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Evaluation of clinical and diagnostic imaging findings of bilateral superficial digital flexor tendon luxation in the tarsus of a gelding

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Abstract

Superficial digital flexor tendon (SDFT) plays an important role in the locomotion of the horses with flexion of the limbs. In the hind limb, it passes over the calcaneal bone and attaches to medial and lateral surfaces of calcaneous by two bands of connective tissue; while, the medial band is weaker than the lateral one. Occasionally, severe trauma, over-extension or fracture of the calcaneous may cause rupture of the supportive bands leading to tendon luxation. An 11-year-old Thoroughbred jumping gelding with symptoms of lameness in both legs, after examination by an internal specialist veterinarian in equine practice field was referred to the Teaching and Research Hospital of the Faculty of Veterinary Medicine of the University of Tehran, Tehran, Iran. Clinical examination showed lateral luxation of SDFT in the right and left tarsal joints. Radiography revealed no sign of calcaneal involvement, except soft tissue swelling. In the radiography of the tarsal joints, the calcaneus bones did not show significant changes, but among the bones of the central and 3rd tarsal bone (distal intertarsal joint) of the tarsus, osteophyte formation was observed to a mild extent, indicating mild bone spavin in both tarsal joints. In ultrasonography, SDFT thickenings accompanied by hypoechoic regions in tendons were seen, confirming the signs of tendonitis. Moreover, fibrous tissue formation was diagnosed. In the left leg, anechoic fluid in the calcaneous bursa was seen. Evaluation of diagnostic imaging findings enables veterinarians to diagnose the site and extent of the lesions, choosing the appropriate therapeutic approach in addition to clinical symptoms.

Introduction

Superficial digital flexor tendon (SDFT) plays an important role in the locomotion of the horses with flexion of the limbs. The SDFT injuries are among the most common types of tendon injuries in performance horses, especially racehorses and top-level event horses. The SDFT is an energy-storing structure essential for efficient locomotion and thus performance, yet has very narrow mechanical margins for error, making it susceptible to injury. The most common site of SDFT injury is the middle of the tendon having the smallest cross-sectional area (CSA). The SDFT is found in the horse's fore and hind limbs; In general, injuries in the pastern region to the SDFT occur most frequently in the forelimbs.

In the hind limb, it passes calcaneal tuber and attaches to medial and lateral surfaces of calcaneous by two bands of connective tissue (retinaculum); while, the medial band is weaker than the lateral one. Occasionally, severe trauma, over-extension or fracture of calcaneous may cause rupture of the supportive bands leading to tendon luxation.[1-4]

The aim of this report was to present the clinical and diagnostic imaging findings of bilateral SDFT luxation in the tarsus of an 11-year-old Thoroughbred horse.

Case Description

In May 2020, an 11-year-old Thoroughbred jumping gelding with symptoms of lameness in right hind leg, after examination by an internal specialist veterinarian in equine practice field was referred to the Teaching and Research Hospital of Faculty of Veterinary Medicine of University of Tehran, Tehran, Iran. In clinical examination, it was found that the SDFT of the right leg moved out of its original location and moved to the lateral side of the calcaneus bone during movement after making a clicking sound.

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The tendon was also moved by hand manipulation and returned to its original place. Meanwhile, SDFT had a swollen and prominent appearance. In the ultrasound imaging, the increase in the size of the tendon and the presence of hypoechoic areas inside it were evident. The SDFT dislocation of the right hind limb with severe tendonitis was diagnosed.

Unfortunately, due to the lack of cooperation of the owner, special treatment was not carried out at that time; while, after this period, sometimes the horse was still used for jumping.

After 2 years, the same horse with symptoms of lameness in both legs was referred to the Teaching and Research Hospital of the Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.

In the clinical examinations, it was found that in addition to the right leg, the SDFT dislocation from the calcaneus bone also occurred in the left leg. The SDFT of the left leg was also out of its original location, moved to the side of the calcaneus bone and showed severe swelling.

This tendon, like the right leg, was returned to its original location with hand manipulation; but, after being released, it moved again. The hairs of the tarsal joints of both legs were clipped and prepared for ultrasonography. Ultrasonography was performed with a portable device (Micromaxx; Sonosite, Bothell, USA) and a linear probe of 6.00 - 12.00 MHz. Lateral and oblique radiographs of the tarsal joint of both legs were prepared to check the possible involvement of the tarsal region bones. The animal was also lame in the left hoof area. For this reason, radiography of the animal's left forelimb hoof was also performed.

On palpation of the tarsal joint of both legs, the displacement of the SDFT to the outside and its swelling could be detected (Fig. 1A). In the radiography of the tarsal joints, the calcaneus bones did not show significant abnormalities except soft tissue swelling; but, between the central and 3rd tarsal bone (distal inter-tarsal joint) of the tarsus, the osteophytes formation was observed mildly, indicating a slight bone spavin in distal inter-tarsal joint of tarsus (Fig. 1B). In addition, in the left forelimb, a severe bone reaction was seen on the back surface of the 2nd phalanges, being a sign of a severe ring bone complication. Ultrasonography evaluation of the plantar aspect of the right and left tarsi was performed. Ultrasonography of both legs revealed an increase in tendon size and presence of hypoechoic areas in the tendons, confirming tendinitis. Using a plantar approach, the SDFT, gastrocnemius tendon, bone surfaces of the two lobes of the tuber calcanei, gastrocnemius bursa and calcaneal bursa of the SDFT (if distended) can be accurately assessed. Using a collateral approach, the tenocalcaneal ligaments of the SDFT and the branches of the calcaneal tendon of the caudal femoral muscles can be imaged.[5-6]

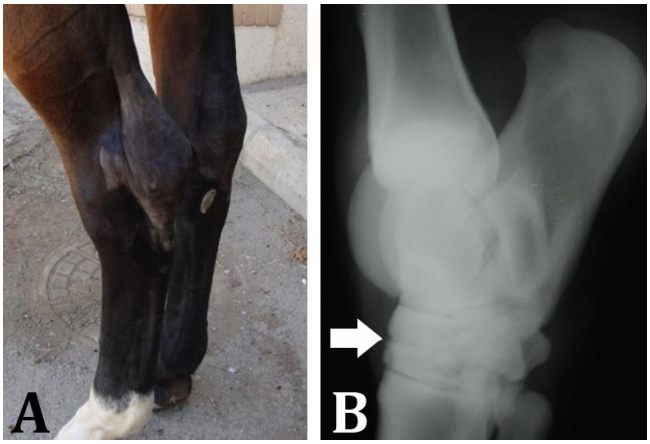

Fig. 1. A) Tarsal swelling due to the superficial digital flexor tendon dislocation of left leg. **B)** Lateral radiograph of the tarsal joint of the left foot. The calcaneus bone appears to be normal. At the same time, mild bone spavin symptoms can be seen in the distal inter-tarsal joint of tarsus (arrow).

In the left leg, in addition to tendonitis, effusion in the calcaneus bursa and inflammation of the bursa were observed (Fig. 2). In ultrasonography of the right leg, the signs of chronic tendinitis were evident in the form of tendon calcification and fibrous tissue formation around the SDFT (Fig. 3). In this regard, a previous study described lesions of SDFT characterised by thickening and alternation of echogenicity, a hypoechogenic pattern in the acute stages and a heterogeneous pattern in chronic cases. The SDFT luxation is more frequently unilateral; but, bilateral lesions are not rare.[7] Thickening and hypoechogenicity of the proximal digital annular ligament are often found in association with SDFT tendonitis. Peritendinous thickening, corresponding to diffuse edema, is indicative of the acute stage of tendonitis.[7]

Based on clinical presentation and findings regarding diagnostic imaging, the horse was diagnosed with traumatic superficial digital flexor tendinitis, in addition to SDFT lateral luxation and capped hock (Fig. 2).

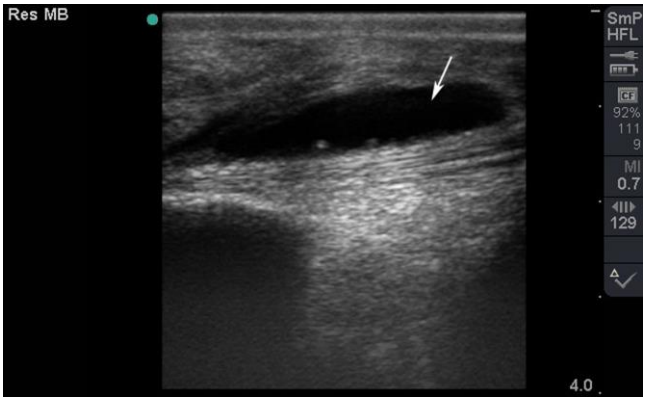

Fig. 2. Sonogram of the longitudinal view of the tarsal joint of the left leg. The symptoms of bursitis are evident in the form of thickening of the synovial layer and effusion inside the calcaneus bursa. The arrow shows the fluids inside the bursa.

Fig. 3. Transverse sonogram of the proximal area of the tarsal joint of the right leg at the site of the calcaneus bone. Hypoechoic areas and calcification are seen as hyperechoic spots in the superficial digital flexor tendon (arrows), indicating chronic tendonitis.

Discussion

The SDFT luxation have been reported in dogs, cats, cattle and horses.[1,2,5] Tendon luxation occurs when the connection of the fascia of tendon to the calcaneus bone is disrupted. Due to the severe swelling of the tarsal joint area, it may be confused with capped hocks injury. However, when the swelling subsides, SDFT luxation can be detected from the tarsal joint location. Usually, the SDFT is shifted outwards.[8] Although medial luxation has also been reported, a case of dislocation to both medial and lateral sides has been reported.

Affected horses show some degrees of lameness at first; but, with the passage of time, the painful response of the animal's limbs decreases and a relative loss of hind limb control appears; sometimes this condition occurs to both legs.[2,4,8-10]

Dislocation of SDFT occurs during racing, jumping and competition or kicking or along with fracture.[4,8-10] In the acute stage, there is an obvious lameness. In palpation, displacement and luxation of the tendon can be detected. The tendon is often displaced when the tarsal joint is flexed. Over time, the lameness decreases; but, the horse has less control over its limbs and periodic dislocation of the tendon occurs. Although the diagnosis is made based on clinical symptoms routinely, the possibility of fracture should be ruled out with radiographs.[1,4,8-10]

In ultrasonography, the normal SDFT has a homogeneous and echogenic appearance and is slightly less echogenic than the deep digital flexor tendon (DDFT). It is composed of long parallel fiber bundles appearing as long white echoes in the sagittal or long axis view and as a uniform distribution of pinpoint white echoes in the transverse or short axis view. The tendon CSA at the identical level in each of the contralateral fore and hind limbs should be the same. The size and sonographic appearance of the SDFT change in response to race training with the CSA of the tendon enlarging somewhat (approximately 10.00%) and the echogenicity of the tendon decreasing. The most common injuries occur to the SDFT which lies immediately under the skin surface. This tendon is also the most frequently injured tendon or ligamentous structure at the level of the pastern. The SDFT may be damaged at any site from its muscular attachment to its insertion onto the 1st and 2nd phalanges. The most common site for SDFT injuries is in the mid-metacarpal region when a swelling of the tendon is usually evident, resulting in a bowed appearance of the palmar metacarpus when viewed from the lateral aspect. Similar to the present report, ultrasonographic examination of these injuries often reveals a focal area of decreased echogenicity (core lesion) within the central, medial, lateral, dorsal and/or palmar areas of the tendon.[11]

The severity of clinical symptoms depends on the degree of SDFT dislocation. Some horses only suffer slight damage in the connecting bands and an incomplete dislocation occurs. The degree of dislocation and type of the horse activity determine the treatment method. When the tendon dislocation is minor, rest in the stable for 3 to 6 months will in most cases a cure and return the horse to normal activity.[1,4,12]

If the tendon remains on the prominence of the calcaneus bone, horses often have their function, only the constant movement of the superficial flexor tendon of the toes can cause problems for the animal. The timing of the surgery is important, because the newly torn tissues do not hold the sutures well and there is a possibility of wounding the skin or infection. On the other hand, after the dislocation, the fascia on the opposite side contracts and after a few days it becomes difficult to return the tendon to its original place. It is difficult to keep the tendon in the original place with a bandage or cast in the pre-operative period. During the initial surgery, the SDFT laceration was opposed to minimise any pain associated with partial or intermittent luxation and splitting either side of the calcaneal tuber.[1,4,13]

A high survival rate can be expected after SDFT, DDFT, suspensory ligament and/or distal sesamoidean ligaments lacerations in horses; but, only 55.00% of affected horses returned to their previous activity level. The number of structures affected was the major factor determining whether horses returned to an equal level of performance.[14]

In the case presented, the owner of the animal, knowing about the treatment process and its prognosis and considering the relatively severe involvement of the forelimb, did not show a desire for surgical procedure. Regardless of the varying levels of knowledge and experience among industry stakeholders, the literature has strongly suggested that trainers are considerably more interested in measures to prevent SDFT injury rather than treatment due to the destructive nature of this injury.[1]

To the best of the authors' knowledge, this is the first report describing the clinical and diagnostic imaging findings of bilateral SDFT luxation in the tarsus of a gelding horse in Iran. In the diagnosis of tendon complications of horses, diagnostic techniques such as radiology, ultrasono-graphy and contrast tenography offer added diagnostic value, especially for the detection of manica flexoria tears where a sensitivity as high as 96.00% and a specificity of up to 80.00% have been reported. Magnetic resonance imaging is useful for the diagnosis of marginal tears of the SDFT or DDFT and palmar/plantar annular ligament and proximal or distal digital annular desmitis. Ultimately, tenoscopic examination of the digital flexor tendon sheath (DFTS) under general anaesthesia appears to be the most reliable technique to confirm the presence of marginal tendon lesions associated with non-septic DFTS tenosynovitis and tenoscopy also facilitates immediate treatment of lesions detected during the surgical procedure.[15]

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Conflict of interest

The authors declare that they have no conflict of interest.

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