

Early Distal Adding-On Following Adolescent Idiopathic Scoliosis
Correction Using Stable Vertebra Minus One (SV-1): A 1-Year
Radiographic Study

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Introduction

Distal adding-on is a recognised phenomenon following posterior spinal fusion (PSF) for adolescent idiopathic scoliosis (AIS), with reported incidence ranging from 3–15% and potential association with distal fusion level selection. At our centre, the lowest instrumented vertebra (LIV) is commonly selected as stable vertebra minus one (SV-1). This study aimed to determine the incidence of early distal adding-on at one year following PSF for AIS using an SV-1 strategy and to assess associations with LIV–central sacral vertical line (CSVL) relationship, skeletal maturity, and curve magnitude and correction.

Materials and Methods

A retrospective single-centre radiographic review was performed of AIS patients (Lenke 1 and 5) undergoing PSF between 2021 and 2024. The LIV was selected using an SV-1 strategy. Distal adding-on was defined as an increase in LIV–LIV+1 disc angulation greater than 5° on standing anteroposterior radiographs at one-year follow-up compared with early post-operative imaging. Demographic data, Risser grade, pre- and post-operative Cobb angles, percentage correction, and CSVL–LIV relationship were recorded. Associations with distal adding-on were analysed using Fisher’s exact test and Mann–Whitney U tests.

Results

One hundred and eighteen patients had complete radiographic data (mean age 14.1±1.4 years; 86.4% female). Mean pre-operative Cobb angle was 64.4±13.1°, improving to 25.1±12.3° post-operatively (mean absolute correction 39.3°; mean percentage correction 61.0%). Distal adding-on occurred in 9 of 118 patients (7.6%) at one-year follow-up. One patient (0.8%) subsequently required revision surgery for progressive distal adding-on identified at one year and revised at two-year follow-up. A statistically significant association was identified between adding-on and younger age (p=0.003) and lower Risser grade (p=0.049). No statistically significant association was identified between adding-on and gender or CSVL–LIV relationship (all p>0.05).

Conclusion

Use of SV-1 as the distal fusion level in AIS is associated with a low rate of early distal adding-on at 1 year. Lower skeletal maturity may increase the risk of early distal adding-on, while CSVL–LIV relationship alone does not guarantee prevention. Longer-term follow-up is required to determine the clinical significance and revision risk.

Variable	Value
Total Patients	118
Mean Age (years)	14.1
Mean Risser Grade	2.81
Distal Adding-On Rate	9/118 (7.6%)
Revision Rate	1/118 (0.8%)

Variable	Adding-On Cohort (n=9)	No Adding-On (n=109)
Mean Age (years)	12.8	14.2
Mean Risser Grade	1.89	2.89