A 6-year-old Thoroughbred gelding was presented for acute onset right forelimb lameness, following track work. Relevant history included carpal and forelimb fetlock pain bilaterally, that spanned approximately a year and was being treated with intra-articular tramcinolone acetonide (Keracon T-A 10, Aspen Australia) and hyaluronic acid (Equine injection, Randlab). Both intermediate carpal joints and metacarpo-phalangeal joints were treated. A high 1-point block (lateral branch of the palmar digital nerve) was performed. A focal, standing low field magnetic resonance imaging (MRI) study of the right carpus (distal radius to proximal third metacarpus) was completed using a 0.27T, open standing magnet. Multiple sequences were acquired including T1 W GRE, T2*W GRE, STR FSE and T2W FSE in sagittal, frontal and transverse planes. The MRI showed a number of abnormalities within the carpus: • An osseous fragment (measuring 4mm proximal to distal, 1.5cm medial to lateral and 4mm dorsal to palmar) that had fractured off the distal aspect of the palmar eminence of the third carpal bone (C3) (Figure 3). • The fragment was associated with the soft tissues palmar to C3 including the palmar carpal ligament and the origin of the accessory ligament of the deep digital flexor tendon (AL-DDFT). • Poorly defined region of moderate hyper-intensity within the palmar, medial aspect of the AL-DDFT. • Marked, diffuse STR hyper-intensity at the palmar aspect of the third carpal bone (Figure 4). • Small region of demineralisation of the palmar, medial aspect of C3 in the region of the attachment of the palmar intercarpal ligament between the second carpal bone (C2) and C3. This area was also surrounded by mild sclerosis. • Mild to moderate sclerosis of the intercubular bone of the dorsal, lateral aspect of the third carpal bone (Figure 3, frontal T2*W GRE image). • Marked diffuse STIR hyper-intensity at the palmar aspect of the C3 including the palmar carpal ligament and the origin of the AL-DDFT. The MRI was interpreted as showing no evidence of sepsis. The high degree of osseous fragmentation within the carpus, with an associated soft tissue injury, led to the diagnosis of a third carpal bone palmar avulsion fracture (Figure 3). Synovioctenesis analysis of the intermediate carpal joint indicated no evidence of sepsis.

Clinical Outcome

The horse is still in rehabilitation, however, examination 6 weeks post injury showed the lameness to have improved to grade 1/5 lame at the trot. The horse was mildly positive to palpation of the carpal flexion and had no heat or pain on palpation of the palmar carpus.

Discussion

Even though the avulsion fracture was clearly identified on radiographs, the soft tissue structures within the carpus could not be accurately assessed by ultrasonography and required the use of standing MRI. The difficult in diagnosing palmar carpal injuries has been established, especially in relation to the limitations of ultrasonography. While endosteal irregularity on MRI at the palmar aspect of the third metacarpal bone in the region of the origin of the AL-DDFT have been reported, to the authors’ knowledge, a case of palmar third carpal bone avulsion fracture has not been described. This suggests that the injury is somewhat unique. Causes for both proximal AL-DDFT tearing and avulsion fracture of the origin of the suspensory ligament have been described and relate to hyperextension of the carpus. AL-DDFT tearing is thought to occur when on impact, while the fetlock is in full extension, the carpus suddenly snaps into complete extension. This results in a sudden increase in tensile forces. Presumably this fracture has occurred in a similar fashion however, the weakest point must have been within the palmar aspect of C3 instead of within the AL-DDFT. This is unusual as the majority of injuries to C3 occur in the dorsal, weight bearing portion of the bone and poses the question whether the endosteal irregularity is a prerequisite marker for this injury. The significance of intercarpal ligament injuries and their role in causing lameness is controversial. In this particular case there were irregularities associated with the presence of the palmar intercarpal ligament (MPICL) onto C3, that correlate with ligament damage. Such findings could explain the long history of carpal pain that the horse had been experiencing and give support to the role of palmar intercarpal ligament injury in causing lameness.

The unusual nature of this injury means the precise cause, application of efficacious therapy and long term prognosis is difficult to determine. Platelet-rich Plasma (PRP) is widely used in the treatment of soft tissue injuries in the equine patient. Although unproven in the horse, human and laboratory studies have shown PRP to accelerate the histological union of fractures and increase bone strength. ESWT is another treatment modality that is used for a range of musculoskeletal injuries. Although the direct mechanisms are unclear, it is known to stimulate osteogenic cells and promote neovascularisation at the tendon-bone junctions. The collective use of these treatment therapies, in conjunction with the extended rest period, aim to return this horse to full athletic capabilities.

Low Field Standing MRI

In order to fully understand the nature and extent of the injury, magnetic resonance imaging of the right carpus was performed. A focal, standing low field magnetic resonance imaging (MRI) study of the right carpus (distal radius to proximal third metacarpus) was completed using a 0.27T, open standing magnet. Multiple sequences were acquired including T1 W GRE, T2*W GRE, STR FSE and T2W FSE in sagittal, frontal and transverse planes. The MRI showed a number of abnormalities within the carpus:

• In the region of the origin of the AL-DDFT.

• Marked diffuse STR hyper-intensity at the palmar aspect of the third carpal bone (Figure 4).

• Small region of deminerelisation of the palmar, medial aspect of C3 in the region of the attachment of the palmar intercarpal ligament between the second carpal bone (C2) and C3. This area was also surrounded by mild sclerosis.

• Mild to moderate sclerosis of the intercubular bone of the dorsal, lateral aspect of the third carpal bone.

Fig. 1. Dorso-palmar radiograph of the right carpus. Black arrow highlights transverse radiolucent line in the third carpal bone.

Fig. 2. Lateral to medial radiograph of the right carpus. Black arrow shows a fracture of the palmar distal aspect of the third carpal bone.

Fig. 3. Frontal T2*W GRE image obtained from the palmar aspect of the right carpus. Black arrow indicates osseous fragment. Red arrow indicates hyper intensity within the AL-DDFT.

Fig. 4. Sagittal STR image of the right carpus. Red arrow shows marked hyper intensity within the palmar portion of C3. White arrow indicates osseous fragment.

Treatment

The location and size of the fragment precluded surgical fixation or removal, therefore conservative therapy was advised. This consisted of the following:

• Per-ligamentous injection of platelet-rich plasma (PRP) around the palmar third carpal bone and proximal AL-DDFT, 4 and 8 weeks post injury.

• Extracorporeal Shockwave Therapy (ESWT) of the affected area at 8 weeks post injury - 3 treatments, 2 weeks apart.

Repeat radiographs at 16 weeks.

Reference


