Bracing Outcomes and Risk of Curve Progression in Adolescents with Idiopathic Scoliosis and Autism Spectrum Disorder

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INTRODUCTION:

Whether sensory and behavioral traits associated with autism spectrum disorder (ASD) affect treatment outcomes in adolescent idiopathic scoliosis (AIS) remains unclear. This study evaluated the impact of ASD on bracing success, curve progression, and patient-reported outcomes in AIS.

METHODS:

This retrospective cohort study included patients aged 10–18 years treated with bracing for AIS between 2014 and 2024. Fifty-eight ASD patients were matched 1:2 to 116 non-ASD controls using nearest-neighbor matching based on BrAIST-Calc predicted probabilities of untreated success. All ASD patients had documented diagnoses confirmed by developmental-behavioral pediatricians.

When available, severity was assessed using DSM-5-defined support levels, which range from Level 1 (requiring support) to Level 3 (requiring very substantial support); otherwise, support level was recorded as unspecified to avoid misclassification. Exclusions included non-idiopathic scoliosis, advanced skeletal maturity, initial curves <25° or >40°, or inadequate follow-up. Curve progression to surgical threshold was defined as a major curve ≥45°. Firth logistic regression was used to assess the relative influence of ASD on progression, adjusting for covariates and residual imbalances.

RESULTS:

The matched cohort (n = 174) demonstrated balanced propensity scores (SMD = 0.006). The overall study population was 51% male, with a mean age of 12.8 years (±1.5). Brace types included Boston (83%), Providence (10%), Rigo-Chêneau (6%), Milwaukee (1%), and Charleston (1%).

ASD patients had higher rates of progression to surgical threshold (40% vs. 20%; p = 0.005), progression ≥6° (60% vs. 38%; p = 0.005), and surgery recommended or performed (33% vs. 13%; p = 0.002). Self-reported noncompliance (36% vs. 22%; p = 0.04) and brace-related issues (22% vs. 8%; p = 0.006) were also more common.

DSM-5-defined support level was documented in 74% of ASD patients: 41% were Level 1, 24% Level 2, and 9% Level 3. Support level was unspecified in the remaining 26%. Among patients with documented support levels, progression to surgical threshold occurred in 80% of Level 3, 50% of Level 2, and 29% of Level 1 patients. Noncompliance was observed in 60%, 50%, and 29%, respectively. Surgery was recommended or performed in 60%, 50%, and 25%. Among patients with unspecified support levels, 33% progressed to surgical threshold, 27% were noncompliant, and 20% underwent or were recommended surgery.

In multivariable analysis, ASD (OR, 3.12 [1.32–7.35]; p = 0.009), noncompliance (OR, 4.00 [1.65–9.71]; p = 0.002), and greater initial curve magnitude (OR, 1.26 [1.15–1.38]; p < 0.001) were associated with increased odds of progression to surgical threshold. BMI percentile and sex were included but not significant.

Within the ASD group, significant improvements over time were observed in the Self-Image, Management, and Total domains of the SRS-22r. No significant between-group differences were observed in any SRS-22r domain change scores.

DISCUSSION AND CONCLUSION:

Adolescents with ASD had higher rates of curve progression, surgery recommended or performed, noncompliance, and brace-related issues. Despite these challenges, 60% of ASD patients avoided progression to surgical threshold, and within-group improvements in SRS-22r scores were observed. This suggests ASD may be a risk factor for bracing failure, potentially mediated by sensory or behavioral intolerance. Varying support needs across the autism spectrum may also influence treatment tolerance and outcomes. Nonetheless, bracing remains a viable option, likely best supported by individualized care and closer follow-up. Future studies should focus on improving tolerance and adherence.