Abstract

STUDY DESIGN: A descriptive study (based on skeletal material) was designed to measure sacral anatomic orientation (SAO) in individuals with and without spondylolysis.

OBJECTIVE: To test whether a relationship between SAO and spondylolysis exists.

SUMMARY OF BACKGROUND DATA: Spondylolysis is a stress fracture in the pars interarticularis (mainly of L5). The natural history of the phenomenon has been debated for years with opinions divided, i.e., is it a developmental condition or a stress fracture phenomenon. There is some evidence to suggest that sacral orientation can be a "key player" in revealing the etiology of spondylolysis.

METHODS: The pelvis was anatomically reconstructed and SAO was measured as the angle created between the intersection of a line running parallel to the superior surface of the sacrum and a line running between the anterior superior iliac spine (ASIS) and the anterior-superior edge of the symphysis pubis (PUBIS). SAO was measured in 99 adult males with spondylolysis and 125 adult males without spondylolysis. The difference between the groups was tested using an unpaired t test.

RESULTS: Spondylolysis prevalence is significantly higher in African-Americans compared to European-Americans: 5.4% versus 2.04% in males (P < 0.001) and 2.31% versus 0.4%, P < 0.001 in females. SAO was significantly lower in the spondylolytic group (44.07 degrees +/- 11.46 degrees) compared to the control group (51.07 degrees +/- 8.46 degrees, P < 0.001).

CONCLUSION: A more horizontally oriented sacrum leads to direct impingement on L5 pars interarticularis by both L4 inferior articular facet superiorly and S1 superior articular facet inferiorly. Repetitive stress due to standing (daily activities) or sitting increases the "pincer effect" on this area, and eventually may lead to incomplete synostosis of the neural arch.