

New Classification for Degenerative Spondylolisthesis of the Lumbar Spine: a Reliability Study

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Summary

Degenerative Spondylolisthesis of the Lumbar Spine (DSLS) is a common cause of chronic low back pain in adults. To this date, there is no consensus for a comprehensive analysis of DSLS.

Hypothesis

This new classification could be a reliable tool for the assessment of DSLS.

Design

Inter-observer and Intra-observer reliability study.

Introduction

A new degenerative spondylolisthesis of the lumbar spine (DSLS) classification system based on sagittal alignment and balance was proposed and required evaluation. Our objective was to assess its reliability.

Methods

108 patients admitted in our spine surgery department for surgical treatment of DSLS between January 2012 and December 2015 were included. Three observers measured sagittal alignment parameters with a validated software: segmental lordosis (SL), lumbar lordosis (LL), pelvic incidence (PI), pelvic tilt (PT), and sagittal vertical axis (SVA). Full Body low-dose lateral view X-rays were analyzed and classified according to three main types: type 1a: preserved LL and SL ; type 1b: preserved LL and reduced SL ($\leq 5^\circ$) ; type 2a: $PI-LL \geq 10^\circ$ without pelvic compensation ($PT < 25^\circ$) ; type 2b: $PI-LL \geq 10^\circ$ with pelvic compensation ($PT \geq 25^\circ$) ; type 3: global sagittal malalignment ($SVA \geq 40\text{mm}$). Two observers classified X-rays twice with a 3-week-interval for intra-observer reproducibility. Inter-observer reproducibility was calculated using Fleiss's κ and intra-class coefficient. Intraobserver reproducibility was calculated using Cohen's κ .

Results

99 patients out of 108 had valid full body images. Mean age was 69 years. Mean sagittal alignment parameters values were the following: PI: $50.7^\circ \pm 34.3^\circ$; PT: $19.9^\circ \pm 15.6^\circ$; SVA: $41.1\text{mm} \pm 45\text{mm}$; SL: $17.8^\circ \pm 9.5^\circ$. Interobserver and intra-observer reproducibility showed an almost perfect agreement (ICC=0.91 and 0.94, respectively). Fleiss κ value for inter-observer reproducibility was 0.91. Cohen's κ for intra-observer reproducibility was 0.91.

Conclusion

This new classification showed an excellent inter- and intra-observer reliability. This simple method can help surgeons improve their preoperative DSLS analysis taking into account global sagittal parameters