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Clinical Study

Preoperative epidural injections are associated with increased risk of infection after single-level lumbar decompression

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Abstract

BACKGROUND CONTEXT: Lumbar epidural steroid injections (LESIs) are often performed as a treatment option for lumbar stenosis and radiculopathy before lumbar decompression surgery. Several case series have reported spinal infections after LESIs. There is lack of literature on the rate of postoperative infections after lumbar decompression in patients who had prior LESIs.

PURPOSE: The goal of the present study is to employ a large national database to determine if there is an association between preoperative LESIs at various time intervals before lumbar decompression and the incidence of postoperative infection.

STUDY DESIGN/SETTING: Retrospective case control database study, Level III was used in this study.

PATIENT SAMPLE: This study comprised Medicare patients over age 65 years who had a LESI within 1 year of single-level lumbar decompression surgery.

OUTCOME MEASURES: International Classification of Diseases, 9th Revision diagnosis codes for postoperative infection and Current Procedural Terminology procedure codes for treatment of postoperative infection were the outcome measures for this study.

METHODS: The PearlDiver Patient Records Database, an insurance-based database of patient records, was used for this study. The database was queried for LESI and single-level lumbar decompression procedures using Current Procedural Terminology codes. These study patients were then divided into four separate cohorts: (1) lumbar decompression within 1 month following LESI, (2) lumbar decompression between 1 and 3 months following LESI, (3) lumbar decompression between 3 and 6 months following LESI, and (4) lumbar decompression between 6 and 12 months following LESI. Unique control groups for each study cohort were created with patients who underwent single-level lumbar decompression without previous LESI and matched for major risk factors for infection, including age, gender, smoking status, diabetes, and obesity.

RESULTS: Overall, the rate of postoperative infection after single-level lumbar decompression after LESI remained relatively low, ranging between 0.8% and 1.7%. The incidence of 90-day postoperative infection after lumbar decompression was significantly higher than matched controls in groups with LESI within 1 month (OR=3.2, p<.0001) and 1–3 months before surgery (OR=1.8, p<.0001). The incidence of 90-day postoperative infection was not significantly different from matched controls in groups with LESI between 3–6 months (OR=1.3, p=.15) and 6–12 months before decompression surgery (OR=1.3, p=.18)

FDA device/drug status: Not applicable.

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CONCLUSIONS: Single-level lumbar decompression within 3 months after LESI may be associated with an increased rate of postoperative infection. Increasing the time interval between LESI and single-level lumbar decompression surgery to at least 3 months may decrease postoperative infection rates.

Keywords: Complications; Epidural injection; Lumbar decompression; Postoperative infection; Spinal infection; Spine surgery

Introduction

Lumbar radicular and sciatic complaints are the second most common symptom-related cause for medical office visits in the United States [1,2]. Lumbar epidural steroid injections (LESIs) are often performed for both diagnostic and therapeutic purposes for patients with lumbar radicular symptoms related to spinal stenosis. LESIs are the most commonly performed medical interventional treatment in the management of lumbar stenosis or radiculopathy in the United States [3]. These injections are thought to relieve pain through the potent anti-inflammatory effects of glucocorticoids, which reduce episodes of neurogenic claudication due to nerve-root inflammation and ischemia [1,4,5]. Rates of transforaminal LESIs have increased 665% since 2000, with more than 2.2 million performed each year in the Medicare population [6,7]. There are conflicting data in the literature on the long-term effectiveness of LESI for lumbar radiculopathy; however, most authors agree that LESIs are an integral component to the medical interventional treatment regimen [8–12].

Although rare, risks of LESI include positional headaches, adhesive arachnoiditis, intravascular injections, and less commonly, epidural abscess and infection [13]. Studies addressing the incidence of infection following LESI have been limited to small case series and retrospective reviews. Furthermore, to our knowledge, there have been no studies evaluating the association between preoperative LESI and risk of postoperative infection after lumbar decompression. The goal of the present study is to use a large national database to determine if any association exists between administration of preoperative LESIs at various time intervals before lumbar decompression and the incidence of postoperative infection.

Materials and methods

The PearlDiver Patient Records Database (http://www.pearldiverinc.com, Fort Wayne, IN, USA), an insurance-based database of patient records, was used for this study. The database contained procedural volumes and patient demographics for patients with Current Procedural Terminology (CPT) codes or International Classification of Diseases, 9th Revision (ICD-9) diagnoses and procedures. All data were de-identified and anonymous, and were thus exempt from Institutional Review Board approval. The PearlDiver data for the present study were derived from a Medicare-based database within PearlDiver, which was limited to patients over age 65 years. The Medicare database has over 100 million patient records from 2005 to 2012.

The database was queried for single-level lumbar decompression procedures using CPT codes 63005, 63030, and 63047. It was important to note that CPT code 63005 specifies lumbar laminectomy of one or two levels. This code was included in the query of single-level decompression as there was not a more specific code designating only single-level laminectomy without facetectomy. Multiple-level spine lumbar procedures with CPT codes 63017, 63035, and 63048 were excluded. Revision lumbar procedures, including those designated by CPTs 63042 and 63044 were also excluded. Patients who underwent LESI were queried using CPTs 64483 or 62311. CPT codes were used in favor of ICD-9 procedure codes to query for procedures as CPT codes allow specificity for single-level procedures and LESIs.

Patients who underwent single-level lumbar decompression after LESI were then identified using Boolean coding within the database. These study patients were then divided into four separate cohorts: (1) lumbar decompression within 1 month following LESI, (2) lumbar decompression between 1 and 3 months following LESI, (3) lumbar decompression between 3 and 6 months following LESI, and (4) lumbar decompression between 6 and 12 months following LESI. Separate control cohorts without any previous LESI were created for each study group with a similar proportion of potential confounders that contribute to postoperative infection risk, using an algorithm that first matched age group distribution and gender, followed by smoking status, obesity, and presence of diabetes mellitus (DM). Individual control groups were created so that each study group could have a corresponding matched control group. Postoperative infection within 90 days of the index lumbar decompression was assessed using the following ICD-9 and CPT codes: ICD-9s 998.5, 998.51, 998.59 and CPTs 20005 and 22015.

Statistical comparisons of cohort demographics and postoperative infection rates between the study and control groups were completed using Pearson chi-square analysis. Odds ratios (ORs) were calculated with respective 95% confidence intervals (CIs). For all statistical comparisons, $p<.05$ was considered significant. IBM SPSS Statistics for Macintosh, Version 22.0 (IBM Corp., Armonk, NY, USA) was used for all statistical calculations.

Results

The database query identified the following mutually exclusive individual patient data: 2,261 patients who underwent