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Effectiveness of SEAS Self-Correction as Assessed by Ultrasound Cobb Angle in AIS

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Background

Treatment of Adolescent Idiopathic Scoliosis (AIS) with Scoliosis Specific Exercises (SSE) requires repeated active self-correction (ASC). However, antero-posterior radiographs cannot be systematically used to verify ASC efficacy due to ionizing radiation concerns. 3D ultrasound systems, such as Scolioscan (Telefield, Hong Kong), have emerged as a reliable, non-invasive alternative for coronal plane assessment. While previous studies show high agreement between Ultrasound Cobb Angle (UCA) and radiographic measures, further validation in clinical settings is needed—particularly regarding the impact of postural variations and active correction.

Study Design

Cross-sectional study

Objective (s)

To assess coronal curve magnitude variations between spontaneous standing (SS) and ASC positions using UCA. Secondarily, to identify clinical or demographic predictors of ASC efficacy.

Methods

Consecutive AIS patients, Risser 0–3, curves 10–35°, apex below T7, BMI < 23, treated with SSE were included. We assessed them using Scolioscan. UCA in SS, and then in ASC were blindly measured by a single expert and compared. Normal distribution was verified and comparison between relaxed and ASC positions was performed using paired t-tests. Success predictors were investigated via logistic regression, factors influencing the percentage of correction were analyzed using a linear regression model.

Results

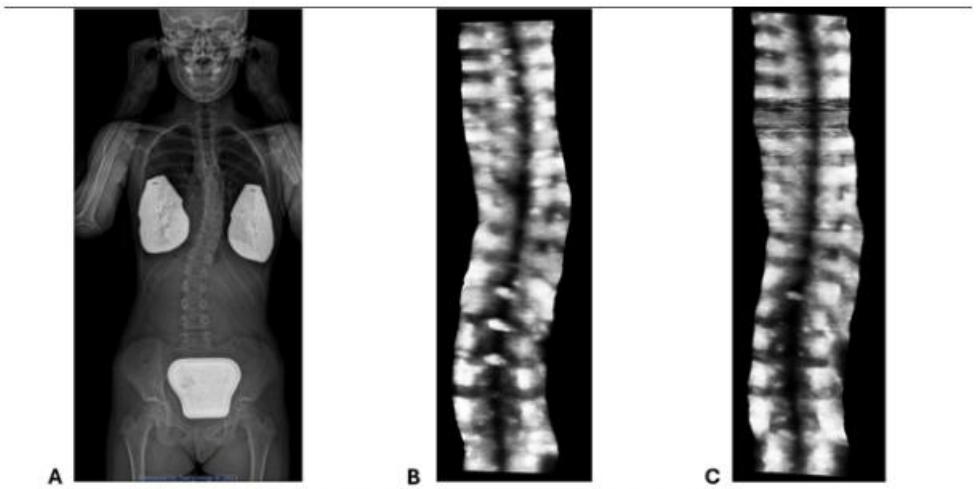

Figure 1. Representative images of a patient included in the study.

(A) PA radiograph with right thoracic 31° Cobb; (B) 3D ultrasound (Scolioscan) assessment in spontaneous standing with 33° UCA; (C) 3D ultrasound assessment in active self-correction (ASC) with 21° UCA.

The study included 170 patients (88% females; Risser 0–1 in 54%, age 13.2±1.7, and 22±6° Cobb. Main curves were 41% thoracic and 59% thoracolumbar/lumbar; mean years from SSE initiation was 1.2±1.1. In an interim analysis of 30 patients, a significant reduction in the main curve UCA was observed during ASC compared to SS with a mean correction of 6 UCA degrees (95% CI 3.6-8.4; p<0.0001). Success was achieved in 83% of cases, with distal slopes showing greater correction ability compared to the cranial slopes (p=0.03).

Baseline severity was the primary driver of success: a higher baseline UCA independently predicted correction (OR=1.40/degree, p=0.039; Pseudo R2=0.32). **The complete analysis of the full cohort will be available within 30 days.**

Conclusion(s)

ASC significantly reduces the coronal curve as measured by ultrasound. Larger curves allow for greater improvement. Further studies are necessary to validate UCA in ASC against the radiographic gold standard, since muscle contraction required for ASC might interfere with ultrasound measurement accuracy.

Clinical significance

The finding that larger curves demonstrate a higher correction capacity highlights that baseline severity is not a barrier to achieving significant immediate postural improvement. Conversely, the greater difficulty in correcting milder curves and the cranial slope suggests that clinicians should implement more specific and effective motor strategies. Scolioscan can offer a valid tool to monitor the quality of ASC in individual patients.