Journal of Orthopaedics 14 (2017) 501–506

Contents lists available at ScienceDirect

Journal of Orthopaedics

journal homepage: www.elsevier.com/locate/jor

Original Article

Effect of mental health on post-operative infection rates following cervical spine fusion procedures

Emin Dedeogullari[a], Permsak Paholpak[a], Kaku Barkoh[a], Joshua Lucas[a], Larry Lee[a], Christopher Wang[a], Patrick C. Hsieh[b], Jeffrey C. Wang[a], Zorica Buser[a,*]

[a] Department of Orthopaedic Surgery, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA
[b] Department of Neurological Surgery, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA

ARTICLE INFO

Article history:
Received 6 June 2017
Accepted 6 August 2017
Available online 9 August 2017

Keywords:
Cervical spine procedures
ACDF
PCF
Mental health
Post-operative infection
Sepsis

ABSTRACT

Purpose: The aim of this study was to determine whether having an existing psychiatric disorder is a risk factor for developing post-operative infection following anterior cervical discectomy with fusion (ACDF) and posterior cervical fusion (PCF).
Results: A total of 34,007 patients within Humana database was included in this study. Patients with mental disorders had post-operative infection rates of 3.2% and 4.4% within 1 and 3months, compared to 2.5% and 3.5% in patients without a psychiatric disorder ($p < 0.05$).
Conclusions: Patients with mental disorders had significantly higher rates of post-operative infection compared to patients who were never diagnosed with a psychiatric disorder.

1. Introduction

The number of patients who undergo cervical spine procedures is increasing every year.[1] Anterior cervical discectomy with fusion (ACDF) and posterior cervical fusion (PCF) are the most commonly performed cervical procedures.[1–3] The increase in the number of surgical procedures performed exposes more patients to the risks of post-operative complications. Post-operative infection is a common and debilitating complication of cervical spine surgery. It has been reported that surgical site infection rates after cervical spine surgery vary between 1% to 6% and non-surgical site infection were reported at 2.8%.[4–7] Post-operative infections can extend the length of stay and increase healthcare expenditures between $3000 to $29,000 per case in the United States.[4,8]

Previous studies have shown that risk factors such as diabetes, obesity, chronic steroid use, and length of surgery can contribute to the development of post-operative infections.[9–11] The presence of a psychiatric illness was also demonstrated to be a risk factor in several types of procedures including total knee arthroplasty and coronary artery bypass.[12–16] Menendez et al. reported that patients with depression, schizophrenia, or dementia had a higher rate of adverse events including wound complications, acute renal failure, pulmonary embolism, and an increased need for blood transfusion.[21] To our knowledge, there is no research on the effects of psychiatric disorders on post-operative infections following cervical spine procedures. The main objective of this study was to show whether having a pre-existing psychiatric disorder was a risk factor for developing infections following ACDF and PCF procedures.

2. Materials & methods

In this retrospective study, PearlDiver Technologies was used to analyze the Humana database from 2007 to the 3rd quarter of 2015. Patients who underwent primary cervical spine surgery (ACDF or PCF) were included in the study. Patients were followed for 3 months following the surgery to determine if a postoperative infection occurred. Corresponding International Classification of Disease, 9th edition (ICD-9) diagnosis codes for psychiatric disorders (depression, anxiety, bipolar disorder, schizophrenia) and post-operative infections were used. For ACDF and PCF procedures, corresponding ICD-9 procedural codes and Current Procedural Terminology (CPT) codes were used (Appendix A). The

* Corresponding author at: Department of Orthopaedic Surgery, Keck School of Medicine, University of Southern California, Elaine Stevely Hoffman Medical Research Center, HMR 710, 2011 Zonal Ave, Los Angeles, CA 90033, USA.
E-mail address: zbuser@usc.edu (Z. Buser).

http://dx.doi.org/10.1016/j.jor.2017.08.006
0972-978X/

main study group was defined as patients who underwent primary ACDF or PCF procedures. This group was subdivided into patients who had a diagnosis of psychiatric disorder on the day of surgery or within 60 days prior to surgery, and patients who were never diagnosed with specific psychiatric disorders. Patients who had a psychiatric disease in the past but did not carry the diagnosis within 60 days prior to surgery were excluded. The psychiatric diseases with the highest incidence in the United States (anxiety, depression, bipolar disorder, and schizophrenia) were included. Each group was further divided based on presence or absence of postoperative infection (Fig. 1). Potential infections included surgical site, urinary tract, catheter related, and sepsis. Since PearlDiver does not allow for classification of infection severity, sepsis was analyzed separately to determine if patients with psychiatric disorders are more prone to severe infections. Due to the large number of patients with multiple psychiatric conditions, the sum of patients with a single psychiatric disorder was lower than the number of patients in the total psychiatric disorder group. Chi-square test was used to calculate p value, odds ratio (OR) and confidence interval (CI) in this study. Since all the information obtained was de-identified, this study was exempt from our institutional review board approval. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

3. Results

3.1. Demographics

A total of 34,007 patients who underwent primary ACDF or PCF were included in this study. Eighty percent of these patients had ACDF while the remainder had PCF. There were 17,280 female and 16,727 male patients. There were no significant differences in terms of gender. The age group 65 to 69-years of age had the highest prevalence of both ACDF and PCF (18% and 20%,

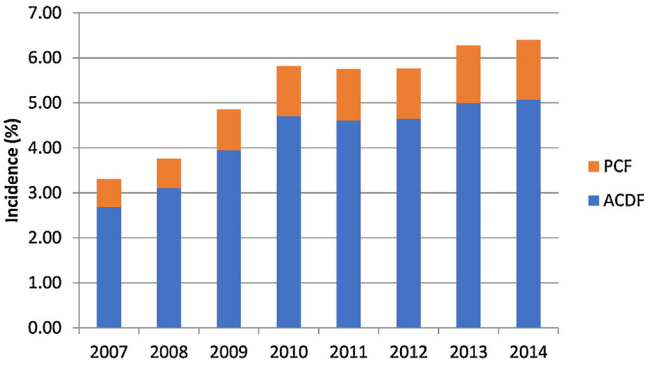

Fig. 2. Trend in ACDF and PCF procedures.

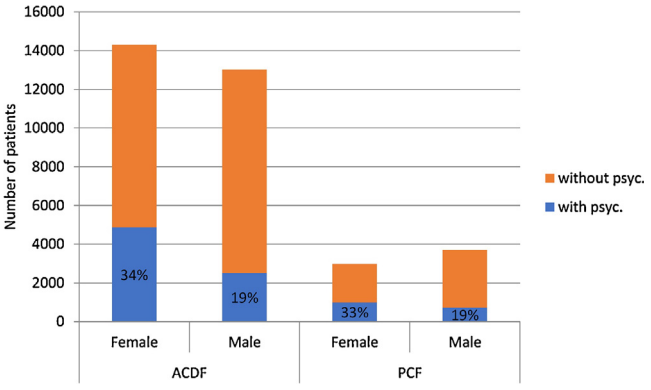

Fig. 3. Patient demographics.

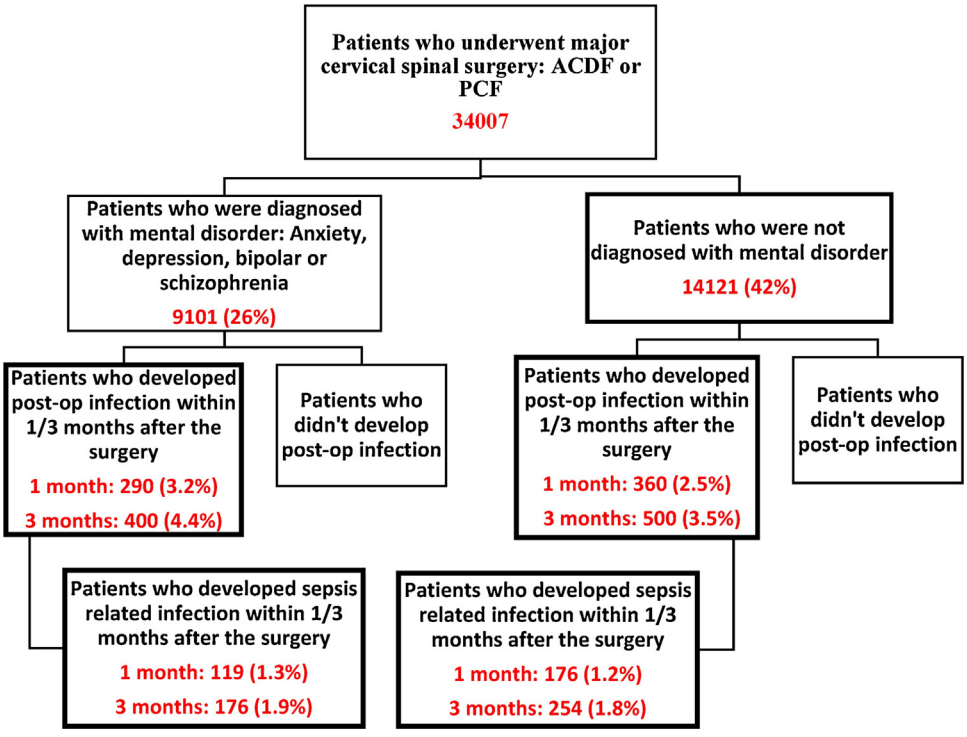

Fig. 1. Study groups.