Wounds of the Equine Foot

EM Gaughan, DVM, DACVS

Wounds of horses’ feet are not common but can present numerous challenges. An accurate and timely diagnosis is essential to successful management and return to soundness. Aggressive treatment plans are also often necessary to resolve the initial injury and return a wounded foot to structural integrity and athletic soundness. Various wound origins often require uniquely tailored diagnostic and treatment plans.

Puncture Wounds

Most puncture wounds of the foot penetrate from the sole, with nails and other metallic foreign material being the most common culprits. Occasionally, during the forward swing phase of a horse’s gait, a puncture can occur through the coronary band. Experience with this kind of wound is that wooden material (IE: a stick or branch) is most common. Although even more rare, puncture through the hoof wall can happen, but the hard hoof wall is usually quite protective for the deep structures of the foot.

Solar Puncture Wounds

The most common site of puncture wounds of the foot is through the sole, with an affected horse stepping on the puncturing device – often a nail. Several thoughts come to mind for successful management:

1. Encourage the owner NOT to pull the nail before you can examine the foot
   a. A tip that has worked well is to suggest the affected horse be wrapped in a very bulky material (IE: bath towel) such that the horse is reluctant to bear weight.
      i. Owners often enjoy showing the nail to the veterinarian on arrival at the farm. Some problems arise from this:
         1. Even though the sole is hard, tough keratinized tissue, it is elastic enough after an acute puncture that the entry wound can be difficult to identify
         2. Depth of penetration can be difficult to discern even when the nail is left in place. This is even more difficult when a nail has only been in place a short time.
         3. More chronic nail presence may allow a tract and entry wound to be identified
4. If the client must remove the nail before veterinary examination, some form of entry wound identification is very helpful (IE: heavy Sharpie marker circle, etc.)
   b. Encourage the owner to restrain the horse where it is found and not walk it to an examination site. This will keep the horse from potentially driving a nail deeper into the foot.

2. When possible, obtain a number of radiographic projections to help identify the location of the nail and potential depths of penetration. It is important to recognize that the nail may have penetrated deeper than what is obvious on the radiographs. But in most cases these survey images will provide a sound working understanding of what issues are likely involved.

3. If a nail can be easily extracted when gently manipulated, there will likely be an easily identified exit wound and tract. So it should be safe to remove the nail at this point.

4. Local anesthesia is usually safe to perform once the nail has been removed or when a veterinarian can control the foot, such that the affected horse will not unknowingly step down, driving the nail deeper into the foot. A basi-sesamoid or abaxial sesamoid block will anesthetize the foot.

5. If you evaluate the horse acutely after puncture and have obtained radiographs the nail should be removed. Some means of identifying the entry/exit wound is important. Carving an “inverted cone” around the nail with a hoof knife, while the nail is in place has been very helpful in being able to positively return to the puncture tract as needed. Opening this tract as for a subsolar abscess can now be readily performed if needed.

6. If understanding a puncture wound requires more information, contrast radiography can be very helpful. After nail removal following acute puncture, a sterile metal probe may be helpful – sometimes with additional radiographs. Placement of a flexible catheter, followed with injection of positive contrast material can also nicely outline the depth of puncture and the potential for vital structure (IE: navicular bursa, coffin joint, navicular bone, P3 and the deep digital flexor tendon) involvement, when additional radiographs are made.
   a. Bone involvement can be frustrating to confirm, as radiographic evidence of bone lysis can take up to 10-14 days. Management of a subsolar abscess that is not responding as directly and timely as expected would be an indication for radiographic studies. One rule that has helped is: “If you have to make a second visit to see a subsolar abscess, radiograph the foot”.

7. Treatment suggestions:
   a. Check tetanus prophylaxis status
In adult horses tetanus toxoid administration is usually indicated after puncture wounds

Knowing the status of the deep tissues of the foot is essential for proper management. Prioritization is needed for:

i. Synovial involvement
   1. Treat as for septic synovitis

ii. Bone involvement: P3
   1. Affected bone can be successfully removed as long as the coffin joint and tendon/ligament insertions are preserved.

iii. Bone involvement: Navicular bone
   1. Very challenging with a challenging prognosis
   2. May be approached via arthroscopic techniques
      a. Traditional “street nail” procedure may be required

Close team work with a farrier can be very beneficial

i. Hospital/Treatment plate shoe
   1. Allows repeated access to solar aspect of the foot yet maintains good hygiene

**Coronary Band Punctures**

These wounds can be shallow or reach depths that can involve the lamina, the digital extensor tendon or the coffin joint. Close attention to the wound may reveal foreign body presence, although probe placement or contrast radiographs may be necessary to complete the diagnosis. Treatment will be dependent on the nature of the wound and the tissues involved.

**Coronary Band Lacerations**

Lacerations that involve the coronary band are often amenable to routine laceration wound management. Complete diagnostic understanding is important such that deeper tissue involvement is not missed and likely viability of skin and coronary tissues is evaluated. Sharp lacerations that can be sutured usually do well. Proximal hoof wall and coronary band tissues can often be placed in apposition with suture. Size 0 and 2-0 monofilament suture on a cutting needle has been successful in these locations. Motion can be an issue to contend with, so a stout bandage or foot cast may be helpful. Follow up work with a farrier may also be helpful if a defect in hoof wall production results from a laceration.

A more problematic event occurs when coronary band tissue is avulsed or lost during wounding. Management is essentially forced into second intention healing. It is important to recall that tissue viability may not be fully apparent until 5-7 days after wounding. This is due to some latency in loss of local vascularity and blood flow. Local wound hygiene is important in
management as is control of mound site motion. Placement of a “foot cast” that includes all of
the foot and the distal pastern can help avoid several complications – including the production
of exuberant granulation tissue. A foot cast left in place 10-21 days can substantially shorten
the duration of wound management and down time for the affected horse. If a horse remains
weight bearing and “comfortable”, the cast can be left in place even with exudate at the
proximal rim of the cast and foul odor. Typically, mature, well-controlled granulation tissue will
be evident on cast removal such that bandaging and hygiene exercises can be minimized
though completion of wound management.

**Hoof Wall Avulsion**

Avulsion, or tearing, of the hoof wall, is not common, but can be very challenging to reach a
satisfactory outcome. Distal hoof wall “chipping” can be readily managed and most horses do
not experience lameness or down time. However, when the sensitive lamina and coronary
band are involved, an affected horse is typically Grade 4-5 lame and intensive management
efforts are indicated.

At times, an avulsed portion of hoof wall may be the best bandage material available and can
be compressed back to close to normal position with bandage materials after thorough
cleansing. This is often a first aid maneuver and may not be the method of treatment through
final resolution. Viability of coronary band and laminar tissues usually dictate this. If
vascularity is lost, associated hoof wall will slough. If tissue maceration and contamination are
severe, resecting the involved hoof wall may be indicated. When the deeper tissues of the foot
are noted to be intact, management with a foot cast can be very rewarding. A foot cast in this
situation can be left in place for 2-4 weeks if no complications are encountered.

Follow-up farrier assistance can be vital for final successful outcome. Floating the affected
portion of an affected foot can help maintain comfort and allow a good start to coronary tissue
healing and initial generation of new hoof wall. Maintenance of a bandage or protective foot
cover can be helpful as well. An abnormal, somewhat unorganized, appearance to the newly
generated outer hoof wall tissue should be expected, but normal function is often obtainable.

**Heel Bulb Laceration**

Successful resolution of heel bulb lacerations depends on early recognition of the deep, vital
tissues and management of either primary closure or second intention wound healing via
granulation/epithelization.

Vital tissues of concern with heel bulb lacerations include:

1. Digital flexor tendon sheath
2. Coffin joint
3. Pastern joint
4. Navicular bursa
5. Deep digital flexor tendon
6. Distal sesamoidean ligaments
7. Collateral cartilages

Once these tissues are satisfactorily addressed, management of heel and foot motion becomes the goal. Some very sharply created, acute lacerations can be closed with suture. Most heel bulb wounds are not amenable to primary closure and must be managed by second intention wound management. This is one of the most successful applications of a foot cast. As previously mentioned, these casts can usually be left in place 10-14 days (or longer), even with evidence of foul odor and exudate. Lameness is the primary reason to remove a foot cast before the required immobilization days are reached. Typically a good prognosis can be offered for affected horses and placement of a foot cast saves owner money over repeated bandage applications.