Physeal Fractures in Foals

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KEYWORDS

• Physis • Fracture • Internal fixation • External coaptation • Foal

KEY POINTS

- Physeal fractures are common musculoskeletal injuries in foals.
- Careful evaluation of the patient, including precise radiographic assessment, is paramount in determining the options for treatment.
- Prognosis for physeal fractures varies depending on location, age of patient and timeliness of referral.

INTRODUCTION

The term physis is historically defined as "a common term used to describe the epiphyseal growth plate" of long bones.[1] It is also commonly called the growth plate or, more appropriately, the metaphyseal growth plate because elongation of the bone is done by lengthening the metaphysis and not the epiphysis. The term physis is most appropriate when dealing with physeal fractures because some fractures deal with the cartilaginous plate and some deal with the adjacent bone. Physis covers all of these fracture types.

During rapid growth of the immature animal, the physis provides a weak point in the bone where fractures can occur. Fracture configuration, treatment, and prognosis differ depending on the location and type of fracture sustained. Physeal fractures have been historically classified using the Salter Harris classification system.

Salter Harris Classification System

- Type 1: A fracture through the zone of hypertrophied cells only, without involvement of the adjacent epiphysis or metaphysis.
- Type 2: A fracture through the physis across part of the width of the bone and through the metaphysis, leaving a segment of metaphysis attached to the epiphysis.
- Type 3: A fracture through the physis across part of the width of the bone and through the epiphysis, entering the joint.
- Type 4: A fracture across the epiphysis, growth plate, and a portion of the metaphysis perpendicular to the plane of the physis.
- Type 5: A crushing or compression fracture of the growth plate with little or no displacement.

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Although the Salter Harris system is the most common classification system to describe physeal fractures, it does not fit all physeal fractures. Although many of the physes in the horse are under compressive loads (compression physis), there are some physes at attachment sites of soft tissue structures (ie, olecranon) that are under tensile loads (tension physis). The Salter Harris system is not equipped to describe fractures of the tension physis and, therefore, simple anatomic description of these fractures is preferred by the authors.

PATIENT ASSESSMENT

Similar to most conditions, a good history and thorough physical examination is of utmost importance. History of how the fracture occurred, as well as the age of the patient and duration of fracture, can help determine the prognosis in several cases.

Physical examination will give information regarding patient stability and safety, as well as additional information that can aid in determination of prognosis. Whether the fracture is new or old, the condition of overlying soft tissue structures, as well as the overall health of the patient, can guide the course of action.

Careful initial patient assessment, including heart rate, mucous membrane color, hydration status, and capillary refill time, can determine if the patient is stable or hypovolemic. Shock from trauma may occur although blood loss that from fractured long bones is generally not a major concern for foals with physeal fractures because these fractures do not involve the diaphysis. Young foals with fractures may also not be able to nurse effectively and can rapidly become dehydrated and possibly hypoglycemic. If available, initial hematology and serum biochemical analysis, including packed cell volume, total solids, blood glucose, and lactate measurements, can aid in assessing the foal's level of hydration and volume status. Fluid therapy should be administered as determined to stabilize a patient before treatment or shipping.

Radiographs should be obtained before stabilization if appropriate and available. Very unstable limbs or injuries in the field, where radiography is unavailable, should be stabilized to the best ability of the clinician.

Wounds should be cleaned, investigated, and addressed before shipping. In most cases, open fractures have a decreased prognosis compared with closed fractures. Appropriate antimicrobial therapy and tetanus prophylaxis should be considered in open fractures before transport and treatment.

Stabilization of the limb before transport can prevent further injury; however, it cannot be stressed enough that improper stabilization can exacerbate the initial injury, which may lead to decreased prognosis, depending on the degree of fracture propagation or continued soft tissue injury. Fig. 1 can help guide stabilization techniques, though the authors would recommend the use of a modified Robert-Jones as opposed to the traditional Robert-Jones bandage. Splint material can be made from a variety of household items if specialized equipment is not available. The best splint material is lightweight and strong, providing stability without excessive weight. Polyvinyl chloride (PVC) pipe cut in half lengthwise is commonly used and is a lightweight and rigid material. Wood, especially 2 by 4 inch boards, is too heavy and often can lead to more injury. Splints should be applied over a light bandage that protects the skin and soft tissues. Application of a splint over a large or heavily padded bandage increases the distance from the bone to the splint, thereby decreasing the effectiveness of the splint. A light elastic bandage can also be placed over the splint as an additional protective layer, to avoid the foal injuring adjacent structures or limbs.