



Hans Wilderjans, Dipl. ECVS

Dierenkliniek De Bosdreef,  
Spelonckvaart 46, 9180  
Moerbeke-Waas, Belgium

[www.bosdreef.be](http://www.bosdreef.be)

### DEEP FOOT PENETRATION

Wounds, lacerations and puncture wounds can affect the sole, the wall and the coronary band of the foot.

Depending on the depth only the cornified tissue can be involved but deeper wounds can also involve the laminae/corium and/or underlying pedal bone, soft tissue structures (DDFT, impar ligament, digital frog cushion) or synovial cavities (DIP joint, navicular bursa, digital flexor tendon sheath).

Deep wounds have an increased risk for serious complications and the need for early correct diagnosis of the affected structures and the institution of a correct aggressive medical and surgical intervention can not be overemphasized.

Common mistakes are assuming the wound is superficial, with inappropriate trimming and removal of affected tissue leading to entrapment of dirt and bacteria. Delaying an appropriate medical and meticulous surgical treatment, may be the difference between a full return to soundness and humane destruction.

This lecture will focus on:

- the diagnosis of involved tissue.
- when and how treatment can be safely performed at the stable/farm.
- how to monitor successful healing.
- which cases can not be treated at the stable and need to be referred to an orthopaedic specialist working in a hospital environment.
- what can be done in a referral centre.

Nail punctures:

Nail punctures or deep penetrations of the sole or frog are always an emergency.

In general as soon as the corium has been penetrated lameness is very quickly apparent. Unfortunately the depth of the penetration is difficult to ascertain and the degree of pain/lameness does not help to define the structures that are involved.

The first question that needs to be answered is whether the puncture wound penetrated a synovial cavity (DIP joint, navicular bursa, digital flexor tendon sheath) and/or a tendinous structure (DDFT, impar ligament).

This requires a methodical examination of the foot.

- If no clean surface can be provided the horse should be transported to another examination area or referred to a hospital.
- If the nail/foreign body is still in the frog and weight bearing does not push the object deeper, the foreign body should not be removed until radiographs are taken.
- If the foreign body is not present anymore, the penetration place should be located (visual inspection, hoof tester, superficial paring of the sole and localisation of entry place).
- Make sure you have enough qualified people to help you.
- Sedate the horse and use a perineural block of the digital nerves.
- Clean sole and frog, remove dirty horn and clean sole and frog with antiseptic soap.
- Determine depth and direction of penetrating wound with a sterile probe.
- Take LM radiographs with a probe in place.
- Ultrasonography and MRI can greatly assist with an accurate diagnosis and complete visualisation of the nail tract and the affected structures.
- If impar ligament, DDFT, navicular bursa, DIP joint or digital flexor tendon sheath is involved referral to a hospital is in the best interest of the horse.
- If P3 is injured or only corium/digital frog cushion is injured further treatment can be carried out at home.

Treatment of a solar puncture should be performed in the same way as treatment of a contaminated or infected skin wound. Sharp debridement of the sole horn and underlying corium should be performed in such a way that only healthy tissue remains before applying a bandage. All loose horn, necrotic/infected soft tissue and foreign material should be removed. At the end of the debridement only healthy tissue and a firm connection between sole horn, corium and bone should remain. This can only be performed using very sharp hoof knives. A bloodless environment is essential to be able to

## NEVA STREAM: DIAGNOSTIC IMAGING AND ORTHOPAEDICS

assess properly the remaining tissue and its attachments. Use a tourniquet to be able to distinguish between healthy and abnormal tissue.

If the pedal bone is involved a proper curettage of the bone is mandatory so that only healthy bone remains.

Inappropriate cleaning/drainage will lead to infection and abscessation with delayed wound healing. The sole will seal quickly but the infection will remain.

Osteitis and sequestrum formation may take weeks to become radiographically visible. Follow up radiographs may be needed if the wound is not healing appropriately. Doubtful cases require CT or MRI of the foot.

Proper treatment will lead quickly to a horse that is weight bearing well at walk 1-2 days following treatment. If that is not the case one should question the treatment and check for shortcomings in the diagnostic work up.

Use of a foot poultice to draw out dirt is in most cases not necessary if a complete resection of the tract has been performed.

A well-fitted, dry bandage however should be kept in place to protect the wound from contamination and the foot should remain covered in a bandage until the solar/frog wound is completely covered with healthy horn.

A bandage change is performed every 3-4 days and the wound healing is assessed. Only healthy granulation tissue should be present and the new horn should be firmly attached to this granulation tissue during the healing process. If that is not the case it should be removed.

Once the infection has disappeared and the healing is going well the foot can be treated in a cast for several weeks. This might be very helpful especially in painful cases and or cases where the DDFT has been injured.

Topical creams like fucidin and flammazine can be used with every bandage change.

In case of unhealthy/infected granulation tissue is covering the wound, a swab should be taken for bacteriology and the topical antibiotics should be changed in light of the antibiogram.

Appropriate absorbent wound dressing may be necessary depending on the status of the wound (calcium alginate/silver dressing).

If only horn and corium is involved the antibiotic treatment is minimal. Low dose of NSAID should be used to monitor weight-bearing and to avoid masking lameness, which is often an indication of a complicated healing.

Penetration within a synovial cavity (DIP joint, bursa, tendon sheath) should be treated as any other intra-articular wound and this is only possible in a hospital environment with the horse under general anaesthesia.

Synovial fluid samples are obtained for cytology (total WBCC, total protein, differential and SAA) and bacterial culturing.

Endoscopic lavage and debridement are necessary in combination with systemic, intrasynovial and regional antibiotic treatment.

A successful outcome is based on swift intervention, an accurate diagnosis of structures involved, prompt medical and/or surgical treatment, with a prolonged and dedicated follow up and rehabilitation.