Shape Abnormalities in the Atlas May Lead to Instability in Chiari Patients

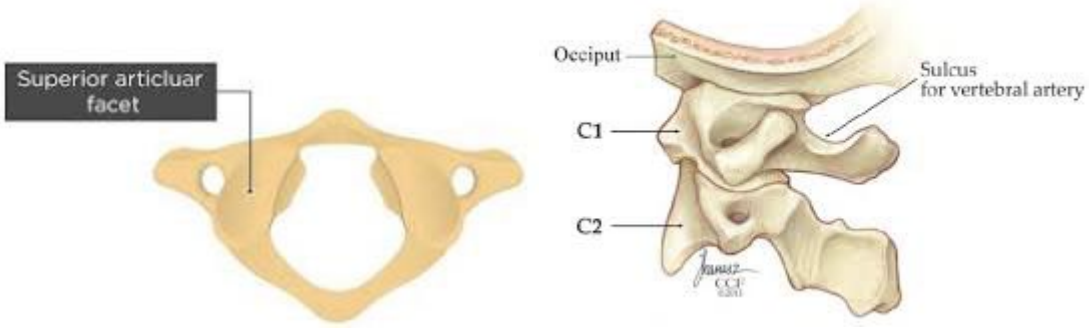
The atlas is the top vertebrae in the spine, or C1. It is called the atlas because it essentially bears the weight of the skull. The connection between the skull, or occiput, and the atlas is called the atlanto-occipital joint (AOJ). The AOJ is comprised of two protrusions (condyles, one on each side) of the skull which rest onto corresponding depressions on the atlas (Figure 1) called facets. The shapes of the condyles and facets allow for the head to move forward (flexion) and back (extension).

A recent study based on images from the Chiari1000 has found that the facets of the atlas in Chiari patients are smaller and flatter than normal. Specifically, the study used a sophisticated 3D shape analysis to compare the facets of 46 adult, female Chiari patients who had supplied CT images to 55 age matched healthy females. The researchers found that on average the facets of the Chiari patients were significantly smaller and flatter, especially towards the front. While it needs to be investigated further, this suggests that the AOJ in Chiari patients may not be as stable as it should be.

In fact, this was hypothesized by Conquer Chiari researchers a couple of years ago as they speculated that subtle instability of the AOJ leads to overworking of the sub-occipital muscles which in turn leads to failure of the myodural bridge complex which in turn leads to a loss of flexibility in the cervical dura.

Based on this finding, an interesting next step would be to explore how much additional strain these anatomical changes to the AOJ would put on the sub-occipital muscles of the neck.

Figure 1



Note: This journal paper is the 100th peer reviewed publication resulting from Conquer Chiari's research program. This milestone was only possible thanks to the generosity of our donors and volunteers. THANK YOU!

Sources: Millard JA, Perera IR, Scardina B, Rondon B, Satoskar C. Atlantal facet geometry in Chiari I malformation. *J Craniovertebr Junction Spine*. 2025;16(4):392-395. doi:10.4103/jcvjs.jcvjs_160_25

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Conquer Chiari's research updates highlight and summarize interesting publications from the medical literature while providing background and context. The summaries do contain some medical terminology and assume a general

understanding of Chiari. Introductory information and many more research articles can be found in the Conquer Chiari Library.

Conquer Chiari is a 501(c)(3) public charity dedicated to improving the experiences and outcomes of Chiari patients through education, awareness and research.