Lumbar endplate fracture

Lumbar endplate fractures were investigated in different experimental scenarios, however the biomechanical effect of segmental alignment was not outlined. The objectives of a study were to quantify effects of spinal orientation on lumbar spine injuries during single-cycle compressive loads and understand lumbar spine endplate injury tolerance. Twenty lumbar motion segments were compressed to failure. Two methods were used in the preparation of the lumbar motion segments. Group 1 (n = 7) preparation maintained pre-test sagittal lordosis, whereas Group 2 (n = 13) specimens had a free-rotational end condition for the cranial vertebra, allowing sagittal rotation of the cranial vertebra to create parallel endplates. Five Group 1 specimens experienced posterior vertebral body fracture prior to endplate fracture, whereas two sustained endplate fracture only. Group 2 specimens sustained isolated endplate fractures. Group 2 fractures occurred at approximately 41% of the axial force required for Group 1 fracture ($p < 0.05$). Imaging and specimen dissection indicate endplate injury consistently took place within the confines of the endplate boundaries, away from the vertebral periphery. These findings indicate that spinal alignment during compressive loading influences the resulting injury pattern. This investigation identified the specific mechanical conditions under which an endplate breach will take place. Development of endplate injuries has significant clinical implication as previous research identified internal disc disruption (IDD) and degenerative disc disease (DDD) as long-term consequences of the axial load-shift that occurs following a breach of the endplate [1)].

1)
Curry WH, Pintar FA, Doan NB, Nguyen HS, Eckardt G, Baisden JL, Maiman DJ, Paskoff GR, Shender BS, Stemper BD. Lumbar spine endplate fractures: Biomechanical evaluation and clinical considerations through experimental induction of injury. J Orthop Res. 2015 Nov 26. doi: 10.1002/jor.23112. [Epub ahead of print] PubMed PMID: 26610067.