Case Report

Radiographic and ultrasonographic appearances of chronic tenosynovitis of the lateral extensor tendon at the right tarsus in an Argentinian polo pony

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Abstract

A 19-year-old polo pony presented with mild lameness alongside a lateral protuberance of the right tarsus. Radiographic findings revealed various defects, including an osteochondral lesion of the medial trochlear ridge of the talus, a sclerotic lesion of the tarsometatarsal joint, a radiolucent area on the distal border of the fourth tarsal bone and an enthesophyte at the proximolateral aspect of the metatarsal bone. Ultrasonography demonstrated the interesting finding of synovial sheath thickening of the lateral extensor tendon with synovial fluid accumulation. In addition, the presence of neutrophils and a granular mucinous background, according to cytological analysis of the fluid, indicated inflammation of the synovial sheath of the tendon. All evidence suggested that the pony was likely suffering from degenerative joint disease and chronic tenosynovitis of the lateral extensor tendon at the right tarsus. The imaging analyses benefited the tarsal defect investigation and proper disease management.

Keywords: degenerative joint disease, diagnostic imaging, polo pony, tenosynovitis, tarsus

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Introduction

The tarsus is a complex apparatus of multiple bones, soft tissue and joint structures susceptible to extensive injuries (Clegg, 2003). It acts relatively to stifle, fetlock and coffin joints as a hindlimb shock absorber during the stance phase of motion (Back *et al*., 1995). Hence, tarsus defects are primarily found in sporting horses engaging in high-intensity exercise such as galloping, reining and jumping (Gabel, 1980). Given the complicated structure of the tarsus and the enormous strain of strenuous exercise, tarsus injuries are the most likely cause of hindlimb lameness in the horse (Axelsson *et al*., 1998; Kinns and Nelson, 2010).

Various types of tarsus damage, including degenerative joint disease (DJD), osteochondrosis, disease of the synovial structure and tendon and ligament injuries, can lead to hindlimb lameness (Blaik *et al*., 2000). Amongst the structural defects in the tarsus, tarsal DJD is considered to be the primary cause of hindlimb lameness (Vaughan, 1965). It is characterized by the presence of periarticular osteophytes, subchondral bone lysis or sclerosis and ankylosis (Björnsdóttir *et al*., 2000; Butler, 2000) and has been reported in several riding populations, including the Swedish Icelandic horse (Axelsson *et al*., 1998; Eksell *et al*., 1998) and the Thoroughbred and American Quarter horse (Taintor *et al*., 2014).

Tenosynovitis is an inflammation of the synovial membrane and fibrous layer of the tendon sheath, indicated by synovial effusion in the injured area (Mcilwraith, 1987). The most common sites of tenosynovitis are the tarsal sheath, digital flexor tendon sheath and extensor tendon sheath of the carpus (Mcilwraith, 1987). Peritendinous strain and irritation between the visceral layer and the outer surface of the tendon itself also cause tenosynovitis (Wallace, 1972). This case report demonstrates diagnostic imaging of the affected right tarsus and the cytological properties of synovial fluid from the protuberant lesion in an Argentinian polo pony.

Case description

A 19-year-old Argentinian polo pony (gelding) was presented with an enlargement of the lateral aspect of the right tarsus (Figures 1A and 1B). At the initial examination, a blemished protuberance was observed at the lateral aspect of the right tarsus, which was firm and relatively warm but insensitive to compression. Fundamental gait analysis revealed mild lameness on the right hindlimb and a positive response to the hock flexion test.

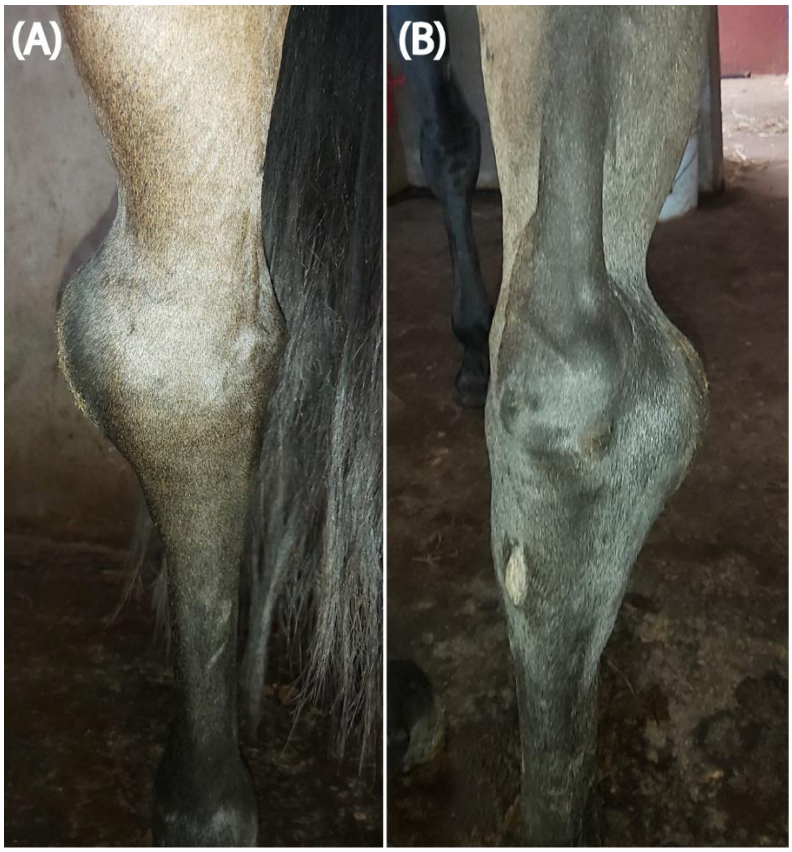

Figure 1 The blemished protuberance is present on the lateral aspect of the right tarsus in the dorsal (A) and plantar (B) views.

A radiograph of the right tarsus was performed according to the method described previously (Kinns and Nelson, 2010; Vanderperren *et al*., 2009b). The radiographic imaging illustrated multiple defects: 1) a lateral protuberance on the right tarsus and the formation of an enthesophyte at the proximolateral third metatarsal bone (MT3) (Figure 2A), 2) a bony spur at the medial trochlear ridge of the talus (Figures 2B), 3) a sclerotic lesion and narrowed space of the joint at the osseous margin of the tarsometatarsal joint (Figures 2B, 2D), 4) various radiolucent areas indicating subchondral bone lysis on the ventral surface of the fourth tarsal bone (Figure 2B), and 5) the presence of enthesopathy characterized by a radiolucent area alongside bony ossification at the dorsal aspect of tuber calcanei (Figures 2B and 2C). Ultrasonography was

subsequently performed at the transverse (Figure 3A) and longitudinal planes (Figure 3B) of the enlargement area to assess soft tissue configuration. The ultrasonographic images (Figures 3C–3E) revealed an anechoic fluid accumulation within the fibrous thickening of the lateral extensor tendon sheath. Moreover, synovial proliferation was also observed in the inner lining of the tendon sheath. Approximately 2 mL of accumulated fluid was aspirated from the lesion for cytological analysis. The fluid was a reddish colour with low viscosity and moderate turbidity (Figure 4A) with a 0.88 x 10^9/L total nucleated cell count (TNCC) and 40 g/L of total protein. The aspirated fluid also showed numerous erythrocytes, neutrophils and a granular mucinous background (Figure 4B). The presence of free erythrocytes might indicate blood contamination during sample collection. Nevertheless, elevated neutrophils alongside the increased expression of a granular mucinous background would suggest inflammation of the synovial tendon sheath. Regarding the case history and clinical examination, the polo pony was diagnosed with degenerative joint disease (DJD) and chronic lateral digital extensor tendon tenosynovitis of the right tarsus. Initially, pain-relieving gel (cold gel containing *Arnica* extract) and oral anti-inflammatory medication (phenylbutazone 4.4 mg/kg body weight) were administered twice daily for 14 days. Although the protuberance still existed, the lameness of the right hindlimb had improved by the end of the therapeutic period.

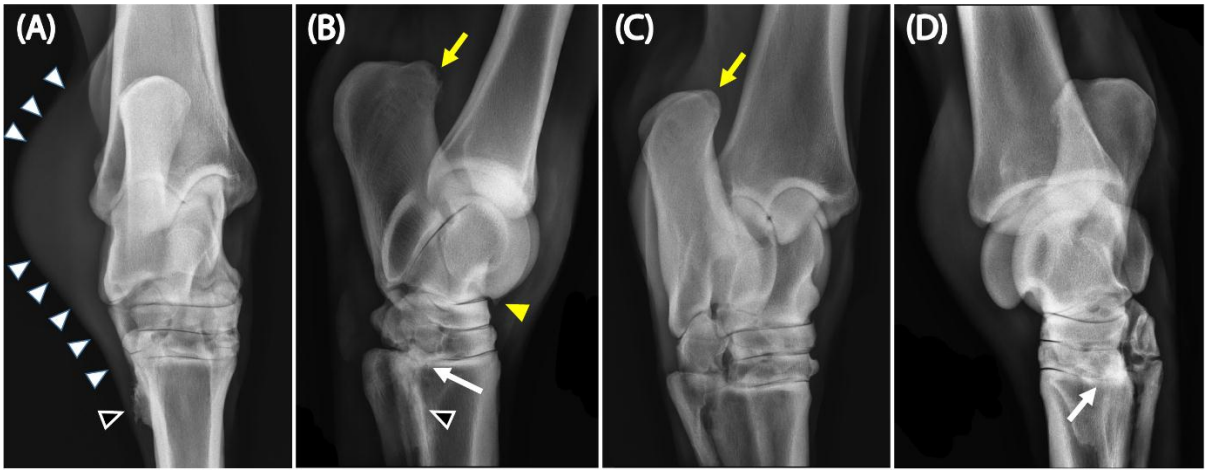

Figure 2 The radiographic images demonstrated multiple defects, including 1) soft tissue protuberance at the lateral aspect of the joint (sequential white triangles) (A) and a enthesophyte formation at the lateral aspect of the proximolateral angle of the third metatarsal bone (black-white triangles) (A and B), 2) a bone spur at the trochlea ridge of the talus (yellow triangle) (B), 3) a sclerotic lesion of the osseous margin at the tarsometatarsal joint (white arrows) (B and D), 4) various radiolucent areas indicating subchondral bone lysis on the ventral surface of the fourth tarsal bone (B), and 5) a radiolucent area at the dorsal aspect of tuber calcanei (yellow arrow) (B and C).

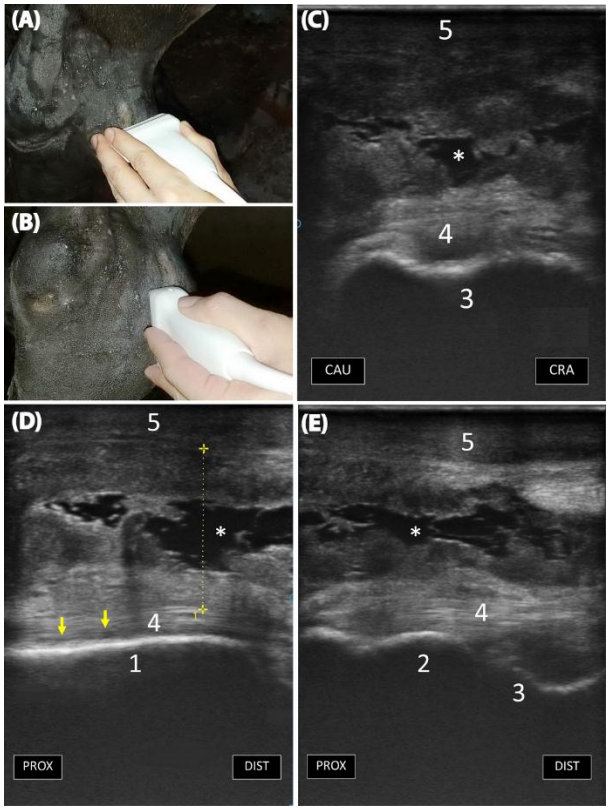

Figure 3 The ultrasonography was performed at the transverse (A) and longitudinal planes (B). The transverse (C) and longitudinal (D and E) ultrasonographic images demonstrate the hypoechoic soft tissue swelling and synovial thickening with anechoic effusion (*). The images also show a small loss of normal fibre pattern in the lateral extensor tendon (yellow arrows) (D). Synovial proliferation is seen at the inner lining of the affected tendon sheath (D and E). The width of the thickened synovial tendon sheath at the most distended point was 2.33 cm (yellow vertical dots) (D). PROX = proximal part; DIST = distal part; CAU = caudal part; CRA = cranial part; 1 = tibia; 2 = tibial malleolus; 3 = talus; 4 = lateral extensor tendon; 5 = skin; asterisk (*) = anechoic fluid.

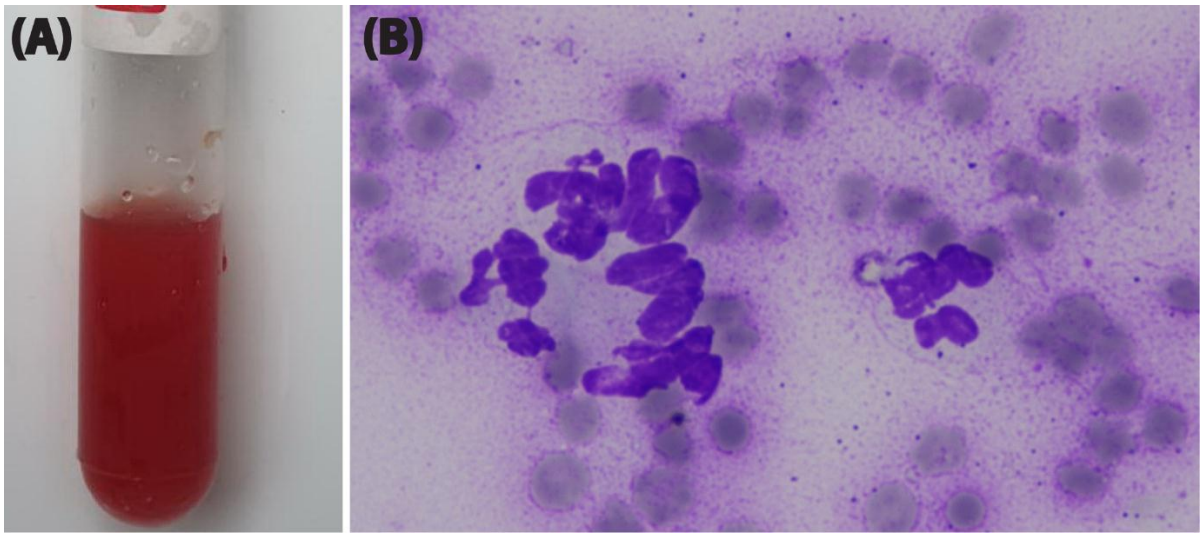

Figure 4 Reddish synovial fluid was aspirated from the lesion (A). A captured image of the cytological examination (100x magnification) shows numerous erythrocytes, neutrophils and granular mucinous background (B).

Discussion

Several abnormalities of the tarsal structure, such as degenerative joint disease (DJD), osteochondrosis (OC) and soft tissue injuries, can be revealed by the appropriate imaging technique (Vanderperren *et al*., 2009a; Vanderperren *et al*., 2009b). Radiographic and ultrasonographic modalities are still the primarily selected instruments that provide practical advantages for tarsal defect investigation (Kinns and Nelson, 2010). Nonetheless, some convoluted defects may not be correctly identified by these imaging techniques. Consequently, care must be taken to avoid misinterpretation of the tarsal abnormalities. In this case, numerous structural disorders of the right tarsus were discovered by diagnostic imaging analysis.

The radiographic findings demonstrated bone surface irregularity, narrowing of the joint space, subchondral bone lysis, bony sclerosis, enthesophyte formation and periarticular bone proliferation. These symptoms have been associated with DJD of the tarsus in previous studies (Gough and Munroe, 1998; Verschooten and Schramme, 1994). The predisposing cause of DJD at distal intertarsal and tarsometatarsal joints was thought to accompany an unbalanced force distribution on the joint surface (Björnsdottir *et al*., 2004). Apart from DJD, the osteochondrosis (OC), a bony defect attributable to abnormal endochondral ossification, was also seen (Donabédian *et al*., 2008). Although a bony spur was present at the medial trochlear ridge of the talus, in this case, it did not necessarily develop the OC though it is occasionally visible in some horses (Butler, 2000; Clegg, 2003). Hence, the outcome of this imaging addressed the paramount importance of radiography for evaluating tarsal defects. The superimposition of bony structures and the inability to distinguish the architecture of soft tissues are the main limitations of using this modality (Kraft and Gavin, 2001; Park *et al*., 1987). Therefore, ultrasonography has been subsequently utilized to depict the sonographic appearance of the ligament and tendon structure surrounding the tarsus (Davis *et al*., 2014; Dik, 1993). Interestingly, the ultrasonography implemented in this case illustrated anechoic fluid accumulation, fibrous thickening of the lateral digital extensor tendon sheath with synovial proliferation and evidence of the loss of the typical fibre pattern of the tendon. This evidence is likely to indicate chronic tendinitis with tenosynovitis of the tendon as reported previously (Mcilwraith, 1987; Raes *et al*., 2010). The accumulated fluid was aspirated for pathological examination of the tendon architecture. The aspirated fluid was reddish, with reduced viscosity and high turbidity. Although the TNCC of the fluid (0.88 x 10^9/L) was within the normal range (0.2 to 3.5 x 10^9/L) (Steel, 2008), an increase in total protein (> 20 g/L) alongside the presence of high neutrophil number and a granular mucinous background support the diagnosis of tenosynovitis of the lateral digital extensor tendon.

The treatment of tenosynovitis of the tendon sheath can be administered by intrathecal injection or surgical resection depending on the severity and location of the affected tendon sheath (Taintor *et al*., 2013; Wright and McMahon, 1999). Since an improvement in the lameness after oral administration of the anti-inflammatory drug and the application of the pain-relieving gel, the pony has neither undergone a local injection of anti-inflammatory prescription nor surgical treatment even though the lateral protuberance is still present. However, the intrathecal administrations of short-acting corticosteroid may be alternatively considered if the lameness recurred due to DJD and inflammation of the tendon sheath.

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