

Metabolic Impacts on Post-Surgical Outcomes after Hemiepiphyodesis for Hypophosphatemic Rickets

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INTRODUCTION:

Hemiepiphyodesis is a growth modulation surgery used to correct angular limb deformities associated with hypophosphatemic rickets. We aimed to evaluate the effects of metabolic control on surgical outcomes in children with genetic forms of hypophosphatemic rickets.

METHODS:

This was a multicenter retrospective study. Records and radiographs of children with hypophosphatemic rickets who underwent hemiepiphyodesis, were reviewed. The study period was 12 months pre- to 24 months postoperative. Serum alkaline phosphatase activity (ALP) was used to assess metabolic control as a percentage above the upper limit of normal (%ALP ULN) due to different reference ranges for age and sex. Mechanical axis deviation (MAD) was measured serially to assess surgical correction.

RESULTS:

Twenty-four children (71% female) with hypophosphatemic rickets (22/24 X-linked hypophosphatemic rickets, 2/24 Fanconi syndrome) underwent hemiepiphyodesis (mean age at surgery 9.3 +/- 3.6 years, 92% bilateral deformities). Correction to neutral (MAD \leq 0mm) was achieved in 45% limbs by 12 months and in 76% by 24 months. Correction occurred in all valgus deformities but only 56% of varus deformities. Preoperatively, limbs that corrected had lower preoperative MAD (mean 38.3 vs. 56.0 mm, $p=0.008$) but no significant difference in %ALP ULN (corrected 98% vs. uncorrected 57%, $p=0.06$). %ALP ULN and MAD correlated positively at 12 months postop ($r=0.8$, $p=0.005$), while %ALP ULN at 12 months postop correlated negatively with both MAD rate of change ($r=-0.72$, $p=0.02$) and overall percentage MAD change ($r=-0.75$, $p=0.02$).

DISCUSSION AND CONCLUSION:

Postoperative metabolic control of rickets as assessed by ALP appears to influence the rate of angular deformity correction regardless of preoperative values. Optimization of metabolic control and follow up are prudent for these patients to improve surgical outcomes. Larger studies are needed to further assess predictive factors for success after hemiepiphyodesis.