
After Kentucky Derby winner Barbaro underwent surgical repair of a severe fracture many equine veterinarians were hearing the same statement “I didn’t think you could fix a broken leg in a horse”. The truth is some you can and some you cannot. This article will describe recent advances in fracture fixation in horses and attempt to clarify why some fractures are considered “good” fractures and some are considered “bad”.

The first sign of a fracture is generally a non-weight bearing lameness. The first thing to rule out is the most common cause of severe lameness in horses, the foot abscess. With foot abscesses the foot is frequently warm and the pulse to the foot is increased. Start at the hoof and work your way up the limb applying pressure every several inches around the limb to check for other sites of pain, heat or swelling. The horse should be confined and a veterinarian called immediately to help differentiate the two. Sometimes with fracture of major long bones the diagnosis is unfortunately very easy due to instability of the leg. With some fractures the goal will be returning a horse to full athletic soundness. In other instances you are attempting to save their life for “pasture” soundness. Which ones are good and which ones are bad can be very surprising and should be evaluated by someone specializing in fracture repair.

The cost associated for repair of many fractures can vary tremendously depending on the duration of hospitalization, number of implants (plates and screws etc.), type of surgery needed etc (figure 1).

The biggest challenge facing equine surgeons with regards to fracture repair is the fact that horses for the most part need to remain weight bearing on all 4 limbs. This is true even in the case of a fracture. If a person has a serious fracture of a limb, we are generally confined to bed rest for long periods of time and then transitioned to a wheel chair or crutches and possible a walking cast if all goes well. Horses need to be able to put weight on a fractured limb immediately after surgery. Add in the fact that many of our equine patients weigh over 1,000 pounds and are “fight or flight” animals and the challenges become obvious. Most fractures even in large horses could be repaired but the opposite (“good”) leg needs to be able to bear weight. If the good leg supports too much of the horses body weight for too long a period of time, the support structures of that leg start to break down frequently leading to laminitis (see volume 1, issue 4). This is why it is better to have a fracture of the hind limb than
of the forelimb. Forelimbs must also support the weight of the head and neck. Laminitis of the "good" leg is called "support limb" laminitis and represents one of the most serious forms of the disease (this is what ultimately led to the demise of Barbaro).

Body weight is the primary reason that fractures in foals and ponies tend to carry a much more favorable prognosis than full sized horses. In general, most fractures in foals less than approximately 500-600 pounds are candidates for repair (see figure 2). As body weight increases, the biggest determining factor for prognosis becomes the bone involved. In general, full sized horses with a fracture below the knee or hock may be candidates for surgical repair. Fractures above the knee or hock in full sized horses carry a poor prognosis unless the bones are not displaced at all. X-rays are generally needed to provide an accurate prognosis. Other factors include where in the bone the fracture occurred (i.e. how close to the middle), whether or not the fracture extends into a joint, the number of pieces involved, and whether or not the skin over the fracture is intact (a "closed" fracture) or has penetrated the skin (an "open" fracture).

Transfixation Cast. The first-aid applied can be of paramount importance in improving chances for survival. Equine veterinarians are trained in how to best prepare a horse with a fractured limb for transportation to a surgical facility. Improper first-aid can lead to a closed fracture becoming an open one. In general, open fractures have a much lower prognosis and a much higher cost associated with treatment. The reason for this is the next big challenge in fracture repair, infection of the implants can be a very serious complication and repair of open fractures have a higher incidence of infection. As bacteria gain access to the stainless steel implants they may secrete a "biofilm" that can prevent the access of antibiotics and lead to loosening of the screws and plates used in a repair. Antibiotics given intravenously or intramuscularly often are not sufficient to combat infected implants and a race may begin where the fractured bone hopefully heals before infected implants need to come out. Some of the biggest recent advances in fracture repair in horses have been in the treatment and prevention of infections.

There are very few implants used in fracture repair in horses that are designed specifically for horses, most are made for people. Although it seems intuitive that horses would just need much bigger plates, the laws of physics and the amount of skin present limit the size of the plates that may be used. Plates used in fracture repair are designed to compress the fractured bone ends together.
Plates and screws are oftentimes not sufficient to allow a horse to bear weight after surgery so some type of cast is frequently needed. A “transfixation cast” is sometimes placed due to the fact that this type of cast can support the majority of the weight of the limb (see figure 3). With transfixation casts, large pins are placed through the bone above the fractured bone and then incorporated into the cast. This transfers the weight of the limb through the pins to the cast. These casts are not without risk as additional fractures can occur through the holes used to place the pins. However, the added protection of a transfixation cast can sometimes be the difference between success and failure. Casts of some sort may be used anywhere from just the recovery from anesthesia for months post-operatively. One of the most stressful times in repair of a fracture is getting the horse from the operating table to back on their feet. Options to help minimize the chances of the repair falling apart include pool recovery systems like used on Barbaro at New Bolton Center, recovering in a sling, or using a system of ropes on the head and tail to assist in standing (figure 4).

In closing, surgical repair of fractures in horses will always remain a huge challenge for equine surgeons due to the above mentioned factors. However, many fractures that were once hopeless are now fixable. If you suspect your horse has a fracture work with your veterinarian to decide whether or not surgical repair should be attempted. Even though fracture repair has made huge advances in recent years, it can still be a major undertaking and the risks and benefits should be thoroughly weighed before choosing repair.

Figure 1: Radiograph showing use of large number of implants.
Figure 2A & B: Fracture of a foal’s cannon bone.
Figure 3: Transfixation Cast.
Figure 4: Horse recovering from anesthesia in a sling.

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