Association Between Baseline Affective Disorders and 30-Day Readmission Rates in Patients Undergoing Elective Spine Surgery

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■ BACKGROUND: **There is a growing understanding of the prevalence and impact of affective disorders on perception of health status in patients undergoing elective spine surgery. However, the role of these disorders in early readmission is unclear. The aim of this study is to investigate the influence of psychiatric comorbidities on 30-day all-cause readmissions after elective spine surgery.**

■ METHODS: **The medical records of 400 patients undergoing elective spine surgery at a major academic medical center were reviewed, of which 107 patients had comprehensive 1- and 2-year patient-reported outcomes data. We identified all unplanned readmissions within 30 days of discharge. The prevalence of affective disorders, such as depression and anxiety, were also assessed. All-cause readmissions within 30 days of discharge was the primary outcome variable.**

■ RESULTS: **Baseline characteristics were similar between groups. Approximately 6% of patients in this study were readmitted within 30 days of discharge. The rate of readmission was 3-fold more for individuals with a psychiatric comorbidity compared with those without a psychiatric comorbidity (10.34% vs. 3.84%, $P = 0.03$). In a univariate analysis, race, body mass index, gender, patient age, smoking, diabetes, and fusion levels were associated with increased 30-day readmission rates. However, in a multivariate logistic regression model, depression was an independent predictor of readmission within 30 days of discharge. In addition, there was no significant difference in baseline, 1- and 2-year patient-reported outcomes measures between groups.**

■ CONCLUSIONS: **Our study suggests that psychologic disorders, like depression and anxiety, are independently associated with higher all-cause 30-day readmission rates after elective spine surgery.**

INTRODUCTION

Under the Patient Protection and Affordable Care Act, the Hospital Readmissions Reductions Program was implemented to improve patient care and reduce hospital readmission rates.[1] Through Centers for Medicare & Medicaid Services, an estimated 80% of hospitals are now being penalized for high rates of 30-day readmissions.[1,2] The potential costs to Medicare annually are in the tens of billions of dollars, of which, Centers for Medicare & Medicaid Services estimates $17 billion in readmissions that could have been prevented or completely avoided.[1,3] Identifying the causes and risk factors of 30-day readmissions is imperative to reduce the soaring healthcare costs due to hospital readmissions.

As the prevalence of affective disorders increase, a better understanding is necessary to determine its affects on patient health status. Depression, in particular, has been correlated with

Key words
- 30-Day readmission
- Affective disorder
- Anxiety
- Depression
- Spine surgery

Abbreviations and Acronyms
BMI: Body mass index
MCS: Mental component score
ODI: Oswestry disability index
PCS: Physical component score
SD: Standard deviation
SF-36: Short-form 36
VAS-BP: Back pain visual analog scale
VAS-LP: Leg pain visual analog scale

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decreased perception of one's own health status.[4] Previous studies have demonstrated that patients with depression experience increased postoperative pain, perioperative analgesic requirements, and worse long-term outcomes.[5] In a prospective study of 69 patients undergoing revision lumbar surgery, Adogwa et al[6] demonstrated that preoperative depression was an independent predictor for lower postoperative functional improvement. Implications of having depression and a decreased perception of health status prolongs rate of recovery, increases loss of wages, and decreases quality of life. Although the preponderance of studies have focused on the effect of depression on patient reported outcomes, there is a paucity of studies investigating the relationship between depression, healthcare utilization rates, and 30-day readmission after elective spine surgery. Accordingly, the role of depression in early readmission remains unclear.

The aim of this study is to investigate the influence of psychiatric comorbidities on 30-day all-cause readmissions after elective spine surgery.

METHODS

This was a retrospective analysis of a prospectively collected data. Medical records were retrospectively reviewed of 400 adult patients undergoing elective spine surgery at a major academic medical center. Institutional Review Board approval was obtained before study initiation. Patients (108) had comprehensive 1- and 2-year patient-reported outcomes data and were included in the present study. Of the 108, 29 patients had a known history of depression diagnosed at least 6 months before surgery by a board-certified psychiatrist. We identified all unplanned readmissions within 30 days of discharge after indexed spine surgery.

Demographic variables evaluated included patient age, gender, and body mass index (BMI). Comorbidities included diabetes, chronic obstructive pulmonary disease, coronary artery disease, peripheral vascular disease, and atrial fibrillation. Other preoperative variables collected were smoking status and baseline albumin. Operative variables included number of vertebral levels involved, estimated blood loss, and urinary output. Postoperative complications included length of hospital stay, urinary tract infection, pneumonia, deep and superficial surgical site infections, deep venous thrombosis, pulmonary embolism, myocardial infarction, cardiopulmonary arrest, and 30-day readmission rate.

Patient-reported outcomes metrics were collected and compared between cohorts (depressed cohort: n = 29, nondepressed cohort: n = 79) before surgery, then 1 and 2 years after surgery. Functional status was determined by the Oswestry disability index (ODI).[7] Back and leg pain was assessed using the back and legpain visual analog scale (VAS-BP, VAS-LP).[8] Short-form 36 (SF-36) physical component score (PCS) and mental component score (MCS) was used for the assessment of physical and mental health status, respectively.[9] These questionnaires have been validated, widely used, and accepted in spine research.

Parametric data were expressed as means ± standard deviation (SD) and compared with the Student's t-test. Nonparametric data were expressed as median (interquartile range) and compared with the Mann-Whitney U test. Nominal data were compared with the χ^2 test. Relationship between independent variables and 30-day readmission rates was assessed using univariate analysis and multivariate logistic regression model. All tests were 2-sided and were statistically significant if the P value was < 0.05. We used SAS 9.3 (SAS Institute, Inc., Cary, North Carolina, USA) for all data preparation and analysis.

RESULTS

One hundred eight adult patients (depressed cohort, n = 29; nondepressed cohort, n = 79) were included in this study. There was no significant difference in age between groups (depressed cohort, 58.24 ± 10.42 years vs. nondepressed cohort, 56.97 ± 14.63 years; P = 0.62). No significant differences in BMI between groups were observed (depressed cohort, 32.22 ± 7.81 years vs. nondepressed cohort, 29.15 ± 6.08 years; P = 0.06). More men were included in the nondepressed cohort (52.56%) compared with the depressed cohort (13%) (Table 1). There were no significant differences between groups in the prevalence of other comorbidities such diabetes, chronic obstructive pulmonary disease, coronary artery disease, peripheral vascular disease, atrial fibrillation, smoking status, and baseline albumin (Table 1).

The mean ± SD estimated blood loss for the depressed and nondepressed cohorts was 963 ± 1763 mL and 711 ± 977 mL (P = 0.48), respectively (Table 1). The mean ± SD intraoperative urine output for the depressed and nondepressed cohorts was 559 ± 521 mL and 573 ± 524 mL (P = 0.09), respectively (Table 1). There was no significant difference in the median number of levels operated (P = 0.48; Table 1).

30-Day Readmission Rates and Postoperative Complication Profile

There was a significant difference in 30-day readmission rates between groups, with depressed patients having an increased rate compared with nondepressed patients (depressed cohort, 10.34% vs. nondepressed cohort, 3.84%; P = 0.03) (Table 1). There was no significant difference in length of hospital stay between groups (depressed cohort, 4.06 ± 3.12 days vs. nondepressed cohort, 4.65 ± 6.36 days; P = 0.52) (Table 1). The prevalence of postoperative complications were similar between cohorts (depressed cohort vs. nondepressed cohort)—urinary tract infection (14% vs. 12%; P = 0.8), pneumonia (6.89% vs. 2.56%; P = 0.4), deep and superficial surgical site infections (0 vs, 1.28%; P = 0.32), other infections (6.89% vs. 3.84%; P = 0.56), and myocardial infarction (0 vs. 1%; P = 0.99) (Table 1). No patient had a deep venous thrombosis, pulmonary embolism, or cardiopulmonary arrest (Table 1).

30-Day Readmission Independent Predictors

In a univariate analysis, race, BMI, gender, patient age, smoking, diabetes, and fusion levels were associated with increased 30-day readmission rates (Table 2). In a multivariate binary logistic regression analysis preoperative depression (P = 0.04), number of levels fused (P = 0.02), and low preoperative albumin level (P = 0.01) were independent predictors of readmission within 30 days of hospital discharge (Table 2). Patient age, BMI,