

No foot, no horse – no lie

The hoof is a complex structure and any number of complications can arise

The foot of the horse is a very complex structure. The outer surface, or ‘wall’, is composed of closely packed tubules of keratin which run from the coronary band to the ground. These ‘interdigitate’ like millions of tiny fingers with the deeper lamellae (layers) of living, sensitive tissue which are adherent to the underlying pedal bone. The sole is similarly made, although the solar horn is slightly softer and the tubules are much shorter. The hoof is effectively a cone which transfers the horse’s weight from the ground into the skeleton with each footfall. The frog and the expansion of the hoof, especially at the heels, act as shock absorbers.

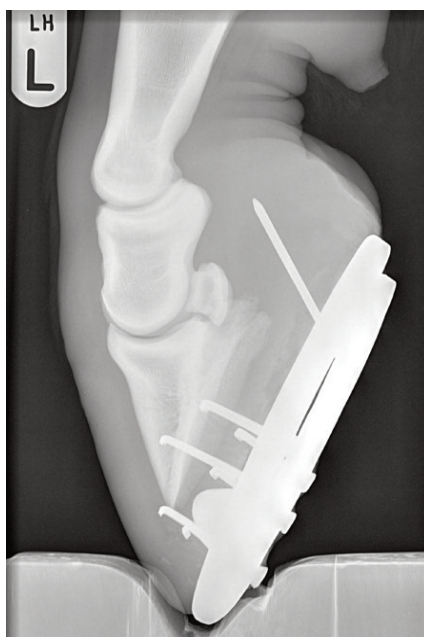
The pedal bone (P3) sits at the base of the bony column of the limb completely encased by the hoof wall and sole. It forms the coffin joint above with the short pastern bone (P2). This joint is largely within the hoof. Nestled in behind the pedal bone and P2 is the small navicular bone. Between and around these bones are numerous ligaments holding them together but allowing them to move with each stride. The largest of these is the deep digital flexor tendon (DDFT), which runs over the back surface of the navicular bone and attaches to the bottom of the pedal bone. The navicular bursa is a small fluid-filled sac which allows this tendon to move freely over the navicular bone.

There are many different conditions that can affect the horse’s hoof. Some are self-limiting or easily rectified, but others can cause considerable lameness – either in the short-term or for long periods of time – and a few are life threatening.

Bruising and infection

Any soft tissue can be bruised and the foot is no exception. Bruises can form after a horse stands on a stone or exercises on firm ground. These usually resolve with rest but occasionally can become infected. A bruise in the heel region, where the bar of the foot turns back on itself, is called a ‘corn’ and these can occur if a horse is not shod properly or not frequently enough. Corns are pretty common in horses with flat soles and collapsed heels. Such horses must be shod well to avoid this.

A crack or a small penetrating wound



A nail wound can be life-threatening

might allow infection in – or a bruise can become infected by blood-borne spread of bacteria. This is called ‘pus-in-the-foot’, a ‘foot abscess’, or ‘gravel’. The affected horse will be lame – often non-weight bearing – and the affected spot very sore to hoof testers.

In most cases, the treatment involves cutting a hole into the sole to release the accumulated pus. In a few cases, the infection will track under a considerable area of the sole. This is called an under-run sole and this can take quite some time to resolve to a point where a normal shoe can be reapplied.

Sometimes it is not possible to determine exactly where drainage can be established on the sole and the pus may track up the hoof wall and burst out at the coronary band or over the heels. In these cases, a horizontal split will remain in the hoof wall until it grows out at ground level.

Deeper penetrating injuries

Occasionally, a penetrating wound can enter the foot and cause damage to the deeper structures. Infection might enter the pedal bone and this will then require surgery, usually under sedation and local anaesthesia,

so that the damaged bone can be scraped away.

Following this procedure a hospital plate will be fitted. This allows dressings to be applied and kept under pressure so that the wound is allowed to fill in (granulate) slowly and harden off to become ‘normal’ hoof tissue. Antibiotics will also be required, at least in the early stages of healing.

In a small number of cases, a deeper penetration of the sole, e.g. by a nail, may enter the navicular bursa. This is a potentially life-threatening emergency and the joint will need to be flushed – usually under general anaesthesia – as soon as possible. It might be necessary to perform contrast radiographic studies to confirm the involvement of the bursa.

The coffin joint can also become infected via a wound at the coronary band. Again, the joint must be flushed with a large volume of sterile fluid if the horse is to have a chance of recovery.

Thrush

Thrush is caused by infection of the frog and in severe cases can spread to the heel region and to deeper tissues. It causes a crumbly, black appearance and texture, and a characteristic unpleasant odour. If the deeper tissues are affected the horse may be lame.

It is usually seen in horses whose beds are >>



Keratoma can cause bone damage

>> not kept clean or who live in muddy conditions. Cases can be relatively simple to treat if caught early but chronic or severe cases can be extremely difficult to resolve. Keeping bedding scrupulously clean and ensuring the feet are picked out regularly are simply good management and go a long way to prevent this condition. Once it is present, the damaged tissue needs to be debrided (cut away) carefully. The feet should be cleaned and packed with an antibacterial solution such as povidone iodine or sprayed with dilute bleach. Systemic antibiotic might also be necessary.

Laminitis

Laminitis is literally ‘inflammation of the laminae’ of the feet. The condition has been discussed in a previous issue but it is worth mentioning again as it is so prevalent.

Any horse can be affected (although it is rare in animals under three years of age) and it is not only caused by excessive amounts of spring grass. Laminitis is seen in mares and stallions with chronic poor hoof conformation; in horses who have suffered a metabolic or toxæmic insult such as metritis or colitis; in horses that are severely lame on another limb due to infection or injury; in horses that receive too much grain; and in horses that suffer from traumatic or concussive damage due to an excessive level of exercise on unsuitable ground.

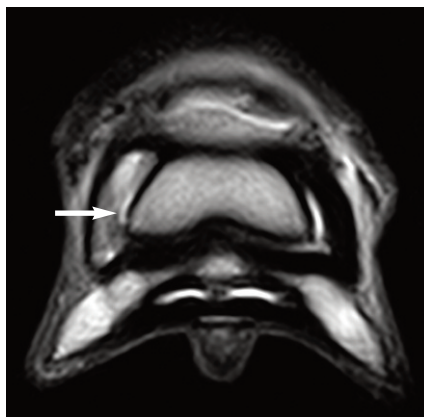
The symptoms can range from very mild, short-term discomfort to severe, acute pain associated with complete separation of the pedal bone from the hoof wall, necessitating euthanasia.

We see a number of broodmares every year who become increasingly uncomfortable on their laminitic feet as their pregnancy progresses. If their feet are radiographed, they often have much more severe changes than anticipated – including ski-jump appearance or erosion of the tip of the pedal bone. With time these mares become less responsive to remedial shoeing and analgesics. Some stallions are similarly affected by chronic laminitis.

Tumours of the feet

Keratomas are tumours of the horn-producing cells of the hoof wall or sole. They cause lameness by putting pressure on the underlying structures and may cause erosion of the pedal bone.

Often the first sign of a keratoma is a foot abscess that either recurs or which won't resolve with usual treatment. On radiographs, there is usually a defect in the pedal bone adjacent to the keratoma. Treatment is surgical and afterwards a hospital plate is usually applied to assist with slow healing and to keep the wound clean. It can take a very long time for the defect to completely fill in.



MRI image of collateral ligament injury

Tendon and ligament injuries

Until recent years, it was difficult to accurately diagnose some injuries within the foot because we could not get images of these deeper structures. Recently, however, we have been able to use MRI and CT scanning to allow non-invasive visualisation of soft tissue and bony structures.

Lesions such as tendon strains and tears, (e.g. to the DDFT), injuries to the ligaments supporting the navicular bone (collateral and impar ligaments) or coffin joint and damage to the navicular bone itself, bone cysts and cartilage lesions can now be imaged.

Historically, many of these injuries came under the umbrella of ‘navicular disease’ but we can now differentiate much further and this allows better choice of treatment options

and prognostic information. The lists of injuries and treatment options are too long to discuss here but at least it is simpler to get the correct diagnosis than it used to be.

Fractures and trauma

Fractures of the pedal bone are relatively common – particularly in foals. In simple cases, the fracture line might run through the edge of the bone or avoid the coffin joint, but in others the fracture might split the bone and extend into the coffin joint.

The simple fractures usually heal with box rest with no long-term consequences, but if the joint is involved (articular fracture) it may be necessary to apply a bar shoe to restrict movement of the hoof wall during the healing process to minimise the risk of arthritis developing in the coffin joint. Articular fractures can take many months to heal.

The navicular bone can also fracture and some of these cases are permanently lame due to the development of arthritis, damage to ligaments and failure of the bone to properly repair. Both pedal bone and navicular bone fractures may be caused by a horse kicking out at the wall.

Traumatic injuries to the hoof are also not uncommon and can range from a severe overreach where part of the heel, including hoof wall, is torn to full avulsion of the hoof capsule. Such injuries can require intensive and long term treatment but in most cases the hoof will regrow if the sensitive tissues have not been too badly affected.



A hospital plate is fitted after surgery for dressings to be applied under pressure