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Patient satisfaction after multiple revision surgeries for adult spinal deformity

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OBJECTIVE Revision surgery is often necessary for adult spinal deformity (ASD) patients. Satisfaction with management is an important component of health-related quality of life. The authors hypothesized that patients who underwent multiple revision surgeries following ASD correction would exhibit lower self-reported satisfaction scores.

METHODS This was a retrospective cohort study of 668 patients who underwent ASD surgery and were eligible for a minimum 2-year follow-up. Visits were stratified by occurrence prior to the index surgery (period 0), after the index surgery only (period 1), after the first revision only (period 2), and after the second revision only (period 3). Patients were further stratified by prior spine surgery before their index surgery. Scoliosis Research Society–22 (SRS-22r) health-related quality-of-life satisfaction subscore and total satisfaction scores were evaluated at all periods using multiple linear regression and adjustment for age, sex, and Charlson Comorbidity Index.

RESULTS In total, 46.6% of the study patients had undergone prior spine surgery before their index surgery. The overall revision rate was 21.3%. Among patients with no spine surgery prior to the index surgery, SRS-22r satisfaction scores increased from period 0 to 1 (from 2.8 to 4.3, $p < 0.0001$), decreased after one revision from period 1 to 2 (4.3 to 3.9, $p = 0.0004$), and decreased further after a second revision from period 2 to 3 (3.9 to 3.3, $p = 0.0437$). Among patients with spine surgery prior to the index procedure, SRS-22r satisfaction increased from period 0 to 1 (2.8 to 4.2, $p < 0.0001$) and decreased from period 1 to 2 (4.2 to 3.8, $p = 0.0011$). No differences in follow-up time from last surgery were observed (all $p > 0.3$). Among patients with multiple revisions, 40% experienced rod fracture, 40% proximal junctional kyphosis, and 33% pseudarthrosis.

CONCLUSIONS Among patients undergoing ASD surgery, revision surgery is associated with decreased satisfaction, and multiple revisions are associated with additive detriment to satisfaction among patients initially undergoing primary

ABBREVIATIONS ASD = adult spinal deformity; HRQOL = health-related quality of life; SRS-22r = Scoliosis Research Society–22; SVA = sagittal vertical axis.

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surgery. These findings have direct implications for preoperative patient counseling and establishment of postoperative expectations.

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KEYWORDS adult spinal deformity; revision surgery; patient satisfaction; HRQOL

Patient satisfaction in healthcare is receiving growing attention as a key quality metric used to determine hospital and physician reimbursement[1,2] and will be an increasingly important parameter to measure in patients who have undergone spine surgery. This information can help surgeons understand and assess the value of established procedures and processes that their patients undergo.[3]

In adult spinal deformity (ASD) surgery, patient satisfaction has been associated with self-image, pain, standing difficulty, and sagittal alignment restoration. Gum et al. demonstrated that satisfaction among ASD patients correlated most closely with self-reported appearance scores.[4] Furthermore, patients undergoing revision surgery are not always as satisfied with these later surgeries as they were with the index procedure. In patients undergoing revision cervical spine surgery, significant improvement was observed on average across all patient-reported outcome measures; only 75%–85% of patients, however, were satisfied.[5] It is important to consider satisfaction in revision cases for ASD, because a large proportion of patients will require revision surgery.[6,7] Revision cases have a higher incidence of infection, and the most common causes of revision may be implant failure, junctional kyphosis, and enduring scoliosis.[6] Multiple revision surgeries in a single patient are also common.[7,8] Revision ASD patients who had undergone two or more previous operations presented with more coronal and sagittal malalignment and worse function than patients who had undergone fewer previous operations. However, compared with patients who had undergone fewer previous operations, those who had undergone three or more surgeries had relatively higher rates of reoperation but similar perioperative complication rates and similar clinical improvements.[9] Our hypothesis was that patients who underwent multiple revision surgeries following ASD correction would exhibit lower Scoliosis Research Society–22 (SRS-22r) satisfaction scores.

Methods

Data Sources

This was a retrospective cohort study of a prospectively collected database of ASD patients. This data set included patients ≥ 18 years of age with adult degenerative or idiopathic scoliosis and ≥ 1 of the following criteria: coronal Cobb angle ≥ 20°, sagittal vertical axis (SVA) ≥ 5 cm, pelvic tilt ≥ 25°, or thoracic kyphosis ≥ 60°. Patients with causes of deformity other than degenerative or idiopathic—including traumatic, neuromuscular, congenital, infectious, and paralytic—were excluded. Consent was obtained from all patients, and IRB approval was obtained at each participating site.

Patient Selection

Only patients who were undergoing operative management of ASD and were eligible for a minimum of 2 years of follow-up were included.

Dependent and Independent Variables

The primary dependent variables in this study were the SRS-22r satisfaction subscore and total score. This questionnaire was administered at serial follow-ups beginning with the index surgery. As the timing of revision surgeries may vary, the date of surgery and the date of questionnaire administration were used to place responses into four categories: 1) before the index surgery, 2) after the index surgery only, 3) after one revision only, and 4) after two revisions. Many patients had undergone spine surgery prior to their index surgery ("index revision" surgery), and these groups were analyzed separately.

Statistical Analysis

Patient-level data were transposed to visit-level data with associated questionnaire responses from each specific visit. SRS-22r satisfaction and total scores were compared at each of the four revision status periods. Importantly, with this design patient visits were stratified solely on the basis of their relationship to primary and revision surgeries. The study design does not differentiate patients based on specific timing of the visit with regard to revision, namely, whether the visit occurred before versus after manifestation of the pathology necessitating revision. Multiple general linear regression was used to adjust for potential confounding factors, including age, sex, Charlson Comorbidity Index, and deformity type (coronal, sagittal, or combined). The mean days postoperatively from the latest surgery were also determined for each revision status group. Statistical significance was defined as p values < 0.05.

Results

Descriptive Statistics

In total, 1256 patients were included in this study; 73.2% (n = 919) were female and 50.2% (n = 633) had undergone spine surgery prior to their index surgery. The mean SVA was 70.9 ± 72.9 mm, the mean L1–S1 lordosis was 38.2° ± 21.7°, and the mean pelvic incidence was 55.8° ± 13.0° (Table 1).

Across all patients, 5792 visits with follow-up data were recorded. Of these, 22.1% of visits were prior to the index surgery, 71.1% were after the index surgery only, 6.1% were after one revision surgery only, and 0.7% were after two revision surgeries; in addition, 49.4% of visits were among patients with a history of spine surgery prior to the index surgery (i.e., index revision surgery) (Table 2).

TABLE 1. Patient-level descriptive statistics

Variable	Value
Total no. of patients	1256
Sex	
Male	337 (26.8)
Female	919 (73.2)
Frequency missing = 4	
Prior spine op	
No	627 (49.8)
Yes	633 (50.2)
ASA grade	
1	69 (5.6)
2	607 (49.4)
3	534 (43.5)
4	18 (1.5)
Frequency missing = 32	
CCI	
0	364 (28.9)
1	270 (21.5)
2	279 (22.2)
≥3	346 (27.5)
Frequency missing = 1	
Deformity type	
Coronal & sagittal	578 (47.42)
Coronal only	357 (29.29)
Sagittal only	284 (23.3)
Frequency missing = 41	
Age, yrs	60.4 ± 14.3
SVA, cm	70.9 ± 72.9
L1–S1 lordosis, °	38.2 ± 21.7
PI, °	55.8 ± 13.0
PT, °	24.5 ± 10.8

ASA = American Society of Anesthesiologists Physical Status Classification System; CCI = Charlson Comorbidity Index; PI = pelvic incidence; PT = pelvic tilt. Values are presented as number (%) of patients or mean ± SD.

TABLE 2. Visit-level descriptive statistics

Variable	Value
Total no. of visits	5792
Time period	
Before index op	1280 (22.1)
After index op only	4119 (71.1)
After 1st revision only	351 (6.1)
After 2nd revision only	42 (0.7)
Frequency missing = 1374	
Spine op prior to index op	
No	2930 (50.6)
Yes	2862 (49.4)
CCI	
0	1733 (30.0)
1	1240 (21.4)
2	1249 (21.6)
3	1565 (27.0)
Frequency missing = 5	
Sex	
Male	1470 (25.5)
Female	4305 (74.5)
Frequency missing = 17	
Deformity type	
Coronal & sagittal	2648 (47.14)
Coronal only	1721 (30.64)
Sagittal only	1248 (22.22)
Frequency missing = 175	
SRS-22r satisfaction score	3.8 ± 1.2
SRS-22r total score	3.3 ± 0.8
Age, yrs	60.0 ± 14.5

Values are presented as number (%) of patients or mean ± SD.

Among patients with multiple revisions, 40% (n = 6) experienced rod fracture, 40% (n = 6) experienced proximal junctional kyphosis, 33% (n = 5) experienced pseudarthrosis, and 20% (n = 3) experienced a deep surgical site infection.

Follow-Up Duration

The mean time since previous spine surgery was assessed across all visit categories. Among patients with no previous history of spine surgery, visits after the index surgery alone occurred on average 465.6 days postoperatively (95% CI 447.2–484.0, median 365.0 days), and visits after one and two revisions occurred 462.5 days (95% CI 395.0–529.9, median 367.0 days) and 344.9 days (95% CI 126.6–563.2, median 275.0 days) after the most recent revision, respectively ($p = 0.56$). Among patients with spine surgery prior to their index surgery, visits after the index, first revision, and second revision occurred on average 459.8 days (95% CI 441.8–477.9, median 365.0 days), 434.4 days (95% CI 376.4–492.5, median 362.0 days), and 473.4 days (95% CI 318.4–628.5, median 348.0 days) after the most recent surgery ($p = 0.70$).

Patient Satisfaction

Among patients with no history of prior spine surgery, patient satisfaction, as indicated by SRS-22r satisfaction scores, at visits after the index surgery, was significantly increased compared with satisfaction at baseline visits ($p < 0.0001$), but patient satisfaction was decreased at visits after one revision surgery ($p < 0.0001$ vs after primary surgery only) and was further decreased at visits after two revision surgeries ($p = 0.0362$ vs one revision surgery only) (Fig. 1). Similar observations were made for patients with a history of spine surgery prior to the index surgery, for whom satisfaction at visits after the index surgery was higher than satisfaction at baseline visits ($p < 0.0001$), but satisfaction decreased at visits after one revision ($p = 0.0127$). There was no significant difference in satisfaction between visits after one versus two revisions among this group ($p = 0.8972$) (Fig. 2).

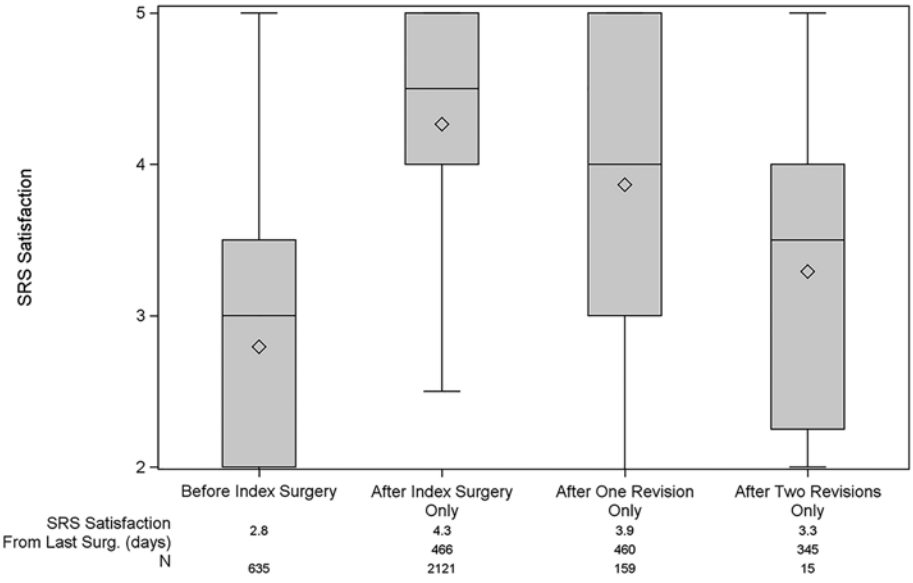

FIG. 1. SRS-22r satisfaction score by period: primary index surgeries. *Boxes* represent interquartile values; *diamonds*, means; and *whiskers*, minimum and maximum observations. Surg. = surgery.

SRS-22r Total Score

Among patients without previous spine surgery, the SRS-22r total score recorded at visits after only the index surgery significantly improved compared with the SRS-22r total score at baseline visits ($p < 0.0001$), but then decreased after one revision only ($p = 0.0005$) and further deteriorated after two revisions ($p = 0.0204$) (Fig. 3). A comparable pattern was observed for patients with a history of spine surgery prior to their index surgery. The SRS-22r total score was improved at visits after the index surgery versus baseline surgery ($p < 0.0001$) and decreased after one revision only ($p = 0.0092$). No significant difference was observed between SRS-22r total score at visits after one revision only compared with visits after two revisions ($p = 0.1817$) (Fig. 4).

Case Examples

Case examples of surgery patients are shown in Figs. 5 and 6. A 64-year-old female patient who underwent posterior instrumented fusion from T9 to the pelvis with multilevel Smith-Petersen osteotomies had a baseline SRS-22r satisfaction score of 3 and baseline SRS-22r total score of

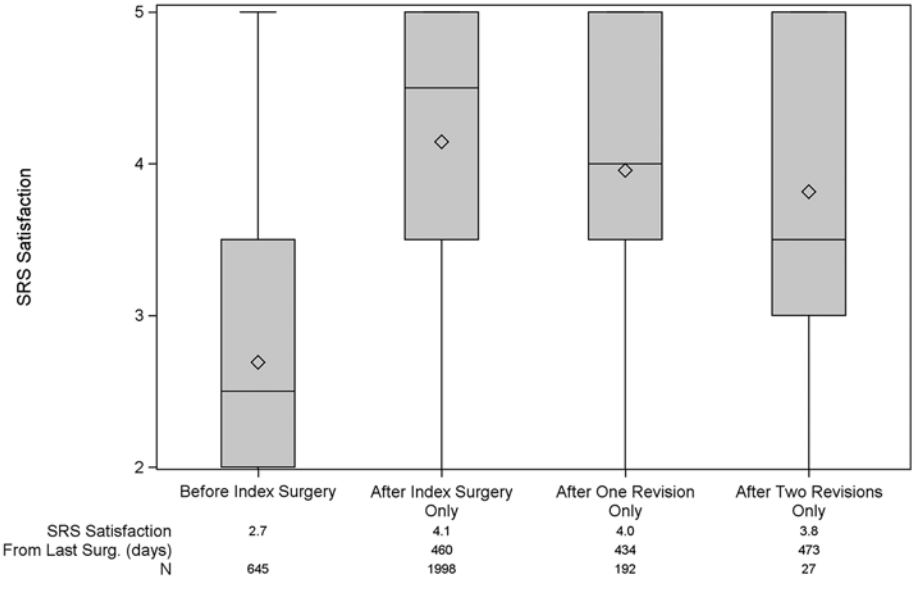

FIG. 2. SRS-22r satisfaction score by period: revision index surgeries. *Boxes* represent interquartile values; *diamonds*, means; and *whiskers*, minimum and maximum observations.

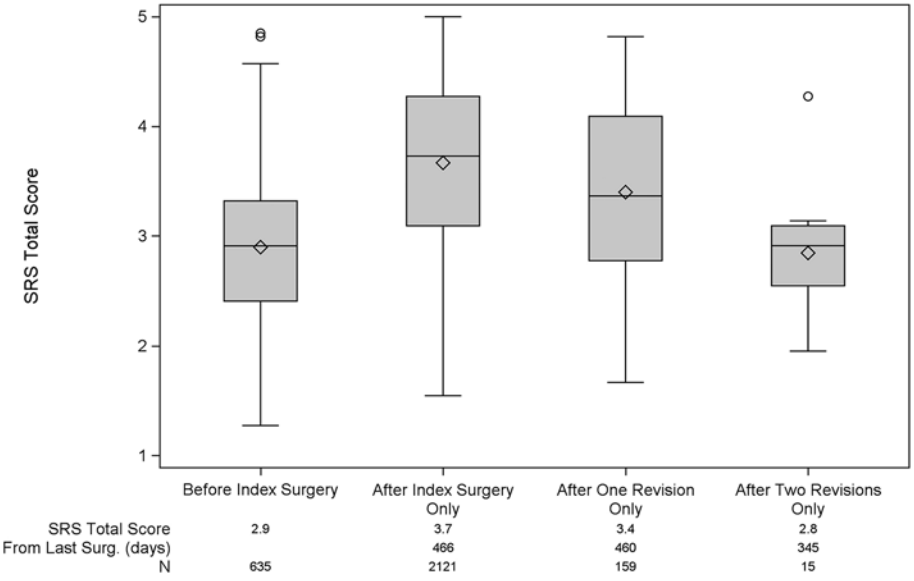

FIG. 3. SRS-22r total score by period: primary index surgeries. *Boxes* represent interquartile values; *diamonds*, means; *whiskers*, minimum and maximum observations; and *circles*, outliers.

2.2 (Fig. 5). A 65-year-old female patient (Fig. 6) underwent posterior instrumented fusion from T6 to the pelvis without the need for revision surgery. Incidental durotomy was encountered and addressed intraoperatively. Baseline SRS-22r satisfaction with management was 1.0, with an SRS-22r total score of 3.2. At 62 months postoperatively, the SRS-22r satisfaction score for management was 5.0, and the SRS-22r total score was 4.8.

Discussion

In this study we found that both satisfaction with management and total SRS-22r scores increased at visits after primary surgery versus baseline but decreased progressively with each subsequent revision in patients undergoing primary ASD surgery. Among those patients who had previously undergone spine surgery, although satisfaction and total SRS-22r scores increased after their index surgery, both metrics significantly decreased at visits after one revision. The impact of complications and revision surgery on patient-reported outcomes among ASD surgery patients has received much attention in recent years, often with conflicting findings. In a study of 280 consecutive ASD patients, Núñez-Pereira et al. did not observe

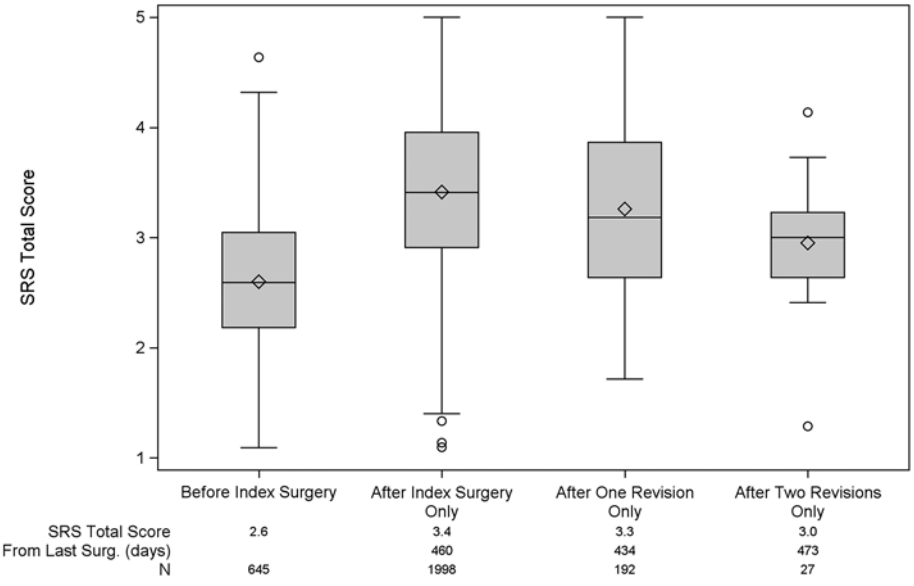

FIG. 4. SRS-22r total score by period: revision index surgeries. *Boxes* represent interquartile values; *diamonds*, means; *whiskers*, minimum and maximum observations; and *circles*, outliers.

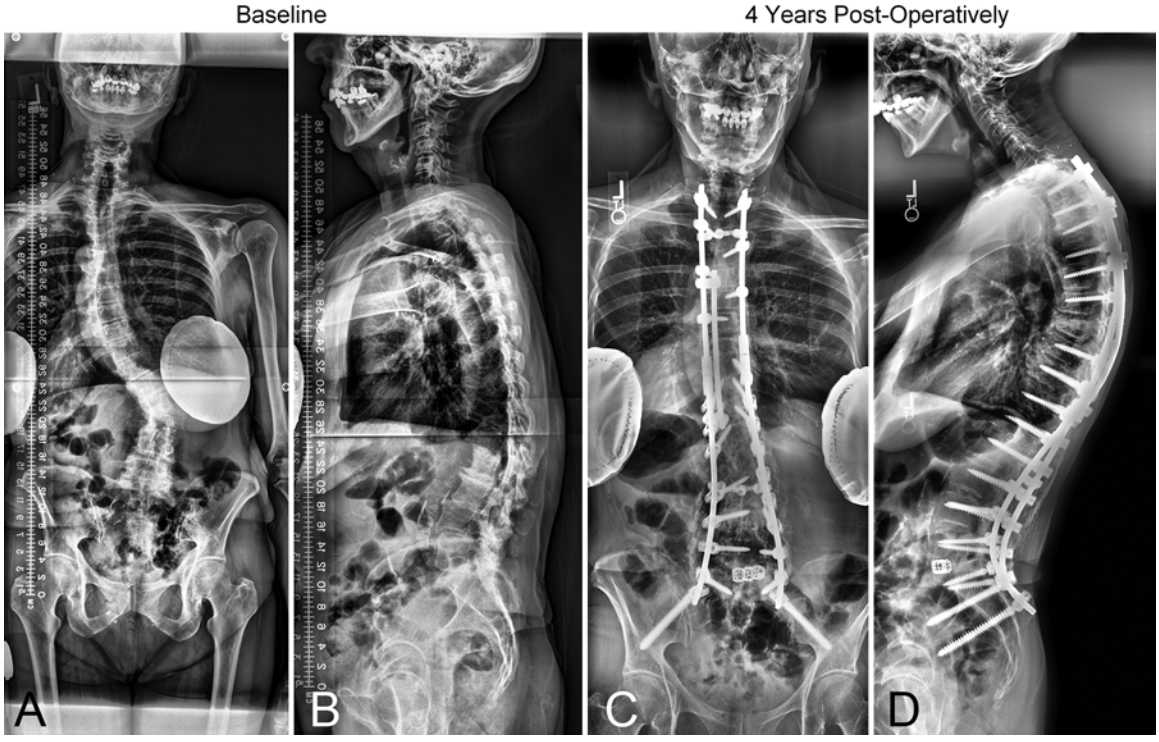

FIG. 5. Case example with multiple revisions: anteroposterior and lateral radiographs obtained in a 64-year-old female patient who underwent posterior instrumented fusion from T9 to the pelvis with multilevel Smith-Petersen osteotomies. The baseline SRS-22r satisfaction score was 3, and the baseline SRS-22r total score was 2.2. Proximal junctional kyphosis was noted as early as 6 months postoperatively, ultimately requiring revision surgery with cranial extension to T2 at 40 months postoperatively. Within a week after this surgery, the patient was noted to have implant malposition causing radiculopathy, and she underwent a subsequent revision for implant repositioning. The SRS-22r satisfaction score at follow-up 8 months after the latest revision and 48 months from surgery was 2.0, with an SRS-22r total score of 2.6.

significant differences in the improvement of Oswestry Disability Index (ODI) scores, SRS-22r, or SF-36 among patients who required versus patients who did not require revision surgery.[10] Although the postoperative change in these metrics was directionally above the minimal clinically important difference only for the nonrevision group, this comparison was not evaluated statistically. Similarly, in a study of 175 consecutively treated ASD patients, Lee et al. found no statistically significant differences in SRS-22r or ODI scores at 2 years postoperatively among patients with versus those without revision surgery.[11] Auerbach et al. examined patients undergoing three-column osteotomy for ASD and found no significant difference in SRS-22r scores at 2 years postoperatively among patients with versus those without complications.[12] Conversely, Passias et al. analyzed a large, multicenter database of ASD patients and found that compared with revision patients, nonrevision patients had inferior improvement in health-related quality of life (HRQOL) at 2 years from baseline.[13] Smith et al. and Pugely et al. both observed that significant adverse events are associated with inferior improvement in HRQOL at a minimum 2-year postoperative follow-up, though Smith et al. cautioned that compared with nonoperative patients, operative patients with complications still exhibited superior HRQOL.[14,15] This study adds to the growing body of literature suggesting that revision surgery is ultimately detrimental to patient outcomes.

The literature is similarly conflicted with regard to the impact of revision surgery and complications on patient satisfaction. Auerbach et al.'s abovementioned study similarly reported no difference in satisfaction scores among patients with versus those without complications.[12] Hayashi et al. observed an association between revision surgery and satisfaction in ASD, but only among older patients.[16] Lee et al. observed a significant increase in satisfaction even among patients requiring revision, although a specific comparison of satisfaction between patients who did versus those who did not undergo revision was not conducted.[11] In a more recent study by Passias et al., several statistical methods were used to determine whether revision surgery was associated with inferior postoperative outcomes at a minimum 2-year follow-up. According to both a normalized HRQOL analysis and an integrated health state analysis, patients undergoing revision surgery exhibited inferior satisfaction with management at 2 years postoperatively.[17] The present study adds to this debate not only by supporting the possibility that revision surgery is detrimental for patient satisfaction, but also by demonstrating that this detrimental effect is additive for multiple revisions among patients undergoing primary surgery.

Factors that impact patient satisfaction are not always predictable. One study showed that surgical satisfaction was associated with large hospitals, high surgical volume, and low mortality; however, outside of mortality, favorable

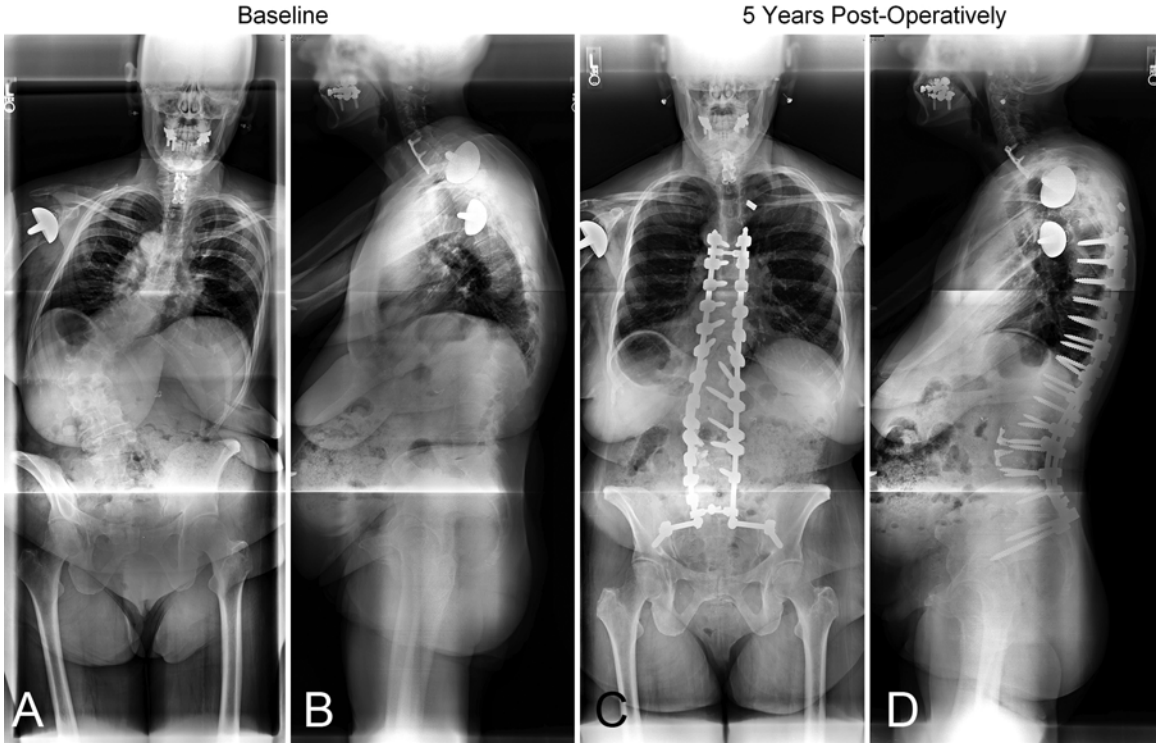

FIG. 6. Case example with no revisions: anteroposterior and lateral radiographs obtained in a 65-year-old female patient who underwent posterior instrumented fusion from T6 to the pelvis. Incidental durotomy was encountered and addressed intraoperatively. The baseline SRS-22r satisfaction score with management was 1.0, with an SRS-22r total score of 3.2. At 62 months postoperatively, the SRS-22r satisfaction score with management was 5.0, and the SRS-22r total score was 4.8.

surgical outcomes were not consistently associated with high satisfaction scores.[18] Fortunately, there are ways for physicians to improve patient satisfaction. Patients place a high value on time spent with their surgeon, and increased time with patients in the office can increase patient satisfaction even at the cost of more time spent in the waiting room.[19,20] In patients undergoing lumbar spine surgery, the most important factors for satisfaction were patients perceiving that the staff was doing everything they could to help with pain, and that the nurses were always being respectful.[2]

It is important to underscore that this study made use of an existing database to track changes in patient-reported satisfaction at various intervals with respect to primary and revision ASD surgery. Follow-up visits were not timed to answer the question of whether the patient's HRQOL changed immediately before or after a revision. For example, the timing of a follow-up visit classified as before a first revision may or may not have occurred after identification of the pathology necessitating revision. Accordingly, our results should be interpreted as retrospectively indicating that patients who require multiple revision surgeries tend to have lower satisfaction and HRQOL than those who do not. In this article, however, we cannot comment on whether a patient experiencing a complication would or would not benefit from a first or even second revision surgery. In certain cases of infection, junctional failure, and CSF leak, revision surgery is necessary, and failure to perform a revision would be disastrous.

The above explanation is particularly relevant to an interesting feature of our data. Among patients undergoing primary spinal fusion as their index surgery in our database, satisfaction and HRQOL decreased after the first revision. However, among patients undergoing revision spinal fusion as their index surgery in our database, HRQOL and satisfaction improved after their index surgery. While these results initially appear contradictory, several potential explanations exist. First, the timing of pre–first revision visits is far more likely to occur after the impact of the pathology requiring revision in patients with an index revision surgery than in patients with an index primary surgery. This underscores the above observation regarding temporal limitations to our data. Second, it is possible that patients specifically seeking a different surgeon for revision may be more likely to be satisfied with the resulting surgical management than those undergoing revision with the same surgeon as for their primary surgery. Both of these hypotheses merit further investigation.

This study has several potential limitations. Although the data were collected prospectively, this study was retrospective in nature, and it is therefore possible that these results have been influenced by unknown confounding variables. Additionally, the primary unit of analysis in this study was a patient visit, rather than an individual patient. This design was necessitated by the variable timing of both follow-up and revision surgeries in our database and was ultimately felt to be the most transparent approach to data management. Nevertheless, this design allowed for

potential variability in follow-up duration between study groups. While we demonstrated no significant differences in time from most recent surgery between all groups, this result does not exclude the possibility of bias. Furthermore, although all patients in the study were eligible for a minimum 2-year follow-up from the index surgery, because of the variable nature of revision timing, not all patients had a minimum of 2 years of follow-up from the last revision. The high proportion of missing data in this study is also a limitation. Dissatisfied patients may have been more likely to follow up with their surgeon, but it is likely that this occurred in all study groups to some degree. Accordingly, the degree to which this phenomenon may have biased our results is unclear. A further potential limitation is sample size, particularly the small sample size in the group who underwent multiple revision surgeries. Accordingly, for comparisons involving this group, we are hesitant to extrapolate findings indicating no detectable significant difference to indicate that no difference exists.

Conclusions

Among patients undergoing ASD surgery, not only is revision surgery associated with decreased satisfaction, but also the need for multiple revisions is associated with additive detriment to satisfaction among patients initially undergoing primary surgery. The results of this study indicate that, retrospectively, patients requiring more revision surgeries tend to have poorer satisfaction scores than those requiring a primary surgery alone. Importantly, this investigation was not designed to comment on whether patients, on average, benefit most from revision surgery preoperatively versus postoperatively. This study adds to a growing body of literature attesting to the negative impact of revision on HRQOL in patients undergoing ASD surgery. Given the high revision rate in adult deformity surgery, these findings have direct implications for preoperative patient counseling and establishment of postoperative expectations.

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Disclosures

This study was supported by the International Spine Study Group Foundation (ISSGF). Dr. Daniels reports being a consultant for Spineart, Stryker, Medtronic, Medicrea, EOS, and Orthofix. Dr. Passias reports being a consultant for Medtronic, Globus, and Royal Biologics. Dr. Protopsaltis reports being a consultant for Globus, NuVasive, K2M/Stryker, and Medtronic; receiving royalties from Altus; being a stock option unit holder in Spine Align; holding stock options in Torus; and receiving support of non–study-related clinical or research effort overseen by the author from Medtronic. Dr. Lafage reports receiving honoraria

from Stryker, Implanet, and DePuy Synthes Spine; being a consultant for Alphatec and Globus Medical; receiving royalties from NuVasive; having ownership in VFT Solutions LLC; and being a committee member of SRS and ISSG. Dr. Smith reports being a consultant for Zimmer Biomet, Carlsmed, DePuy Synthes, NuVasive, Stryker, SeaSpine, and Cerapedics; receiving royalties from Zimmer Biomet, NuVasive, and Thieme; having direct stock ownership in Alphatec and NuVasive; receiving clinical or research support for the study described (includes equipment or material) from DePuy Synthes/ISSGF; and receiving support of non–study-related clinical or research effort overseen by the author from DePuy Synthes/ISSGF, NuVasive, and AO Spine. Dr. Shaffrey reports being a consultant for NuVasive, Medtronic, SI Bone, and Proprio; having direct stock ownership in NuVasive; being a patent holder in NuVasive, Medtronic, and Zimmer Biomet; and receiving royalties from NuVasive, Medtronic, Zimmer Biomet, and SI Bone. Dr. Gupta reports being a consultant for DePuy, Globus, and Medtronic; receiving royalties from Innomed, DePuy, and Globus; having direct stock ownership in J&J; receiving honoraria from AO Spine, Wright State, LSU, and the Malaysia Spine Society; and receiving other benefits from the Scoliosis Research Society Board of Directors, travel for course faculty; DePuy travel; Medtronic travel; Zimmer travel; AO Spine travel; and the National Health Spine Foundation Scientific Advisory Board, voluntary/nonfinancial. Dr. Klineberg reports being a consultant for DePuy Synthes, Stryker, and Medicrea/Medtronic; serving on the speakers bureau for AO Spine; and receiving a fellowship grant from AONA. Dr. Schwab reports direct stock ownership in VFT Solutions and SeaSpine; being a consultant for Zimmer Biomet, Medtronic, and Mainstay Medical; receiving royalties from Zimmer Biomet, Medtronic, and Medicrea; receiving support of non–study-related clinical or research effort overseen by the author from DePuy, K2M, NuVasive, Medtronic, Globus, AlloSource, Orthofix, and SI Bone—paid through ISSGF; and being an executive committee member of the International Spine Study Group (ISSG). Dr. Gum reports direct stock ownership in Cingulate Therapeutics, Inc.; being an employee for Norton Healthcare; being a consultant for Acuity, DePuy, Medtronic, NuVasive, and Stryker; being a patent holder in Medtronic; receiving honoraria from Baxter, Broadwater, NASS, and Pacira Pharmaceuticals; being on the speakers bureau for Medtronic and Stryker; receiving clinical or research support for the study described (includes equipment or material) from the Alan L. & Jacqueline B. 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Author Contributions

Conception and design: all authors. Acquisition of data: Durand, Diebo, Passias, Kim, Protopsaltis, V Lafage, Smith, Shaffrey, Gupta, Klineberg, Schwab, Gum, Mundis, Eastlack, Kebaish, Soroceanu, Hostin, Burton, Bess, Ames, Hart, Hamilton. Analysis and interpretation of data: Durand, Daniels, DiSilvestro, R Lafage, Diebo. Drafting the article: Durand, DiSilvestro, R Lafage, Passias, Kim, Protopsaltis, V Lafage, Smith, Shaffrey, Gupta, Klineberg, Schwab, Gum, Mundis, Eastlack, Kebaish, Soroceanu, Hostin, Burton, Bess, Ames, Hart, Hamilton. Critically revising the article: Daniels, Diebo, Passias, Kim, Protopsaltis, V Lafage, Smith, Shaffrey, Gupta, Klineberg, Schwab, Gum, Mundis, Eastlack, Kebaish, Soroceanu, Hostin, Burton, Bess, Ames, Hart, Hamilton. Reviewed submitted version of manuscript: all authors. Statistical analysis: Durand, R Lafage. Study supervision: Daniels, Hamilton.

Supplemental Information

Previous Presentations

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