

Introduction

Lumbar spondylolisthesis can be related to facet arthropathy and disc degeneration or to a fracture of the pars interarticularis, but the mechanistic underpinnings of spondylolisthesis remain unclear. There is growing evidence that spinopelvic parameters relate to lumbar lordosis and are pivotal to understanding the occurrence of spondylolisthesis. We posit that high sacral slope is associated with pars fractures.

Methods

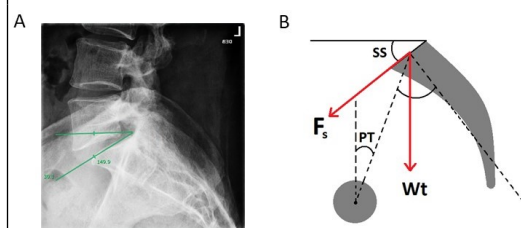
To investigate this hypothesis, we retrospectively studied sacral biomechanics in 131 patients who underwent single level fusion in our institution for L5-S1 spondylolisthesis. We measured sacral slope in each patient and compared the sacral inclination in patients with a pars fracture to those of patients without a pars fracture. We also calculated the sacral inclination vector force by multiplying the trigonometric sine of the sacral angle with patients' weight and compared this vector between the two groups.

Results

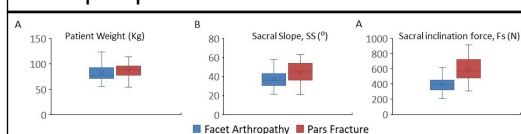
We found that patients with pars fractures had steeper sacral slopes ($43.2^\circ \pm 10.1^\circ$) compared to those without pars fractures ($36.8^\circ \pm$

Patient demographics		
Age (years)		
Min		22
Mean		56
Max		81
Gender		
Female		75 (57%)
Male		56 (43%)
Weight (kg)		
Min		45.4
Mean		83.8
Max		141.9
Cases		
Pars fracture		32
Facet arthropathy		99
Total		131

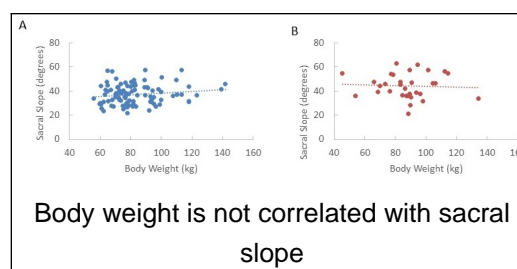
Figure 1. Schematics of spinopelvic biomechanics



Spinopelvic biomechanical factors



Spondylolisthesis due to pars fracture associated with higher sacral slope and higher sacral inclination vector forces



Conclusions

Taken together, these data suggest a strong association between high sacral slopes and presence of pars fracture, and further shows that sacral biomechanics influences the pathogenesis of spondylolisthesis.

Learning Objectives

Understand how spinopelvic biomechanics influences pathogenesis of spondylolisthesis

References

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