# Sagittal Alignment in Adolescent Idiopathic Scoliosis: Implications of Nonoperative Management for Long-Term Spinal Health

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Introduction

The diagnosis, severity, and treatment of adolescent idiopathic scoliosis (AIS) typically rely on the coronal curve measured by the Cobb technique. However, adult spine literature emphasizes sagittal parameters such as sagittal vertical axis (SVA) and the pelvic incidence-lumbar lordosis (PI-LL) mismatch for long-term spine health. This study investigates sagittal alignment in AIS patients who reach skeletal maturity with moderate-to-severe coronal curves but do not meet surgical criteria. We hypothesize that many such patients may have sagittal misalignment that raises concerns for their long-term spinal health.
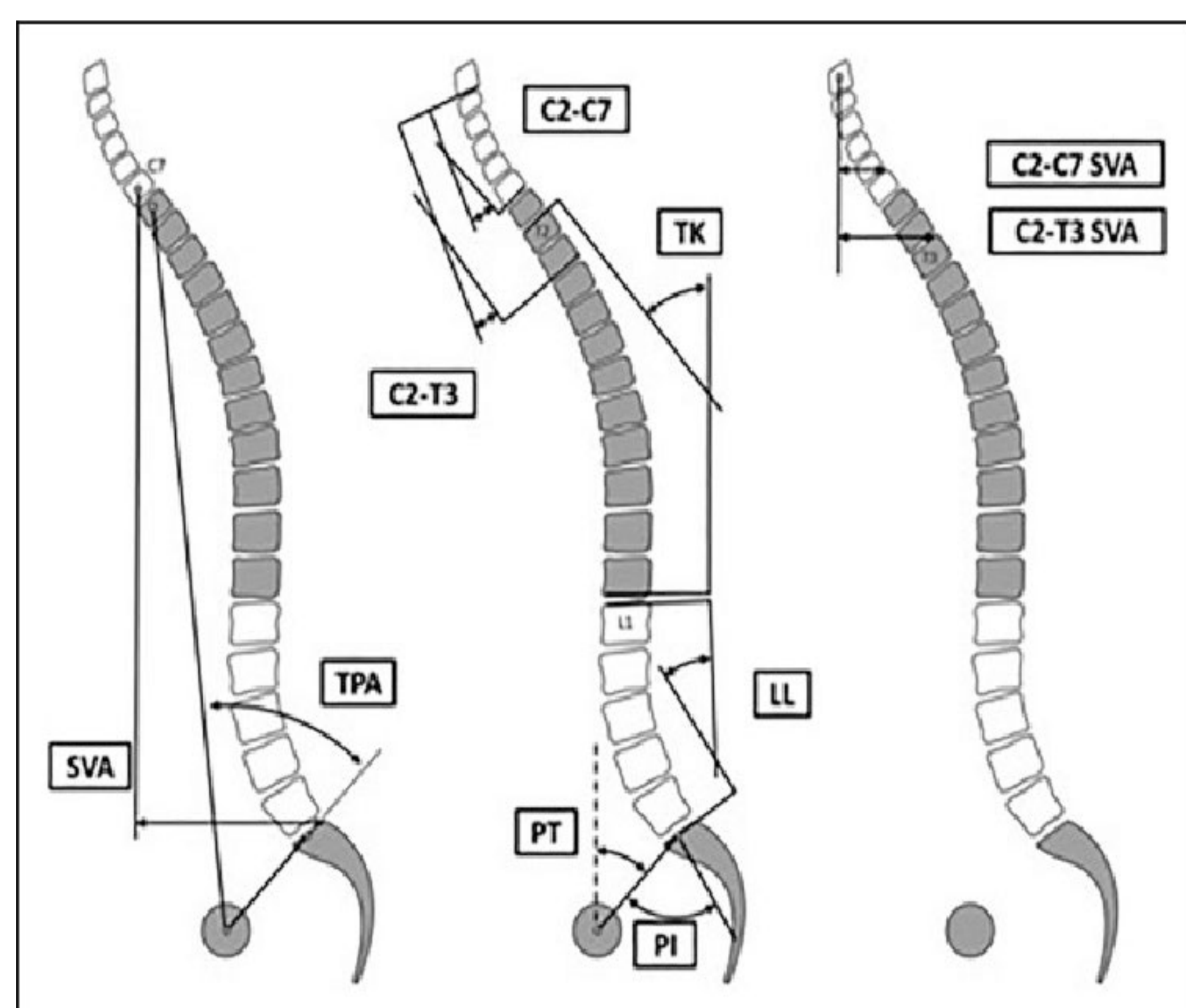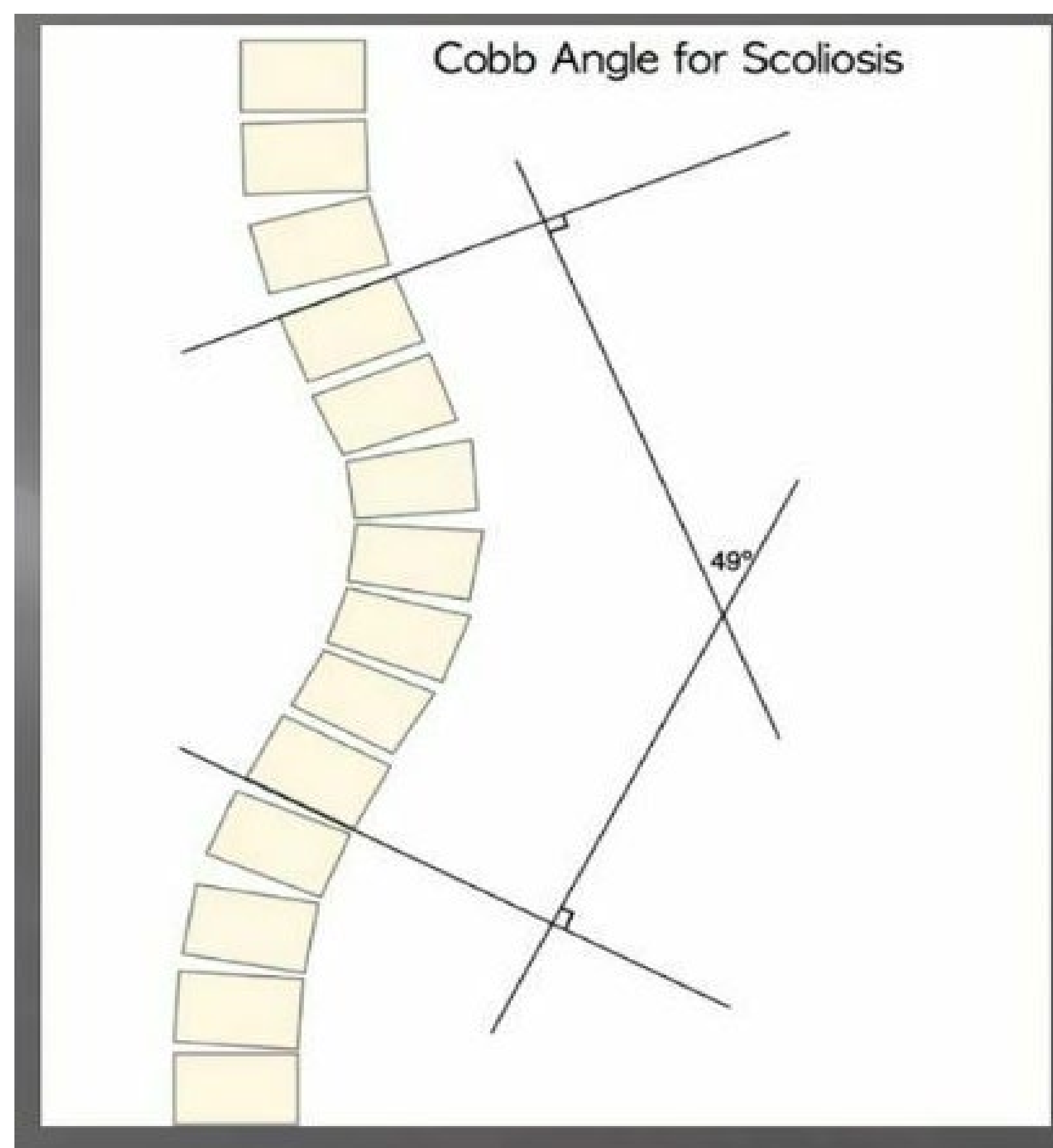
Methods

A retrospective chart review was conducted on patients diagnosed with AIS at a tertiary, academic freestanding pediatric hospital between September 2016 and February 2022. Inclusion criteria included a major coronal curve between 30° and 50° upon reaching skeletal maturity and "graduating" from further monitoring.

Clinical, demographic, and radiographic data were collected. Radiographic measurements included the major coronal curve, thoracic kyphosis, lumbar lordosis, cervical lordosis, pelvic incidence, sacral slope, sagittal vertical axis (SVA), pelvic tilt, T1-pelvic angle, and Roussouly sagittal classifications.

Concerning sagittal parameters were defined as: SVA greater than 5 cm, pelvic tilt greater than 25°, lumbar lordosis-pelvic incidence mismatch greater than 10°, cervical lordosis less than 20°, thoracic kyphosis less than 20°, and T1-pelvic angle greater than 14°.

Patients were categorized based on Roussouly classifications using sacral slope and pelvic incidence. Subset analyses were conducted on patients deviating from the Roussouly classifications. The percentage of patients with concerning sagittal parameters was reported.
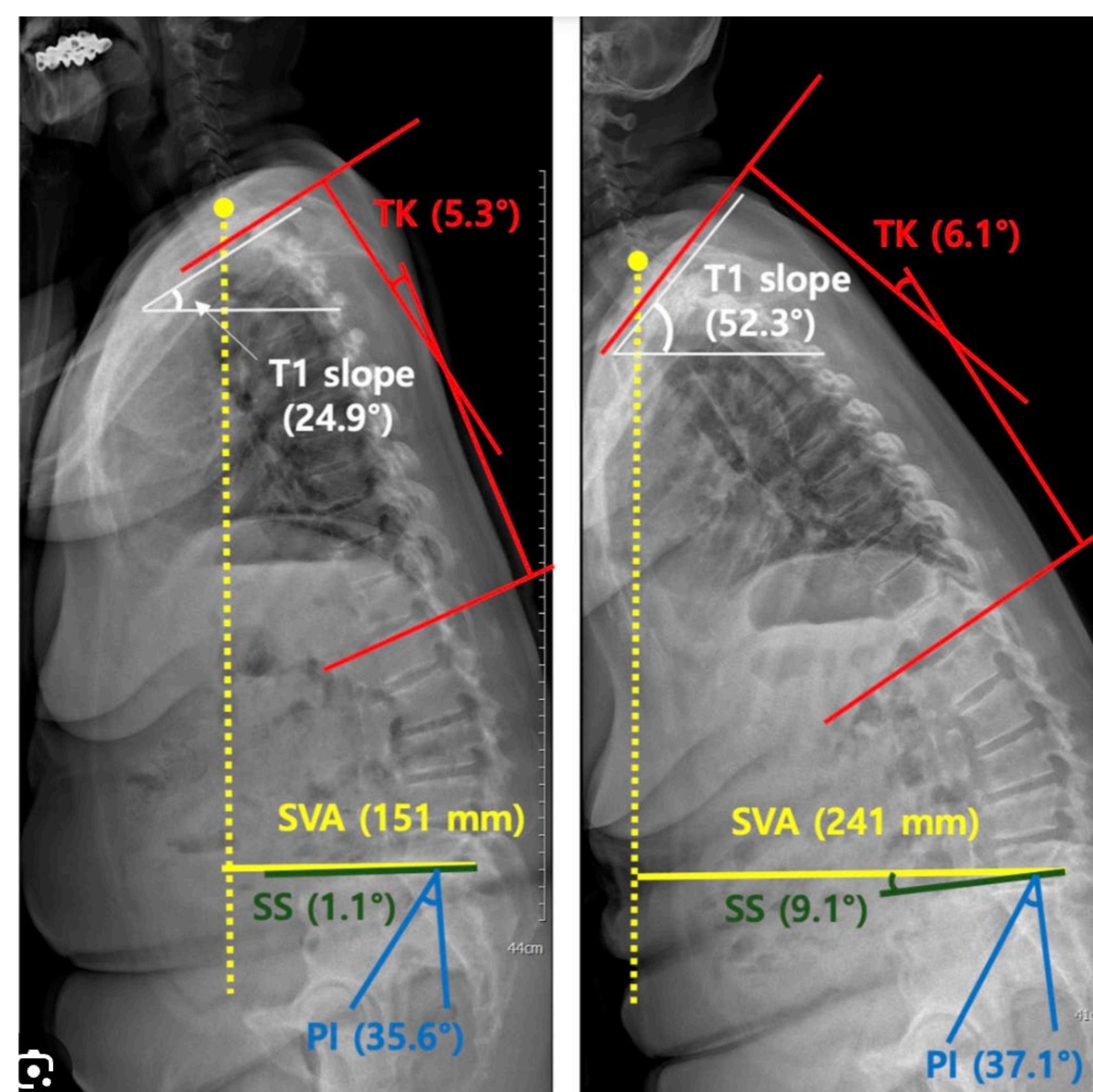
Results 2

Sixty-seven patients met inclusion criteria, with an average coronal curve of 38.2°. The average thoracic kyphosis was 38.7°, lumbar lordosis 47.6°, and cervical lordosis 17.8°. Notably, 32.84% of patients had a PI-LL mismatch above 10°, and 10.45% had a T1-pelvic angle > 14°. Around 4.48% had a SVA > 5 cm. Additionally, 10.45% of patients mismatched their Roussouly classification.

▶ Key Findings:

  ▶ 32.84% had PI-LL mismatch > 10°.

  ▶ 10.45% had T1-pelvic angle > 14°.

  ▶ 4.48% had SVA > 5cm.
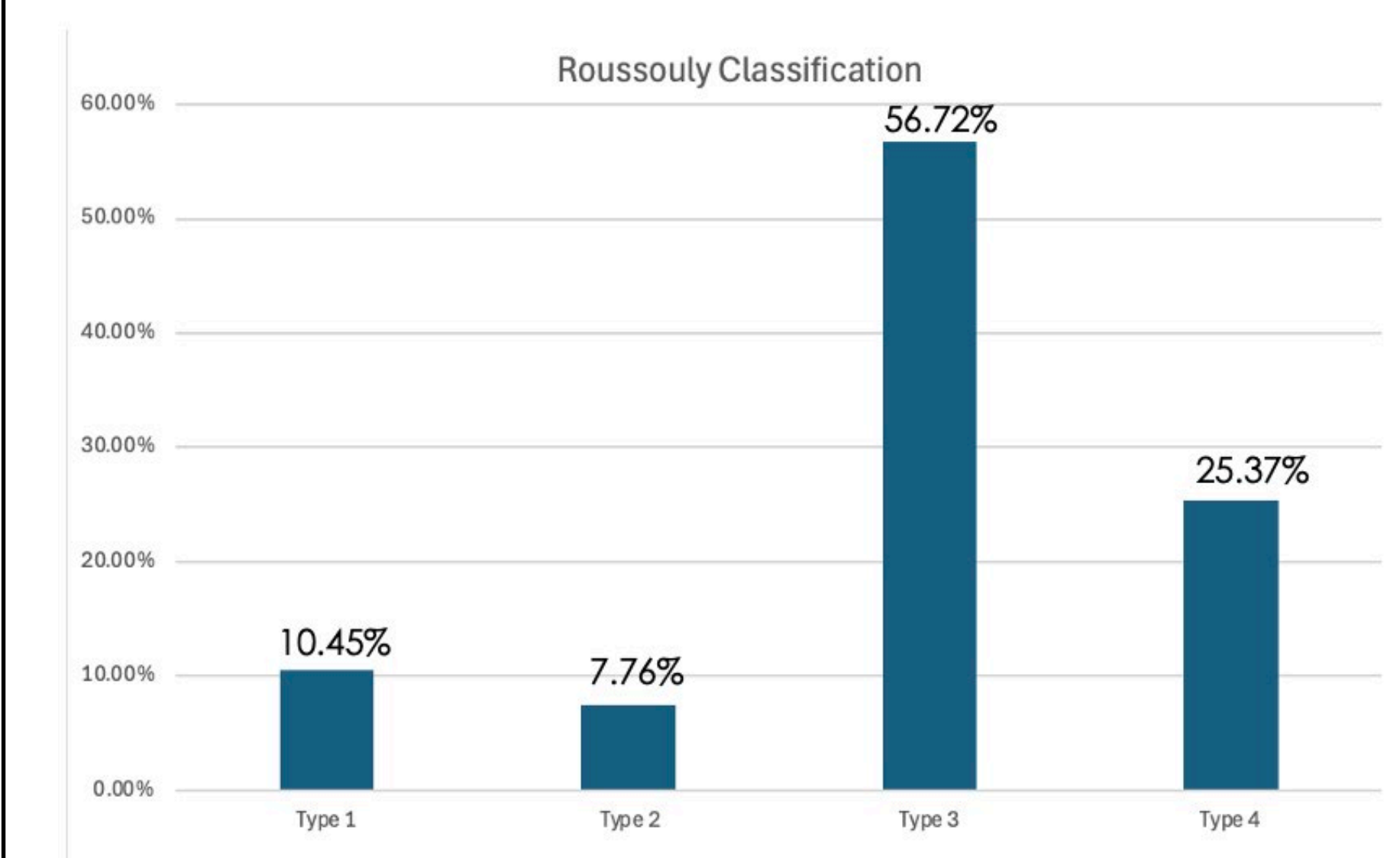
Conclusion

AIS patients who do not meet the criteria for posterior spinal fusion often exhibit sagittal parameters that are deemed unacceptable in adult spine literature. These findings suggest that sagittal alignment should play a larger role in surgical decision-making, and PSF may be beneficial for a subset of patients based on these metrics.

This study is significant because it highlights the importance of sagittal parameters in AIS patients with moderate to severe coronal curves who are typically not considered for surgery. Incorporating sagittal metrics into decision-making could improve long-term outcomes, shifting the paradigm for managing AIS based on both coronal and sagittal alignment.