An Evaluation of Hemicircumferential Periosteal Transection and Elevation in an Angular Limb Deformity Model

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In an angular limb deformity model, the use of hemicircumferential periosteal transection and elevation as a treatment for angular limb deformities ascribed to long bone growth disparity was no more effective than stall confinement and hoof trimming alone. Authors' addresses: Department of Large Animal Clinical Sciences (Read, Clark, and Wilson) and Department of Small Animal Clinical Sciences (Read and Pharr), Western College of Veterinary Medicine, University of Saskatchewan, 52 Campus Drive, Saskatoon, SK S7N 5B4, Canada. © 2001 AAEP.

1. Introduction
Hemicircumferential periosteal transection and elevation (HCPTE) is one of the most common elective surgical procedures that is currently performed on a horse. To the authors' knowledge, there has never been a critical evaluation of the efficacy of HCPTE, despite the widespread practice of this technique in equine practice. The purpose of this study is to create a model of angular limb deformity that would allow us to evaluate HCPTE as a treatment modality. Our hypothesis was that stall confinement and hoof trimming alone would be equally effective as HCPTE in the correction of experimentally created angular limb deformities.

2. Materials and Methods
Ten light horse foals were obtained at 3 days to 3 weeks of age and were group-housed with their dams in small pens. All protocols were approved by the University of Saskatchewan (Saskatoon) Animal Care and Use Committee. At 30 days of age, bilateral dorsopalmar (DP) radiographs were taken of the carpal region to allow for measurement of angulation. The measurement was performed by drawing lines that longitudinally bisected the third metacarpus and the radius. The intersection of these 2 lines was the pivot point, and the measure of angulation was taken at this site. The foals were subsequently anesthetized and a transphyseal bridge was placed at the distal lateral radial physis of each leg using a pair of 4.5 mm cortical screws and 2 strands of 1.2 mm wire. The foals were then confined in a large pen until significant limb angulation developed. When the limbs had reached 15° of angulation or the foals were 90 days old, the implants were removed and a randomly chosen limb received HCPTE at the distal radial physis. The contralateral limb received implant removal and a sham approach only, to serve as the control limb. Bilateral standing DP radiographs were taken of the carpus after recovery to assess angulation at the...
time of implant removal. Radiographs were repeated bi-weekly until the foals had returned to within 3° of their baseline measurements (angle at 30 days of age). All radiographs were interpreted and angulation measurements performed by a blinded observer. The foals were confined postoperatively and had weekly rasping of their outer hoof walls to maintain medial-to-lateral balance. The Wilcoxon signed rank test was used to assess the difference between treated and control limbs. Significance level was set at $p \leq 0.05$.

3. Results

No significant difference was found between treated and control limbs (mean, 5.4°; range, 4°–10°) before their entry in the study ($p = 0.10$). The transphyseal bridge placement significantly increased the angulation of both limbs (mean, 13.9°; range, 11°–17°), with no significant difference between the limbs in individual foals ($p = 0.43$). By approximately 8 weeks after the periosteal stripping, the angulation of both limbs had significantly improved; however, there remained no significant difference between the treated (mean, 8.5°; range, 5°–12°) and control limbs (mean, 8.2°; range, 5°–13°; $p = 0.887$). Evaluation of the foals’ limbs at one year of age indicated no significant difference between treated (mean, 3°; range, 2°–4°) and control limbs (mean, 2.6°; range, 0°–4°; $p = 0.69$), but there was a significant improvement in overall angulation ($p < 0.05$).

4. Discussion

The mean angulation of our foals at the time of entry into the study was 5°, which is consistent with that reported elsewhere. Despite this angulation measured on the radiographs, the foals were visually noted to have straight front legs. We believe that the measurement of 5° is created by the geometrical analysis of the radiographs and an aberration of the measurement technique. The use of temporary transphyseal bridging allowed creation of a consistent angular limb deformity model that allowed us to evaluate HCPTE. In our model, the use of HCPTE as a treatment of angular limb deformities ascribed to long bone growth disparity was no more effective than stall confinement and hoof trimming alone. This model lends support for conducting a clinical trial to evaluate the efficacy of performing periosteal stripping in foals with naturally occurring disease.

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Reference