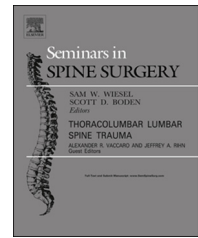


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Value of scoliosis care: Nonsurgical treatment versus surgery

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ABSTRACT

Adult scoliosis is a complex issue, providing unique challenges to both the spine surgeon and the patient. Recently, there has been an interest in examining the quality of life of patients undergoing treatment for adult spinal deformity to compare the value of nonoperative versus operative management. This article reviews the current literature on the treatment of adult spinal deformity, in hopes of drawing conclusions for the best approach to these patients. Quality of life outcome measures and cost-effectiveness are reviewed to better understand the benefits, or lack thereof, of management options. It is crucial for spine surgeons to begin to use the same validated measures when studying this cohort of patients in order to compare treatments and draw appropriate conclusions. There is currently no literature reporting the quality-adjusted life years (QALY) or cost-utility of surgical treatment of adult scoliosis. Only one study analyzing the cost of nonoperative treatment for adult scoliosis was identified. Future prospective studies focusing on the cost-effectiveness of adult scoliosis treatment with an emphasis on improving the quality of life of these patients are needed to confirm the current retrospective literature's assertion that surgery provides better quality of life than nonoperative treatment.

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1. Introduction

Adult scoliosis may be a *de novo* deformity associated with degenerative changes, or a progression of adolescent idiopathic scoliosis into adulthood.¹ In both cases, disc and/or facet degeneration can lead to increased deformity and may contribute to pain and disability. It is a complex issue that can negatively impact the quality of life and function of affected patients. Adults with scoliosis have reported worse health-related quality of life, limitations in function, increased analgesic use, and increased incidence of back pain compared with adults without scoliosis.^{2,3}

In contrast to adolescents with scoliosis in which asymptomatic curves are treated based on measurement and progression, adults with scoliosis are primarily treated for their pain and disability.⁴ Nonoperative treatment measures are

often exhausted before surgical treatment is considered in adult scoliosis. The decision to undergo surgical treatment is ultimately made after a thorough discussion between the physician and his patient. Most importantly, the complexity of the surgery along with its high risk of complications must be well understood.

The prevalence of scoliosis in patients older than 50 years has been reported to be 6%,⁵ while the prevalence in routine chest radiographs has been found to be between 1.4% and 9%.^{6,7} Symptoms begin to present over time with further degeneration of the spinal elements. With the growing elderly population, physicians can expect to see an increase of patients with scoliosis and an evidence-based approach to treatment of these patients is essential.

It is evident that adult spinal deformity presents a challenging situation for the treating orthopedic surgeon, as there

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are no clear evidence-based recommendations for nonoperative versus operative treatment. The purpose of this paper is to review the current literature to (1) assess the quality of life in those with adult scoliosis who underwent nonoperative and/or surgical treatment and (2) assess the cost-effectiveness of different scoliosis treatment modalities reported in the literature.

2. Methods

MEDLINE and PubMed databases were searched to identify articles using the following keywords: “adult scoliosis,” “adult spine deformity,” “adult scoliosis surgery,” “QALY,” “surgery,” “nonoperative,” “outcomes,” and “cost.” HRQOL measures searched included Oswestry Disability Index (ODI) scores, Scoliosis Research Society (SRS) instrument scores, Short-Form Health Survey (SF-12), and Numerical Rating Scale (NRS) for leg and/or back pain. Abstracts were screened and the studies included were those primarily involving patients with adult scoliosis, who underwent primary surgery or nonoperative management. The studies that focused on the change in validated outcome scores from the onset of the study to final follow-up were found to be valuable. Studies that were predominantly adolescent scoliosis based and those that only measured postoperative outcomes scores were excluded.

3. Quality-of-life assessment

In order to quantify the impact of scoliosis on affected individuals, self-assessment of measures such as health status, pain, disability, and self-image must be established. In the adult with scoliosis, measurements in these domains elucidate the value of surgical or nonsurgical care. The Scoliosis Research Society (SRS) instrument, particularly the SRS-22 (Table 1), has proven to be a reliable and valid instrument used in measuring outcomes and health status in adults with spinal deformity.³ The SRS-22 is a questionnaire containing 22 questions which cover 5 domains: 5 questions each on pain, self perceived image, function, and mental

health, and 2 questions on satisfaction with management.⁸ Baldus et al.⁹ validated the use of the SRS instrument in adult spinal deformity patients, making it a valuable health-related quality of life (HRQOL) tool. When compared with “normal” volunteers, adults diagnosed with idiopathic or de novo scoliosis had significant differences in terms of pain, appearance, and activity SRS domains. Of note, the mental health domain scores of men aged 61–80 years were not found to be statistically different between deformity and non-deformity patients.⁹ Other measures such as the Oswestry Disability Index (ODI), 12-Item Short-Form Health Survey (SF-12), and the Charlson Comorbidity Index (CCI) may be useful in identifying patients who would benefit from surgical treatment.¹⁰ The CCI is considered a validated and reproducible method of determining comorbidity and predicting outcome in the elderly and the ODI is felt to be a validated condition-specific outcome measure in spine-related disability.^{11,12} The SRS-22 has also been found to correlate well with the SF-12 and the ODI in assessing adult spinal deformity patients.¹³ However, the SRS has been found to be more responsive to change brought on by primary surgical treatment of adult scoliosis when compared with ODI and SF-12.¹⁴ The psychometric qualities of the SRS instrument such as concurrent validity, internal consistency, reliability over time, and sensitivity to change have been confirmed in adult deformity patients.¹² Furthermore, the SRS-22, ODI, and Numerical Rating Scale for leg and/or back pain (NRS) have been shown to accurately predict SF-6D scores, allowing for cost-utility analysis.^{15,16} These tools can be useful in quantifying the effect of treatment on the patients' quality of life and for evaluation of quality-adjusted life years (QALY) values and thus, cost-effectiveness. Current literature supports the use of these tools in order to place a value on treatment choices.

4. Nonoperative treatment

Nonoperative treatment of adult scoliosis includes a range of options from no intervention at all to physical therapy, exercise therapy, injections, chiropractic care, and pain management. Glassman et al.¹⁷ evaluated the resource utilization

Table 1 – Scoliosis Research Society-22 scoring scale.⁸

Domain	No. of questions	Total score Pt (possible)	No. of questions answered* (possible)	Mean score* (possible)
		A	B	A ÷ B
Pain	5	(25)	(5)	(5)
Function/activity	5	(25)	(5)	(5)
Self-image/appearance	5	(25)	(5)	(5)
Mental health	5	(25)	(5)	(5)
Satisfaction with management	2	(10)	(2)	(5)
			Total mean score* (possible)	(5)

Scoring instructions.

Unanswered questions reduce the questions answered denominator (B) by appropriate amount.

Delete questions with more than one response.

Domains cannot be scored if fewer than 3 questions answered.

* Mean score: 5 best and 1 worst.

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