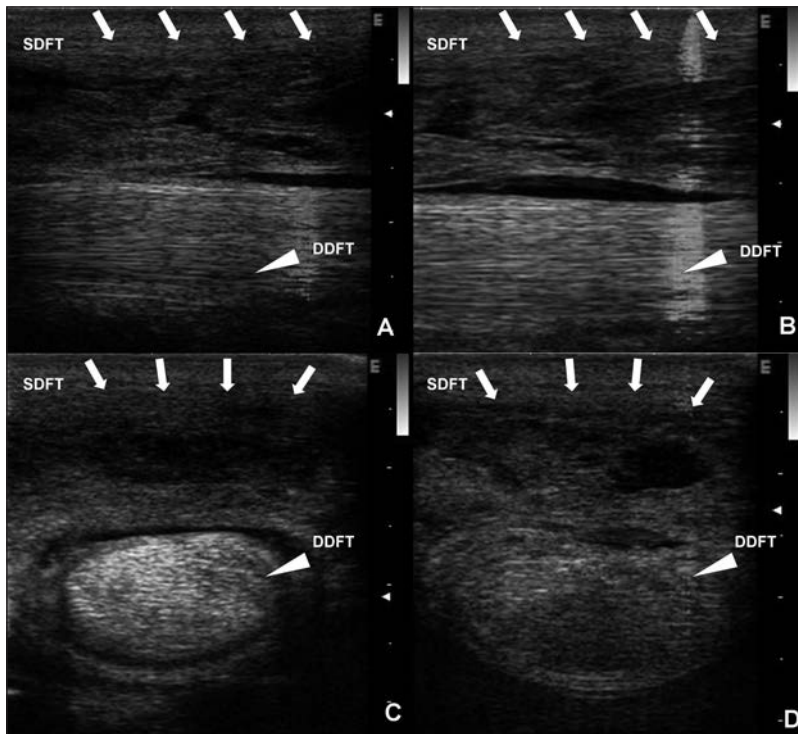


Figure 2—Same ultrasonographic images as in Figure 1. Notice the fiber disruption in the longitudinal view (arrows in A and B) and the diffusely decreased echogenicity in the transverse view (arrows in C and D) of the superficial digital flexor tendons (SDFT). The deep digital flexor tendons (DDFT) appear unremarkable (arrowheads). Notice the artifactual hyperechoic streaking in the longitudinal views A and B. Also notice that the DDFT appears hypoechoic in the right forelimb (D), compared with the left forelimb (C), likely because of anisotropism.

### Diagnostic Imaging Findings and Interpretation

Ultrasonographic examination of the digital flexor tendons in the region of the swelling revealed atypical echogenic heterogeneity and an overall decrease in echogenicity of the superficial digital flexor tendons (SDFTs) in both forelimbs (Figure 2). Marked disruption of the normal fiber pattern was also noted in these areas just proximal to the metacarpophalangeal (fetlock) joints. Although identification of the SDFT margins was impaired by the complete loss of fiber pattern, approximation of these margins confirmed the subjective impression of an increase in cross-sectional area. Based on the degree of fiber disruption and hypoechogenicity of the SDFT lesions, a diagnosis of complete rupture of the left front SDFT and > 75% rupture of the right front SDFT was made. Ultrasonographic examination of the hind limbs revealed increased cross-sectional area of the right hind SDFT and tendon sheath effusion. For completeness, abdominal ultrasonography was performed, and findings were compatible with intramural uterine abscess formation at the site of the uterine incision. Peritoneal effusion was not evident.

### Treatment and Outcome

Despite treatment with splint support and aggressive pain management including regional anesthesia, continuous IV administration of analgesic drugs, and oral administration of gabapentin, the mare was eutha-

nized on day 6 of hospitalization because of uncontrollable pain and the associated poor prognosis for recovery. Necropsy confirmed rupture of the SDFTs in both forelimbs with histologic evidence of severe subacute bilateral segmental fibrihemorrhagic tendonitis, collagenolysis, and granulation tissue formation.

### Comments

Reluctance to bear weight on the forelimbs, difficulty walking, and difficulty turning are clinical signs most commonly observed in horses with laminitis. In the horse of the present report, the concurrent history of inflammatory and infectious conditions heightened the suspicion of laminitis. However, the digital pulse character and localization of signs of pain between the fetlock joint and proximal aspect of the metacarpus by regional anesthesia combined with focal swelling warranted further evaluation of the digital flexor tendons in the region of the metacarpus.

Ultrasonographic evaluation is commonly used to evaluate tendons and ligaments in horses.<sup>1</sup> Fiber disruption is indicated by loss of fiber alignment and the presence of hypoechoic fluid pockets, with the severity of injury determined by the extent and degree of disruption in

the affected area. In the horse of the present report, a diagnosis of bilateral SDFT rupture was made.

Reported causes of injury to the SDFTs, including isolated trauma or accumulation of repetitive strains, typically affect only 1 limb.<sup>2</sup> The definite cause of this severe bilateral tendinopathy could not be determined; however, we speculate that the bilateral nature of the condition, ultrasonographic appearance of the tendons, and history of enrofloxacin treatment made fluoroquinolone-associated tendinopathy the primary differential diagnosis. Fluoroquinolone-associated tendinopathy and tendon rupture are well documented in humans.<sup>3</sup> Unlike in humans, severe tendinopathy and tendon rupture have not been reported in association with fluoroquinolone treatment in horses.<sup>4</sup> In the horse of the present report, enrofloxacin had been administered for 14 days at a commonly used dosage (10 mg/kg [4.5 mg/lb], IV, q 24 h) and was discontinued 16 days prior to hospital admission.

1. Whitcomb MB. Ultrasonographic evaluation of the metacarpus, metatarsus, and pastern. *Clin Tech Equine Pract* 2004;3:238–255.
2. O'Sullivan CB. Injuries of the flexor tendons: focus on the superficial digital flexor tendon. *Clin Tech Equine Pract* 2007;6:189–197.
3. Khaliq Y, Zhanel GG. Fluoroquinolone-associated tendinopathy: a critical review of the literature. *Clin Infect Dis* 2003;36:1404–1410.
4. Bertone AL, Tremaine WH, Macoris DG, et al. Effect of long-term administration of an injectable enrofloxacin solution on physical and musculoskeletal variables in adult horses. *J Am Vet Med Assoc* 2000;217:1514–1521.