Operative Treatment of ASD Improves Disease State and Physical Function

Written by Phil Vinall

Patients with adult spinal deformity (ASD) have levels of disability similar to patients with cancer, diabetes, heart disease, and lung disease. The level of disability increases with increasing sagittal malalignment. Shay Bess, MD, Medical Center of the Rockies, Presbyterian/St Luke's Medical Center, Denver, Colorado, USA, presented recent data from a 2-year prospective multicenter analysis, titled "Operative Treatment of ASD Improves Disease State and Physical Function Regardless of Age and Deformity Type, While Nonoperative Treatment Has No Impact"[Fu KM et al. *Spine*. 2014] indicating that operative treatment of ASD improves short-form health survey (SF-36) physical component scores (PCS) although they remain below the 25th percentile of US norms.

The analysis evaluated the impact of operative vs nonoperative treatment of ASD in 497 patients with ASD and no prior surgery. Other objectives were to assess the ability of treatment to restore patients with ASD to normal physical function levels, identify which deformity types are responsive to which treatment types, evaluate the ability of treatment type to improve health status, and determine the disease state correlates after treatment for different deformity types.

Patients were grouped by deformity type, location, and severity: primarily coronal (scoliosis > 20°, sagittal vertical axis [SVA] < 5 cm, located in the thoracic, lumbar, or both areas); primarily sagittal (scoliosis < 20°, SVA > 5 cm vs > 10 cm); and mixed deformity (scoliosis > 20°, SVA > 5 cm). The primary outcome measures (SF-36 PCS and mental component score [MCS]) were assessed at baseline and at 2-year follow-up and compared with US normative and disease specific SFG-36 PCS and MCS scores and US population norm-based scoring (NBS). A minimal clinically important difference was defined as 3 NBS points.

The mean age was 51.6 years, with a mean degree of scoliosis of 47.5°, mean SVA of 2.3 cm, and mean PCS of 39.8. Two-year follow-up was available for 61% (303/497) of the patients. Of these, 148 received operative treatment while 155 received nonoperative treatment. At baseline, patients in the nonoperative group had worse sagittal alignment and more mixed deformity (Table 1). The nonoperative group also had a worse PCS ($P < .0001$) and slightly higher MCS ($P = .0040$).

Table 1. Baseline Operative vs Nonoperative Results

ASD (n = 303)	Operative (n = 148)	Nonoperative (n = 155)	*P* Value	Total
SVA > 5 cm	50 (33.8)	25 (16.1)	.0004	75 (24.8)
SVA > 10 cm	22 (14.9)	6 (3.9)	.0010	28 (9.2)
Thoracic	56 (37.8)	53 (34.2)	N/S	UT = 109
Thoracolumbar	40 (27.0)	54 (34.8)	N/S	MT = 94
Lumbar	52 (35.1)	48 (31.0)	N/S	LT = 100
Mixed deformity	43 (29.3)	23 (15.3)	.0021	66 (21.8)

Data are presented as no. (%) unless otherwise indicated.

ASD, adult spinal deformity; BMI, body mass index; LT, lower thoracic; MT, middle thoracic; N/S, not significant; SVA, sagittal vertical axis; UT, upper thoracic.

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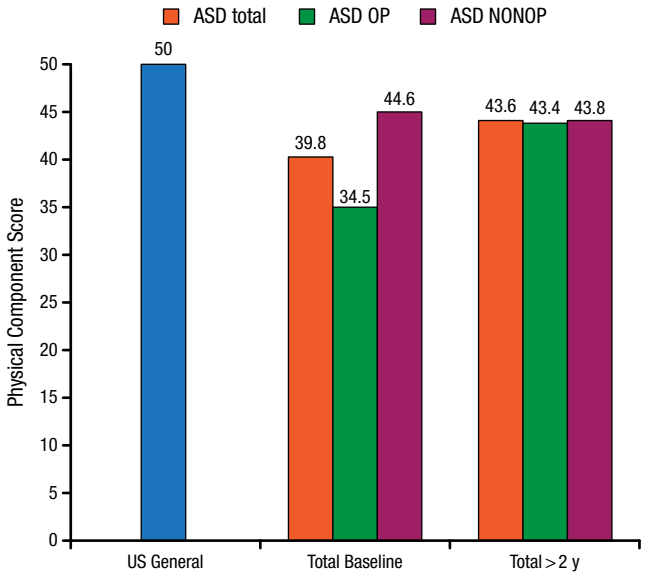
Figure 1. Effects of Operative vs Nonoperative Treatment



ASD, adult spinal deformity; NONOP, nonoperative; OP, operative; US, United States.

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Patients receiving operative treatment improved significantly (PCS 34.5 at baseline vs 43.4 at 2 years; $P < .05$) over the 2-year follow-up but never reached the US norm. There was no change for those patients receiving nonoperative treatment (44.6 at baseline vs 43.8 at 2 years; Figure 1).

The results were similar when the data were analyzed based on age with operative patients improving and nonoperative patients remaining the same or declining. However, only in the youngest (aged 20-30 years)

and oldest (aged 70-80 years) groups did the operative patients reach the norm for their generation. This was also true for type of deformity. Operative treatment was associated with improvement in all deformity types with the largest improvement seen in patients with lumbar scoliosis and SVA > 10 cm.

Registry Data May Prove Useful in Benchmarking Lumbar Spine Surgery Outcomes

Written by Phil Vinall

Björn Strömqvist, MD, PhD, Lund University, Lund, Sweden, presented data from the Swedish Spine Register [Swespine; www.4s.nu] where > 90 000 surgeries are currently included. Prof Strömqvist suggested that these data and data from similar databases may be useful in benchmarking baseline data and outcomes of lumbar spine surgery.

Swespine was created > 20 years ago and now registers > 85% of all lumbar spine surgeries performed in Sweden [Strömqvist B et al. *Eur Spine J.* 2013]. Surgical data are entered by surgeons. All other data are obtained from patients prior to surgery and at years 1, 2, 5, and 10 postoperatively.

To provide examples of the types of data that can be collected from registries and used to benchmark baseline data and surgical outcomes, Prof Strömqvist presented data on several patient-reported outcome measures (PROMs): visual analog scale leg pain, the short form-36 health survey (SF-36), the EuroQol-5D (EQ-5D), the Oswestry Disability Index (ODI), and patient satisfaction with surgery. The reports are based on data from > 45 000 patients who received surgery during a 10-year period.

Historical data from Swespine allows researchers to gain an understanding of the changing indications for lumbar surgery over time. For example, between 2004 and 2013, there was a shift from lumbar disc herniation (LDH) to central stenosis as the most common reason for surgery in Sweden. At the same time, there was a slight decrease in surgery for degenerative disc disease (DDD).

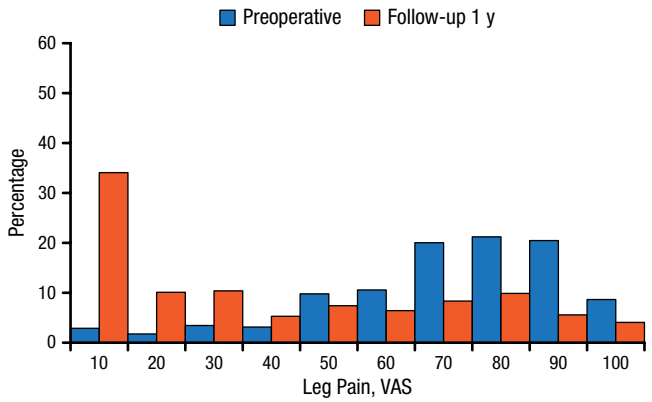
PROMs data from Swespine shows that patients' perception of their leg pain before and 1year after surgery for LDH improved steadily from a mean preoperative score of 67 to a mean postoperative score of 22 (Figure 1).

Among patients receiving surgery for isthmic spondylolisthesis, SF-36 profiles are consistently low prior to surgery; however, by year 1 after surgery there is a significant improvement across all subscales of both physical and mental components ($P < .0001$, all). Improvement is also seen on the EQ-5D at year 1 and these results are maintained at 2 and 5 years after surgery for DDD, central and lateral stenosis, isthmic spondylolisthesis, and in particular, LDH. Patients also report improved scores on the ODI, an index derived from the Oswestry Low-Back Pain Questionnaire used by clinicians and researchers to quantify disability for low-back pain.

One year after surgery, patients' overall level of satisfaction with their surgery outcomes are uniformly high, ranging from 67% of patients treated for lateral stenosis to 83% among those treated for LDH (Table 1). These results are maintained over 10 years.

Prof Strömqvist concluded that the outcome of lumbar spine surgery is generally favorable based on the registry data that has been studied on an annual basis over 10 years. Additional information about the registry, including annual reports, is available at www.4s.nu.

Figure 1. Leg Pain Before and 1 Year After Surgery for LDH



LDH, lumbar disc herniation; VAS, visual analog scale.
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Source: Strömqvist B et al. *Eur Spine J.* 2013.

Table 1. Satisfaction 1 Year After Surgery

	Satisfied	Uncertain	Dissatisfied
LDH	83	14	3
Central stenosis	69	21	11
Lateral stenosis	67	25	9
Isthmic spondylolisthesis	70	18	11
DDD	74	18	8

Data given in percentage.
DDD, degenerative disc disease; LDH, lumbar disc herniation.
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