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Anatomy and clinical disease of the less commonly affected tendon sheaths and bursae

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Abstract

The purpose of this presentation is to serve as a limited reference for clinicians asked to evaluate focal, fluctuant swelling located over the carpus or tarsus. The more commonly affected joints and tendon sheaths will be disregarded and the focus will be on those structures that are less commonly involved. A brief review of the anatomy of each synovial structure will be followed by case material showing the clinical appearance of disease, its diagnosis and possible treatment options.

Synovial structures overlying the carpus

Beginning dorsomedially and tracking laterally the first structure to be considered is the tendon sheath surrounding the tendon of insertion of the extensor carpi radialis muscle (Fig. 1 and 2 A). The tendon is contained within its sheath as it travels over the middle, axial groove of the distal radius before inserting on proximal metacarpal III. The tendon sheath begins approximately 10 cm proximal to the carpus and extends over the carpometacarpal joint. At its insertion the tendon is cushioned by a subtendinous bursa. The latter often communicates with the carpometacarpal joint (Wissdorf 2010). Septic tenosynovitis of this tendon sheath is an uncommon complication of dorsally located carpal wounds (Honnas et al. 1991).

Continuing in a lateral direction the tendon of the extensor digitalis communis muscle tracks through the lateral groove of the distal radius. It comprises a large humeral head and a slight radial head. Although the latter remains relatively isolated both are contained within a common tendon sheath (Fig. 1 B). This common sheath begins approximately 6-8 cm proximal to the carpus and splits at the...
proximal aspect of the third metacarpus to accommodate the lateral deviation of the radial head (German anatomy texts refer to the ‘Phillip’s-tendon’) to the lateral digital extensor tendon (Wissdorf 2010). This tendon sheath deserves particular attention in both foals and adult horses. In cases of flexural contracture overload of the extensor tendons can lead to unilateral or less commonly bilateral rupture of the common digital extensor tendon within its carpal tendon sheath. Foals present with a characteristic fluctuant swelling located dorsolaterally over the carpus (distension of the tendon sheath) and an inability to extend the lower limb (Auer 2006). Infection of this tendon sheath in the adult horses can be the cause of persistent effusion and lameness and resection of larger sections of the tendon and its sheath may be necessary (Booth et al. 2004).

A (traumatically) acquired subcutaneous precarpal bursa is commonly located dorsal to the third carpal bone and is refered to as ‘hygroma’. Filling of this bursa should be differentiated from effusion of the carpal joints (a true hydrops or joint herniation) and the tendon sheaths of the extensor tendons.

The circular tendon of the lateral digital extensor muscle travels over the carpus through the groove within the lateral styloid process of the distal radius. Its tendon sheath begins approximately 6-8 cm proximal to the carpus. The tendon within its sheath is laterally restricted by the lateral collateral ligament (Fig. 1 C).

The tendon sheath of the laterally located tendon of the extensor carpi ulnaris muscle (commonly referred to in English anatomy texts as ‘ulnaris lateralis’ (Dyce 1996)) begins proximal to the accessory carpal bone. The tendon within its sheath travels through a groove on the lateral aspect of the accessory carpal bone and inserts proximally on the fourth metacarpal bone (Fig. 1 D). A second insertion of this tendon on the accessory carpal bone lacks a tendon sheath.

The abductor pollicis longus muscle (extensor carpi obliquus (Dyce 1996)) also has its own tendon sheath (Fig. 2 E). It crosses the carpus in a proximolateral to distomedial direction, tracking beneath the extensors with the exception of the extensor carpi radialis tendon. Travelling through the medial ridge of the distal radius the tendon inserts on proximal metacarpus II (Wissdorf 2010).

The carpal sheath surrounds the superficial and the deep digital flexor tendon in the region of the carpus. It extends from approximately 8-10 cm proximal to the radiocarpal joint distally to the point of merger of the inferior check ligament with the deep digital flexor tendon (junction first to second third of the metacarpus). Distally the wall of the sheath merges with the superficial digital flexor tendon. The single proximal outpouching of the sheath lies laterally between the lateral digital extensor and extensor carpi ulnaris tendon (Fig. 1 F). The distal extent of the sheath can be seen both laterally and medially at the junction of the proximal and middle thirds of the metacarpus (Fig. 2 G). Septic tenosynovitis and intrathecally located soft tissue trauma or bony proliferation are the most common causes of carpal sheath pathology, warranting further diagnosis and treatment (Nixon et al. 2004; Southwood et al. 1998).

The digital flexor tendons are covered mediopalmarly by the tendon of insertion of the flexor carpi ulnaris muscle. This tendon lacks a sheath and inserts medially on the accessory carpal bone. The flexor carpi radialis muscle has a circular tendon with its own tendon sheath (Fig. 2 H). It too covers the flexor tendons medially as it tracks over the flexor surface of the carpus. This tendon ends on proximal metacarpal II.
Synovial structures overlying the tarsus

Beginning dorsally: At the distal tarsus the tendon of the tibialis cranialis muscle travels through that of the peroneus tertius muscle. It is surrounded by a tendon sheath that ends shortly before the tendon splits into two for its insertion on proximal MTIII and medially on TI, TII and the medial proximal splint bone (Fig. 3 A). The medial insertion, known as the cunean tendon, courses over a bursa which in the past has been ascribed clinical importance with regard to lower tarsal joint pain (Gabel 1979a, b) (Fig. 5 B).

Also dorsally located is the tendon of the peroneus tertius muscle. At the height of the proximal third of the tarsus the tendon divides into lateral, middle and medial branches. All 3 are without tendon sheaths.
The tendon of the long digital extensor muscle begins proximal to the tarsus. In its dorsolateral location it is surrounded by a tendon sheath which extends to the proximal metatarsal region shortly before the long and the lateral digital extensor tendons merge (Fig. 4 and 5 C).

Laterally the tendon of the lateral digital extensor runs through a groove in the lateral malleolus. It is held in place by a number of fascial bands and merges with the tendon of the long digital extensor muscle at the junction between the proximal and middle third of MTIII. It is surrounded by its own tendon sheath, beginning at the height of the lateral malleolus (Fig. 4 D). Fluid distension of the latter two tendon sheaths can be idiopathic and is not necessarily associated with lameness.

The medial digital flexor tendon is one of three structures comprising the deep digital flexor tendon (DDFT). It runs through a ridge in the medial malleolus of the distal tibia at the medial to plantar junction of the tarsus. It tracks medially and distally and is surrounded by a tendon sheath (Fig. 5 E) which communicates distally with the tarsal sheath. Its involvement should be borne in mind when addressing medially located tarsal wounds.

The second and third components of the DDFT, the lateral digital flexor tendon and the tendon of the caudal tibial muscle glide through the sustentaculum tali within the tarsal sheath. This tendon sheath begins at the height of the tuber calcanei and extends to the height of the proximal splint bones. Effusion of the tarsal sheath is most prominent medially but can also be observed laterally as an oval fluctuant non-painful subcutaneous swelling (so-called ‘Kurbengalle’, ‘thoroughpin’) (Fig. 4 and 5 F). Idiopathic effusion may occur but unilateral presentation more commonly results from septic tenosynovitis or chronic inflammation resulting from bony change affecting the sustentaculum tali (Cauvin et al. 1999; Edwards 1978).

The superficial digital flexor tendon forms the cap of the hock. At this location it is bound by 2 synovial cushions. The first is the subcutaneous (Fig. 4 and 5 G), the second the subtendineal bursa (Fig. 4 and 5 H). In the case of effusion in this region ultrasound evaluation allows differentiation of these two structures, which is of importance clinically and for prognostication (Post et al. 2003). The subcutaneous bursa lies between the skin and the superficial digital flexor tendon. Its distension is referred to as ‘Piephacke’ or ‘capped hock’ (Van Pelt and Riley 1968). Repetitive trauma may also result in acquired bursae (also termed ‘capped hock’).

The larger subtendinous bursa is located dorsal to the superficial digital flexor tendon (SDFT). Further differentiation of this structure is necessary into the intertendinous bursa (between SDFT and gastrocnemius tendon) and the more dorsally located gastrocnemius calcaneal bursa. Communication between the two compartments is always present though there is variability from the medial to the lateral aspect (Post et al. 2007). This bursa can extend up to approximately 10 cm proximal to the point of the hock and distally an average of 7 cm. The German literature refers to its distension as ‘Eiergalle’.

Most of the tendinous structures that pass over the carpus and tarsus are aided in their action by synovial structures (tendon sheaths or bursae). Knowledge of their anatomy will help the clinician recognise involvement and to decide on course of action.


