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The biomechanical influence of the facet joint orientation and the facet tropism in the lumbar spine

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The biomechanical influence of the facet orientation and facet tropism on stress on the corresponding segment was investigated. Facet joint orientation and facet tropism are presented as the potential anatomical predisposing factors for lumbar degenerative changes that may lead in turn to early degeneration and herniation of the corresponding disc or to degenerative spondylolisthesis. However, no biomechanical study of this concept has been reported. Three models, F50, F55, and F60, were simulated with different facet joint orientations (50°, 55°, and 60° relative to the coronal plane) at both L2-3 facet joints. A facet tropism (FT) model was also simulated to represent a 50° facet joint angle at the right side and a 60° facet joint angle at the left side in the L2-3 segment. In each model, the intradiscal pressures were investigated under four pure moments and anterior shear force. Facet contact forces at the L2-3 segment were also analyzed under extension and torsion moments and anterior shear force. The F50, F55, and F60 models did not differ in the intradiscal pressures generated under four pure moments: but under anterior shear force, the F60 and FT models showed increase of intradiscal pressure. The F50 model under extension and the F60 model under torsion each generated an increase in facet contact force. In all conditions tested, the FT model yielded the greatest increase of intradiscal pressure and facet contact force of all the models. In conclusion, the facet orientation per se did not increase disc stress or facet joint stress prominently at the corresponding level under four pure moments, but facet tropism could make the corresponding segment more vulnerable to external moments or anterior shear force

Keywords: facet joint orientation, facet tropism, lumbar spine, finite element model