

Clinical Improvement Through Surgery for Adult Spinal Deformity: What Can Be Expected and Who Is Likely to Benefit Most?

Bertrand Moal, PhD^{a,i}, Virginie Lafage, PhD^{a,*}, Justin S. Smith, MD, PhD^b,
Christopher P. Ames, MD^c, Gregory Mundis, MD^d, Jamie S. Terran, BS^a, Eric Klineberg, MD^e,
Robert Hart, MD^f, Oheneba Boachie-Adjei, MD^g, Shay Bess, MD^h, Wafa Skalli, PhDⁱ,
Frank Schwab, MD^a, International Spine Study Group

^aDepartment of Orthopedic Surgery, NYU Hospital for Joint Diseases, New York, NY, 10003, USA

^bDepartment of Neurosurgery, University of Virginia Medical Center, Charlottesville, VA, 22903, USA

^cDepartment of Neurosurgery, University of California San Francisco, San Francisco, CA, 94143, USA

^dDepartment of Orthopedic Surgery, San Diego Center for Spinal Disorders, La Jolla, CA, 92037, USA

^eDepartment of Orthopedic Surgery, University of California Davis, Sacramento, CA, 95817, USA

^fDepartment of Orthopedic Surgery, Oregon Health Sciences University, Portland, OR, 97239, USA

^gDepartment of Orthopedic Surgery, Hospital for Special Surgery, New York, NY, 10021, USA

^hDepartment of Orthopedic Surgery, Rocky Mountain Hospital for Children, Denver, CO, 80205, USA

ⁱLaboratory of Biomechanics, Arts et Metier ParisTech, Paris, France

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Abstract

Study Design: Multicenter, prospective, nonconsecutive, surgical case series from the International Spine Study Group.

Objectives: To evaluate the extent of clinical improvement after surgery for adult spinal deformity (ASD) based on minimal clinically important difference (MCID) and baseline measures.

Summary of Background Data: For ASD, evaluation of surgical treatment success using clinical scores should take into account baseline disability and pain and the improvement defined relative to the MCID.

Methods: Inclusion criteria included operative patients (age > 18 years) with baseline and 2-year SRS-22 scores. Normative values for the SRS scores were included and improvement for patients was expressed in number of MCIDs. At baseline, patients were classified by differences in activity and pain scores from normative values in four groups: “worst,” “severe,” “poor,” and “moderate.” At 2 years after surgery, patients were classified into four groups based on their change in SRS score as follows: “no improvement or deterioration,” “mediocre,” “satisfactory,” or “optimal.” Distinction among curve types was also performed based on the SRS-Schwab ASD classification.

Results: A total of 223 patients (age = 55 ± 15 years) were included. At baseline, for 77% of the patients, the worst scores were in Activity or Pain. At baseline, the distribution was 36% “worst,” 28% “severe,” 19% “poor,” and 17% “moderate.” Patients with sagittal malalignment only were more likely to be in the “worst” state (54%). The overall distribution of improvement was as follows: 24% no improvement or deterioration, 17% mediocre, 25% satisfactory, and 33% optimal. Forty-one percent of baseline “moderate” patients achieved no improvement. Of the baseline “worst” patients, 20% achieved no improvement, and 36% and 19% achieved “satisfactory” and “optimal” improvement, respectively.

Conclusion: Overall, 24% of patients did not experience improvement after surgery. Patients with baseline severe disability were more likely to perceive improvement than patients with less disability.

Level of Evidence: Level II.

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Keywords: Adult spinal deformity; Clinical outcomes; Normative data; Sagittal alignment; MCID

IRB approval obtained at each participating site.

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*Corresponding author. NYU Hospital for Joint Diseases, 306 E. 15th Street, Suite 1F, New York, NY 10003, USA. Tel.: (646) 794-8646; fax: (646) 602-6926.

E-mail address: virginie.lafage@gmail.com (V. Lafage).

Introduction

To standardize the evaluation of adult spinal deformity (ASD), health-related quality of life (HRQOL) instruments are now widely used in clinical practice and the scientific community [1-3]. The Scoliosis Research Society instruments (SRS-22) were validated to provide a disease-specific health questionnaire [4].

Although its use is now common, the interpretation of HRQOL scores changes after treatment and involves considerations beyond simple numerical improvement [5]. Literature on HRQOLs advocates for the use of the minimal clinically important difference (MCID) concept in order to differentiate a statistical improvement from a clinical one, perceivable by the patient [5-9]. Although the use of MCID can enhance clinical relevance, it does not take into account the absolute values of HRQOL scores. Two patients experiencing the same improvement may not have the same outcome if they started at different baseline scores.

Moreover if part of those differences in baseline score is relative to the deficit due to the deformity, there is also an intrinsic clinical difference due to patient age. In a study on normative data, Baldus et al. [10] reported significant differences for SRS scores among sex and age groups. When evaluating the clinical improvement of ASD population, the age range is in general large (18 to >80 years old) [3,11-15], and therefore HRQOL evaluation should account for normative data instead of solely relying on generic scales.

The present study aimed to assess clinical outcomes for ASD treated surgically, with an emphasis on the baseline evaluation to include initial clinical state, age, body mass index (BMI), history of previous surgery, comorbidities, and type of spinal deformity. In contrast to previous studies, the outcomes assessment is based on comparisons with normative data, matched on the basis of age and gender, reported as multiples of MCID.

Material and Methods

This is a retrospective analysis of a nonconsecutive series of ASD patients (age > 18 years) enrolled in a prospective multicenter study. Patients were drawn from the International Spine Study Group (ISSG) prospective database, derived from 10 clinical sites across the United States. Patients were enrolled through an institutional review board-approved protocol by each site. The radiographic inclusion criterion for the ISSG database was at least one of the following: Cobb angle $\geq 20^\circ$, sagittal vertical axis ≥ 5 cm, pelvic tilt $\geq 25^\circ$, or thoracic kyphosis $\geq 60^\circ$. Patients with inflammatory arthritis, tumor, or neuromuscular disease were excluded.

Specific inclusion criteria for the present study included operative treatment, availability of SRS-22 scores, and

availability of X-ray films at baseline and at the 2-year follow-up. Age, BMI, medical history, and comorbidities (Charlson score [16]) were collected. X-ray films were analyzed at baseline using validated software [17,18] (Spineview; Laboratory of Biomechanics Arts et Metiers ParisTech, Paris) to obtain the following parameters: Cobb angle and apex location, pelvic tilt, pelvic incidence (PI), L1-S1 lumbar lordosis, pelvic incidence–lumbar lordosis mismatch, and sagittal vertical axis. Each patient was

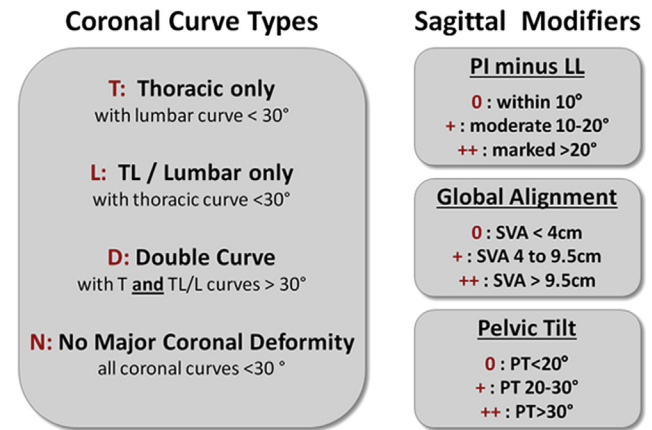


Fig. 1. Scoliosis Research Society (SRS)-Schwab classification.

Table 1
Description of the different types of curves derived from the SRS-Schwab classification for adult spinal deformity.

Type of curve groups	Acronym	Coronal criteria	Sagittal criteria
Thoracic	T	Type T	All modifiers at grade 0
Thoracic/sagittal	TS	Type T	At least one modifier at grade + or ++
(Thoraco)-lumbar	L	Type L	All modifiers at grade 0
(Thoraco)-lumbar/sagittal	LS	Type L	At least one modifier at grade + or ++
Double	D	Type D	All modifiers at grade 0
Double sagittal	DS	Type D	At least one modifier at grade + or ++
Sagittal only	S	Type N	At least one modifier at grade + or ++
Unclassified	U	Type N	All modifiers at grade 0

SRS, Scoliosis Research Society.

Table 2
Minimum clinically important difference (MCID) values used in this study.

SRS-22 domain	MCID
SRS Pain	+0.587 points/5
SRS Appearance	+0.8 points/5
SRS Activity	+0.375 points/5
SRS Mental	+0.42 points/5

SRS, Scoliosis Research Society.

Data from S. Berven, V. Deviren, D. Polly et al., presented at the International Meeting on Advanced Spine Techniques, Banff, Canada, July 7–9, 2005

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