

Is There a Negative Correlation Between Screw Length and Correction Rate via Guided Growth? A Retrospective Study of 138 African Limbs with Genu Varum

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INTRODUCTION: The purpose of this study was to identify factors that contribute to the speed of angular correction in skeletally immature patients with genu varum treated with paraphyseal tension band plates. Specifically, the study hypothesized that screw length and divergence, severity of deformity, and underlying pathology influence the rate and speed of genu varum correction

METHODS: This retrospective study reviewed 53 patients under 18 years with genu varum treated with guided growth (GG) using 2-hole semitubular plates (2020-2022). Inclusion criteria included radiographic diagnosis and ≥ 6 months of follow-up. Patients were categorized by age (< 8 vs. ≥ 8 years) and etiology (idiopathic vs. non-idiopathic). Standardized surgical technique allowed immediate weight-bearing. Radiographic assessments were performed preoperatively, every 3 months, and at final follow-up. Deformity severity, correction speed, and screw parameters were analyzed using STRADUS. Statistical analysis (R software) included t-tests, ANOVA, and regression models, with significance at $P < 0.05$.

RESULTS: This study identified key factors influencing the speed of angular correction in skeletally immature patients with genu varum treated with guided growth. Screw length was inversely correlated with correction rate ($P < 0.001$); shorter screws ($< 40\%$ of physis width) resulted in faster correction ($1.75^\circ/\text{month}$) than longer screws ($> 75\%$ of physis width, $0.93^\circ/\text{month}$). Deformity severity also negatively impacted correction speed ($P < 0.001$). Age was a significant factor, with patients < 8 years correcting faster ($2.03^\circ/\text{month}$) than those ≥ 8 years ($0.92^\circ/\text{month}$, $P < 0.001$). Etiology did not significantly affect correction speed, though metabolic disease showed the slowest rate. Tibial correction was faster than femoral correction in univariate analysis ($P < 0.001$), but not in multivariate analysis. Initial screw divergence, gender, and etiology within bone groups had no significant effect. Higher BMI showed a borderline significant faster correction ($P = 0.061$).

DISCUSSION AND CONCLUSION: We identified the screw length as an important parameter affecting the rate of genu varum correction with GG using paraphyseal tension band plates.

