

Assessment of skeletal age at the wrist in children with a new ultrasound device

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Background

Determination of skeletal development in children is important. The most commonly used method of evaluation uses the standards of Greulich and Pyle (G&P) to assess the left hand radiograph. Numerous assessments may be made during follow-up.

Objective

The aim of our study was to compare the accuracy of a new sonographic method with the standard radiographic method.

Materials and methods

Seventy consecutive patients (age 6–17 years; 34 girls, 36 boys) underwent radiography of the left hand, followed by sonographic examination of the same hand using the BonAge system (Sunlight Medical Ltd., Israel). This system evaluates the relationship between the velocity of sound passing through the distal radial and ulna epiphysis and growth, using gender- and ethnicity-based algorithms. One experienced paediatric radiologist analysed the radiograph and assigned bone age scores based on the G&P atlas for the whole left hand and for the distal radius alone. The radiologist was blinded to the chronological age (CA), height of the patient and the BonAge result. Correlation between BonAge and G&P was undertaken.

Results

In 65 patients, BonAge measurement could be performed successfully. In five patients, the scanning process was impossible using the ultrasound device. The r^2 (r is the Pearson correlation coefficient) of the BonAge ultrasound measurement and the G&P method was 0.82. The averaged accuracy (i.e. absolute difference in years between G&P reading and BonAge ultrasonic results) was calculated. Results were similar for boys and girls: 1.0 ± 0.8 years for the whole left hand and 0.8 ± 0.7 year for the distal radius. On average, the difference between BonAge and CA is the same as the difference between G&P and CA, i.e. 1.4 years.

Conclusions

The BonAge device demonstrates the ability of ultrasound to produce an accurate assessment of bone age. The results are highly correlated with skeletal age evaluated conventionally using the G&P method. Obvious advantages of the ultrasound device are objectivity, lack of ionizing radiation, and easy accessibility.

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