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Comparison of biomechanics of atlantoaxial and total cervical spine rotation after atlantoaxial fusion and anterior odontoid screw fixation- Observation study of 30 patients

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Title: Comparison of biomechanics of atlantoaxial and total cervical spine rotation after atlantoaxial fusion and anterior odontoid screw fixation- observation study of 30 patients

Background: Atlantoaxial fusion (AAF) and anterior odontoid screw fixation (AOSF) are surgical modalities used to treat odontoid fractures. However, both differ in the way they affect biomechanics of the cervical spine, as AAF immobilizes the atlantoaxial joint and AOSF is a motion sparing technique.

Research question: How does AOSF affect atlantoaxial rotation and total cervical spine rotation compared to AAF?

Design: Single center case control observational study

Methods: Fifteen patients with AAF and 15 patient patients with AOSF underwent dynamic CT evaluation of axial rotation of the cervical spine 1-2 years after surgery. Atlantoaxial, occipitoatlantal and total cervical spine rotation were evaluated and compared to healthy controls of the same age and gender.

Results: Patients with AAF demonstrated a mean decrease of total cervical spine rotation by 29.0° a mean decrease of atlantoaxial rotation by 54.6° and a mean increase of occipitoatlantal rotation by 9.3° compared to healthy controls. Patients with AOSF demonstrated a mean decrease of total cervical spine rotation by 8.7° a mean decrease of atlantoaxial rotation by 14.1° and mean increase of occipitoatlantal rotation by 0.7° compared to healthy controls.

Discussion: AOSF is biomechanically superior compared to AAF in terms of motion preservation of atlantoaxial and total cervical spine rotation. Nonetheless, AOSF does decrease total cervical by 8.7°, which is most likely the result of reparation changes within the cervicocranial junction and postoperative cervical spine immobilization by a cervical collar. Although AAF does decrease total cervical spine rotation by 29.0° due to fusion of the atlantoaxial joint, compensatory increase of rotation occurs in the occipitoatlantal joint