

Predictors of patient satisfaction in the surgical treatment of cervical spondylotic myelopathy

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OBJECTIVE Patients with cervical spondylotic myelopathy (CSM) experience progressive neurological impairment. Surgical intervention is often pursued to halt neurological symptom progression and allow for recovery of function. In this paper, the authors explore predictors of patient satisfaction following surgical intervention for CSM.

METHODS This is a retrospective review of prospectively collected data from the multicenter Quality Outcomes Database. Patients who underwent surgical intervention for CSM with a minimum follow-up of 2 years were included. Patient-reported satisfaction was defined as a North American Spine Society (NASS) satisfaction score of 1 or 2. Patient demographics, surgical parameters, and outcomes were assessed as related to patient satisfaction. Patient quality of life scores were measured at baseline and 24-month time points. Univariate regression analyses were performed using the chi-square test or Student t-test to assess patient satisfaction measures. Multivariate logistic regression analysis was conducted to assess for factors predictive of postoperative satisfaction at 24 months.

RESULTS A total of 1140 patients at 14 institutions with CSM who underwent surgical intervention were included, and 944 completed a patient satisfaction survey at 24 months postoperatively. The baseline modified Japanese Orthopaedic Association (mJOA) score was 12.0 ± 2.8 . A total of 793 (84.0%) patients reported satisfaction (NASS score 1 or 2) after 2 years. Male and female patients reported similar satisfaction rates (female sex: 47.0% not satisfied vs 48.5% satisfied, $p = 0.73$). Black race was associated with less satisfaction (26.5% not satisfied vs 13.2% satisfied, $p < 0.01$). Baseline psychiatric comorbidities, obesity, and length of stay did not correlate with 24-month satisfaction. Crossing the cervicothoracic junction did not affect satisfactory scores ($p = 0.19$), and minimally invasive approaches were not associated

ABBREVIATIONS ACDF = anterior cervical discectomy and fusion; ASA = American Society of Anesthesiologists; CSM = cervical spondylotic myelopathy; CTJ = cervicothoracic junction; LOS = length of stay; mJOA = modified Japanese Orthopaedic Association; NASS = North American Spine Society; NDI = Neck Disability Index; NRS = numeric rating scale; PROM = patient-reported outcome measure; QOD = Quality Outcomes Database.

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with increased patient satisfaction ($p = 0.14$). Lower baseline numeric rating scale neck pain scores (5.03 vs 5.61, $p = 0.04$) and higher baseline mJOA scores (12.28 vs 11.66, $p = 0.01$) were associated with higher satisfaction rates.

CONCLUSIONS Surgical treatment of CSM results in a high rate of patient satisfaction (84.0%) at the 2-year follow-up. Patients with milder myelopathy report higher satisfaction rates, suggesting that intervention earlier in the disease process may result in greater long-term satisfaction.

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KEYWORDS cervical spondylotic myelopathy; patient satisfaction; Quality Outcomes Database; QOD

CERVICAL spondylotic myelopathy (CSM) is a degenerative condition of the cervical spine, secondary to deterioration of the spinal elements and progressive spinal cord compression. Unlike acute spinal cord pathologies, CSM often has a gradual onset, resulting in a constellation of progressive symptoms that may include weakness, sensory changes, gait difficulty, or bowel/bladder dysfunction.¹ CSM management ranges from conservative treatment with physical therapy and pain management to surgical intervention with decompression, realignment, and stabilization. The objective of treatment is to halt disease progression and maintain or restore quality of life.² Both anterior and posterior approaches have shown efficacy in correcting the degenerative features of CSM,³ and rates of cervical fusion have increased 7-fold over the past 2 decades.⁴

Identifying predictors of patient satisfaction following surgery for CSM is important in directing management and setting expectations with patients. While robust evidence supports surgical intervention for CSM in symptomatic patients,⁵⁻⁷ patient outcomes are not universal and may be influenced by preoperative baselines and surgical decision-making. In a recent Quality Outcomes Database (QOD) study by Park et al., social factors such as race, education, employment, and insurance status predicted satisfaction at 24 months following surgery.⁸ Patel et al. found that females were more likely to report improved Neck Disability Index (NDI) scores 1 year following surgery for CSM,⁹ and self-reported depression and anxiety were associated with worse outcome measures up to 1 year following surgery.¹⁰ The impact of anterior versus posterior approaches on patient satisfaction has also been studied in CSM, demonstrating clinical equipoise for multilevel disease and resulting in wide practice variability.¹¹ Previous QOD analyses have shown that posterior approaches are associated with older, more medically complex patients; worse myelopathy scores; and more levels treated, while anterior approaches are performed in shorter constructs with primary disc herniation pathology.¹¹

In the current study, we explore predictors of patient satisfaction following surgical intervention for CSM. This QOD analysis may help guide surgeons in patient expectations and management.

Methods

Patient Selection

The CSM module of the QOD includes patients who underwent cervical spine surgery for CSM across 14 high-enrolling sites. Inclusion criteria of this cohort have been previously described.¹² Adult patients (age ≥ 18 years) with a surgical indication of CSM and a primary diagnosis of

myelopathy with a modified Japanese Orthopaedic Association (mJOA) score < 17 who underwent elective surgery between January 2016 and December 2018 were included.¹³ Patients were excluded if they also had a diagnosis of spinal infection, tumor, traumatic injury, other spinal deformity, or preexisting spinal injury. Follow-up was obtained either in person or via telephone for the completion of patient-reported outcome measures (PROMs) at the 3-month, 12-month, and 24-month postoperative intervals. The present study included only patients who completed North American Spine Society (NASS) patient satisfaction questionnaires at the 24-month follow-up ($n = 944$). Participating sites obtained IRB approval during the development of the QOD registry. As this registry contains de-identified patient information, no additional IRB approval or consent was required.

Study Variables

The study cohort was divided into two groups based on patient satisfaction. High patient satisfaction was defined as an NASS satisfaction score of 1 or 2, and all other scores (3 or 4) were defined as low satisfaction. Baseline patient characteristics included age, sex, self-reported race, insurance coverage, smoking status, American Society of Anesthesiologists (ASA) class, BMI, diabetes, anxiety, depression, and other medical comorbidities. Clinical variables included underlying pathology (i.e., disc herniation, foraminal or central stenosis, pseudarthrosis), presenting symptoms (i.e., radiculopathy, myelopathy, gait difficulty), and symptom duration. Surgical variables included approach (i.e., anterior, posterior, combined) and type of procedure (i.e., anterior cervical discectomy and fusion [ACDF], corpectomy, laminectomy, laminoplasty, foraminotomy), number of levels of arthrodesis, and if the cervicothoracic junction (CTJ) was crossed.

Outcome Variables

PROMs included mJOA scores, NDI scores, and neck and arm pain visual analog scale (VAS) scores. The primary outcome of interest was the achievement of postoperative satisfaction at the 24-month follow-up. Postoperative satisfaction was determined using the NASS patient satisfaction index, with an ordinal scale ranging from 1 to 4,¹⁴ where 1 is defined as “The treatment met my expectations”; 2 as “I did not improve as much as I had hoped, but I would undergo the same treatment for the same outcome”; 3 as “I did not improve as much as I had hoped, and I would not undergo the same treatment for the same outcome”; and 4 as “I am the same or worse as compared with before surgery.” In this study, patients with a score of 1 or 2 were considered satisfied.^{11,15,16} NDI scores ranged

from 0 to 100, with higher scores indicative of greater disability. VAS scores ranged from 0 to 10, with higher scores indicating greater reported levels of pain. Outcomes were collected at baseline and 24-month time points, to determine clinically important differences.

Statistical Analysis

Descriptive statistics are reported as means \pm standard deviations for continuous variables and frequencies and percentages for categorical variables. The independent-samples Student t-test and Pearson chi-square test were performed for univariate analyses of continuous and categorical variables, respectively. A multivariate logistic regression model was created to evaluate baseline predictors associated with postoperative satisfaction at the 24-month follow-up. For the model, variables were selected if $p < 0.20$ on univariate analysis and/or they were clinically relevant. The covariates used in this analysis were age, BMI, race (reference: White), smoking status, ambulation dependence (reference: independent), baseline motor deficit, listhesis/dynamic instability, surgical approach (reference: anterior), minimally invasive approach, fusion across the CTJ, number of levels treated (reference: 2), baseline patient-reported outcomes (arm pain, neck pain, mJOA, NDI, EQ-5D), discharge disposition (reference: home), re-admission (90 days), and reoperation status (2 years). Results were considered statistically significant at a p value < 0.05 . Statistical analyses were performed using R software (version 4.2.3, R Foundation for Statistical Computing).¹⁷

Results

Demographic and Baseline Characteristics

A total of 1140 patients with CSM who underwent surgical intervention were included. Patient baseline characteristics are summarized in Table 1. The mean age was 60.5 ± 11.8 years, and 48.3% of patients were female. The baseline mJOA score was 12.0 ± 2.81 . A total of 944 patients completed a satisfaction survey at 24 months following surgery, with 84.0% ($n = 793$) reporting high satisfaction. Satisfied patients were not significantly different in age (61.07 vs 59.90 years, $p = 0.25$), sex (female sex: 48.5% vs 47.0%, $p = 0.73$), or BMI (30.04 vs 30.57 , $p = 0.35$). Black patients had lower mJOA scores at baseline compared with the rest of the cohort (10.93 ± 3.11 vs 12.26 ± 2.70 , $p < 0.01$) (Table 2).

Education level was not predictive of patient satisfaction ($p = 0.29$), nor was mean socioeconomic status ($p = 0.13$) or preoperative employment status ($p = 0.09$). Preexisting medical comorbidities including smoking, diabetes, depression, anxiety, and chronic obstructive pulmonary disease also did not predict patient satisfaction. Preoperative ASA class was not predictive of patient satisfaction ($p = 0.28$).

Preoperative Clinical and Surgical Characteristics

The duration of preoperative symptoms did not have a significant association with satisfaction ($p = 0.06$). Satisfied patients were less likely to have radicular numbness symptoms (57.9% vs 66.9%, $p = 0.04$) and were more likely on preoperative imaging to have a listhesis or signs of

dynamic instability (28.6% vs 18.2%, $p = 0.01$). Satisfied patients reported higher baseline mJOA scores (12.28 vs 11.66, $p = 0.01$) and lower baseline numeric rating scale (NRS) neck pain scores (5.03 vs 5.61, $p = 0.04$). Satisfied patients had higher EQ-5D scores at baseline (0.58 vs 0.52, $p < 0.01$).

With regard to surgical strategy, patients receiving an anterior approach were more likely to be satisfied (71.1% vs 57.0%, $p < 0.01$), while patients undergoing a posterior approach were more likely to not be satisfied (43.0% vs 28.9%, $p < 0.01$). Minimally invasive approaches were not predictive of patient satisfaction ($p = 0.14$). Fusion across the CTJ was not associated with satisfaction ($p = 0.19$), although patients with fewer levels treated did have higher satisfaction (3.35 vs 3.72, $p < 0.01$).

Univariate Analysis Comparing Clinical Outcomes

Postoperative clinical and patient-reported outcomes can be found in Table 3. Patients who reported high postoperative satisfaction had a shorter length of hospital stay (1.9 vs 2.6 days, $p < 0.01$), but the rates of nonroutine discharge did not impact satisfaction (10.7% satisfied vs 14.1% not satisfied, $p = 0.23$). There were no significant differences between groups in 90-day readmission rates (4.9% satisfied vs 4.0% not satisfied, $p = 0.62$) or rates of reoperation (13.4% satisfied vs 12.6% not satisfied, $p = 0.79$).

Assessing patient-reported outcomes at 24 months, satisfied patients reported less neck pain (2.1 vs 5.3, $p < 0.01$) and arm pain (1.8 vs 4.2, $p < 0.01$) compared with patients who were not satisfied. Satisfied patients had lower NDI scores (17.5 ± 16.8 vs 40.0 ± 21.7 , $p < 0.01$), higher mJOA scores (14.4 vs 11.8, $p < 0.01$), and higher EQ-5D scores (0.768 vs 0.533, $p < 0.01$) at the 24-month follow-up.

Multivariate Analysis of Patient-Reported Satisfaction at 24 Months

The logistic regression model results are summarized in Table 4. Black race was predictive of lower satisfaction at 24 months (OR 0.836, 95% CI 0.705–0.990, $p = 0.039$). Age was not associated with patient satisfaction (OR 0.965, 95% CI 0.838–1.110, $p = 0.615$). Posterior surgical approach (OR 1.034, 95% CI 0.782–1.367, $p = 0.816$) and fusion across the CTJ (OR 0.903, 95% CI 0.780–1.046, $p = 0.175$) were not associated with patient satisfaction. Baseline mJOA scores (OR 1.010, 95% CI 0.984–1.036, $p = 0.475$) and NDI scores (OR 0.997, 95% CI 0.992–1.002, $p = 0.215$) were not predictive of postoperative patient satisfaction at 24 months.

Discussion

Understanding drivers of patient satisfaction following the surgical treatment of CSM informs surgical decision-making and may guide patient expectations. In the QOD registry, the majority of patients receiving surgery for CSM reported postoperative satisfaction, with an 84% satisfaction rate and 65% of patients reporting the highest level of satisfaction.

Patient demographics may be predictive of patient satisfaction following surgical intervention for CSM. While

TABLE 1. Baseline characteristics of patients who underwent surgery for CSM

	Not Satisfied (n = 151)	Satisfied (n = 793)	p Value
Mean age, yrs	59.90 (12.32)	61.07 (11.38)	0.25
Female sex	71 (47.0)	385 (48.5)	0.73
Mean BMI	30.57 (6.33)	30.04 (6.33)	0.35
Insurance status			0.02
Medicaid	18 (11.9)	47 (5.9)	
Medicare	60 (39.7)	315 (39.7)	
Private	68 (45.0)	410 (51.7)	
Uninsured	3 (2.0)	4 (0.5)	
VA/government	2 (1.3)	17 (2.1)	
Education level			0.29
Graduate level	53 (35.1)	329 (41.5)	
High school or less	68 (45.0)	323 (40.7)	
Postgraduate level	21 (13.9)	113 (14.2)	
Prefer not to answer/ NA	9 (6.0)	28 (3.5)	
Workers' compensation	4 (2.7)	19 (2.4)	0.85
Liability claim	9 (6.1)	37 (4.7)	0.32
Race			<0.01
White	98 (64.9)	628 (79.2)	
Black	40 (26.5)	105 (13.2)	
Other	8 (5.3)	27 (3.4)	
Prefer not to answer	5 (3.3)	33 (4.2)	
Mean SES index score	52.49 (4.90)	53.16 (4.96)	0.13
Preop employment status			0.09
Attending school	1 (0.7)	0 (0.0)	
Employed	55 (36.7)	311 (39.3)	
Employed on short-term leave	9 (6.0)	62 (7.8)	
Unemployed	85 (56.7)	419 (52.9)	
Smoking	29 (19.2)	125 (15.8)	0.29
Diabetes mellitus	34 (22.5)	166 (20.9)	0.66
Depression	29 (19.2)	177 (22.3)	0.40
Anxiety	27 (17.9)	152 (19.2)	0.71
Coronary artery disease	14 (9.3)	78 (9.8)	0.83
Osteoarthritis	46 (30.5)	231 (29.1)	0.74
COPD	12 (7.9)	50 (6.3)	0.46
Dependent ambulation	25 (16.6)	143 (18.0)	0.66
Duration of symptoms			0.06
<3 mos	15 (16.0)	110 (24.8)	
>12 mos	79 (84.0)	333 (75.2)	
Radicular motor deficit	41 (27.2)	255 (32.2)	0.22
Radicular arm pain	74 (49.0)	367 (46.3)	0.54
Radicular numbness	101 (66.9)	459 (57.9)	0.04
Motor deficit	89 (58.9)	479 (60.4)	0.74
Disc herniation	33 (21.9)	215 (27.1)	0.18
Foraminal stenosis	71 (47.0)	337 (42.5)	0.30
Central canal stenosis	118 (78.1)	611 (77.0)	0.77

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TABLE 1. Baseline characteristics of patients who underwent surgery for CSM

	Not Satisfied (n = 151)	Satisfied (n = 793)	p Value
Listhesis/dynamic instability	26 (18.2)	204 (28.6)	0.01
ASA class			0.28
I	0 (0.0)	15 (2.0)	
II	67 (47.2)	365 (48.9)	
III	72 (50.7)	357 (47.9)	
IV	3 (2.1)	9 (1.2)	
Surgical approach			<0.01
Anterior	86 (57.0)	564 (71.1)	
Posterior	65 (43.0)	229 (28.9)	
Minimally invasive approach	6 (4.0)	16 (2.0)	0.14
Fusion crossing the CTJ	18 (34.6)	43 (25.3)	0.19
Mean no. of levels treated	3.72 (1.54)	3.35 (1.27)	<0.01
Mean mJOA score at baseline	11.66 (2.87)	12.28 (2.70)	0.01
Myelopathy severity			0.12
Mild	29 (19.2)	189 (23.8)	
Moderate	55 (36.4)	321 (40.5)	
Severe	67 (44.4)	283 (35.7)	
Mean NRS arm pain score at baseline	5.23 (3.44)	4.70 (3.46)	0.08
Mean NRS neck pain score at baseline	5.61 (3.49)	5.03 (3.21)	0.04
Mean NDI score at baseline	40.64 (22.39)	37.25 (20.61)	0.07
Mean EQ-5D score (QALY) at baseline	0.52 (0.22)	0.58 (0.22)	<0.01

COPD = chronic obstructive pulmonary disease; NA = not available; QALY = quality-adjusted life-years; SES = socioeconomic status; VA = Veterans Affairs. Values are given as mean (SD) or number of patients (%) unless otherwise indicated. Boldface type indicates statistical significance.

age and sex were not predictive of postoperative patient satisfaction, patient race stood out as a predictor of satisfaction, with those reporting Black race having a 2-fold greater likelihood of not being satisfied after surgery. These patients were also found to have lower baseline mJOA scores and higher rates of severe myelopathy compared with the rest of the cohort. This disproportionate rate of severe myelopathy may be a result of limited access to care and delayed presentation, impacting overall postoperative satisfaction. After controlling for covariates in a multivariate logistic regression analysis, Black race was negatively predictive of patient satisfaction at 24 months. Racial disparities have been previously described in the CSM literature, with McClelland et al. showing that Black patients are more likely to receive posterior-only approaches for CSM, which is associated with an increased mortality rate.¹⁸ In a National Inpatient Sample

TABLE 2. Myelopathy scores among Black and non-Black patients

	Black (n = 174)	Non-Black (n = 966)	Total (n = 1140)	p Value
Mean mJOA score at baseline	10.93 (3.11)	12.26 (2.70)	12.06 (2.81)	<0.01
Myelopathy severity				<0.01
Mild	27 (15.5)	224 (23.2)	251 (22.0)	
Moderate	52 (29.9)	399 (41.3)	451 (39.6)	
Severe	95 (54.6)	343 (35.5)	438 (38.4)	

Values are given as mean (SD) or number of patients (%) unless otherwise indicated.

database study of 46,500 patients undergoing surgery for CSM, Black patients had an increased risk of postoperative complications, extended hospital length of stay (LOS), and nonroutine discharge.¹⁹ Similar racial disparities have been found elsewhere in the spine surgery literature, with a recent systematic review showing that Black patients experience higher rates of postoperative mortality and in-hospital morbidity compared with White patients, as well as higher rates of readmission and prolonged LOS.²⁰ These racial disparities are important to understand in the perioperative management of minority patients with CSM and should be used by clinicians to guide management.

Preoperative severity of myelopathy may be important in determining the appropriate timing of surgical intervention and managing patient expectations following surgery. In the current study, patients with higher preoperative mJOA baseline scores, suggestive of less severe myelopathy, had higher rates of satisfaction. This finding may suggest that intervention earlier in the disease course results in greater satisfaction because of the ability to maintain a higher level of function in the postoperative period. Interestingly, this study differentiates preoperative severity from preoperative duration of symptoms, with a comparison of patients with symptom duration < 3 months versus > 12 months having no impact on satisfaction ($p = 0.06$). Prior studies have also suggested a greater extent of recovery with intervention earlier in the disease process. In a retrospective cohort study, Hilton et al. found that pa-

tients receiving intervention within 6 months of symptom onset made the most meaningful recovery.²¹ In their study, 59% of patients deteriorated from initial assessment by a provider to spine surgeon assessment. Multiple other studies have shown an association between longer symptomatic preoperative period and worse postoperative improvement.²²⁻²⁴ While the present study does not demonstrate a difference in satisfaction rates based on symptom duration, these findings add to the existing literature supporting the importance of early intervention to mitigate the postoperative recovery process for those patients with a higher likelihood of deterioration.

Understanding differences in postoperative patient satisfaction in patients undergoing surgery for CSM may guide surgical decision-making, as well as the counseling efforts toward patient expectations. Apart from those pathologies demanding a preferential anterior or posterior approach, many instances of CSM may be performed by either approach to halt progression and potentially improve neurological function. In those cases, the present study suggests a higher likelihood of satisfaction at 24 months following an anterior strategy. This is consistent with the findings of a separate QOD analysis by Ambati et al., which compared three-level ACDF versus laminectomy and fusion for CSM and found high satisfaction in the ACDF cohort despite no differences in other PROMs.³

In another QOD analysis, Park et al. found that surgeons more commonly performed posterior approaches

TABLE 3. Postoperative clinical and patient-reported outcomes

	Not Satisfied (n = 151)	Satisfied (n = 793)	p Value
Clinical outcomes			
Mean LOS, days	2.6 (2.3)	1.9 (2.2)	<0.01
Nonroutine discharge	21 (14.1)	85 (10.7)	0.23
90-day readmission	6 (4.0)	39 (4.9)	0.62
Reop	19 (12.6)	106 (13.4)	0.79
Mean patient-reported outcomes			
NRS neck pain score at 24 mos	5.3 (3.1)	2.1 (2.6)	<0.01
NRS arm pain score at 24 mos	4.2 (3.3)	1.8 (2.7)	<0.01
NDI score at 24 mos	40.0 (21.7)	17.5 (16.8)	<0.01
mJOA score at 24 mos	11.8 (2.8)	14.4 (2.5)	<0.01
EQ-5D score at 24 mos	0.533 (0.244)	0.768 (0.222)	<0.01

Values are given as mean (SD) or number of patients (%) unless otherwise indicated. Boldface type indicates statistical significance.

TABLE 4. Logistic regression model for factors predictive of postoperative satisfaction at 24 months

	OR	95% CI		p Value
		Lower Bound	Upper Bound	
Age: ≤63 yrs	0.965	0.838	1.110	0.615
BMI: ≥30	1.029	0.905	1.170	0.668
Race: Black	0.836	0.705	0.990	0.039
Race: other	1.251	0.797	1.963	0.331
Race: prefer not to respond	1.232	0.791	1.920	0.357
Smoker	0.965	0.810	1.151	0.696
Ambulation dependent	1.114	0.944	1.315	0.202
Preop motor deficit	0.999	0.863	1.155	0.986
Listhesis/dynamic instability	1.096	0.954	1.259	0.198
Approach: posterior	1.034	0.782	1.367	0.816
Minimally invasive	0.754	0.501	1.134	0.177
Fusion across the CTJ	0.903	0.780	1.046	0.175
No. of levels: ≥4 vs 2	0.908	0.703	1.172	0.461
No. of levels: 3 vs 2	0.889	0.662	1.195	0.438
Baseline NRS arm pain score	0.996	0.973	1.019	0.705
Baseline NRS neck pain score	1.008	0.979	1.038	0.612
Baseline mJOA score	1.010	0.984	1.036	0.475
Baseline NDI score	0.997	0.992	1.002	0.215
Baseline EQ-5D score	0.787	0.529	1.172	0.240
Nonroutine discharge	0.979	0.843	1.138	0.786
90-day readmission	1.195	0.902	1.582	0.216
2-yr reop	0.917	0.756	1.113	0.383

Boldface type indicates statistical significance.

in patients who were older and more medically complex, with worse neurological status and lower mJOA scores.⁸ In these instances, when an anterior approach and the potential adverse effects are not in the best interests of the patient, an additional consideration is the impact of fusing across the CTJ. In the present study, involvement of the junctional segment is not influential on patient satisfaction. While crossing the CTJ may be associated with more levels treated, a negative predictor of satisfaction, this may be counterbalanced by stabilizing the junctional segment, leading to more durable clinical improvement. In the current study, dynamic instability on radiographic imaging was a predictor of patient dissatisfaction, supporting this relationship. Further investigation is indicated to better understand crossing the CTJ in the setting of CSM as related to patient satisfaction and a possible association with dynamic instability.

The present study represents a retrospective analysis of prospectively collected data, and as such, it carries limitations regarding the accessible data. Relevant preoperative (i.e., cervicothoracic deformity) and postoperative (i.e., fusion rate, dysphagia rate, hardware failure) variables likely to impact satisfaction were not available for analysis. In regard to dynamic instability, binary responses prevent conclusions to be made concerning its influence on the decision-making process for fusion across the CTJ as a stabilization strategy. While patients included in the current

study were followed for 2 years postoperatively, it is possible that satisfaction durability may have various influences at extended time points, and a study with further long-term follow-up would be beneficial to corroborate these findings. Patient satisfaction as an inherently subjective measure has unavoidable limitations for our understanding the influence of a patient's overall physical and mental well-being. In an aging cohort, with a high likelihood of change occurring in a patient's overall health through long-term follow-up, it is unknown how such changes or alterations may confound satisfaction. Nonetheless, the current work focuses on those preoperative predictors of progressive CSM that are most readily available to a surgeon at the time of assessment.

Conclusions

At 24 months of follow-up, patients report high rates of satisfaction following surgical treatment of CSM. Patients with milder myelopathy and those undergoing anterior approaches are more likely to report higher rates of satisfaction. Racial disparities require special attention, with Black race being negatively associated with postoperative patient satisfaction.

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Supplemental Information

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