

Clinical Study

Retrolisthesis and lumbar disc herniation: a postoperative assessment of patient function

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Abstract

BACKGROUND CONTEXT: The presence of retrolisthesis has been associated with the degenerative changes of the lumbar spine. However, retrolisthesis in patients with L5–S1 disc herniation has not been shown to have a significant relationship with worse baseline pain or function. Whether it can affect the outcomes after discectomy, is yet to be established.

PURPOSE: The purpose of this study was to determine the relationship between retrolisthesis (alone or in combination with other degenerative conditions) and postoperative low back pain, physical function, and quality of life. This study was intended to be a follow-up to a previous investigation that looked at the preoperative assessment of patient function in those with retrolisthesis and lumbar disc herniation.

STUDY DESIGN: Cross-sectional study.

PATIENT SAMPLE: Patients enrolled in SPORT (Spine Patient Outcomes Research Trial) who had undergone L5–S1 discectomy and had a complete magnetic resonance imaging scan available for review (n=125). Individuals with anterolisthesis were excluded.

OUTCOME MEASURES: Time-weighted averages over 4 years for the Short Form (SF)-36 bodily pain scale, SF-36 physical function scale, Oswestry Disability Index (ODI), and Sciatica Bothersomeness Index (SBI).

METHODS: Retrolisthesis was defined as a posterior subluxation of 8% or more. Disc degeneration was defined as any loss of disc signal on T2 imaging. Modic changes were graded 1 to 3 and collectively classified as vertebral end plate degenerative changes. The presence of facet arthropathy and ligamentum flavum hypertrophy was classified jointly as posterior degenerative changes. Longitudinal regression models were used to compare the time-weighted outcomes over 4 years.

RESULTS: Patients with retrolisthesis did significantly worse with regard to bodily pain and physical function over 4 years. However, there were no significant differences in terms of ODI or SBI. Similarly, retrolisthesis was not a significant factor in the operative time, blood loss, lengths of stay, complications, rate of additional spine surgeries, or recurrent disc herniations. Disc degeneration, modic changes, and posterior degenerative changes did not affect the outcomes.

CONCLUSIONS: Although retrolisthesis in patients with L5–S1 disc herniation did not affect the baseline pain or function, postoperative outcomes appeared to be somewhat worse. It is possible

FDA device/drug status: Not applicable.

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that the contribution of pain or dysfunction related to retrolisthesis became more evident after removal of the disc herniation. © 2013 Elsevier Inc. All rights reserved.

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Introduction

Low back pain affects up to 30% of the population at any given time [1]. Several sources have been implicated, including intervertebral discs, facet joints, vertebrae, neural structures, muscles, ligaments, and fascia [2]. Retrolisthesis, which is defined as the backwards slippage of one vertebral body on another, has also been associated with back pain and impaired function [3–6]. Series have shown that retrolisthesis may be present in up to 30% of extension radiographs of patients complaining of chronic low back pain [7]. In theory, when combined with intervertebral disc pathology, retrolisthesis may potentially cause increased pain or create a more difficult entity to manage.

In the previous study examining preoperative patient function, there was no significant relationship between retrolisthesis in patients with L5–S1 disc herniation and worse baseline pain or function [8]. Retrolisthesis was also not associated with an increased incidence of having degenerative disc disease, posterior degenerative changes, or vertebral end plate changes.

Isolated lumbar disc herniation [9] and retrolisthesis are known to cause pain. Patients with both ailments who undergo discectomy may not receive the same relief as those with a single identifiable cause. When one source of pain is removed, does the other take its place? There is a paucity of data that looks at the outcomes of these patients after lumbar discectomy. We sought to investigate whether postoperative low back pain, physical function, and quality of life are worse in patients with concomitant retrolisthesis (alone or in combination with other degenerative conditions). Because retrolisthesis may occur more commonly than once believed, it is important to study its role in patients complaining of low back pain and impaired back function.

Materials and methods

Study population

Individuals for this study were drawn from those enrolled in SPORT (Spine Patient Outcomes Research Trial) a randomized study, and a multicenter database of spine patients from 13 institutions across the United States. All individuals in the present study population had complete sets of magnetic resonance imaging (MRI) scans confirming a L5–S1 level disc herniation and subsequently underwent L5–S1 discectomy. Individuals with anterolisthesis were excluded from this study. One hundred twenty-five individuals between 2001 and 2004 were identified for inclusion in this study.

MRI scans

Magnetic resonance images of the lumbar spine were viewed and evaluated on a digital monitor using eFilm software (Merge EMed, Inc., Milwaukee, WI, USA). Clinical scans were collected so there was no predefined magnet strength or acquisition protocol. All images were done supine.

Vertebral measurements and assessment

There are many published methods for determining the amount of listhesis radiographically (expressed in millimeters of subluxation or percent slippage) [10–15]. Retrolisthesis in this study was determined by measuring the position of the vertebral body of L5 relative to S1 on the central-most T1 sagittal MRI. The central sagittal image was determined by the presence of the lumbar spinous processes within the view, having a symmetrical progression of MRI images from laterally based foraminal views to the central image and having the largest measured value for the anteroposterior diameter of L5 and S1 vertebral bodies. Points were then placed along the posterior margins of L5 and S1 on the central sagittal image to measure the amount of backward slippage to the nearest 0.1 mm. All measurements were performed electronically. Percent subluxation was calculated for any individual with a posterior displacement of 3 mm or more. A cutoff point of 3 mm was chosen because this criterion has been used previously both in orthopedic research and clinical practice [3,4,13,16–18]. This 3-mm cutoff corresponded to a slip of 8% that was used as the lower limit to define retrolisthesis. Percent retrolisthesis was calculated by dividing the backwards subluxation of L5 by the anteroposterior diameter of S1.

T1 and T2 axial and sagittal images were also used to assess the degenerative changes at the L5–S1 level. The three areas of L5–S1 evaluated for degenerative changes included the disc space, vertebral end plates, and posterior elements. Loss of disc signal intensity on T2 imaging (signifying disc dehydration) was classified in this article as a sign of early disc degeneration and categorized as a degenerative change. Vertebral end plates were assessed for degenerative changes and classified under the Modic scale. For analytical purposes, stratification between Modic 1, 2, and 3 changes was not done in this article, and all the Modic changes were combined and categorized collectively as a degenerative change of the vertebral end plates. Signs of posterior element degenerative changes included signs of facet joint arthropathy and ligamentum flavum hypertrophy. Stratification between different posterior element degenerative changes was not performed, and all changes were

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