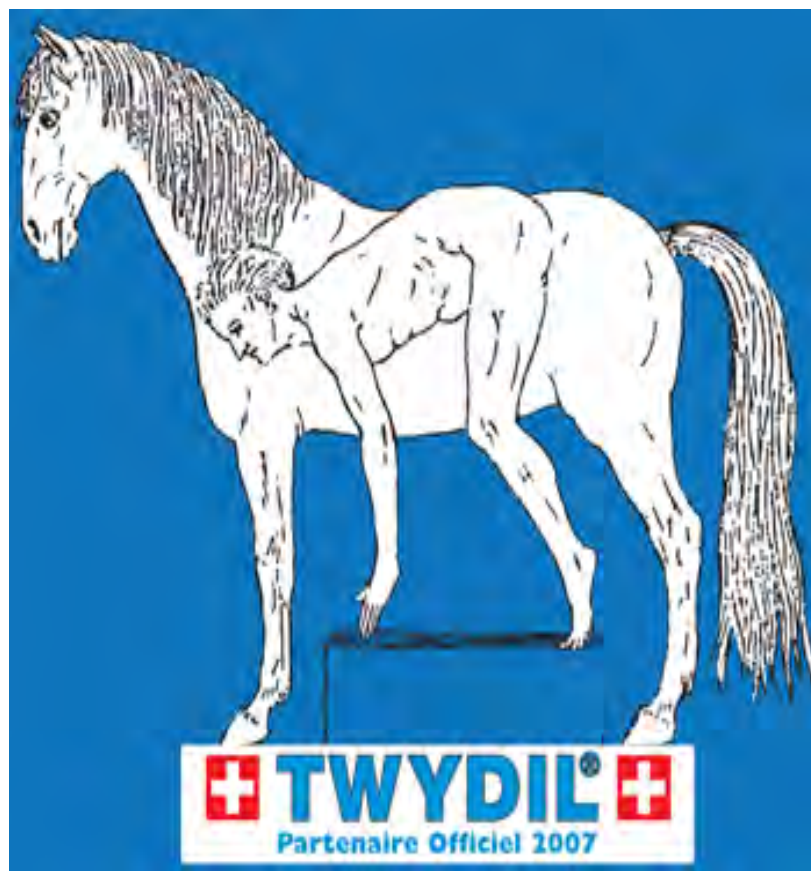


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DIAGNOSIS OF SOFT TISSUE INJURIES OF THE FOOT USING CONTRAST ENHANCED COMPUTED TOMOGRAPHY

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The role and frequency of soft tissue injuries in horses with chronic foot pain have become evident with the introduction and advent of cross sectional imaging of the horse's digit. Deep digital flexor tendon (DDFT) lesions are the most common soft tissue lesion in these horses followed by distal interphalangeal (DIP) collateral ligaments and impar ligament injuries. These lesions can be present as the only pathology or in conjunction with other osseous or soft tissue injuries.

Sport horses, particularly those used for jumping events (jumpers, hunters and three- day event horses), are the most commonly affected, although lesions are also occur relatively frequently in dressage, endurance and western performance horses and occasionally in pleasure horses. The typical history includes unilateral forelimb lameness that is alleviated at least partially by perineural anesthesia of the palmar digital nerves at the level of the heel bulbs. Often there has been a poor or temporary response to treatment with shoeing changes or medication of the distal interphalangeal joint or navicular bursa.

Lameness severity ranges from 1 to 3 out of 5 on the AAEP lameness grading scale although occasional horses with very severe lesions present with a more severe lameness (4/5). Response to regional local anesthesia will differ slightly depending on the location of the lesion within the digit. In our experience, this is especially true for palmar digital (PD) nerve anesthesia at the level of the heel bulbs and (DIP) joint anesthesia whereby the lameness may not completely resolve. More proximal injection of local anesthetic around the palmar digital nerves, at the level of the abaxial margins of the proximal sesamoid bones, will typically resolve the lameness. Digital flexor tendon sheath intra-theal anesthesia will resolve or substantially improve the lameness caused by DDFT lesions with the exception of the DDFT

insertional lesions where often only a partial improvement of the lameness is noted.

Horses with lesions of the collateral ligaments injuries will often not block to a DIP joint block

The clinical history and diagnostic anesthesia results will lead to a presumptive diagnosis of a soft tissue injury within the foot. In order to accurately assess the nature and extent of the injury diagnostic imaging must be employed. Routine diagnostics such as radiographs and ultrasound are useful in many cases. Radiographs commonly result yield negative results however a large number of lesions located proximal to the navicular bone can be reliably identified on ultrasound using a micro-convex probe positioned between the heel bulbs. Only the proximal aspect of the collateral ligaments of the DIP can be assessed ultrasonographically. Impar ligament injuries can be documented using transfurcal ultrasound, although this has not been reliable in our experience.

Advanced cross-sectional imaging modalities such as Magnetic Resonance Imaging (MRI) or Contrast Enhanced Computed Tomography (CECT) allow the visualization of the DDFT and its surrounding structures with a high reliability and are therefore preferred. At our institution, both modalities (standing MRI and CECT) are available and can be used to compliment each other; otherwise, CECT is preferred when a soft tissue lesion is suspected as it allows therapeutic interventions (eg. CT guided intra-lesional injections).

Lesions of the deep digital flexor tendon are located (by order of frequency) in the distal pastern region (usually just proximal to the navicular bursa), at the level of insertion on the third phalanx or finally at the level of the navicular bone. Lesion types include dorsal fibrillation

(typically at the level of the navicular bursa, with or without adhesions), lobe enlargement, core lesion and longitudinal splits.

Lesions of the collateral ligaments of the DIP occur at the origin or in the mid part of the ligament.

Imaging characteristics included abnormal tendon/ligament density and contrast enhancement, dorsal enhancement (DDFT) and fibrillation, enlargement, core lesions, mineralization and also adhesions.

Case management varies depending on lesion severity, location and the owners' wishes. In all cases, corrective shoeing and a 5 to 9 months rehabilitation program including periods of rest and controlled exercise are prescribed. In many cases intra-lesional injections are performed using CT guidance while the horse is under anesthesia, ultrasound or radiographic guidance while the horse is standing and sedated. Injections into the tendon/ligaments are usually reserved for core lesions, longitudinal splits or diffuse enlargement.

The medications used in our hospital include bone marrow supernatant, fat derived mesenchymal stem cells, cultured marrow derived mesenchymal stem cells, and platelet rich plasma. In cases where the predominant lesion involves either longitudinal splits or dorsal DDFT border fibrillation with or without adhesions debridement using tenoscopy or navicular bursoscopy is performed. Acoustic shock wave therapy and transcutaneous for the origin of the DIP collateral ligament and through a transcuneal approach for treatment of DDFT insertion lesions and impar ligament lesions.