

FOOT ISSUES IN THE RACEHORSE: the veterinary viewpoint

Foot issues are amongst the most common causes of lameness in the racehorse and the importance of looking after the foot in order to maintain soundness and athletic performance cannot be over-emphasised. This article will discuss some of the more frequently observed conditions causing foot lameness.

Obtaining a clinical history is key in the first instance. When was the lameness first noted? When was the horse last shod? Is there a history of foot lameness? What level of exercise is the horse currently undertaking?

The horse should then be examined both at the walk and, comfort permitting, at the trot in-hand, in order to assess the current level of lameness and to provide a baseline level of lameness from which improvement or deterioration can be monitored. Both the dorsal hoof wall and the solar surface including the heel bulbs should be examined visually, by digital palpation and with hoof testers, in order to identify any areas of sensitivity that may suggest underlying pathology.

The digital arterial pulses can be felt at either the level of the sesamoid bones or on either side of the pastern; an increase in their amplitude is suggestive of pathology below this point and most likely in the foot. If there remains uncertainty regarding the origin of the lameness, diagnostic anaesthesia – or ‘nerve blocking’ – can be performed to confirm the foot as the source of the lameness, or to rule it out.

Dependent upon the clinical findings, radiography may be employed to examine the bony structures of the foot. Radiographs of the lame foot will often be compared with those of the unaffected foot as well as the expected normal appearance.

Advanced imaging techniques including magnetic resonance imaging (MRI) and computed tomography (CT) may be required when a definitive diagnosis remains elusive despite localisation to the foot, however the majority of foot lameness issues in the racehorse can be resolved without the need for diagnostic imaging, or with radiography alone.

SUBSOLAR ABSCESS

A subsolar abscess, also referred to as ‘pus-in-the-foot’, is one of the most



Attraction: five-time Group 1 winner sustained a pedal bone injury as a two-year-old

common causes of acute lameness in the horse. An abscess forms when bacteria gain entry under the sole or the hoof wall. This can occur following a penetration injury, solar bruising, a nail prick, or through a defect in the white line or a hoof wall crack. Once the bacteria have gained entry to the internal structures of the foot, they proliferate, resulting in the development of an abscess between the sensitive laminae and the rigid hoof wall or solar surface. A subsequent build-up of pressure causes pain and lameness.

The abscess is often identified as an area of particular resentment following the application of hoof testers. The sole can usually be pared and opened up in the area overlying the infection in order to relieve the pressure and drain the purulent material that has formed.



Figures 1a, 1b and 1c show a traumatic hoof wall crack (1a) fixed with surgical wiring (1b) and overlaid with a patch (1c)

At this stage, hot poulticing is often used to soften the sole and draw out further infective material. A marked improvement in the lameness usually ensues. Once the discharge has stopped and the lameness has resolved, the horse can be reshod and return to exercise. A temporary covering may be required over the solar defect until this has healed.

SOLAR BRUISING

Bruising of the sole of the foot is usually caused by direct injury from stones or from uneven ground, and occasionally from poor shoeing. Horses with flat feet and those with thin soles are more frequently affected as the concussive forces that the foot experiences are not effectively absorbed. Bruising is usually noted at the edge of the sole or at the toe as either a red or a red-yellow

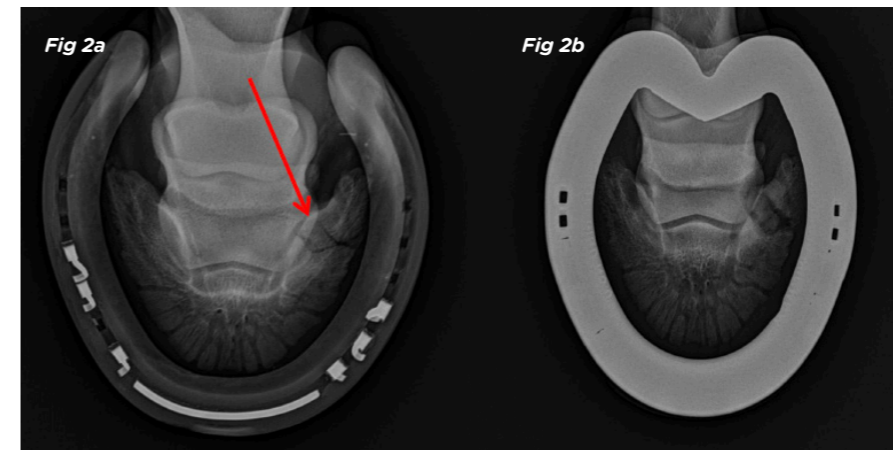


Figure 2a is a radiograph demonstrating a wing fracture of the pedal bone (red arrow) taken on the day of injury. Figure 2b is the same injury a few weeks later. The fracture lines are now more obvious as bone resorption has occurred along the fracture margins. The foot is stabilised in a bar shoe

discolouration of the sole. It is not always associated with lameness. If untreated, areas of solar bruising can become infected and lead to a solar abscess. Treatment aims to relieve pressure on the affected area and to address any underlying issue, such as a thin sole or poor foot balance. Solar pads may be used to protect the solar surface and reduce concussion.

HOOF CRACKS

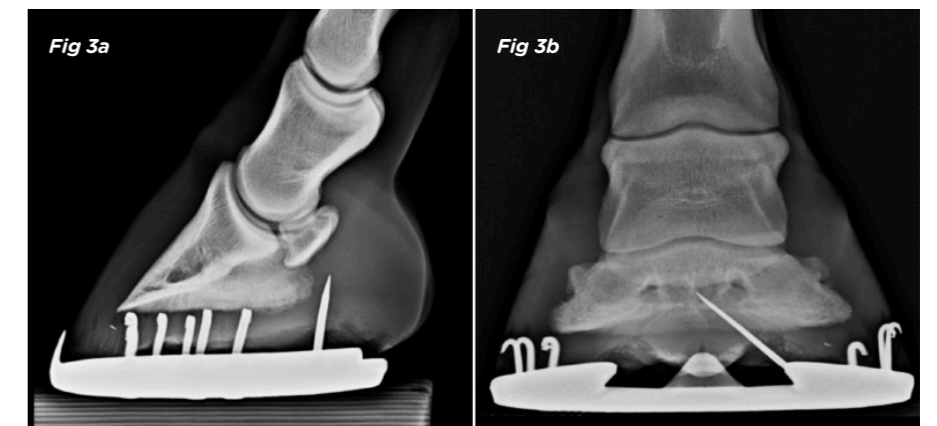
Hoof cracks may form in the hoof wall for a number of reasons. They are noted predominantly in feet that are unbalanced or dry and brittle. They can also form following damage to the coronary band. Cracks originating from the coronary band and extending downwards are often referred to as sand cracks while grass cracks originate from the ground surface and run upwards. Cracks may involve the entirety of the hoof wall from the ground surface to the coronary band, or may only affect a portion of the hoof wall length. Incomplete cracks running from the ground surface do not necessarily cause lameness, however, those cracks including the coronary band often result in significant lameness and may be complicated by secondary infection of the underlying hoof tissue.

All hoof wall cracks warrant attention in order to identify any underlying reason for their development. Careful remedial farriery and the application of a bar shoe may be all that is required in the case of a short incomplete grass crack in a horse that is not experiencing lameness issues. In contrast, sand cracks that have become secondarily infected may require intense farriery and veterinary treatment in order to debride the diseased tissue and clean the underlying structures.

Once the infection has been controlled, remedial farriery will aim to bridge the crack and stabilise the hoof wall using patching material, surgical wires or surgical screws. Application of a bar shoe, often with quarter clips, should limit hoof wall expansion and contraction and so reduce the distractive forces placed upon the crack. A significant period of reduced exercise will be required until sufficient new horn has closed the defect.

PEDAL BONE FRACTURES

Pedal bone fractures, or fractures of the third phalanx, can occur from high-speed exercise or from external trauma, such as kicking a firm object (for example, the box wall). These horses are usually markedly lame at presentation, often have very strong digital arterial pulses and demonstrate a clear resentment to the application of hoof testers in the area of the fracture. This can make the initial differentiation between a pedal bone fracture and a solar abscess difficult. The



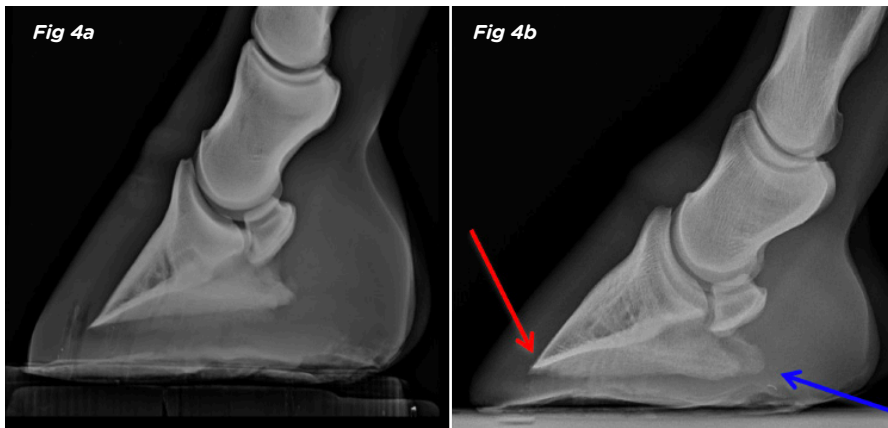
Figures 3a and b show a farrier's nail that has entered this foot at the lateral frog sulcus and is running towards the deep digital flexor tendon. This prompted referral to the hospital for further investigation

type of fracture will ultimately determine the prognosis for future soundness. Extension of the fracture into the coffin joint often results in the development of marked arthritis, alteration of hoof wall growth and persistent lameness. Diagnosis is achieved through the use of radiography, with treatment consisting of a bar shoe to limit expansion and contraction of the hoof wall in addition to an extended period of strict box rest. Surgical screw fixation of the fracture may improve the outcome in some cases.

PENETRATION INJURY

Solar penetrations are relatively common and can involve a farrier's nail, any other building nail or screw, or any firm object that has the ability to pierce the thick solar surface. The location at which the foreign object enters the sole, the direction in which it subsequently travels and the depth it reaches will determine the consequences of the injury. Shallow penetrations that occur distant from the vital structures of the foot may simply require removal, debridement of the penetrating tract and a few days of hot poulticing to aid in the clearance of any debris from the tract.

When penetrations occur close to the frog at the back of the foot, one must be concerned about possible involvement of the underlying deep digital flexor tendon, navicular bursa and coffin joint. Penetrations nearer the tip of the frog can enter the pedal bone and cause a septic osteitis. Radiographs of the foot should be obtained. They will be most informative if the object remains in situ. Metallic objects will show up well on radiographs and their path through the foot can be identified to give a better idea of possible soft tissue and synovial involvement, and so guide treatment. More advanced imaging techniques



Radiograph **4a** demonstrates the normal expected angle of the pedal bone relative to the ground. Radiograph **4b** demonstrates what we may see in cases of reverse rotation of the pedal bone, where the wings of the pedal bone (blue arrow) now lie closer to the ground than the tip of the pedal bone (red arrow)

» (MRI) may occasionally be necessary to reach a definitive diagnosis. If the deep digital flexor tendon, navicular bursa or coffin joint are involved, surgical exploration of the tract and flushing of any affected synovial structure is warranted to clear out the infective material and avoid a grave situation.

REVERSE ROTATION OF THE PEDAL BONE

Reverse rotation, or a negative angle of the pedal bone, can be a cause of ongoing lameness as a result of the altered mechanical forces placed on it. The negative angle describes the fact that the wings of the pedal bone now lie lower than the tip of the pedal bone when viewed on a side-on radiograph. This brings those wings of the pedal bone into closer contact with the ground and the concussive forces they then experience contribute to the lameness observed. This condition can be observed in those horses with flat feet and a thin

sole where there is excessive loading on the heels and lack of frog support. It can also be caused by overzealous trimming of the heel portion of the foot.

A period of rest is often required in order to allow the lamellar inflammation, the inflammation of the pedal bone and

the lameness to settle. Treatment can then be directed towards restoring a normal foot balance, elevating but not crushing the heels, and providing protection and support to the solar surface. These cases will often require long term quality farriery, are not quick to solve and if time is not on your side in terms of training and racing plans, then repeated bouts of foot pain can be observed.

NAVICULAR BONE FRACTURES

Navicular bone fractures most commonly occur as a result of external trauma to the foot but are occasionally seen as a training injury. They are less common than pedal bone fractures and can be noted in both the forelimb and the hindlimb. Pain can often be elicited by the hoof testers in the frog region at the back of the sole. Radiography will confirm this presumptive diagnosis. Surgical treatment of some non-displaced fractures is technically very challenging but can improve the prognosis. However, this is often a career-ending injury for a racehorse.



Radiographs demonstrating the same navicular bone fracture (red arrow). This was a career-ending injury