

Long-Term Impact of Adolescent Idiopathic Scoliosis Surgery Using Harrington Instrumentation on Quality of Life

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Introduction

Harrington instrumentation was the first widely adopted technique for the surgical correction of adolescent idiopathic scoliosis (AIS). While effective for coronal-plane correction, it has been superseded by modern systems because of long-term complications, particularly sagittal malalignment and flatback syndrome. This study aimed to evaluate the long-term impact of AIS surgery using Harrington instrumentation on health-related quality of life (HRQoL) and to analyse associations between radiographic parameters and patient-reported outcomes, with a minimum follow-up of over 25 years.

Materials and Methods

This single-centre observational cohort study included 142 patients with AIS who underwent surgical correction with Harrington instrumentation between 1971 and 1997. At long-term follow-up, all patients underwent a standardised clinical examination and standing full-spine radiographs in posteroanterior and lateral projections. Spino-pelvic and global sagittal alignment parameters were measured using Surgimap software (Globus Medical, Inc., Audubon, Pennsylvania, USA). HRQoL was assessed using the Oswestry Disability Index (ODI), Scoliosis Research Society-22r (SRS-22r), and EQ-5D-5L questionnaires. Correlations between radiographic parameters, extent of instrumentation, and HRQoL outcomes were analysed using appropriate parametric and non-parametric statistical tests ($p \leq 0.05$).

Results

Overall, HRQoL scores indicated favourable long-term outcomes. A significant association was observed between EQ-5D-5L scores and lumbar lordosis ($p = 0.027$). ODI scores were significantly associated with pelvic tilt ($p = 0.026$), T1 pelvic angle ($p = 0.005$), sagittal vertical axis ($p = 0.033$), and thoracolumbar/lumbar curve magnitude ($p < 0.001$).

No statistically significant associations were found between the number of instrumented vertebral levels and ODI ($p = 0.509$), EQ-5D-5L ($p = 0.378$), or SRS-22r ($p = 0.113$). Similarly, no significant differences were observed between groups defined by upper or lower instrumented vertebrae in ODI, EQ-5D-5L, or SRS-22r scores.

No statistically significant associations were found between gender and ODI ($p = 0.046$), EQ-5D-5L ($p = 0.117$), or SRS-22r ($p = 0.046$). Likewise, patient age at follow-up was not significantly associated with ODI ($p = 0.388$), EQ-5D-5L ($p = 0.883$), or SRS-22r ($p = 0.223$).

Conclusion

More than 25 years after surgery with Harrington instrumentation for AIS, patients maintain a preserved quality of life, with predominantly mild pain and functional limitations. Sagittal alignment parameters, particularly pelvic tilt, T1 pelvic angle, and thoracolumbar/lumbar curve magnitude, are important predictors of functional outcome. The extent of spinal fusion does not significantly influence long-term quality of life.