



Case study

Sexual function after cervical spine surgery: Independent predictors of functional impairment



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ABSTRACT

Sexual function (SF) is an important component of patient-focused health related quality of life (HRQoL), but it has not been well studied in spine surgery. This study aims to assess SF after cervical spine surgery and identify predictors of SF. This single-center retrospective study evaluates SF of adults who underwent cervical spine surgery 2007–2012. Predictor variables included demographics, medical/surgical history, operative information, HRQoL measures (Neck Disability Index, SF-12), validated SF surveys [Female Sexual Function Index (FSFI) and Brief Sexual Function Inventory (BSFI) for males], and a study-specific SF questionnaire. 59 patients (31M, 28F; mean age = 56 ± 8.4) had significantly lower SF scores compared to age-matched peers: average BSFI = 2.26 ± 1.22 (vs. 06 ± 0.74), average FSFI = 13.05 ± 11.42 (<26.55 indicating sexual dysfunction). In men, lower mental SF-12 and higher NDI, back pain, and number of operated levels were associated with lower BSFI scores (all $p < 0.05$). In women, higher total number of medications and pain medications were associated with lower FSFI scores (both $p < 0.05$). 46% of patients reported difficulty performing a sexual position after surgery that they had previously enjoyed. 39% of men had difficulty on top during intercourse, and 32% of participants reported difficulty performing oral sex. 39% of patients reported worse SF, while only 5% reported an improvement in postoperative SF. Men and women who underwent cervical spine surgery had lower SF scores than age-matched peers, likely attributable to general mental health, regional neck disability, back pain, and medications. A large portion of patients reported subjectively worsened SF after surgery.

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1. Introduction

Health Related Quality of Life (HRQoL) measures, such as the Neck Disability Index (NDI), Short Form 12 (SF-12), and modified Japanese Orthopedic Association (mJOA) score, have been used extensively in patients before and after cervical spine surgery [1,2]. They account for pain, mental health, mobility, satisfaction,

and function in activities of daily life, such as driving, working, and recreation. However, sexual function, an important component of patient-reported HRQoL, has been largely overlooked.

Sexual function has been examined in other fields such as urology, obstetrics, psychology, and oncology [3–6]. Several validated questionnaires [7] have been used to measure sexual function, including the Dutch International Index of Erectile Function (IIEF) [8], the Changes in Sexual Function Questionnaire-14 (CSFQ-14) [9], the Brief Sexual Function Inventory (BSFI) [10,11], and the Female Sexual Function Index (FSFI) [12,13]. The BSFI is a short, validated questionnaire for males that addresses sexual drive, erectile and ejaculatory function, and overall sexual satisfaction [10,11]. The FSFI is a validated questionnaire for females that assesses desire, arousal, lubrication, orgasm, pain, and satisfaction [12,13].

Despite well-validated sexual function measures and strong association between sexual well-being and overall life satisfaction,

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there is relatively little research exploring sexual function after spine surgery [14]. A study of 47 men with spinal cord injury showed sexual function is critical for quality of life and interpersonal relationships [15]. Another investigation of 39 female patients with severe spinal cord injury demonstrated unchanged sexual desire, but decreased sexual activity after injury [16]. A third paper analyzed 22 men with cervical spondylotic myelopathy and found an association with sexual dysfunction that improved post-operatively [17]. These studies are each limited to one gender, small patient samples, and primarily severe spinal cord pathologies. The study goals were therefore to assess sexual function, using the validated BSFI and FSFI, of men and women undergoing cervical spine surgery (without severe spinal cord injury), and to determine the patient and surgery-specific factors affecting sexual function.

2. Materials and methods

We performed a retrospective survey-based study of adult patients who underwent cervical spine surgery between 2007 and 2012 with orthopedic or neurological surgeons at our institution. Inclusion criteria included age ≥ 18 and history of cervical spine surgery. Exclusion criteria included underlying neurological or neuromuscular conditions, and occipito-atlantal surgery. Patients who met inclusion and exclusion criteria were consented and completed surveys via telephone in 2014–2015. This study was approved by UCSF's Committee on Human Research (IRB#13-12528).

Participants completed two standardized HRQoL questionnaires, one validated sexual function questionnaire, and one study-specific sexual activity questionnaire. The HRQoL measures were the NDI, which assesses regional neck disability, and the SF-12, reflecting general health as a Physical Component Score (PCS) and Mental Component Score (MCS). The validated sexual function questionnaire was either the BSFI for men or the FSFI for women. A non-validated study-specific questionnaire was used to gather relevant medical and surgical histories (including comorbidities, medications, and prior surgeries), difficulty with sexual activities, subjective assessment of sexual function, and sexual satisfaction (Appendix A).

Demographics and medical history were collected from the electronic medical record, including sex, age, body mass index (BMI), primary diagnosis, comorbidities, and tobacco use. Surgical data including procedure type (fusion versus no fusion), approach (anterior, posterior, combined), and number of operated levels were also collected.

Data aggregation and exploratory analysis were performed in Microsoft Excel (14.2.5), and values were expressed as average \pm standard deviation (STD). JMP (12.0, SAS Institute Inc.) was used to perform statistical analysis. Univariate regression analysis was performed to determine significant variables associated with the outcome measures, FSFI and BSFI. Two-sample t-tests and Pearson's chi-square tests were employed for subgroup analyses where appropriate. Multivariate analyses were not performed due to our small sample size.

3. Results

3.1. Patient population

105 patients (44 men, 61 women) were called and met inclusion/exclusion criteria. 21 (20%) were not reached, 25 (24%) declined to participate, and 59 (56%) were consented for participation. Of these 59 patients, 31 (53%) were men and 28 (47%) were women with a mean age of 56 ± 8.4 years (range = 24–67 years)

Table 1

Demographics, surgical and medical history, and HRQoL measures of our cervical spine patient cohort. STD = standard deviation, NDI = Neck Disability Index.

	Number of patients (% of Total), or average (\pm STD)
Sex	
Male	31 (53%)
Female	28 (47%)
Age	
Male	58 (± 7.6)
Female	54 (± 8.7)
Medical history	
Psychiatric co-morbidity	20 (34%)
Medical co-morbidity	13 (22%)
Lumbar surgery	17 (29%)
Hip replacement	2 (3%)
Genitourinary surgery	16 (27%)
Abdominal surgery	18 (31%)
Number of medications	4.1 (± 3.5)
Surgery type	
Fusion	50 (85%)
No Fusion	9 (15%)
Surgical approach	
Anterior	28 (47%)
Posterior	27 (46%)
Combined	4 (7%)
Number of operated levels	4.4 (± 1.7)
NDI	30.5 (± 20.7)
SF-12 physical component score	33.2 (± 12.4)
SF-12 mental component score	52.3 (± 8.7)

(Table 1). Participants were diagnosed with cervical spine pathologies including herniated disc, ossification of the posterior longitudinal ligament, degenerative disc disease, and spinal cord tumor. Patients with infection were excluded. 33 (56%) patients were myelopathic, while the remaining 26 (44%) were not. 20 (34%) reported psychiatric comorbidities (e.g. depression, bipolar disorder, posttraumatic stress disorder, anxiety, and/or attention deficit disorder), and 13 (22%) reported medical comorbidities (e.g. diabetes, cancer, arthritis, adrenal fatigue, thyroid disorder, multiple sclerosis, osteoporosis, coronary artery disease, congestive heart failure, high blood pressure, and/or restless leg syndrome). Study participants took an average of 4 ± 3.5 medications. 17 (29%) patients had also undergone surgery on their lumbar spine, 2 (3%) had hip replacements, 16 (27%) had genitourinary surgery, and 18 (31%) had abdominal surgery before or after surgery on their cervical spine (Table 1).

50 patients (85%) underwent fusion surgery for treatment of cervical pathology. 9 (15%) underwent non-fusion cervical surgery, including laminoplasty and total disc replacement. 28 (47%) surgeries were performed via an anterior approach, 27 (46%) were performed posteriorly, and 4 (7%) utilized a combined anterior-posterior approach. Patients had an average of 4.4 ± 1.7 operated vertebral levels (range = 2–8 levels; Table 1).

HRQoL assessment revealed our patient cohort was, on average, severely disabled, with a mean NDI of 30.5 ± 21 ($25 < \text{NDI} < 34$ indicating severe disability). 73% of the respondents qualified as at least moderately disabled ($\text{NDI} > 15$). Note that higher NDI indicates worse disability due to regional neck pain. Average SF-12 PCS was 33.2 ± 12.4 and average SF-12 MCS was 52.3 ± 8.7 (population mean = 50 ± 10 ; scale 0–100, 100 indicating highest level of health) (Table 1).

Analysis of sexual function questionnaires revealed that our patients had significantly lower sexual function scores compared to age-matched peers. Average total BSFI score reported by men was 2.25 ± 1.22 , which is significantly lower than the normative

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