Table 1. Multivariate Analysis of Factors Distinguishing Best and Worst Outcomes on the ODI and SRS-22

Distinguishing Factors	OR (95% CI)	*P* Value
ODI		
Baseline BMI	0.893 (0.803 to 0.993)	.037
Follow-up SVA	0.987 (0.976 to 0.997)	.014
Baseline ODI	0.914 (0.872 to 0.959)	<.001
SRS-22		
Baseline depression	0.081 (0.010 to 0.651)	.018
Minor or major complication	9.012 (1.166 to 69.628)	.035
Baseline SRS-22	10.641 (1.760 to 64.335)	.010

BMI, body mass index; ODI, Oswestry Disability Index; SRS-22, Scoliosis Research Society Questionnaire–22; SVA, sagittal vertical access.

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Table 2. Factors Distinguishing Best and Worst Outcomes for ASD Surgery

ISSG	SDSG
Preoperative/operative	
Depression/anxiety	Depression/anxiety
Mean BMI	Mean BMI
Mean back pain score	Mean back pain score
Mean leg pain score	Mean leg pain score
SVA > 5 cm	Age
Comorbidities	Smoking
Prior spine surgery	
Major complication	
Follow-up	
Mean back pain score	Mean back pain score
Mean leg pain score	Mean leg pain score
PI-LL mismatch	

ASD, adult spinal deformity; BMI, body mass index; ISSG, International Spine Study Group; PI-LL, pelvic incidence–lumbar lordosis; SDSG, Spinal Deformity Study Group; SVA, sagittal vertical access.

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Significant Improvement in ASD With Operative vs Nonoperative Treatment

Written by Toni Rizzo

Evidence to date suggests that surgical treatment can improve pain and disability in adults with symptomatic spinal deformity. However, most previous studies were small, retrospective series without direct comparisons with nonoperative treatment approaches. The aim of this study, Outcomes of Operative and Nonoperative Treatment for Adult Spinal Deformity (ASD): A Prospective, Multicenter Matched and Unmatched Cohort Assessment with Minimum Two-Year Follow-up [Smith JS et al. *Spine*. 2014], presented by Justin S. Smith, MD, PhD, University of Virginia Health System, Charlottesville, Virginia, USA, was to compare minimum 2-year outcomes for operative and nonoperative treatment for ASD in a prospective population, using both matched and unmatched cohorts.

The patients (n = 689) were recruited from a multicenter database for ASD through the International Spine Study Group. They were classified as operative (n = 286) or nonoperative (n = 403) based on the initial management approach. At baseline and follow-up, the patients completed health-related quality of life (HRQOL) measures, including the Scoliosis Research Society Questionnaire-22 (SRS-22), Oswestry Disability Index (ODI), Short Form-36 Health Survey (SF-36) physical component score (PCS), and measures of back and leg pain.

Included patients (aged > 18 years) had a diagnosis of ASD and at least one of the following: coronal Cobb angle ≥ 20°, sagittal vertical access > 5 cm, pelvic tilt ≥ 25°, and thoracic kyphosis ≥ 60°. Outcomes were compared within and between surgical and nonsurgical groups using unmatched and propensity-matched cohorts. The propensity-matched cohort was matched according to baseline ODI, SRS-22, leg pain score, pelvic incidence-lumbar lordosis (PI-LL) mismatch, and maximum thoracolumbar/lumbar Cobb angle.

At baseline, patients in the operative group (n = 246) had significantly worse HRQOL measures ($P < .001$) and mean body mass index ($P = .003$) compared with those in the nonoperative group (n = 223). The operative group also had significantly worse mean coronal balance ($P < .001$), sagittal balance ($P < .001$), pelvic tilt ($P = .002$), and PI-LL ($P < .001$) at baseline.

At a minimum 2-year follow-up, for unmatched outcomes, patients in the operative group (n = 246) had significant improvements from baseline in ODI ($P < .001$), SF-36 score ($P < .001$), SRS-22 score ($P < .001$), numeric

Table 1. Impact of Nonoperative vs Operative Treatment on Outcomes

Outcome	Treatment Group (Unmatched) Nonoperative (n = 223)	Operative (n = 246)	*P* Value (Operative vs Nonoperative)
ODI			
Baseline	22.9 (16.0)	41.5 (19.9)	< .001
Minimum 2-y follow-up	23.4 (17.9)	26.1 (20.6)	.134
P value (baseline vs 2-y)	.538	< .001	
SF-36 PCS			
Baseline	43.2 (10.0)	33.3 (10.3)	< .001
Minimum 2-y follow-up	42.6 (11.4)	41.4 (11.6)	.249
P value (baseline vs 2-y)	.620	< .001	
SRS-22 total score			
Baseline	3.6 (0.6)	2.8 (0.7)	< .001
Minimum 2-y follow-up	3.6 (0.7)	3.7 (0.8)	.218
P value (baseline vs 2-y)	.064	< .001	
NRS back pain score			
Baseline	4.4 (2.7)	7.1 (2.3)	< .001
Minimum 2-y follow-up	4.4 (3.0)	3.5 (3.1)	.001
P value (baseline vs 2-y)	.899	< .001	
NRS leg pain score			
Baseline	2.5 (2.9)	4.2 (3.3)	< .001
Minimum 2-y follow-up	2.7 (3.0)	2.5 (3.0)	.477
P value (baseline vs 2-y)	.261	< .001	

Data are presented as means (SD), unless otherwise indicated.

NRS, numeric rating scale; ODI, Oswestry Disability Index; PCS, physical component score; SF-36, Short Form-36 Health Survey; SRS-22, Scoliosis Research Society Questionnaire 22.

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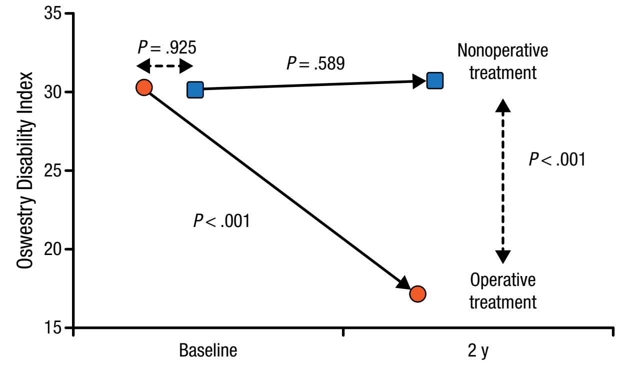
Figure 1. Operative vs Nonoperative Treatment: Impact on Disability



Data are presented for 97 propensity-matched operative-nonoperative pairs. *P* values were calculated with the paired *t* test.

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rating scale (NRS) back pain score (*P* < .001), and NRS leg pain score (*P* < .001), whereas the nonoperative group (n = 223) had no significant improvements from baseline in these measures (Table 1). The operative group had significantly improved mean back pain score compared with the nonoperative group (*P* = .001).

A total of 97 matched operative-nonoperative pairs were identified based on propensity scores. The only parameter that was significantly different between the operative and nonoperative pairs was mean age (51.4 vs 58.0; *P* = .003). Among the matched pairs, the operative group had significant improvements from baseline and vs the nonoperative group in ODI score (*P* < .001 both comparisons; Figure 1), SRS-22 total score (*P* < .001 both comparisons), SF-36 PCS (*P* < .001 both comparisons), back pain score (*P* < .001 both comparisons), and leg pain score (*P* < .001 both comparisons). The nonoperative group lacked significant improvements from baseline in any of the measures, except for the SRS-22 (*P* = .021).

Patients electing nonoperative treatment tend to have less deformity and less pain and disability than patients choosing to undergo surgery. Surgical treatment for ASD can provide significant improvements in HRQOL at a minimum 2-year follow-up. Nonoperative treatment appears to maintain presenting levels of pain and disability.

Cervical Sagittal Measurements Strongly Correlated Between Full-Length and C-Spine Radiographs

Written by Toni Rizzo

The effect of spinal deformity on cervical spine (C-spine) alignment has been a topic of recent interest. Several authors have proposed standardized radiographic sagittal alignment parameters for the C-spine. These papers recommend the use of full-length 36-inch spine radiographs. However, full-length spine radiographs often produce poor images of the cervical region, making evaluation difficult. Routine use of full-length spine radiographs also increases cost and patient exposure to radiation. Casey L. Smith,