

Clinical Study

National trends in the surgical treatment for lumbar degenerative disc disease: United States, 2000 to 2009

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Received 24 February 2014; revised 6 August 2014; accepted 15 September 2014

Abstract

BACKGROUND CONTEXT: Surgical treatment for lumbar degenerative disc disease (DDD) remains controversial. Options include anterior lumbar interbody fusion, posterior approach fusion procedures such as posterior lumbar interbody fusion (PLIF) and posterolateral lumbar fusion (PLF), anterior and posterior lumbar fusion (APLF), and total disc replacement (TDR). However, the trends during the last decade are uncertain.

PURPOSE: To examine the trends in the surgical treatment for lumbar DDD on a national level.

STUDY DESIGN: A retrospective analysis of population-based national hospital discharge data collected for the Nationwide Inpatient Sample (NIS).

PATIENT SAMPLE: In the NIS from 2000 to 2009, patients aged 18 years or older with primary diagnosis of lumbar/lumbosacral DDD who underwent surgical treatment were included.

OUTCOME MEASURES: Trends in the surgical treatment for lumbar DDD.

METHODS: Clinical data were derived from the NIS between 2000 and 2009. Patients aged 18 years or older with a primary diagnosis of lumbar/lumbosacral DDD who underwent spinal fusion or TDR were identified. Data regarding patient- and health care system-related characteristics were retrieved and analyzed.

RESULTS: A total of 380,305 patients underwent surgical treatment for lumbar DDD between 2000 and 2009. Population adjusted incidence increased 2.4-fold from 2000 to 2009. Among the procedures, APLF increased 3.0-fold and PLIF/PLF increased 2.8-fold. Total disc replacement did not increase significantly. Anterior lumbar interbody fusion was performed in 16.8% of patients, PLIF/PLF in 67.9%, APLF in 13.6%, and TDR in 1.8%. Surgical treatment for lumbar DDD was 1.8 times more common in the Midwest region and 1.7 times more common in the South region than in the Northeast region. Total disc replacement was more common in younger patients and in the Northeast region. Posterior lumbar interbody fusion/PLF was more common in older patients and in the South region.

CONCLUSIONS: During the last decade, surgical treatment for lumbar DDD has increased 2.4-fold in the United States. Although all fusion procedures significantly increased, TDR did not increase. Surgical treatment for lumbar DDD was more common in the Midwest and South regions. Trends in the procedures were different depending on the age group and hospital region. © 2015 Elsevier Inc. All rights reserved.

Keywords:

Lumbar degenerative disc disease; Surgical treatment; Trend; Spinal fusion; Total disc replacement; Nationwide Inpatient Sample

FDA device/drug status: Not applicable.

Author disclosures: **HY:** Nothing to disclose. **DY:** Nothing to disclose.

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Introduction

Surgical treatment for lumbar degenerative disc disease (DDD) remains controversial [1]. The mainstay of treatment for lumbar DDD are conservative treatments such as activity modification, medications, and physical therapy,

EVIDENCE & METHODS

Context

A number of studies have determined that the use of spine surgery, and spinal fusion in particular, has increased dramatically over the last two decades. The authors sought to explore this issue further using 10 years worth of data from the Nationwide Inpatient Sample (NIS).

Contribution

More than 380,000 spine surgeries were performed for lumbar degenerative disc disease from 2000–2009, representing more than two-fold increases in the use of spine surgery for lumbar degenerative disc disease as a whole, as well as the performance of 360-degree fusion and posterior lumbar fusions.

Implications

This investigation adds to a growing body of literature highlighting the increased use of surgery, as well as fusion-based procedures, as treatment for degenerative conditions of the spine. Given the limitations of the NIS dataset, the authors cannot account for the population-at-risk (eg, the entire population of individuals with lumbar degenerative conditions). In light of the aging demographic and the increased prevalence of musculoskeletal disease, as well as enhanced access to medical care, an increase in surgical interventions for spinal conditions might be anticipated to a certain extent. The population adjustments employed by the authors cannot truly account for this. Clearly, this is an important issue warranting further research, with a keen focus on the clinical contexts in which such surgical interventions occur.

—The Editors

and some studies have identified negative outcomes after surgical treatment. Knox and Chapman [2] found poor results in two-level fusions and in almost half (47%) of single-level fusions for lumbar DDD. Carragee et al. [3] also reported that only 43% of patients undergoing spinal fusion for lumbar DDD met the criteria for minimum acceptable outcome. In contrast, the Swedish Lumbar Spine Study Group found that fusion for lumbar DDD results in superior outcomes relative to standard nonsurgical care [4].

Surgical options for lumbar DDD include anterior lumbar interbody fusion (ALIF), posterior approach fusion procedures such as posterior lumbar interbody fusion (PLIF) and posterolateral lumbar fusion (PLF), anterior and posterior lumbar fusion (APLF), and total disc replacement (TDR). Posterior lumbar interbody fusion and PLF are popular procedures for spinal surgeons performing lumbar surgery. A

variety of surgical techniques and innovative procedures have been introduced during the last decade. Recent ALIF techniques include anterior cage with screws and extreme/direct-lateral interbody fusion (XLIF/DLIF) with or without plates [5,6]. Anterior lumbar interbody fusion with percutaneous pedicle screw fixation has also gained popularity during the last decade [7]. In the middle of last decade, lumbar TDR was approved in the United States [8], which may have changed the trend in surgical management of lumbar DDD. However, trends in the surgical treatment for lumbar DDD during the last decade are uncertain in the United States.

The purpose of this study was to examine the trends in the surgical treatment for lumbar DDD using population-based national hospital discharge data collected for the Nationwide Inpatient Sample (NIS) between 2000 and 2009. We hypothesized that the incidence of patients with lumbar DDD undergoing surgical treatment had increased over the last decade and the surgical trends would have changed with the introduction of TDR and other innovative surgical and instrumentation techniques.

Methods

Data source

The NIS is the largest all-payer inpatient care database in the United States and contains data of approximately 8 million hospital stays from 1,000 hospitals each year. These data comprise a 20% stratified sample of all US community hospitals [9]. Each entry in the database represents a single hospitalization record. Records in the NIS database include discharge data and hospital information, which were used to generate national estimates in this analysis.

Patient selection

Our study samples were retrospectively obtained from the NIS between 2000 and 2009, using codes from the International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM). Patients aged 18 years or older with primary diagnosis of lumbar or lumbosacral DDD (772.52) were included in the study. Then patients were divided into those who underwent ALIF (81.06), PLIF/PLF (81.07 and/or 81.08), APLF (81.06 and 81.07–81.08), and TDR (84.65). Patients who underwent XLIF/DLIF were grouped with those undergoing ALIF. Patients who underwent transforaminal lumbar interbody fusion (TLIF) were grouped with those undergoing PLIF.

Patient- and health care system-related characteristics and patient outcomes

Patient age, gender, race, comorbidities, hospital size, hospital teaching status, hospital region, and payer information were extracted from the NIS. Patients were categorized into the following four groups according to the age: 18 to 44

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