

# Disc displacement patterns in lumbar anterior spondylolisthesis: Contribution to foraminal stenosis

P.J. MacMahon<sup>\*,1</sup>, D.H. Taylor<sup>1</sup>, D. Duke<sup>1</sup>, D.D. Brennan<sup>1</sup>, S.J. Eustace<sup>1</sup>

*The Department of Radiology, Cappagh National Orthopaedic Hospital, Finglas, Dublin 11, Ireland*

Received 11 June 2007; received in revised form 4 December 2007; accepted 5 December 2007

## Abstract

**Purpose:** To describe the particular disc displacement pattern seen at MRI in patients with spondylolisthesis, and its potential contribution to foraminal stenosis.

**Methods:** 38 patients with symptomatic lumbar anterior spondylolisthesis and 38 sex and aged matched control patients with herniated disc disease, at corresponding disc space levels, were included for study. In each case note was made of the presence, absence and direction of disc displacement and also the presence and location of neural contact with the displaced disc.

**Results:** In 33 of 38 (86.8%) patients in the spondylolisthesis group, the vertical disc displacement was upward. In the control group only 3 patients (7.8%) had upward vertical disc displacement. 19 patients (53%) from the spondylolisthesis group had exit foraminal nerve root contact, compared to 7 patients (18.4%) from the control group. 27 control patients (71%) had contact within the lateral recess, compared to only 6 patients (17%) with spondylolisthesis. Differences for upward displacement were significant ( $p < 0.05$ ).

**Conclusion:** Disc displacement in patients with spondylolisthesis is predominately in a cephalad and lateral direction. Although this disc displacement pattern can occur in patients without spondylolisthesis, its incidence is much greater in the subset of patients with concomitant spondylolisthesis. In the setting of acquired osseous narrowing of the exit foramen, this described pattern of disc displacement superiorly and laterally in spondylolisthesis increases the susceptibility of spondylolisthesis patients to radicular symptoms and accounts for the exiting nerve root being more commonly affected than the traversing nerve root.

© 2007 Elsevier Ireland Ltd. All rights reserved.

**Keywords:** Spondylolisthesis; Intervertebral disk; Lumbosacral region; Magnetic resonance

## 1. Introduction

Lumbar anterior spondylolisthesis is the anterior subluxation of a vertebral body relative to the inferior vertebral body. There are six broad categories of aetiology: dysplastic, isthmic, degenerative, traumatic, pathological and iatrogenic [1]. One of the frequent causes of subluxation is a defect in the vertebral neural arch, most commonly at the pars interarticularis. Fig. 1(a) and (b) demonstrates this particular type of spondylolisthesis etiology only.

In most affected patients, reflecting the antero-posterior infero-superior obliquity of the lower lumbar disc spaces, neural arch compromise is complicated by minor anterior slippage of the vertebral body resulting in episodic pain. The vertebral

body can eventually stabilise and thus become asymptomatic. Spondylolisthesis may be identified as an incidental finding later in life on imaging of the spine undertaken for other purposes. The imaging features of the various classes of spondylolisthesis have been previously well described [2]. When spondylolisthesis becomes symptomatic in maturity, usually the 3rd, 4th and 5th decades, it frequently presents with radiculopathy [3–5]. In radiculopathic spondylolisthesis, review of axial images frequently fails to reveal nerve root compression, which is in contrast to patients with radiculopathy and normal vertebral alignment. In addition, when spondylolisthesis patients present clinically with radiculopathy, it is usually attributed to the nerve root above the level of the spondylolisthesis in contrast to a typical paracentral disc herniation affecting the traversing nerve root [3,6].

In patients with anterior spondylolisthesis, nerve root compression typically occurs at the exit foramen secondary to acquired osseous narrowing. It is also noted that disc displacement contributes to foraminal nerve root encroachment.

\* Corresponding author. Tel.: +353 868157084; fax: +353 18140364.

E-mail address: [petermacmahon@yahoo.com](mailto:petermacmahon@yahoo.com) (P.J. MacMahon).

<sup>1</sup> Tel.: +353 868157084; fax: +353 18140364.

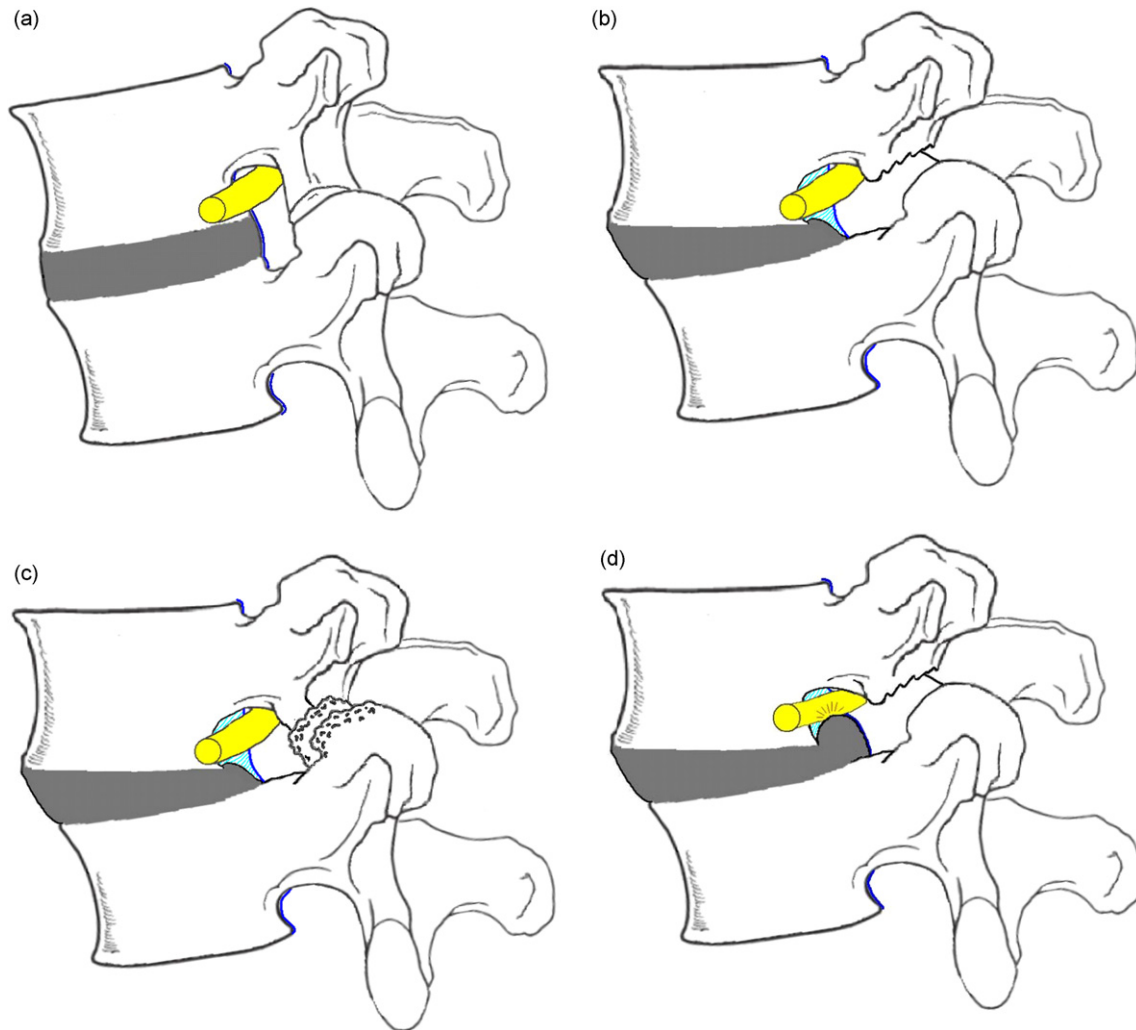


Fig. 1. (a) Normal lumbar vertebrae alignment. Posterior longitudinal ligament (blue line) located posterior to disc. Nerve root exits above intervertebral disc through intervertebral foramen. (b) Diagrammatic representation of isthmic spondylolisthesis. Anterior spondylolisthesis secondary to a defect in the pars interarticularis creating an epidural space anterior to the posterior longitudinal ligament (blue line). Superior vertebral body sinks into disc below. (c) Representation of degenerative anterior spondylolisthesis in lumbar spine. Note degenerative changes at lumbar facet joints. (d) Disc herniation upwards and outwards, contacting the exiting nerve root above the level of the degenerate disc.

However, previous studies have not explained or described the particular displacement patterns, seen at MRI, of the intervertebral disc at the level of the olisthesis. In this study, we compared the disc patterns of patients with symptomatic spondylolisthesis to sex and aged matched patients with radiculopathy but without spondylolisthesis.

## 2. Materials and methods

All patients with anterior spondylolisthesis and radiculopathy presenting to our institution over a 12-month period were retrospectively reviewed. Patients were referred for MRI lumbar spine after experiencing radiculopathy type symptoms suggestive of disc herniation. The presence of spondylolisthesis was not always known prior to MRI. Patients with a history of previous surgery to the lumbar discs, those with retrolisthesis and those with incomplete studies were excluded. 38 patients were included for study and compared to a randomly selected

age, sex and disease level matched control group. This control group was identified from a large database of patients with symptomatic disc herniation but without evidence of spondylolisthesis. For anonymous retrospective studies ethic board approval and patient informed consent is not required in our institution. All imaging was performed using a Philips 1.5 Tesla magnetic resonance (MR) imaging system (Gyrosan Interna Release 7; Philips Medical Systems, Best, The Netherlands). Imaging included sagittal T1 (TR 500 ms, TE 15 ms), sagittal and axial T2 (TR 2000 ms, TE 80 ms) weighted scans.

All studies were reviewed by two dedicated musculoskeletal radiologists (blinded to the case or control status of the patient) at a workstation using efilm™ imaging software (efilm™ Medical Inc. Toronto, Ontario, Canada). Differences in interpretation were resolved by consensus.

The 38 patients in the spondylolisthesis group included 27 males and 11 females with an average age of 51 years. These patients were matched according to age, sex and the level of the

Download English Version:

<https://daneshyari.com/en/article/4227668>

Download Persian Version:

<https://daneshyari.com/article/4227668>

[Daneshyari.com](https://daneshyari.com)