



Original article

Spinopelvic balance evaluation of patients with degenerative spondylolisthesis L4L5 and L4L5 herniated disc who underwent surgery[☆]

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ABSTRACT

Objective: To correlate spinopelvic balance with the development of degenerative spondylolisthesis and disk herniation.

Methods: This was a descriptive retrospective study that evaluated 60 patients in this hospital, 30 patients with degenerative spondylolisthesis at the L4–L5 level and 30 with herniated disk at the L4–L5 level, all of whom underwent Surgical treatment.

Results: Patients with lumbar disk herniation at L4–L5 level had a mean tilt of 8.06, mean slope of 36.93, and mean PI of 45. In patients with degenerative spondylolisthesis at the L4–L5 level, a mean tilt of 22.1, mean slope of 38.3, and mean PI of 61.4 were observed.

Conclusion: This article reinforces the finding that the high mean tilt and PI are related to the onset of degenerative spondylolisthesis, and also concluded that the same angles, when low, increase the risk for disk herniation.

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Avaliação do equilíbrio espinopélvico dos pacientes com espondilolistese degenerativa L4L5 e hérnia de disco L4L5 submetidos a cirurgia

RESUMO

Objetivo: Correlacionar o equilíbrio espinopélvico com o desenvolvimento de espondilolistese degenerativa e hérnia discal.

Métodos: Estudo retrospectivo de caráter descritivo, no qual foram avaliados 60 pacientes, 30 portadores de espondilolistese degenerativa no nível L4-L5 e 30 portadores de hérnia de disco no nível L4-L5, todos submetidos a tratamento cirúrgico.

Palavras-chave:

Degeneração do disco intervertebral

Coluna vertebral

Espondilolistese

Estudos retrospectivos

[☆] Study conducted at the Hospital Santa Casa de Misericórdia de Vitória, Vitória, ES, Brazil.

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Resultados: Os pacientes portadores de hérnia de disco lombar no nível L4-L5 apresentaram uma média da inclinação pélvica (TILT) de 8,06, da inclinação sacral (SLOP) de 36,93 e da incidência pélvica (IP) de 45. Nos pacientes portadores espondilolistese degenerativa no nível L4-L5 foi observada uma média da TILT de 22,1, da SLOP de 38,3 e da IP de 61,4.

Conclusão: O presente artigo reforça a descoberta de que as elevadas médias obtidas da TILT e da IP estão relacionadas com o surgimento da espondilolistese degenerativa e ainda conclui que os mesmos ângulos, quando baixos, aumentam o risco para hérnia de disco.

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Introduction

Lumbar disc herniation is an intervertebral displacement of the nucleus pulposus through the annulus fibrosus; it occurs mainly between the 4th and 5th decade of life, and it is estimated that 2% to 3% of the population may be affected, with a higher prevalence in men.^{1,2} In turn, degenerative spondylolisthesis is defined as a slippage of a lumbar vertebra with an intact neural arch, which occurs mostly in adults over 40 years, with a predilection for females.³⁻⁵ Both diseases have a multifactorial etiology that may be associated with smoking, sedentary lifestyle, and obesity, as well as genetic predisposition and anatomical changes.^{1,2,4,6} Spinopelvic balance has been increasingly studied in degenerative diseases of the lumbar spine as an important factor in the development of these diseases. Spinopelvic balance is the interaction of the spine morphology with the pelvis, and directly impacts the mechanical behavior of the discs, ligaments, and muscle strength. These mechanisms allow the individual to remain upright and move, minimizing energy expenditure.^{2,7-10} Currently, the treatment of these pathologies is conservative; in cases with greater symptom severity and lack of response to conservative treatment, surgical treatment is indicated.^{2,11}

Although diseases such as lumbar disc herniation and degenerative spondylolisthesis are common in the population, no studies that assessed and compared spinopelvic balance in these patients were retrieved from the literature. Therefore, the authors conducted the present study in order to better understand spinopelvic balance, the relationship of its biomechanics with the development of spondylolisthesis and disc herniation, as well as to be able to make an early identification of patients at risk of developing these diseases. By understanding spinopelvic balance, preventive measures or even better treatment for these diseases can be developed.

Methods

This was a descriptive and retrospective study that evaluated 60 patients, 30 with degenerative spondylolisthesis at L4-L5, and 30 with disc herniation at the L4-L5 level, all of whom underwent surgical treatment. All patients were assessed by lumbopelvic radiography in profile; magnetic resonance imaging was also used for the diagnosis of disc herniation.

Inclusion criteria in group I were patients with lumbar herniation at L4-L5 and refractory to conservative treatment

after 20 physiotherapy sessions without instability criteria observed at lumbar radiography. Group II included patients with degenerative spondylolisthesis at the L4-L5 level, classified according to Wiltse, Newman, and Macnab, with failure of conservative treatment with physical therapy and medication for analgesia. Both groups of patients underwent surgical treatment at Hospital Santa Casa de Misericórdia de Vitoria (ES).

Exclusion criteria comprised patients with herniated disc at other levels, those lost to follow-up, or those who did not undergo surgical treatment. In group II, patients with other types of spondylolisthesis, at levels other than L4-L5, or who did not undergo surgical treatment were excluded.

To assess spinopelvic balance, X-ray imaging in orthostatic position (Fig. 1) was used, in which the following could be analyzed: pelvic incidence (PI), through the intersection of the lines that pass through the midpoint of both centers of the femoral heads and the midpoint of the sacral plateau with the line perpendicular to the sacral plateau; sacral slope (SS), assessed through the intersection of lines parallel to the sacral plateau and parallel to the ground; and pelvic tilt (PT), which was assessed by the intersection of the lines that cross the midpoint of both centers of the femoral heads and the midpoint of the sacral plateau with the line perpendicular to the ground.

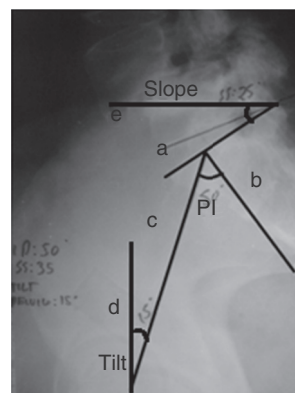


Fig. 1 – Measurement of PT, SS, and PI. PT, pelvic tilt; SS, sacral slope; PI, pelvic incidence. (a) Sacral plate; (b) line perpendicular to the midpoint of the sacral plate; (c) line between the center of the femoral head and the mean sacral point; (d) reference line of the vertical plane; (e) reference line of the horizontal plane.

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