The effects of staged static cervical flexion-distraction deformities on the patency of the vertebral arterial vasculature.

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STUDY DESIGN: Thirty-five fresh frozen cervical spine specimens underwent vertebral artery cannulization and angiography to determine the static influence of the four stages of subaxial flexion-distraction injuries as described by Allen et al on vertebral artery patency. OBJECTIVES: To evaluate the degree of vertebral vessel deformation and potential injury in staged static flexion-distraction deformities of the cervical spine. SUMMARY AND BACKGROUND DATA: Asymptomatic vertebral artery injury is found in up to 19% of all patients who incur trauma to the lower cervical spine. This incidence increases in flexion-distraction deformities. It is unclear as to the individual contributions of various force loads and resultant deformity on the etiology of these injuries. RESULTS: No significant deformation in vertebral artery flow was noted in the flexion-distraction Stage I injuries within the physiologic range of cervical flexion. Flexion-distraction Type II and III injuries (unilateral and bilateral facet dislocations, respectively) demonstrated considerable impairment to vertebral artery dye flow in proportion to the degree of vertebral deformity. Manipulating the dislocated vertebral segments into a localized lordosis (flexion-distraction Stage II) further impaired vertebral vessel patency. Coexistent rupture of the vertebral radicular vessels was a constant finding in Stage II and III injuries. Longitudinal stretch deformities of the vertebral artery were limited primarily to the injured vertebral segment. Stage IV injuries resulted in irreversible disruption of vertebral dye flow. CONCLUSION: The static deformity of flexion-distraction Stage II to IV subaxial cervical injuries results in significant objective compression of the vertebral vasculature. The precise contribution of static cervical malalignment related to advanced staged flexion distraction injuries on irreversible vertebral vessel flow disruption is presently uncertain.

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