Three Methods of Guided Growth for Pediatric Lower Extremity Angular Deformity Correction

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Purpose: To compare the angular correction obtained in pediatric patients undergoing three different methods of guided growth correction for coronal plane deformities about the knee. The hypothesis was that no group would be more efficacious with angular correction.

Methods: A retrospective review was undertaken comparing the use of a titanium staple, eight plate and the PediPlate at a tertiary pediatric hospital after IRB approval. Full-length weight-bearing lower extremity radiographs were analyzed and standard angular measurements recorded as described by Paley. Clinical data was recorded with respect to underlying diagnosis, BMI, clinical outcome, follow-up length, and treatment related complications.

Results: 77 patients were included in the analysis with 18 in the staple, 24 in the eight plate, and 43 in the pediplate group. Average follow up was 18 months after implantation (range 7-22). The groups were similar with respect to underlying diagnosis; however there were more patients with a diagnosis of Blounts disease in the eight plate group. The change in mechanical tibiofemoral angle for the staple group was significantly greater than the eight plate group (6.5° vs 3.1°, p<0.05) and approached significance for the Pediplate group when compared to the eight plate group (6.4° vs 3.1°, p=0.056). The rate of angular correction per year was 4.34° for the pediplate, 4.16° for the staples, and 2.09° for the eight plate. The complication rate was significantly lower (p<0.05) in the pediplate group 11.6% (5/43), compared to 50% in the staples group (9/18), and 29.2% in the eight plate group (7/24). There was no significant difference between groups in age at implantation, BMI, initial deformity, or change in mechanical axis zone.

Conclusion: With respect to angular correction staples and pediplates achieved larger correction more rapidly than did the eight plate. The pediplate also had a lower rate of complications than either the eight plate or staple group. Our analysis supports previous data that patients with a diseased physis, more severe deformity, and higher BMI are more likely to be resistant to guided growth techniques and experience complications.

Significance: This large retrospective series provides data on the angular correction that can be expected with several popular guided growth techniques. Our series indicates that the pediplate provided rapid correction with the lowest complication rate.