Diagnostic Approaches to Lameness of the Proximal Metacarpus and Carpal Sheath

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Diagnosis of lameness caused by lesions of the distal radius, proximal metacarpus, and carpal tendon sheath often requires an extensive clinical examination, including careful palpation, examination of the horse in hand and under saddle, and regional anesthesia. Lesions are often difficult to identify with the use of conventional imaging modalities. Author’s address: Miller & Associates, 120 Nichols Road, Brewster, NY 10509; e-mail: kit.miller.dvm@miller-dvm.com. © 2013 AAEP.

1. Introduction
The distal radius, proximal metacarpus, and distal forearm, including the carpal tendon sheath and its enclosed soft-tissue structures, is a frequent and often confusing source of performance-limiting lameness in the show horse. Lameness referable to this area can be difficult to identify and to image accurately. Diagnosis of these conditions is dependent on a thorough clinical examination, including palpation and diagnostic anesthesia, and the horse must be examined on multiple surfaces both in hand and under saddle. Radiography is often equivocal, and treatment decisions frequently depend on the results and interpretation of the clinical and ultrasonographic examinations.

2. Anatomy
The carpal canal, which contains the carpal tendon sheath, is formed by the accessory carpal bone and associated ligaments laterally, the accessory ligament of the superficial digital flexor tendon (ALSDF) medially, the palmar carpal ligament dorsally, with the palmar border formed by the flexor retinaculum and palmar metacarpal fascia. The carpal sheath contains both the superficial digital flexor tendon (SDFT) and the deep digital flexor tendon (DDFT) and is immediately adjacent to the distal palmar radius. The anatomical location of these structures is important to understand when trying to decipher the results of individual peripheral nerve and intrathecal blocks.

3. Imaging
Conventional imaging (radiology and ultrasound) of the distal radius proximal metacarpus and especially the carpal tendon sheath can be difficult to interpret. Whereas soft-tissue injuries to the SDFT or suspensory ligament in the proximal metacarpus are often easily diagnosed with simple palpation and routine ultrasound examination, soft-tissue injuries in the region of the distal radius can be difficult to identify. It is possible to obtain accurate ultrasound images of the soft-tissue structures within the carpal tendon sheath, however, and interpretation of the images requires a thorough knowledge of the gross anatomy. Ultrasound images of the DDFT and SDFT, along with its accessory ligament, within the carpal sheath, are most easily obtained with the ultrasound transducer positioned caudo-medially over the region of the
sheath and axial to the accessory carpal bone. Images of the SDF and DDF muscles along with their musculotendinous junctions in the distal antebrachium can be obtained with the probe placed at the back of the forelimb. The presence of muscle fibers interspersed with the superficial and deep tendons at the musculotendinous junctions makes image interpretation of these structures particularly difficult. It is helpful to routinely image both front limbs simultaneously to help make an accurate determination.

Radiographs are often inconsistent at providing a diagnosis. Some bony lesions at the back of the radius, such as osteochondromas, are consistently identified radiographically. Osteochondromas are cartilage-capped outgrowths from the palmar radial cortex and consist of a mixture of cartilage and bone. They are typically located proximal to the physeal scar on the caudomedial radius. Osteochondromas can impinge on the DDFT within the carpal sheath, resulting in carpal sheath effusion and lameness. Other bony abnormalities such as physeal remnant spikes, located at the level of the physis on the caudal radius, or enthesiophytes on cortex of the proximal palmar metacarpal bone can be very difficult to image because of their small size and superimposition of other bony structures.

4. Diagnostic Approach
Acute lameness related to the proximal metacarpus and carpal sheath appears to be quite common in show jumpers and hunters. A typical history is the horse that exercises quite vigorously, either in the ring or on the lunge line, without apparent incident, and becomes acutely and often markedly unsound. Frequently, the lameness may not become apparent for more than 24 hours. In the author’s opinion, this is a classic “high suspensory” history. Frequently, the affected limb is unremarkable to physical examination. Occasionally, there is mild venous congestion in the proximal, medial metacarpus region, but generally the limbs are often surprisingly normal on palpation, given the magnitude of the lameness. It is important to rule out the lower limb as the source of lameness with systematic nerve blocks before anesthetizing the structures of the proximal metacarpus. As with palpation, images of the affected proximal metacarpus are often unimpressive. In our practice, horses with this type of history and clinical symptoms are treated symptomatically with ice, nonsteroidal anti-inflammatory agents, and rest, and they are rechecked in approximately 10 days. Some horses improve dramatically in that time period. At the 10-day re-check, if the horse jogs soundly with no palpable abnormality and no demonstrable lesion on ultrasound, we will typically start light exercise. This usually consists of walking the horse under tack for an additional 10 days followed by tack-walking with short, straight-line trotting intervals for another 10 days. If the horse remains normal on clinical and ultrasound evaluation at that time (30 days after injury), it is gradually returned to normal exercise. For horses that show any lameness during this progression, we return it to walking-only exercise for a 2-week period and try again. In horses with lesions of the proximal suspensory that can be identified on ultrasound examination, we begin the exercise progression once the horse is sound and the lesion has resolved.

In the show hunters and jumpers, it is important to differentiate whether lameness localized to the proximal metacarpus is caused by proximal superficial flexor tendonitis or injury to other soft-tissue structures. Proximal SDFT injury is often a progressive, degenerative condition, which occurs more frequently in the older show hunters and jumpers. Affected individuals are often observed to have a subtle forelimb gait asymmetry when first ridden, which resolves quickly as the animal warms up. In the author’s opinion, these horses are often uncomfortable at the canter, and, in the early stages, the lameness may be transient or indiscernible at the trot. There may be a brief period of lameness after vigorous exercise, which resolves spontaneously. Swelling of the proximal SDFT may be difficult to identify because the affected tendon may be constricted within the carpal sheath, making effusion uncommon. However, the soft-tissue swelling may be present if the injury extends distally into the proximal metacarpus. Because proximal SDF tendonitis is an important rule-out in the older show horse, diagnostic blocking patterns are an important consideration. Anesthesia of the lateral palmar nerve on the axial surface or at the base of the accessory carpal bone will frequently anesthetize both a proximal suspensory desmitis and a proximal SDF tendonitis. The lateral palmar nerve block is performed by injection of a small volume of anesthetic solution into the longitudinal groove along the medial aspect of the accessory carpal bone in its distal one-third. The needle is advanced until it contacts the carpal bone, and the anesthetic solution is deposited. It is important to image all of the soft-tissue structures in the proximal metacarpus in horses whose lameness resolves with the lateral palmar nerve block, most particularly the SDFT and the origin of the suspensory ligament. Practitioners who diagnose proximal suspensory desmitis with local infiltration of the suspensory origin are at risk of missing a case of proximal SDF tendonitis if they do not also anesthetize the lateral palmar nerve, because local infiltration of the suspensory origin may not effectively anesthetize the proximal SDFT. Furthermore, if the SDF tendonitis extends proximally into the carpal canal, anesthesia of the lateral palmar nerve may result in improvement but not complete abolition of the lameness. It is particularly important, then, to consider the horse’s age, history, and clinical presentation in making this diagnosis.
Lameness of the carpal tendon sheath may also be a performance-limiting condition in show horses, particularly in the jumpers and equitation horses. Acute injury to soft-tissue structures within the sheath, such as the SDFT and DDFT, frequently causes a significant and easily identified carpal tendon sheath effusion. The ALSDFT and palmar radial physis and cortex are peripheral to the sheath; therefore, carpal tendon sheath effusion in these cases is more variable. Diagnosis of lameness related to structures within the carpal sheath often requires an extensive clinical examination. Affected horses may be much more lame when examined with a rider than in hand, and the lameness may be somewhat transient. In addition, the results of diagnostic anesthesia can be somewhat confusing in that the lameness may be markedly improved though not completely abolished. Lameness caused by SDFT or DDFT injury within the carpal tendon sheath should resolve or nearly resolve after anesthesia of the carpal tendon sheath because the affected structures are contained within the sheath. Results of intrathecal anesthesia are somewhat more variable for horses whose lameness is caused by pathology of the distal radius or ALS-DFT because sections of these structures are outside of the sheath.

Injury to the SDF can also occur in the distal antebrachium at the musculotendinous junction. This condition is similar to proximal SDF tendonitis because it tends to occur in older individuals. In the author’s opinion, this type of lameness is often acute in onset and frequently occurs when an older show horse stumbles and becomes severely lame. The flexor muscles may be rigid and visibly or palpably thickened in affected horses. Severely affected animals may stand with the carpus in flexion and may be resistant to full weight-bearing. Because the injury involves the flexor muscle, it may be difficult to identify on initial ultrasound, though the echogenicity of the muscle tissue will change significantly over time and can be tracked with serial ultrasound examinations of the superficial flexor muscles at the back of the radius.

Carpal joint lameness is an infrequent diagnosis in our practice. In the author’s opinion, many show horses compete successfully with carpal joint pathology, particularly to the dorsal aspect of the intercarpal and radiocarpal joints. Injury to the palmar aspect of these same joints occurs after direct trauma and is frequently of much greater consequence. Jumping horses will occasionally fall, with a rail caught at the back of their carpus, and traumatize or fracture their accessory carpal bone. These injuries may be performance-limiting or even performance-ending, depending on the extent of the trauma.

Diagnosis of lameness in the proximal metacarpus and carpal sheath is often difficult and time-consuming. A complete and thorough clinical examination, including careful palpation, examination of the horse in variable settings, and systematic diagnostic anesthesia, are essential. The affected structures have overlapping anatomic location and innervations, and conventional imaging is frequently suggestive rather than definitive. Being systematic and thorough, it is possible to accurately identify many of these conditions. Many can be managed with combinations of physical therapy and medication, both intrathecal and systemic. For horses with injury to tendons or ligaments within the carpal tendon sheath, tenoscopy often has a favorable outcome. Tenoscopy allows accurate visualization of the structures within the sheath, and surgical debridement of lesions is often important for complete resolution of the lameness. For horses with progressive, degenerative injury, particularly to the proximal SDF tendon and SDF muscle, the rate of injury recurrence is quite high. Many of these horses will have their show careers prolonged if they are accurately diagnosed when the condition is in its early stages.

References