Radiographic Assessment of Lumbar Facet Spacing and Spondylolytic Defects in a Pediatric Population

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Introduction: Spondylolytic defects are frequently observed in both the adult and pediatric populations. Although no definitive etiology for this process has been agreed upon, Ward and Latimer have suggested that one potential cause is insufficient increase lumbar interfacet spacing throughout the lower levels of the lumbar spine. This lack of space increases the risk of fracture and resorption of the pars as biomechanical forces of flexion and extension are experienced at these levels. Spondylolytic adults have a less pronounced increase in mediolateral distances between articular facets from L4 to S1 than normal individuals. The relationship between pars defects and facet spacing, however, has not been explored in a pediatric population. We propose that this similar relationship holds true in pediatric patients as well.

Materials and Methods: Plain anteroposterior lumbar spine radiographs of 41 patients of mean age 13 (range 6 to 18) with spondylolytic defects were compared to unaffected age and sex-matched controls. Using sliding calipers, interfacet distances were measured at the L1/L2 level through the L5/S1 level. Interpedicular distances and body width of L1-L5 were also recorded in all individuals to standardize measurements and control for overall vertebral size. The ratio of the transverse interfacet distance to interpedicular distance at each level was compared in both groups and significance was determined using a Mann Whitney U test. An Interclass correlation coefficient (ICC) was used to confirm intraobserver and interobserver reliability for two different observers taking measurements on both populations.

Results: Significant differences between the lytic (affected) and the control groups the L5/S1 levels were observed in interfacet distance increase, even when controlled for size using interpedicular distances (p=.004). No significant differences were detected between the absolute interfacet distances at any level between the two groups. Measurements were both reliable and reproducible as interobserver and intraobserver reliability were .94 and .97 respectively, excellent by statistical standards.

Discussion: A caudal increase in the mediolateral separation of the lumbar facets is necessary to allow normal lumbar hyperextension. Individuals without sufficient increase in lumbar facet spacing are at greater risk for developing spondylolytic defects. This relationship was previously confirmed in the adult population and holds true in the pediatric population as well as shown by this study. This suggests that the lateral translation of the facet joints during adult life as a response to lytic defects is unlikely but rather anatomic variation among individuals leads to increased risk for lytic defects. As this relationship is present in the pediatric population the theory of remodeling becomes less likely. Further studies are necessary to determine if unaffected individuals in a pediatric population with a slightly narrower interfacet spacing are at increased risk of developing spondylolytic defects later in life.


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