

Practical Approaches to Fracture Treatment

Bhatt, R. H., Roon Mathai, Jhala, S. K., Kelawala, N. H., Parikh, P. V. and Patil, D. B.

Department of Surgery and Radiology,
College of Veterinary Science and A. H., AAU, Anand

Successful fracture repair relies on creating and maintaining an environment that is viable (vascularized) and stable. Although the horse presents some special challenges including large physical size, necessity for immediate weight bearing, slow callus formation (relative to ruminants, for example), and scarcity of soft tissue coverage for some bones; many complete bone fractures are amenable to treatment and successful healing.

Regardless of the numerous appliances available for fracture stabilization, tissue viability must be maintained at the fracture site. Therefore, principles of treatment must include prevention of further soft tissue damage, debridement of devitalized and contaminated tissues, and stabilization of fracture fragments. Antibiotic therapy should also be considered with open wounds and surgical exposure of the fracture site. Considerations for prevention of further soft tissue damage include immediate stabilization of the fractured limb until definitive treatment and selection of a definitive method of stabilization that minimizes further soft tissue and vascular disruption relative to its ability to stabilize the fracture fragments.

The most sophisticated stabilization technique is not necessarily the method of choice. Skill of the veterinarian in different techniques, available appliances and equipment, quality of nursing care, and cost play legitimate roles in selection of a method for fracture management. Often, simpler techniques may minimize additional soft tissue disruption, be more feasible, and enhance the likelihood of successful repair.

Sufficient stability must be maintained for fracture healing. Reconstruction of the bone fragments is optimal for both anatomical reduction and transfer of load. Load sharing by the bone and stabilization appliances both stimulates fracture healing and increases the fatigue life of the stabilization appliances. Perfect anatomic reduction is ideal, however, anatomical reduction may be

compromised particularly when stability is improved, for example, with impaction of a proximal bone fragment into the medullary cavity of a distal bone fragment. Anatomical reduction often improves after fracture healing by bone remodeling in response to the mechanical loading environment. Anatomical reduction becomes a more important consideration with articular fractures and a desired athletic performance outcome.

It is important to optimize the environment for fracture healing and take advantage of the horse's own fracture stabilization mechanisms. For example, fractures of the humerus and femur are surrounded by large soft tissues masses which, through swelling and pain, can promote fracture stabilization. Surgical disruption of major muscles that normally stabilize a bone and its loading environment can be devastating to fracture stability.

The following table outlines the major factors for consideration in selection of a stabilization method for specific situations.

Confinement alone: Incomplete fractures, Inherently stable fractures, Fractures with abundant soft tissue covering.

Required Materials Stall, tie stall, or fence to tie. **Advantages** Inexpensive, Few materials needed, Soft tissues provide mesenchymal cells and may provide inherent stability through swelling, May be only alternative for some fractures

Disadvantages Inability to influence degree of anatomic reduction, Little control over movement.

Sling Support: Emergency treatment until definitive fracture treatment, Proximal locations in the limb (i.e., humerus)

Required Materials Sling and stall with overhead support

Advantages Only method applicable to some fractures

Disadvantages Patient must have a temperament to tolerate sling confinement, Little influence over anatomic reduction Extensive nursing care

Splint: Emergency treatment for distally located fractures, Distal fractures, Young foals, Small horses (ponies).

Required Materials Splints and bandage materials
Advantages R e l a t i v e l y inexpensive in terms of cost, Relatively little influence on degree of anatomic reduction.

Disadvantages Extensive nursing care.

Cast: Distally located fractures, Fractures in young animals.

Required Materials Bandaging and cast materials
Advantages R e l a t i v e l y inexpensive in terms of cost, Better stability than that with a splint.

Disadvantages Daily nursing care for detection of cast sores, May require general anesthesia for application, Frequent changes required for growing animals, May not prevent overriding of fracture fragments with weight bearing.

Transfixation Pins and Cast Distally located fractures.

Required Materials Bandaging and cast materials, Transfixation pins, Pin cutter, Drill and bits.

Advantages Enhanced stability over cast alone with minimal extra effort, Can prevent overriding of fracture fragments with weight bearing.

Disadvantages Daily nursing care for detection of cast sores, Requires general anesthesia for application, Frequent changes required for growing animals

External Fixator Distal limb fractures

Required Materials External fixator commercially available or bandaging and cast materials, transfixation pins, and connecting bars/

shoe Drill and bits, Misc. bolts, nuts, etc.

Advantages Can prevent overriding of fracture fragments with weight bearing, Can spare soft tissue disruption at the fracture site, Can provide access to a wound for treatment.

Disadvantages Daily nursing care, Requires general anesthesia for application, May be technically difficult to apply, Bone fracture through a pin hole.

Intramedullary Interlocking Nail: Diaphyseal long bone fractures.

Required Materials Intramedullary interlocking nail and screws, Specialized insertion equipment.

Advantages Minimize soft tissue disruption at the fracture site, With sufficiently strong materials can neutralize compression, bending and torsional forces, Applicable to comminuted fractures, May require fluoroscopy for screw insertion.

Disadvantages Technically demanding, Expensive equipment and supplies, May require an intra-articular approach, Requires general anesthesia.

Bone Plates and Screws: Most bone fractures.

Required Materials Bone plates and screws, Specialized application equipment.

Advantages Optimal chances for anatomic reduction, Best exposure for debridement at the fracture site, May be able to neutralize bending and torsional forces, May be able to buttress lost fragments.

Disadvantages Technically demanding, Expensive equipment and supplies, Requires general anesthesia, Extensive soft tissue disruption for application.

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