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Clinical Study

Incidence and risk factors for postoperative ileus following anterior, posterior, and circumferential lumbar fusion

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Abstract

BACKGROUND CONTEXT: Postoperative ileus is a known complication of surgery. The incidence and risk factors for ileus after lumbar fusion surgery is not well characterized.

PURPOSE: To determine rates of postoperative ileus, a population-based database was analyzed to identify incidence, mortality, and risk factors associated with anterior (ALF), posterior (PLF), and combined anterior/posterior (APLF) lumbar fusions.

STUDY DESIGN: This was a retrospective database analysis.

PATIENT SAMPLE: The sample consisted of 220,522 patients from the Nationwide Inpatient Sample (NIS) database.

OUTCOME MEASURES: Outcome measures were incidence of postoperative ileus, length of stay (LOS), in-hospital costs, and mortality.

METHODS: Data from the NIS were obtained from 2002 to 2009. Patients undergoing ALF, PLF, and APLF for degenerative pathologies were identified and the incidence of postoperative ileus was assessed. Patient demographics, Charlson comorbidity index (CCI), LOS, costs, and mortality were assessed. SPSS v.20 was used to detect statistical differences between groups and perform logistic regression analyses to identify independent predictors of postoperative ileus. A p value less than .001 denoted significance.

RESULTS: A total of 220,522 lumbar fusions were identified in the United States from 2002 to 2009. There were 19,762 ALFs, 182,801 PLFs, and 17,959 APLFs. The incidence of postoperative ileus was increased in ALFs over PLFs (74.9 vs. 26.0 per 1,000; $p<.001$). Within PLF and APLF groups, CCI scores were increased in the presence of postoperative ileus ($p<.001$). Across cohorts, patients with postoperative ileus demonstrated greater LOS and costs ($p<.001$). PLF-treated patients with postoperative ileus demonstrated increased mortality ($p<.001$). Independent predictors of postoperative ileus included male gender, 3+ fusion levels, alcohol abuse, anemia, fluid/electrolyte disorders, and weight loss ($p<.001$).

CONCLUSIONS: The results of our study demonstrate increased incidence of postoperative ileus associated with anterior approaches for lumbar fusion. Across cohorts, postoperative ileus was associated with increased LOS and costs. To determine the mortality and resource use associated with

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The disclosure key can be found on the Table of Contents and at www.TheSpineJournalOnline.com.

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postoperative ileus, we recommend preoperatively identifying and treating modifiable risk factors, especially when an anterior approach is used.

Keywords: Postoperative ileus; NIS; Nationwide Inpatient Sample; Anterior lumbar fusion; Posterior lumbar fusion; Circumferential lumbar fusion

Introduction

Lumbar fusion surgery is an increasingly common procedure performed in the United States. A study using Medicare claims data demonstrated rates of lumbar fusion have more than doubled in the decade from 1992 to 2003 from 0.3 per 1,000 to 1.1 per 1,000 enrollees [1]. Given the prevalence of lumbar spine fusion surgery, it is important to define the perioperative risk profile.

Postoperative paralytic ileus is a nonmechanical blockage of the small or large intestine. Prolonged ileus following surgery can cause patient discomfort in the form of bloating, abdominal pain, nausea, and vomiting, and can decrease mobility leading to increased hospital length of stay and overall dissatisfaction with surgical care [2,3]. There are no standardized treatments for postoperative ileus and the cornerstone of management includes patient mobilization, aggressive bowel regimen, and limiting narcotic medications [2]. If severe, ileus management may include bowel rest, nasogastric tube suctioning, and medical management.

Little is known about the incidence of ileus in the postoperative period following lumbar spine fusion surgery and whether the incidence differs by approach. Findings extrapolated from the general surgery literature have been applied to spine surgery with few or no data to support its application in spinal interventions [4]. The purpose of this study was to determine the incidence of ileus following lumbar spine surgery in a population-based sample and to determine patient and technique-related factors associated with the development of a postoperative ileus.

Materials and methods

By using the Nationwide Inpatient Sample (NIS) database, researchers and policymakers are able to identify national trends in health-care quality, outcomes, and utilization [5]. Operating under the Agency for Healthcare Research and Quality and the Healthcare Cost and Utilization Project, the NIS is the largest all-payer health-care database in the United States [5]. More than 1,000 hospitals participate in this database, representing approximately 20% of all hospital discharges in the United States each year. The NIS contains information on diagnoses and procedures from the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM).

Data collection

Information from the NIS database was collected from 2002 to 2009. Selected cases were identified using ICD-9-CM procedural codes for anterior lumbar fusion (ALF; 81.06), posterior lumbar fusion (PLF; 81.07 and/or 81.08), and simultaneous anterior/posterior lumbar fusions (APLF; 81.06 and 81.07–08). Patients younger than 18 were excluded. Postoperative ileus was defined using the ICD-9-CM diagnosis code 560.1 for paralytic ileus.

Patient demographics (ie, age, gender, and race) and comorbidities were assessed in each surgical cohort. Outcome measures included length of stay (LOS), hospital costs, and in-hospital mortality (per 1,000 cases). The NIS Disease Severity Measure Files were used to calculate a modified Charlson comorbidity index (CCI) [6]. The CCI uses 22 different comorbidities and patients' age to predict 10-year mortality rates [7]. Some minor modifications were performed, as not all 22 comorbidities were included in the NIS: a history of myocardial infarction was omitted, and liver disease was given an adjusted weight of 2 points rather than 1 point for mild disease and 3 points for moderate-severe liver disease.

Data analysis

Statistical analysis was performed using SPSS v.20 (IBM, Armonk, NY, USA). Significant differences between cohorts for continuous variables were identified using independent-sample *t* test function. Significant differences in categorical variables were detected using the χ^2 test function. Independent risk factors for postoperative ileus were calculated using binary logistic regression analysis. All demographic variables and comorbidities were included simultaneously in the regression model. Separate regression models were analyzed to compare risk factors between anterior and posterior approaches. The risk factors listed are from the best-fit model including all surgical approaches unless otherwise noted. An alpha level of $p \leq .001$ was designated to denote statistical significance. This conservative significance criterion has been previously used by studies from the NIS because of the extremely large sample size [8–10].

Results

A total of 220,522 lumbar fusions were identified in the United States from 2002 to 2009 within the NIS database. Of these, 19,762 (9.0%) were ALFs, 182,801 (82.9%) were PLFs, and 17,959 (8.1%) were APLFs. There were 7,741 documented cases of postoperative ileus across all cohorts. PLFs had the lowest incidence (26.0 events per 1,000 cases). The ALF group had a significantly greater incidence than the PLF cohort (74.9 per 1,000 cases; $p < .001$)