Introduction
Lameness originating in the carpal sheath has probably been underestimated and with the improvement in diagnostic techniques, several pathological conditions have been addressed as causes of carpal canal swelling and low grade lameness. Classic tenosynovitis, radial osteochondroma, tendonitis and myotendonitis of the flexor tendons and fracture of the accessory carpal bone have been recognized as causes of carpal canal syndrome. Recently, radial physeal caudal spikes, exostoses developing at the level of the closed physis, are reported as a cause of damage to the deep digital flexor tendon (DDFT) and as being responsible for carpal tenosynovitis with the same pathogenesis reported for the osteochondroma, from which they differ radiographically and histologically. Both kind of exostoses mentioned can be responsible for deep digital flexor tendon damage and consequently, for the clinical signs of tenosinovitis and mild lameness. In the author’s experience, carpal canal tenosinovitis is often related to the caudal exostosis, which can be under diagnosed especially if of small size.

Diagnosis
Carpal sheath tenosinovitis results in intermittent and eventually chronic distension of the carpal sheath well clearly visible on the proximal lateral aspect with distension of its recess located between the ulnaris lateralis muscle caudally and lateral extensor tendon cranially. In more severe cases additional swelling can be encountered on the proximal medial aspect other than, obviously, on the distal recess in the proximal metacarpal area. Occasionally, the horse can be lame more often after the exercise when intense bleeding fluid is obtained through the centesis; this finding is frequently encountered in case of distal radial exostosis, which impinge and damage the DDFT. Verification of carpal sheath lameness requires intraarticular anesthesia. Follow-up radiographs are necessary to demonstrate the presence of osteochondroma or physeal spike, which aren’t always well noted especially if small in size. In these cases, the ultrasonography is of extreme value for the definitive diagnosis other than essential to evaluate the damage to the DDFT. It is predictable that the synovial effusion of the sheath, in the presence of an osteochondroma or physeal spike, is caused by the exostosis damaging the soft tissue structures and in particular the DDFT, due to its location next to the site where the osteochondromas are typically encountered. The characteristic site where the osteochondroma develops is axial to the medial edge of the caudal cortex of the distal metaphysis of the radius although the lateral location is reported, and this explains the difficulty in detecting, radiographically, the small exostoses on the latero-medial and dorsomedial-palmarolateral oblique (Dm-PLO) radiographic views for the superimposition of both edges (lateral and medial) of the caudal cortex of the radius (LM views) due to its concave shape. On the other hand, the small size of the exostosis is clinically very important for their frequently sharp shape, as shown in our cases, where the osteochondromas were responsible for the damage to DDFT, in these cases ultrasonography can be quite accurate as diagnostic procedure even more than the radiography. Ultrasonography can also highlight primary tendinitis lesions encountered in the proximal metacarpal area especially of the superficial digital flexor tendon with its enlargement and core lesion, which is a good indication for carpal retinaculum desmotomy. In the proximal part of the sheath, the muscolotendineus junction is not to be mistaken for damaged tendons.
Treatment
Most cases of carpal sheath distension without any obvious signs of cause are treated with intrathecal corticosteroid and hyaluronan, but often, carpal tenosinovitis has a cause which requires a surgical treatment through an arthroscopic approach as has been previously described (Cauvin et al., 1997; Southwood et al, 1998). Additionally, horses with tendinitis of the superficial digital flexor tendon are frequently treated with superior check ligament desmotomy which can be performed arthroscopically (Southwood et al, 1999).

Carpal sheath diagnostic arthroscopy. This technique, as described, allows the evaluation of the proximal part of the carpal sheath including the carpal canal, but provides limited access to the distal part. If the surgery has to be performed unilaterally, the horse can be positioned in lateral recumbency with the affected limb uppermost. But if bilaterally, the dorsal recumbency has to be preferred. The author prefers, in all instances, the dorsal recumbency with a direct approach to the sheath, without fluid distension through a stab incision caudal to extensor lateralis tendon and 6-8 cm proximal to the remnant of the physis, leaving the space for the second instrument portal 3-4 cm distal to the arthroscope. Exploration reveals the lateral portion of the DDFT, obscuring most of the SDFT; the common menotenon for SDFT and DDFT is attached to the caudolateral aspect of the carpal sheath and prevents the complete examination of the SDFT over its caudal and medial surfaces, while in the more distal regions of the carpal sheath, the SDFT emerges and can be better visualized.

Radial Osteochondroma removal. The access to the sheath is performed as described for the sheath exploration; the osteochondroma is clearly localised on the palmar radial metaphysis; a second portal is made at the level of the exostose with the help of a needle. Through a stab incision, an osteotome of 4 mm is introduced to separate the osteochondroma from the radius and it is removed with a large roungers. The site of the bone can be smoothed with a curette, or a rasp or a motorized burr. The damage to DDFT is eventually debrided and the sheath finally flushed before the skin closure.

Radial physeal spike removal. This technique is relatively similar to radial osteochondroma removal with the difference being that the physeal spikes are more distal and often has a double component with the lateral one larger. Damage to the DDFT can be extensive with true linear laceration and adjacent reaction which usually needs a debridment which can be performed manually with scissor or better with motorized shaver.

Proximal check ligament desmotomy. This procedure is preferably performed in dorsal recumbency and is recommended bilaterally and for better control of bleeding. The arthroscope is inserted for the sheath exploration. It is important to recognize as landmark for the distal edge of the ligament, the point of blending of radial head of the DDFT with the main body of the tendon. Instrument portal is made 4-5 cm distal the arthroscope portal; the distal landmark is palpated with the blunt obturator and the ligament is severed with a curved, serrated banana blade or with curved fixed scalpel, as the author prefers. Other cutting modalities can be used as radiofrequency. The ligament is severed from distal to proximal direction. More proximally, the ligament becomes ticker and the body is located beyond the proximal reflection of the carpal sheath. This area is more quickly severed using a biopsy punch rounger or arthroscopic scissors which allows a better visualization of the proximal extent and any contained vessel especially if the arthroscope and instrument are inverted with the scope in the distal portal viewing in proximal direction. Bleeding from damage to the artery contained in the proximal part of the ligament can be controlled with pressure or with bipolar laparoscopy or ligaclips. Penetration of the sheath of the flexor carpi radialis is routine and represents the medial landmark of the dissection.

Carpal retinaculum desmotomy. This procedure can also be done arthroscopically and it is preferred when a carpal tunnel syndrome is diagnosed. In the author’s experience, this procedure is more frequently indicated when the horse presents a tendinitis of the SDFT next to the accessory carpal
bone and can be advisably performed with other specific treatments for the tendon damage (regenerative treatments). The desmotomy is performed with the same arthroscopic approach and the instrument portal at the level of the remnant physis. The ligament is severed on its medial aspect, 5 -10 mm caudal from its aponeurosis with the palmar carpal ligament from the distal part up to 10-15 mm proximal to the accessory carpal bone. The entry of the sheath of the flexor carpi radialis is the medial landmark and the palmar retinaculum runs deep alongside, although there are some portions that are superficial to this tendon but in the author’s experience, the desmotomy of this superficial portion wasn’t required to release the carpal tunnel. Desmotomy is performed with the same blade used for the superior check ligament desmotomy: serrated banana blade or with curved fixed scalpel.

Postoperative care. The minimally invasive techniques, such as arthroscopy, require restricted treatment with perioperative antibiotics - only on the same day of surgery, 3-5 days of NAID, rapid walking exercise and the extent of the convalescence period depends on the main disease as in the case of tendinitis, while in case of osteochordroma or spikes, the exercise is quickly resumed (4-6 weeks) and the prognosis is good to excellent while it is obviously guarded in all other cases where desmotomy of the superior check ligament or the carpal retinaculum is performed for cases of superficial digital flexor tendonitis.

References

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