

# HEALTH ZONE

Hoof Care

## Coffin Bone Fractures

BY HEATHER SMITH THOMAS

Most horse owners pick up quickly on visible changes to their horses' hooves. Thrush, cracks, and punctures are issues easily detected and, hopefully, treated. But what happens when injuries occur to structures hidden within the hoof capsule?

The three bones inside the horse's foot,

for instance, can fracture just like any other bone in the body. The coffin bone, the lower end of the short pastern bone, and the navicular bone, which sits behind the coffin bone, articulate together in the coffin joint. Of these three bones, veterinarians say the coffin bone is what horses fracture most commonly.

### Reasons for Fracture

The horse's hoof capsule is designed to protect the bone; the outside horn is hard and immobile, and the sole is tough and resilient. Sometimes, however, this protection is inadequate.

While it's hard to pinpoint precursors to coffin bone breaks, the primary cause of any foot fracture is excessive impact.

"This could be from landing on a rock, or jumping and coming down hard, perhaps with a twist," said Dr. Alicia L. Bertone of Ohio State University. "It's typically a high-impact injury."

Another reason for fracture could be predisposition; researchers have shown that there are certain risk factors for various areas of fracture.

"For instance, Standardbred racehorses are prone to wing fractures," Bertone said. "The coffin bone looks somewhat like a horseshoe. Toward the back, one of the 'wings' may fracture off."

Further, cumulative strain can be a culprit in coffin bone stress-type fractures from speed and repetitive impact rather than a one-point-in-time blow.

### Diagnosing a Fracture

Paul Goodness, senior member of a group farriery practice based in Round Hill, Va., said coffin bone fractures that do not involve the joint can be tricky to diagnose because the clinical signs (lameness, heat, increased digital pulse, etc.) mimic many other foot conditions. You can suspect a coffin bone fracture right away, however, in any previously sound athlete that comes up lame immediately after exertion, Bertone said.

Generally, veterinarians use nerve blocks and radiographs (X-rays) for diagnosis, but Goodness said clinicians might use nuclear scintigraphy, MRI, or a CT scan to pinpoint difficult-to-see fractures. Most owners, however, don't jump right to these more advanced diagnostic tools because of the expense.

Another diagnostic challenge is that sometimes radiographs won't reveal a coffin bone fracture (especially hairline or stress fractures) until five to 10 days post-injury, after osteolysis (dissolving of bone) occurs at the fracture site, creating the dark line that is visible on radiographs, Goodness says. But if the horse suffers a fracture down the front of his coffin bone,



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diagnosis is fairly straightforward.

"These horses will be acutely lame, even at a walk," Bertone said. "There will be heat in the foot, an increase in digital pulses to the foot, and the foot will show positive to a hoof tester examination putting pressure on the foot. These telltale signs would warrant X-rays," she said, which she adds confirm diagnosis in 80% of these cases.

Dr. Nathaniel A. White, professor of surgery at Virginia Tech's Marion duPont Scott Equine Medical Center in Leesburg, said it's best to radiograph the lame foot immediately rather than after doing any other diagnostic tests such as nerve blocks.

"If it's a stress fracture that hasn't separated yet, we don't want to do a nerve block and jog the horse because there is risk of having the bone separate and become fractured," he said.

### Treatments

The primary goals for treating a coffin bone fracture include immobilizing the bone, reducing inflammation, and limiting the horse's activity until the fracture heals.

**Shoeing/Casting**—If the bone has not yet separated, treatment generally consists of a hoof support such as a bar shoe, said White. This protects the hoof wall and prevents it from flexing and expanding when the horse places weight on it.

"If the fracture goes into the coffin joint, a bar shoe with clips around the hoof is recommended," said White. "An alternative is a rim shoe filled with acrylic all the way around the entire hoof—the goal is to stop hoof wall movement and use the hoof as a cast (so the joint is immobilized and the fracture can heal). A fiberglass cast can be applied on the hoof initially, to protect it, but a shoe is used for long-term support."

If the coffin bone is broken into several pieces, there are few treatment options besides attempting to support the foot in a stabilizing shoe.

"These (coffin bones with multiple fractures) can heal, but it depends on the amount of joint damage," said White.

The more fractures affecting the joint, the lower the horse's prognosis for recovery due to the chances of arthritis (joint inflammation) developing.

**Reducing Inflammation**—"If the horse is in a lot of pain, anything to make the foot more comfortable is helpful," said White. Pain-relieving tactics include daily icing and non-steroidal anti-inflammatory (such as phenylbutazone or firocoxib) drug administration.

Veterinarians frequently inject the coffin joint with hyaluronic acid (HA, which plays a role in joint lubrication) to reduce inflammation. However, "corticosteroids are not recommended for acute fractures because they can inhibit healing (i.e., they

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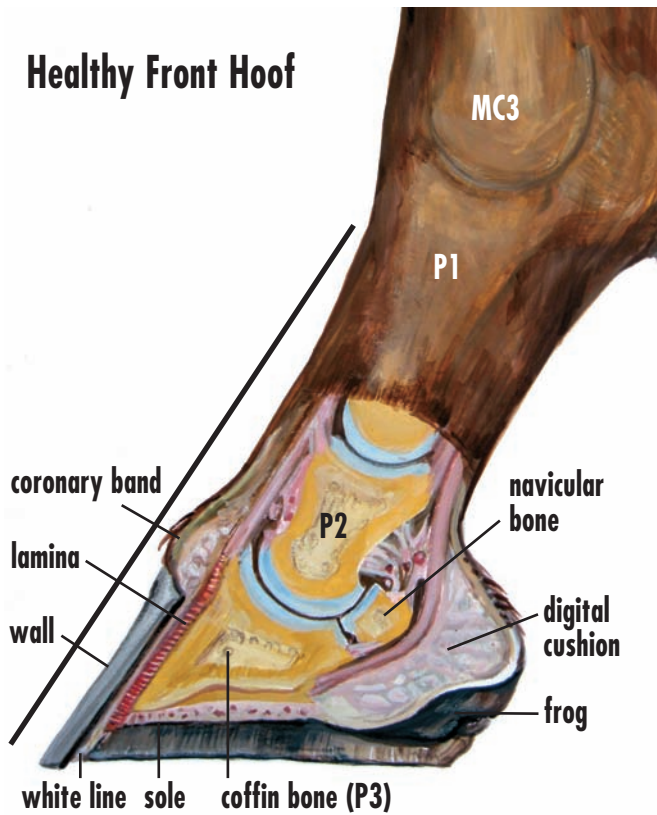


ILLUSTRATION BY ROBIN PETERSON DVM

mask the pain enough that the horse continues loading the leg normally),” he added.

**Resting the Horse**—Depending on the severity of the fracture, White suggests putting the horse on stall rest and possibly introducing some hand walking.

“The horse should have very limited activity so that you don’t continue to cause a problem,” he said. “Stress fracture cracks can take three or four months to fully heal. The horses may be sound in a month or two, but if exercise is started too soon, this may create a repetitive problem at that site.”

## Sometimes radiographs won’t reveal a coffin bone fracture until five to 10 days post injury

It’s best to be conservative and have your veterinarian review the healing process. White says regular MRIs to evaluate bone activity, which is evidence of remodeling, can help accurately monitor progress.

If the fracture is a complete break the horse needs stall rest for two to three months, White suggests. Then if there is no lameness, have your veterinarian radiograph the foot to assess healing and determine if the horse can be turned out.

“These fractures can take a long time to heal, often requiring a minimum of six months,” White said. “During turnout the foot is kept in a supportive shoe with clips or acrylic support all the way around the hoof wall. Sometimes a pad is placed under the shoe to protect the bottom of the foot.”

And even if your horse appears sound post-stall rest, a fracture line can sometimes still be seen on radiographs or scintigraphy for up to 22 months. This continued remodeling is yet another reason to take recovery slowly.

**Surgical Repair**—When a fracture splits the coffin bone in half from toe to coffin joint, a bone screw across the fracture can provide more stability as it heals, White said. Screws can also help stabilize large fractures at the extensor process, which occur when a piece of bone pulls loose at the top front of the coffin bone where the tendon attaches.

**Removing Bone Chips**—Chip fractures in the coffin joint at the extensor process, which are small fragments that are not attached to the tendon, can be removed with arthroscopic surgery. In this procedure the veterinarian inserts a tiny fiberoptic video camera through a roughly quarter-inch-long incision to view and remove chips.

**Neurectomy**—In some cases lameness does not resolve completely with other treatments and the veterinarian might perform a neurectomy. This procedure involves cutting the nerves at the heel and is also called nerving.

“This may decrease or eliminate pain from arthritis and is a way to get some of these horses back into exercise when other treatments haven’t worked,” said White.

Bertone has performed neurectomies on many Standardbreds with wing fractures.

“After being given 60-90 days in rim shoes, with anti-inflammatory treatment, we can nerve them and they go back to the racetrack sooner. The fracture may not be fully healed at that time, but they seem to continue to heal. It appears that racing while the foot continued to heal didn’t make any difference in the final healing,” she said.

### Prognosis

Nonarticular wing fractures and rim fractures normally heal well. There is no associated risk for arthritis development, and

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the horse can generally return to full soundness.

“Depending on the horse’s use, about 50-60% of (all) coffin bone fractures will heal with resolution of lameness,” said White. Supportive shoeing might help prevent lameness once the horse returns to work.

Fractures affecting the joint, such as a crack down the front center of the bone, take longer to heal and come with more lameness issues.

“When these heal, the two pieces tend to form a fibrous union rather than a bony union,” said Bertone. “Several studies have shown that it takes a minimum of 11 months rest, followed by a slow return to activity (to heal). It can be difficult to get these fractures to heal to where the horse might have a chance to be athletic again.”

Generally, the limiting factor is how much arthritis develops in the joint, she noted, which depends on how displaced the pieces are.

“It also depends on whether there is fragmentation of bone in the joint,” she said. “A sliver or chunk of bone in the joint can be detrimental. If a person doesn’t rest the horse long enough before trying to get back into work, this type of fracture may not have a chance to heal. Those horses have more risk for arthritis.”

Overall, time and good fortune play a part in prognosis.

“There is some luck involved, based on how the fracture was created,” said White. “In any fracture that occurs acutely (with sudden lameness), the sooner it can be looked at, and a decision made regarding treatment, the better.”

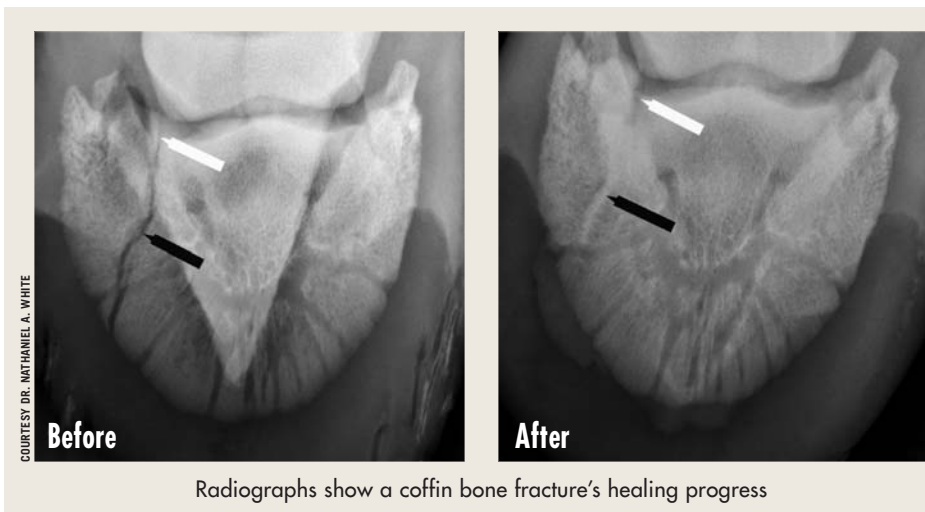
### Facing These Fractures in Foals

Coffin bone fractures in foals heal swiftly (often with just a month of reduced activity) and generally veterinarians give these patients a good prognosis.

“Most foals simply have wing fractures or solar margin fractures,” explained Goodness. “In these instances we generally don’t do anything special if they can be confined for three or four weeks and are not running and playing at pasture. If we can keep them quiet, with minimal activity, and leave the foot alone, these foals generally heal well. But if they have to be turned out, we must come up with some kind of tiny shoe to help immobilize the foot.”

Young animals generally heal much faster than adults, mainly because their bones are still growing. But this also means the tiny supportive shoe the farrier might put on the foal must be replaced frequently with a larger one.

“A rule of thumb when we have to apply a cast or shoe (to a foal) is to remove and replace it every two weeks,” Goodness said. “If you leave one on too long, it will do long-



Radiographs show a coffin bone fracture’s healing progress

term damage by restricting hoof growth.”

### Take-Home Message

Always suspect a fracture should your horse become suddenly lame. Work with your veterinarian to obtain a diagnosis be-

fore assuming it’s a stone bruise or abscess because treatment for these problems is counterproductive for a fracture. Your vet and farrier can help you devise a plan for managing a fracture to give your horse the best chance for optimal recovery. **BH**

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