Kinematics of the cervical spine

The immediate biomechanical stability of the cervical spine following discectomy and stabilization is described. Fresh human ligamentous spines (C2-T2) were potted, and clinically relevant loads were applied by a loading frame attached to the axis of each specimen. A set of three infrared light-emitting diodes (LEDs) were attached rigidly to each of four vertebrae (C4 to C7) to record their spatial locations after each load step application using a Selspot II (Selcom Selective Electronic, Inc., Valdese, North Carolina) system. The specimen was tested in the intact state, following discectomy at the C5-6 intervertebral level, following insertion of a bone graft in the intervertebral space, and following the application of an anterior metal plate. The load-deformation data of the injured and stabilized tests were normalized with regard to the corresponding results of the intact specimens. At the injured level (C5-6), the load-deformation results indicated a highly significant increase in motion in flexion (66.6%), extension (69.5%), lateral bending (41.3%), and axial rotation (37.9%). After the insertion of the bone graft, a significant decrease in motion was seen in the effected segment in extension (-45.9%), with similar reductions in lateral bending and axial rotation and a smaller reduction in flexion. The application of an anterior metal plate in addition to the bone graft at the injured level provided significant reduction in motion (-70%) in all load modalities. This data may have clinical relevance regarding the role of internal fixation in cases of severe spine instability [1)]

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Schulte K, Clark CR, Goel VK. Kinematics of the cervical spine following discectomy and stabilization. Spine (Phila Pa 1976). 1989 Oct;14(10):1116-21. PubMed PMID: 2588062.