

Angular limb deformities in foals, treatment options and timing.

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Angular limb deformities in foals are common and often treatable. Deciding which deformities to ignore, treat, and when and how to treat is often more complex. The etiology of angular limb deformities involves multiple factors, but the basic premise is a disparity of growth rates of the medial and lateral side of the physis resulting in a deviation of the distal limb when viewed perpendicular to the frontal plane. The growth plates involved are the distal radial, distal third metacarpus/tarsus, and distal tibia. Varus refers to a medial deviation and valgus refers to a lateral deviation of the limb distal to the physis. Evaluation of angular limb deformities primarily consists of walking the foal on an even surface toward and away from the examiner, and stopping facing the examiner with the forelimbs evenly placed. It is important to recognize that rotational deformities (inward or outward rotation) may change the frontal plane of the limb being evaluated. It is also imperative to know what the foals intended career is in order to decide how much deviation is acceptable. An ideal conformation is mild distal radial and third metacarpal valgus with mild outward rotation. Understanding growth plate closure and when periods of rapid growth occur is important in deciding management. Radiographic closure of the distal third metacarpal/tarsal physis occurs at 6-15 months of age, the distal radius at 22-36 months of age, and the distal tibia at 17-24 months of age. It is important to evaluate foals early and often every 2-3 weeks as they can change rapidly. Treatments can be divided into conservative or surgical management.

Medical treatment includes stall rest/controlled exercise, splints or casts, and hoof manipulation. I do not think that splints, casts, or commercial splints are useful and have

seen some major complications. I do think that hoof manipulation is beneficial, although one must keep in mind that the further away from the foot the problem is, the less likely shoeing or trimming will help. In general I reserve trimming or shoeing for distal metacarpal/tarsal physeal deformities or combination deformities, I have had little success in managing distal radial deviations with shoeing techniques. To treat a varus deformity of the distal third metacarpal/tarsal physis the inside of the hoof is trimmed lower than the outside and a lateral extension is applied either in the form of equibox or a glue-on shoe. A valgus deformity is the opposite; the outside of the hoof is trimmed lower and an extension placed on the medial aspect. The idea is that these manipulations will unload the side of the physis that is not growing as fast allowing it to “catch up” while loading the side that is growing faster. One particular combination of deformity I have seen great success with is the “windswept” foal. This occurs when there is a valgus deformity of the distal tibial and third metatarsal growth plates with a concurrent varus deformity of the opposite distal tibial and third metatarsal growth plates. Even severely windswept foals seem to respond well to glue on shoes with a lateral extension on the varus hoof and a medial extension on the valgus hoof and stall rest with hand walking or round pen management.

Surgical treatment can be divided into growth acceleration and growth inhibition. Growth acceleration is somewhat controversial as the mechanism is unclear (inflammatory, signaling pathways, mechanical). Shockwave, irritants, and periosteal scratching have been described although I only have experience with periosteal transection/elevation. The advantages of this procedure are it is fast, does not involve implants, and has a low risk of complication. It has to be performed earlier in development to see a beneficial response and I currently recommend distal third metacarpal/tarsal periosteal transection/elevation from 14-

30 days of age and distal radial/tibial periosteal transection/elevation from 60-90 days of age. Growth inhibition is less controversial as it has been demonstrated effective in almost all circumstances unless the physis has closed. Although various methods of growth inhibition have been utilized over the years, I think it is fair to narrow it down to transphyseal screws for the distal third metacarpus/tarsus/and tibia and either a transphyseal bridge (screws and wire) or transphyseal screw for the distal radial physis. For the distal third metacarpus/metatarsus, I recommend placement at about 70 days of age as this seems to allow the most correction and less worry for overcorrection. I utilize a 3.5 mm self-tapping cortical screw under general anesthesia and remove it standing after the desired conformation has been reached or there is little growth left in the physis. For the distal tibial physis I tend to place a transphyseal screw around 4-5 months of age if necessary although these are rare in my practice. For the distal radial physis I will place a screw and wire at 30 days up to 6-7 months depending on the degree of deviation; it is almost always a valgus deformity in foals. I will also remove these implants standing when the confirmation has been improved. I have had clients request transphyseal screws in the distal radial physis of foals due to improved cosmesis and less trouble with the implants, however I currently do not recommend this practice as a transphyseal screw does perturb the physis and can cause significant physitis and premature closure or collapse. I worry about this potential problem in yearlings as a recent large study documented 17% of yearlings with transphyseal screws in the distal radial physis developed severe physitis and 4.4% developed metaphyseal collapse a severe and debilitating condition.¹ Therefore, I don't recommend a transphyseal screw in the distal radial physis until 18 months of age or in April of the yearling year. The decision to recommend surgery is often difficult, and owners always ask us as veterinarians to peer into

the future. In my practice, I tend to be conservative and recommend surgery if the deformity is severe, the deviation will cause a secondary injury, or the natural correction is too slow and will not be complete before the physis closing.

My Approach:

- Look at these foals early and often.
- Treat mild to moderate fetlock deviations with trimming and shoeing.
- Fetlock valgus is often accompanied by outward rotation and valgus carpi, and is more likely to correct than fetlock varus.
- With fetlock varus if there is not significant improvement by 60 days you should evaluate for transphyseal screw (ideal placement 70 days).
- Severe deviations are unlikely to correct on their own and are more likely to cause secondary problems.
- Mild to moderate carpal deviations < 7 degrees will often correct, and there is plenty of time for surgical intervention if necessary.
- Severe carpal valgus should be addressed as they can make rotational deformities worse and cause crush injuries to the carpal bones/distal radius.
- Beware missing combination deformities, a significant carpal valgus may hide a mild to moderate fetlock varus.
- No surgery will help outward rotation.
- Don't forget about incomplete ossification if premature or dysmature foal.

References:

1. Carlson ER, Bramlage LR, Stewart AA., et al: Complications after two transphyseal bridging techniques for treatment of angular limb deformities of the distal radius in 568 Thoroughbred yearlings. *Equine Vet J.* 44: 416-9, 2012