The fascia of the equine metacarpus

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BACKGROUND The fascia of the metacarpal region has not been well described in the horse. The organization of fascia in the limb may assist in understanding loading patterns.

METHODS Eight distal forelimbs (left and right) disarticulated at the carpus were obtained from horses with no evidence of distal forelimb injury and euthanized for reasons not associated with this study. Specimens were allowed to dry at 4°C for 2–3 days before dissection.

RESULTS Dorsally, several thin layers of fascia covered the third metacarpal bone (McIII), each with a highly irregular fibril arrangement. Pulling forces applied to each layer elicited a more parallel fiber alignment in the direction of force. At least 3 layers were easily separable (Fig. 1): 1. The most superficial layer consisted of two thin sheets (inseparable in fresh undried specimens) that merged with the middle layer along the lateral margins of the extensor tendons and the palmar border of the second metacarpal bone (McII) and McIII. 2. The middle layer encased the extensor tendons and could be followed around the medial and palmar aspect of the metacarpus. Distolaterally, it attached to the fourth metacarpal bone (McIV) and McIII with a parallel arrangement of fibers oriented in a mediolateral direction (Fig. 2). 3. The deepest layer was comparatively thin and, distally, it attached laterally and medially along the palmar border of McIII. Laterally, it was traversed by a communicating nerve branch (Fig. 2). Proximally, it continued across both McII and McIV to blend with the fascia surrounding the flexor tendons.

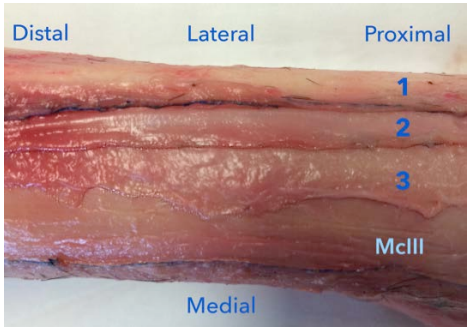

Figure 1.

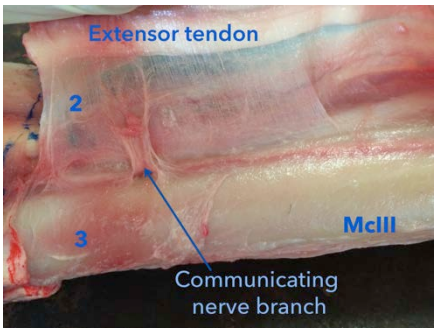

Figure 2.

Palmarly, fascia surrounding the flexor tendons was intricately organized along the length of the metacarpus. Proximally, a thick, strong sheet passed from McII to McIV, closely investing the flexor tendons and maintaining their position along the palmar aspect of McIII. This sheet extended and blended with fascia surrounding the accessory ligament of the deep digital flexor tendon (DDFT). Superficially, it had a cross-hatched arrangement of fibers oriented distolaterally and distomedially which tapered along McII and McIV. Distally, it thinned and encased the communicating nerve branch on the superficial surface of the superficial digital flexor tendon. At about the junction of the proximal and middle thirds of McIII, it blended on each side with the dorsal middle layer and was continuous with fascia extending between the DDFT and the interosseus ligament. Either side of the flexor tendons, medial and lateral palmar nerves and vessels were invested in a dense fascial hiatus originating from fascia covering the dorsal and palmar aspects of the metacarpus.

CONCLUSIONS The equine metacarpal fascia is a complex arrangement of layers and fibrillar alignments which suggests that the metacarpal tissues experience a wide variety of tensile loads and orientations. Extension of this study to the fascia of the proximal and distal forelimb can help us better understand load distribution and movement patterns in the horse.