Angular Limb Deformities
Growth Retardation

Taralyn M. McCarrel, DVM

KEYWORDS

• Foal • Angular limb deformity • Transphyseal bridge • Transphyseal screw

KEY POINTS

- Familiarity with normal growth of the young horse is critical for appropriate case selection of foals that require surgical retardation of physeal growth to correct an angular deformity that would not correct by other means.
- Preoperative radiographic evaluation is critical to confirm that the deformity has the potential to respond to physeal growth retardation.
- Growth retardation procedures are performed on the convex side of the physis of interest and may be combined with growth-promoting procedures on the concave side of the limb.
- The single transphyseal screw has become the preferred approach to surgical retardation in many cases; however, more knowledge on the use of this technique during the rapid growth phase and physitis is required to determine if significant complications will arise.

INTRODUCTION

Ideal musculoskeletal conformation, for reasons of both form and function, has long been a preoccupation of the equine enthusiast. The definition of perfect limb conformation remains elusive for several reasons, including[1–6]

- Differences in breed and discipline standards, with varying degrees of evidence to support those standards
- Challenges objectively and accurately measuring all aspects of the 3-D limb in clinical practice
- The presence of concurrent deformities further complicating subjective interpretation
- The range of expected normal deviations that correct spontaneously as the young horse grows
- The limited number of studies providing objective information on the precise effect of limb deformities on performance and the degree of severity associated with athletic injury

The author has nothing to disclose.
Large Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, Box 100136, Gainesville, FL 32610-0001, USA
E-mail address: tmccarrel@ufl.edu

Vet Clin Equine 33 (2017) 353–366
http://dx.doi.org/10.1016/j.cveq.2017.03.006 **vetequine.theclinics.com**

Therefore, arguably the most critical skill that contributes to successful management of angular limb deformities in foals is mastering the art of monitoring development of the young horse and knowing which treatments to use and when and, just as important, when not to treat.

Angular limb deformity, defined as a deviation of the limb in the sagittal plane, is a common developmental orthopedic disease in the horse. The deformity is named based on the direction of deviation of the distal limb and the joint that appears to be deviated. The location of the deformity, however, is most commonly at the level of the metaphysis (also the physis and occasionally the epiphysis) of the long bone proximal to the joint (**Box 1**). The distal radial physis and distal third metacarpal/metatarsal physis are most commonly affected, with the distal tibial physis requiring treatment less often.[7] There are several options available for treatment of this disorder. This article focuses on surgical procedures that retard the growth of the physis on the convex (long) side of the affected long bone. The procedures discussed share the same fundamental principle, that is, static compression of the physis on the convex side to slow growth while allowing the opposite concave (short) side to continue to grow and straighten the limb.[8] Appropriate case selection, surgical options, and complications are discussed.

PATIENT EVALUATION

Foal Conformation Evaluation

The details of orthopedic examination of the foal are covered elsewhere in this issue. Briefly, a foal should be observed standing squarely from the front and behind (**Fig. 1**). Observers should align themselves with the dorsal or caudal face of each limb to evaluate for angular limb deformity. The foal should also be walked toward and away from the clinician to allow observation of foot flight and tracking. Dynamic evaluation is important because the limb does not travel in a straight line if an angular deformity is present (ie, fetlock varus causes the toe to deviate medially during the flight phase). Careful attention should be paid to note concurrent deformities (ie, carpal valgus and fetlock varus).

Knowledge of normal conformation for the age of the foal, growth stages for the physes of interest, and age at physiologic growth plate closure is essential for correct interpretation of the conformation examination and the most appropriate treatment strategies, if any. Foals are typically born with carpal valgus (<10°) and fetlock valgus or fetlock varus. The entire forelimb often appears outwardly rotated due to the narrow

Box 1
Angular limb deformity definitions

Valgus: lateral deviation of the limb distal to the origin of the deformity

Varus: medial deviation of the limb distal to the origin of the deformity

Fetlock angular limb deformity: common term referring to angular deformity originating from the distal third metacarpal/metatarsal physeal region

Carpal angular limb deformity: common term referring to angular deformity originating from the distal radial physeal region

Tarsal angular limb deformity: common term referring to angular deformity originating from the distal tibial physeal region

Offset knee: common term referring to lateral displacement of the carpus and third metacarpal bone relative to the radius at the level of the radiocarpal joint.[7] This is not a true angular deformity but can benefit from growth retardation procedures.