



Unplanned Reoperations Affect Long-Term Outcomes in Adult Spinal Deformity Patients Undergoing Long Fusions to the Sacrum

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Abstract

Study Design: Retrospective clinical cohort study.

Objective: To compare the long-term complications and outcomes scores of primary and revision surgeries for adult spinal deformity of patients treated with long fusions to the sacrum.

Summary of Background Data: Long fusions in patients with adult spinal deformity are fraught with complications and the need for reoperation that can significantly impact patient health-related quality of life.

Methods: Data from 134 consecutive patients who underwent spinal fusion from the thoracic spine to the sacropelvis and had a minimum of 5-year follow-up were analyzed. Patients were classified as primary surgery (PS) and index revision (IR) surgery; they were then subdivided based on whether they returned to the operating room (RTO) or not (NRTO). RTO complications were classified as 1) infection, 2) neurologic, 3) fusion status, 4) implants, and 5) global alignment and stratified as <6 months, <2 years, and >2 years. Final Scoliosis Research Society Patient Questionnaire (SRS 22r) and Oswestry Disability Index (ODI) scores were compared between subgroups.

Results: Seventy-one PS and 63 IR were included in the analysis. Mean age at surgery was 54.9 years (30–78), mean follow-up 5.8 years (4.9–12.8). RTO rates were 21.1% and 34.9%, respectively, for PS and IR ($p = .16$). 43.8% of patients requiring reoperation did so on multiple occasions. Fifty PS and 41 IR cases had complete SRS 22 and ODI scores. Final SRS 22 total scores were 3.74 and 3.41 ($p = .02$) for the respective groups. ODI scores were 25.4% and 34.0% ($p = .02$).

Conclusions: Both groups had a significant number of revision surgeries performed by 5 years of follow-up. Unplanned reoperation significantly affected ODI and SRS 22 outcomes scores in the individual domains of pain, function, and overall satisfaction as well as total score at the 5-year follow-up regardless of PS or IR status. Overall, the PS group had improved outcomes when compared to the IR group. © 2015 Scoliosis Research Society.

Keywords: Outcomes; Adult deformity; Revision surgery; Complications

Introduction

Despite significant advances in the surgical treatment for adult spinal deformity (ASD) ranging from improvements in surgical techniques and instrumentation, complications

and revision surgery are still prevalent [1-4]. In both the short and long term, major and minor complications are frequently encountered when treating these patients [5-9]. Perioperative complications have a deleterious effect on patient perceived outcomes [10,11]. Lifetime rates of revision surgery in these patients can be significant [4], and the risk of returning to the operating room only increases with age [12].

Treatment outcomes in the field have traditionally been measured by clinical and radiographic parameters. However, with recent concerns of allocation of resources in health

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care, focus has shifted to providing evidence-based research that demonstrates improvement in patient perceived outcomes and economic feasibility [13]. This is especially true with an ever-increasing elderly population and a reported prevalence of ASD to be 68% [14]. Despite many obstacles to performing evidence-based research exist in field of ASD [15], delineating future problems and attempting preventative precaution would be a prudent undertaking. Hence, multiple studies have been performed that demonstrate the patient-derived benefits of surgical treatment [12,16–18].

Accepted indications for surgical intervention include debilitating pain, disability, and progressive deformity [19]. As patients with spinal deformity age, the decision to proceed with surgical intervention is driven primarily by decline in function [20,21]. Just as good outcomes are anticipated to increase patient function, the assumption can be drawn that complications associated with surgical treatment retard patient progress. This study aims to compare revision rates and outcomes scores between primary and revision surgeries for patients with ASD at the 5-year follow-up and to evaluate if return to the operating room has any residual effects on patient perceived outcomes.

Materials and Methods

This study was approved by the institutional review board of the Hospital for Special Surgery. Between the years of 1999 and 2006, 134 consecutive patients underwent anterior-posterior spinal fusion from the thoracic spine to the sacropelvis and had a minimum of 5 years of follow-up (mean 6.8 years, range = 5–12 years). All surgeries were performed by the senior author at a single institution. Inclusion criteria included minimum of 5 years of follow-up, age over 21 at the time of surgery, diagnosis of degenerative ASD, and instrumented spinal fusion of at least 6 motion segments and involving the thoracic spine and sacropelvis. Exclusion criteria included a diagnosis of neuromuscular, posttraumatic, inflammatory spondyloarthropathy, or oncologic spinal deformity.

Patients were divided into 2 groups: primary surgery (PS) and index revision (IR) surgery. PS surgery was defined as the first procedure that a patient was undergoing and included segmental fusion and instrumentation from the thoracic spine to the sacrum. IR surgery was defined as an index revision surgery performed by the senior author at the institution at which this study was being conducted; patients had to have had previous spinal surgery for deformity that did not cross the lumbosacral junction and had been performed more than 10 years prior to the procedure in consideration. Patients in each group were then further subdivided based on whether they had and unplanned return to the operating room (RTO) or not (NRTO). Indications for return to the operating room were then quantified. RTO indications were grouped according to categories relating to 1) infection, 2) neurologic, 3) fusion status, 4) implants, and 5) global alignment and stratified as early (<6 months), late (<2 years), and long term (>2 years). Chi-squared analysis

was utilized to statistically compare the numbers of revision cases between the 2 cohorts.

Patient outcomes

Scoliosis Research Society Patient Questionnaire (SRS 22r) and Oswestry Disability Index (ODI) were used to evaluate patients at the 5-year follow-up visit. Scores were available on 91 of 134 patients (67.9%). Each SRS 22r domain—Function, Pain, Mental Health, and Satisfaction—as well as total score was individually analyzed and evaluated. Statistical analysis was performed using Student *t* test for continuous variables. Further, *p* values less than .05 were considered significant.

Results

There were 134 consecutive patients with 71 PS and 63 IR included in the analysis. Overall, 13 were male and 121 female; the mean age was 56.2 years (range 37–74 years). Mean follow-up was 5.5 years (range 4.8–12.8 years). Mean overall follow-up in the PS group was 6.58 years and 4.81 years in the IR group (*p* = .002). Of the 134 patients in the cohort, 50 PS (70.4%) and 41 IR cases (65.1%) had complete SRS 22 and ODI scores and 5 years of minimum follow-up.

Overall, the RTO rate for the complete study population was 27.6% (37/134). RTO rates were 21.1% and 34.9%, respectively, for PS (15/71) and IR (14/50) (*p* = .16). In addition, 36.8% of patients requiring reoperation did so on multiple occasions. Mean overall follow-up in the RTO and NRTO group was 6.68 and 5.27 years, respectively (*p* = .008). Table 1 displays the overall unplanned return to

Table 1
Overall complications requiring RTO for complete study population and sub-groups.

| Complication type | Total (%) | 6 months | <2 years | >2 years |
|--------------------------|-----------|----------|----------|----------|
| Total revised | | | | |
| Infection | 15 (28) | 12 | 2 | 1 |
| Neurologic | 12 (22) | 9 | 2 | 1 |
| Pseudoarthrosis | 6 (11) | 0 | 2 | 4 |
| Instrumentation | 16 (30) | 5 | 2 | 9 |
| Global alignment | 6 (11) | 2 | 2 | 2 |
| Total RTO | 55 | 28 | 10 | 17 |
| Primaries revised | | | | |
| Infection | 5 (20) | 3 | 2 | 0 |
| Neurologic | 5 (20) | 3 | 1 | 1 |
| Pseudoarthrosis | 2 (8) | 0 | 1 | 1 |
| Instrumentation | 11 (44) | 2 | 1 | 8 |
| Global alignment | 2 (8) | 0 | 1 | 1 |
| Total RTO | 25 | 8 | 6 | 11 |
| Revisions revised | | | | |
| Infection | 10 (33.3) | 9 | 0 | 1 |
| Neurologic | 7 (23.3) | 6 | 1 | 0 |
| Pseudoarthrosis | 4 (13.3) | 0 | 1 | 3 |
| Instrumentation | 5 (16.7) | 3 | 1 | 9 |
| Global alignment | 4 (13.3) | 2 | 1 | 2 |
| Total RTO | 30 | 20 | 4 | 6 |

RTO, return to operation.

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