Format: Abstract

The "Risser+" grade: a new grading system to classify skeletal maturity in idiopathic scoliosis.

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Abstract

PURPOSE: This study aims to propose and validate a **new** unified "**Risser+**" **grade** that combines the North American (NA) and European (EU) variants of the classic **Risser** score. The "**Risser+** " **grade** can effectively combine the North American and European **Risser** Classifications for **skeletal maturity** with adequate intra-rater/inter-rater reliability and agreement.

METHODS: Agreement and reliability were evaluated for 6 raters (3-NA, 3-EU) who assessed 120 pelvic radiographs from the BrAIST trial, all female, average age 13.4 (range 10.1-16.5 years). Blinded raters reviewed x-rays at two time-points. Intra- and inter-rater agreement (RA) were established with Krippendorff's alpha (k-alpha), while intra- and inter-rater reliability (RR) were established with intraclass correlation coefficients (ICC). Acceptable agreement and reliability were set a priori at 0.80.

RESULTS: Inter-RA for the second reading met study requirements (k-alpha = 0.86 [0.81-0.90]) compared to the first reading (0.72 [0.63-0.79]) while combined readings was close to target agreement (0.79 [0.74-0.84]). Removal of 20 readings demonstrating outlier tendencies increased agreement for the first, second, and combined reads (k-alpha = 0.85, 0.89, 0.87, respectively). Intra-RA was sufficient for 4 out of 6 raters (k-alpha > 0.80) and one rater from EU and NA presented subpar intra-RA (k-alpha = 0.64 and 0.74, respectively). Inter-RR met study requirements overall reads (ICC = 0.96 [0.95-0.97]) including the first (0.94 [0.92-0.95]) and second (0.97 [0.97-0.98]) reads, independently.

CONCLUSIONS: The **Risser+ system** showed excellent reliability across multiple reads and raters and demonstrated 79% agreement overall reads and ratings. Agreement increased to over 85% when raters could distinguish **Risser** 0 + from **Risser** 5. These slides can be retrieved from electronic supplementary material.