

## Occipito-Atlanto-Axial Alignment and the Cervical Curve

Toyama Y, et al. Realignment of Postoperative Cervical Kyphosis in Children by Vertebral Remodeling. *Spine*, 1994; 19(22):2565-2570

**ABSTRACT** ...*Methods.* Between 1979 and 1991, there was a total of 12 children who underwent C1-C2 posterior fusions. The average age at the time of surgery was 9.8 years. The alignment of the cervical spine was classified into four groups (lordosis, straight, kyphosis, and swan-neck deformity). Radiographic findings suggestive of the remodeling were as follows: 1) new bone formation on the anterior vertebral cortex, and 2) increase in body/canal ration (BCR). The follow-up period averaged 6.2 years.

*Results.* Postoperative cervical malalignment (kyphosis or swan-neck deformity) occurred in four patients. In all four patients, new bone formation and increase in BCR at the apex of kyphosis were observed. Therefore, there was gradual improvement of the malalignment by vertebral remodeling. This phenomenon was not observed in eight patients with normal alignment. (abstract abridged)

From the result of the clinical study,<sup>17</sup> the optimum angle of C1-C2 fusion was 20° and compensatory change in curvature after surgery occurs in the patients whose C1-C2 fusion angle exceeded 30°. Because hyperextension causes postoperative cervical spine deformation, it is important to keep the fusion angle in mind and to fuse the atlas and axis in the optimum angle.

In children, change in the sagittal curvature of the cervical spine after c1-C2 posterior fusion for upper cervical disorders is commonly observed.

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The role of the atlas position to the body's alignment is brought to light.

The noted study above certainly displays what we at the Khan Kinetic Clinics have observed and documented. These noted changes to the curvature of the spine, which we are able to restore in many a case (adults and children) is crucial to protecting the body from deteriorating (degenerative joint disease, degenerative arthritis, degenerative disc disease).

This restoration to the optimum atlas position allows us to age gracefully so that movement is maximized, height is maintained, and potential fractures / osteoporosis is curtailed.

The absolute alignment is also paramount in protecting nerves, and ensuring blood circulation since the vertebral arteries curl their way through the cervical (neck) vertebrae en route to the brain.

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