

A Novel Ultrasound Method to Assess Skeletal Maturity

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Introduction

Bone age (BA) assessment is useful as an adjunctive diagnostic aid for height prediction and growth abnormalities. The most commonly used method for BA assessment is the Greulich and Pyle method. Recently, a new Quantitative Ultrasound System was introduced. This non-invasive ultrasound device is capable of measuring bone acoustic parameters at the wrist and providing an accurate estimation of BA that correlates with (GP) reading.

Aim

To evaluate the ability of this ultrasound device (Sunlight BonAge=SBA) to accurately predict BA obtained by the standard method.

Method

One hundred and fourteen children, 3-18 years, who were referred to the endocrinology clinic at Kaplan Medical Center, for growth evaluation, were recruited for this study. In all participants the BA assessment according to GP was compared with the SBA reading. GP-BA was assessed by two pediatric endocrinologists.

Results

Using a non-linear regression model resulted in an accuracy (calculated as the average absolute difference with the X-ray results) of 0.90 (± 70) years for boys and 0.86 (± 65) for girls for the SBA. The correlation between the ultrasound measurements and the X-ray method expressed in R² (where R is the Pearson correlation coefficient) was 0.89 and 0.90 for boys and girls respectively. Inter-physician accuracy was 0.65 (± 67) and 0.54 (± 72) year for boys and girls respectively. The R² value between the two physicians' assessment was 0.93 for boys and 0.94 for girls. Inter-operator precision for the ultrasound BA device was 0.34 years for boys and 0.25 years for girls.

Conclusions

Ultrasound acoustic signal measurements using the Sunlight BonAge device are highly reproducible, and highly correlated with conventional BA reading using the GP method. Additional advantages of ultrasound BA upon the GP method: continuous scale results (rather than in intervals of 0.5-1.0 years), objectivity, lack of ionizing radiation, cost effectiveness, and easy accessibility.

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