

# Tension-band wiring and lag screw fixation of a transverse, comminuted fracture of a patella in a horse

R. J. Hunt, DVM, MS; G. M. Baxter, DVM, MS; D. T. Zamos, VMD

A 3-year-old Tennessee Walking Horse × Paint gelding was referred to the teaching hospital with a grade IV/V lameness of the right hind limb. The owner reported that the horse had been kicked in multiple areas on the trunk and limbs by another horse 2 weeks earlier. Initially, the horse had been unable to bear weight on the limb and had a large swelling over the right stifle. Lameness improved slightly throughout the first week with stall confinement, but worsened when allowed into a paddock. The referring veterinarian found crepitation deep to the area of swelling.

Radiography performed at the time of admission revealed a comminuted fracture of the right patella with at least 2 major fragments (Fig 1). The fracture line extended into the femoropatella joint, and minimal displacement of the fragments was seen on the cranioproximal-craniodistal view.

The next day, treatment with potassium penicillin (22,000 IU/kg of body weight, q 6 h, iv) and gentamicin sulfate (2.2 mg/kg, q 8 h, iv) was initiated, and the horse was anesthetized and positioned in dorsal recumbency. The right hind limb was flexed slightly, and a lateromedial radiograph of the stifle joint was obtained to ensure that there was not further displacement of the fragments.

After surgical preparation and draping, a 15-cm longitudinal skin incision was made over the cranial aspect of the stifle, extending 2 cm distal to the base of the patella. Incision through the subcutaneous tissue and fat exposed the cranial surface of the patella and resulted in a 3-cm arthrotomy in the distal femoropatellar joint. Three unstable bone fragments measuring approximately 1 × 1 × 2 cm each were found along the medial aspect of the middle and proximal portions of the patella. Because of their instability, these fragments were removed. The remaining fragments were separated by a transverse fracture line, which was debrided

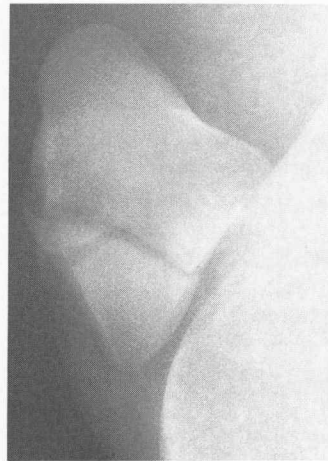


Figure 1—Lateromedial radiographic view of the right stifle of a horse with a history of having been kicked by another horse. Notice the comminuted fracture of the patella.

with rongeurs and a bone curette. A C clamp<sup>a</sup> was used to reduce the fracture, and two 5.5-mm cortical bone screws<sup>b</sup> were placed in lag fashion from a distal to proximal direction to provide stabilization. Two 14-gauge strands of orthopedic wire were placed circumferentially around the patella, incorporating the screws to provide a tension-band effect. The joint was copiously lavaged with sterile acetated Ringer's solution, and the incision was closed in 4 layers. A stent bandage was sutured over the incision.

The horse was unable to bear weight on the limb for approximately 72 hours after surgery. Administration of broad-spectrum antimicrobials was continued, and phenylbutazone was given until day 5 after surgery. On day 4 after surgery, the horse developed colic and became recumbent despite being tied. The colic was attributable to impaction of the left colon, which resolved in 36 hours with medical treatment consisting of iv administration of acetated Ringer's solution. At the time of discharge, 12 days after surgery, the horse had a grade III/V lameness.

Evaluation 10 weeks after surgery revealed a slight to moderate lameness (grade II/V) with full weight bearing at a walk. Radiographically, there

<sup>a</sup>Equine C-clamp with drill guide, Synthes Ltd, Atlanta, Ga.

<sup>b</sup>Cortical bone screws, Synthes Ltd, Atlanta, Ga.

From the Department of Large Animal Medicine, College of Veterinary Medicine, The University of Georgia, Athens, GA 30602. Dr. Baxter's present address is the Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523. Dr. Zamos' present address is Department of Large Animal Medicine and Surgery, Texas Veterinary Medical Center, Texas A&M University, College Station, TX 77843.

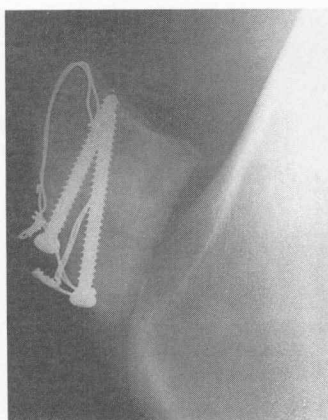


Figure 2—Lateromedial radiographic view taken 10 weeks after surgery to repair the fractured patella.

was evidence of healing and the implants were intact (Fig 2). A 1-cm area of roughening on the apex of the patella was suggestive of patellar chondromalacia. At 4 months after surgery, the owner reported that the horse was sound in the pasture at a trot. One year after surgery, the horse was being used for pleasure riding, and had remained sound.

Patellar fractures are infrequent in horses because of the great mobility of the patella.<sup>1-5</sup> Patellar fractures generally are attributable to trauma such as a direct blow, and result in severe lameness. They also may result from distractive exertional forces during contraction of the quadriceps femoris mechanism.<sup>5</sup>

Management of patellar fractures in horses varies with the type of fracture and the intended use of the horse.<sup>5</sup> Conservative management has been recommended for nondisplaced or nonarticular patellar fractures, but degenerative joint disease may develop as a sequela if the fracture is articular.<sup>2-4,6,7</sup> Small articular fragments may be removed with favorable prognosis for return to soundness.<sup>6-8</sup> Vertical and transverse fractures that are displaced are treated surgically by use of internal fixation, whereas if no distraction is evident, they may respond favorably to conservative management.<sup>3,8</sup>

Transversely oriented fractures of the patella in horses are rare. DeBowes et al<sup>2</sup> described a successful repair accomplished with 3 cancellous bone screws placed in lag fashion. Lag screw fixation of transverse and vertically oriented patellar fractures commonly is used in people and dogs as is tension-band wiring for transverse patellar fractures.<sup>9-12</sup> The combination of lag screw fixation

with cerclage tension-band wiring provides maximal protection against distractive forces from the quadriceps mechanism. With lag screw fixation alone, implants are parallel to the line of distractive forces, thus, strength of the fixation depends primarily on the surface area of the screw threads engaged in the hole.<sup>5,12</sup> Addition of tension-band wire augments lag screw fixation and helps prevent the screw from pulling out.<sup>5,12</sup>

Partial patellectomy has been recommended when fragment size prohibits internal fixation when remodeling precludes anatomic reduction.<sup>4,5</sup> In the case reported here, fragments were small and unstable, and fixation with screws or wires through the small fragments might have interfered with placement of the large lag screws in the 2 major fragments, thus, partial patellectomy was performed. Generally, a poor prognosis for horses with comminuted fractures is warranted,<sup>5</sup> but in this case, the comminuted smaller fragments could be removed. Because of the articular components of the fracture and the distraction in the transverse plane, rigid internal fixation was performed to achieve stability, promote healing, and decrease the chances of developing osteoarthritis.

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