Restricted Exercise and Transphyseal Bridging for Correction of Angular Limb Deformities

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1. Introduction

Congenital angular limb deformities, particularly carpal valgus deformities, are relatively common in foals. Virtually any treatise on the subject will at least allude to the fact that many or most will correct with time as the foal’s chest expands as it grows taller and fills out. Stall confinement or some form of restricted exercise is generally recommended in order to prevent carpal fractures and undo compression on the lateral side of the physis (in the case of carpal valgus) which is the opposite side of the physis that one would want to compress to correct the deformity. Heinze described the use of staples for transphyseal bridging in 1963.1 Turner presented another way to accomplish transphyseal bridging using screws and wire in 1977.2 Fretz, in 1984, studied the growth of the distal radius, metacarpus and metatarsus, and proximal phalanx and determined when the growth at these areas ceased.3 He showed that rapid growth of the distal radius occurred up to 10 weeks of age, but continued until 60 weeks, while growth in length in the other areas abruptly stopped after 10 weeks. The study of periosteal stripping was first reported in 1982 by Auer.4 In this project, normal foals had stainless steel pins placed in the distal metaphysis of both radii. One leg was subjected to periosteal transection on the medial side of the distal radius. With the use of bisecting lines drawn through the radius and third metacarpus on radiographs, the foals were determined to have developed carpal valgus by day 30. Using the radiopaque markers, measurements were taken on the medial and lateral sides of the distal radius in order to account for the angular deformity. Finding no difference in growth between the medial and lateral sides of the distal radius, Auer theorized that the discrepant growth occurred at the proximal radius. In another study by Auer, it was established that four degrees of carpal valgus was normal conformation for a horse.5

2. Materials and Methods

We performed a study similar to Auer’s except that we used drill holes instead of stainless steel pins as our reference points and they were placed at both the proximal and distal radial metaphyses in order to prove whether there was a difference in growth rate between medial and lateral aspects of the radius at either end of the bone. The study was performed on eight mixed-breed foals with a mean age of 33 days and having carpal angles between 0 and 8 degrees. To determine differences in growth be-
tween principle (those that received hemicircumfer-
ential periosteal transection and stripping [HCTP/
PS] of the medial, distal radius) and control radii,
both of the forelimbs were radiographed and
measured at 0, 14, 28, and 42 days using drill
holes, physes, and joint spaces as measurement
landmarks.

3. Results
In our project, we could find no tendency towards
becoming valgus. No statistically significant differ-
ence between medial and lateral growth rates at
either the proximal or distal end of the radius could
be detected between principle and control limbs.

4. Discussion
We believe the discrepancy between Auer’s and our
study regarding the production of a valgus deformity
is explained by the lack of precision in drawing
bisecting lines on radiographs and possibly that
bone production on the medial side of the distal
radius as a result of the HCTP/PS might influence
the position of the line bisecting the radius further
medial than the original true center of the radius.
The changes in growth as measured from reference
points in the metaphysis to the physis or joint space
appear to have less error. Since we found no dif-
ference in growth between medial and lateral as-
pects of either end of the radius we reasoned that no
angulation could have occurred.

In our practice, HCTP/PS is rarely performed and
never recommended to our clients as we believe the
procedure gets credit for correcting those angular
limb deformities that would correct without inter-
vention. Restricted exercise corrects almost all of
the angular limb deformities in our practice.
Transphyseal bridging corrects the 10–20 each year
that do not respond to restricted exercise.

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