Digital Sheath Tenosynovitis: Diagnosis, Treatment and Prognosis

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The digital sheath is a complex synovial structure which surrounds the superficial (SDF) and deep (DDF) flexor tendons from proximal to the fetlock joint distally to mid-pastern. Normally, the sheath contains a small amount of synovial fluid, which serves to promote gliding of the flexor tendons around the palmar/plantar aspect of the fetlock joint. With severe inflammation the sheath can become greatly distended, reaching to mid-metacarpus proximally, and/or "herniating" palmar to the SDF tendon on mid-line. Digital sheath swelling is frequently dismissed as a blemish rather than a lameness issue. In fact, in more than 20% of cases with swelling, lameness will eventually occur and can be career ending. Early diagnosis using ultrasound, followed by appropriate therapy, can avoid future performance problems.

Diagnosis

Clinical signs of digital sheath synovitis reflect the degree of inflammation, which can be categorized into 3 stages. It is not uncommon for athletic horses to present with swelling (Stage 1 synovitis) of unilateral or bilateral forelimb or hind limb digital sheaths. Often, sheath distension decreases following exercise. The distension is fluidly fluctuant on palpation. The patient is sound, non-painful or minimally painful to sheath palpation, and mildly to moderately positive to fetlock flexion. Ultrasonographic examination reveals a moderate amount of fluid in the affected sheath(s), with no evidence of synovial proliferation or adhesions between the tendons and sheath walls. It is important to fully evaluate a horse presented at this stage to determine the cause of digital sheath distension, particularly if only one limb is affected as this strongly indicates overload from lameness elsewhere. Foot balance can also be a contributory factor, in particular uneven heel height between paired limbs or long-toed, low-heeled foot shape.

If synovitis progresses from the effusive stage to synovial proliferation (Stage II), clinical signs include mild to moderate intermittent lameness; often seen first, (if the horse has only one limb affected), as an attempt by the horse to guard the affected sheath by failing to fully extend the fetlock. This is seen as a decreased drop in the fetlock during the stance phase of gait compared to the opposite fetlock. This can be most readily detected by observation of the horse from behind at a walk. If the horse has bilateral digital sheath synovitis, the decreased fetlock drop is more difficult to assess, but can be exacerbated by flexion of the fetlock(s). The digital sheath is firm rather than fluid on palpation, and one aspect of the sheath, usually the lateral aspect, will be more distended. The horse will be positive to fetlock flexion, as this maneuver compresses the sheath. Ultrasonographic examination will reveal distension of the sheath with fluid and proliferative synovial lining. Proliferative tissue may also begin to cover the surfaces of the flexor tendons.

If synovitis progresses to Stage 3, synovial proliferation and inflammatory product secretion may cause the patient to be more consistently lame, or, if the horse is bilaterally affected, to have a consistently shortened caudal phase to the stride and decreased fetlock drop. Ultrasonographic examination will reveal extensive synovial proliferation, often covering the surfaces of the flexor tendons, and one or more adhesions between the tendons and the sheath wall. Often, chronic digital sheath synovitis is accompanied by damage to either the superficial or deep flexor tendons, probably due to the same wear and tear process that caused sheath synovitis; in addition to being exposed long term to the inflammatory products circulating in the sheath, being compressed by synovial proliferation, and finally, due to active pulling on the tendons by adhesions in the sheath.

Septic digital sheath synovitis. The horse will be Grade IV-V/V lame on the affected limb, reluctant to place the heels of the foot on the ground, and will likely not tolerate fetlock flexion. The digital sheath will be distended, painful, and...
firm on palpation. Ultrasonographic evaluation will reveal highly cellular fluid in the acute stage accompanied by fibrin and adhesions in more chronic cases. An ultrasound guided aspirate will confirm sepsis and provide material for culture and sensitivity testing.

### Treatment and Prognosis

Treatment of Stage 1 synovitis is medical, and may consist of 2-3 weeks of local or systemic anti-inflammatory medication, cold hosing/icing of the affected limb(s), placement of the patient on a course of IM Adequan and supplementation with oral glucosamine and hyaluronic acid. A full lameness evaluation is indicated at this time to diagnose and treat any inciting causes. Corrective shoeing, if needed, should be implemented. If the digital sheath does not decrease substantially in size after 2-3 weeks of therapy, injection of the sheath is indicated. As long as the horse is in full athletic use, medical treatment may be required to prevent progression to Stage 2 synovitis. Prognosis for Stage 1 synovitis is excellent.

Treatment of Stage 2 synovitis includes the above. Patients that do not respond fully to medical treatment may require tenoscopy to remove excess proliferative synovial tissue. Tenoscopy must be followed by aggressive medical therapy, generally including a series of hyaluronic acid and steroid injections. Small edge tears in the flexor tendons may be detected on tenoscopy that were obscured by proliferative synovium on ultrasound. If so, the tendon will need a rehabilitation period of 6-8 months to heal. Prognosis for Stage 2 synovitis is fair to good for full athletic work, if appropriate treatment is performed in a timely manner.

Treatment of Stage 3 synovitis requires medical and surgical treatment, as outlined above for Stage 2. Prognosis for Stage 3 synovitis is guarded for full athletic use. Without treatment, these patients may progress to lameness even at a walk.

Treatment of septic tensosynovitis involves appropriate antibiotic therapy and flushing which may include tenoscopy to remove debris. It is critical for a successful outcome to concurrently treat for inflammation; otherwise the infection can be eliminated only to find that the horse continues to be lame from Stage 3 synovitis.

### Surgical intervention

Surgery involves first a thorough exploration of the tendon sheath, superficial digital flexor, deep digital flexor, and intersesamoidean ligament. All proliferative masses are removed. Adhesions present between the tendons and the tendon sheath are likewise debrided back to their bases. Similar adhesions between the tendons are managed by severing the adhesions midsubstance and debriding only one edge back to the base. This is important for reducing the potential of two apposing tendinous lesions scarring together and increasing the risk of new adhesion formation.

The ultrasound image below is of a digital sheath distended with effusion and synovial proliferation (Stage II synovitis).
Selected References:


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- Dr. Carol Gillis is a graduate of UC Davis School of Veterinary Medicine, developed a sport horse practice and became one of the first equine veterinarians to perform ultrasound examinations on the musculoskeletal system of horses.
- Dr. Gillis returned for an equine surgery residency at UC Davis. Following completion of the residency, she obtained a PhD in equine tendon pathophysiology. Concurrently, she established the equine ultrasound service at UC Davis, pioneering ultrasound of the musculoskeletal system at the University and creating courses and wet labs to train veterinary students, residents and veterinarians on how to perform and interpret ultrasonographic examinations.
- Dr. Gillis has developed many exam protocols for previously unexamined sites on the horse, is the author of more than 50 scientific publications on equine soft tissue injury diagnosis and treatment in journals such as the American Journal of Veterinary Research and the Journal of the American Veterinary Medical Association; and recently was an author of “Equine Sports Medicine and Surgery.”
- Dr. Gillis has presented on Equine Sports Medicine topics nationally at the American Association of Equine Practitioners and the American College of Veterinary Surgery meetings and internationally in the United Kingdom, France, Japan, Dubai, Argentina and Mexico.
- Dr. Gillis has performed more than 22,000 ultrasound examinations of the horse and guided successful treatment of problems identified. Most recently, she has developed a sports medicine consulting practice in Aiken, South Carolina and is a charter member of the American College of Veterinary Sports Medicine and Rehabilitation.