

# Asymmetric Atlas Assimilation And Potential Danger To The Brainstem: A Case Report

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## Citation

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## Abstract

Atlas is the first cervical vertebra. It does not have a body like other cervical vertebrae. It has two transverse processes, each one of which bears a foramen transversarium. The vertebral artery passes through this foramen. It has two lateral masses which articulate with the occipital condyles to form atlanto-occipital joints. Rarely, the atlas vertebra fuses with the occipital bone. We observed a potentially dangerous incomplete occipitalization of the atlas vertebra during osteology demonstration classes. The fusion resulted in reducing the diameter of foramen magnum approximately by 25%. The knowledge of this variation may be of importance to orthopedic surgeons, neurosurgeons, radiologists and anthropologists.

## INTRODUCTION

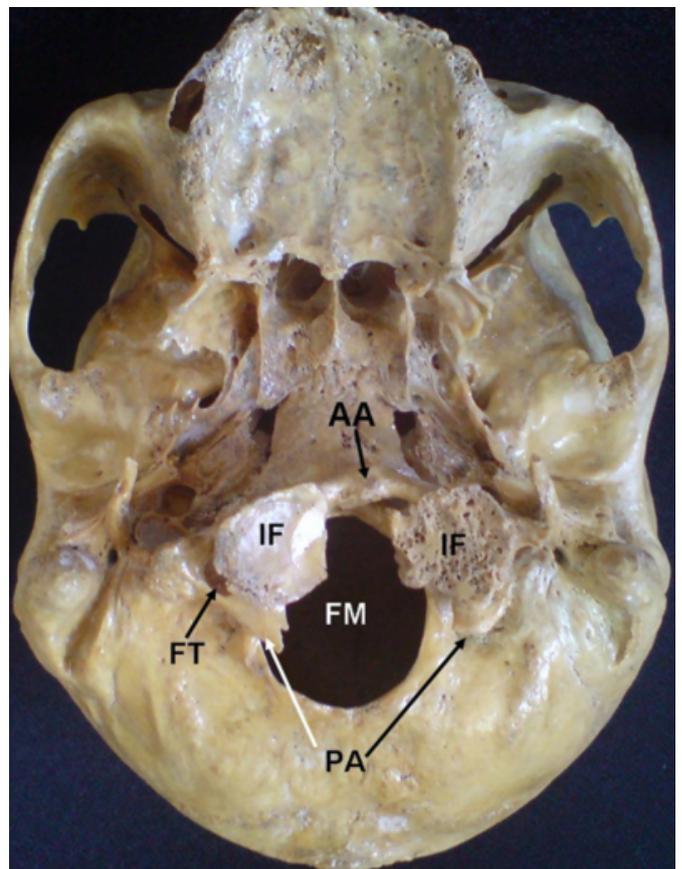
Atlas is the first cervical vertebra. It is ring shaped, and does not have a body. It has an anterior arch, a posterior arch and two lateral masses. The lateral masses articulate with the occipital condyles to form ellipsoid type of synovial joints. The anterior arch articulates with the odontoid process of the axis vertebra to form a pivot type of synovial joint. The posterior arch is grooved by the third part of the vertebral artery. The transverse process has a foramen transversarium, which transmits vertebral artery. We saw an atlas vertebra which fused with the occipital bone incompletely

## CASE REPORT

During the osteology demonstration classes for undergraduate medical students, we noticed the fusion of the atlas vertebra with the occipital bone. The two superior facets on the lateral mass had completely fused with the occipital condyles. The anterior arch had incompletely fused with the basilar part (Figs 1 and 2). The posterior arch was also incomplete. It was represented by two small projections from the two lateral masses, among which the right projection was sharp and irregular. The foramen transversarium was absent on the left side. The left inferior articular facet was seen to have many perforations on it. The foramen magnum had irregular outline and was reduced approximately by 25% in its diameter. This was due to the asymmetrical fusion of the atlas vertebra. All other parts of the skull were normal.

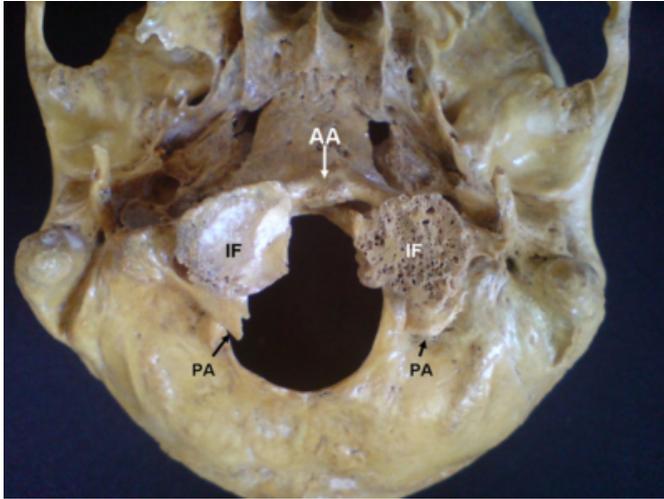
## Figure 1

Figure 1: Norma basalis showing the fusion of the atlas vertebra with the occipital bone (: anterior arch; : posterior arch; : foramen transversarium; foramen magnum inferior articular facet)



**Figure 2**

Figure 2: A closer view of the posterior part of the norma basalis showing the reduction in the size of foramen magnum due to the asymmetric fusion of atlas vertebra (: anterior arch; : posterior arch; : Inferior articular facet)



**DISCUSSION**

The atlas vertebra can partially or totally fuse (assimilation) with the occipital bone [1]. A recent study [2], has shown that the atlas is the most variability among the cervical vertebrae. Absence of foramen transversarium in atlas is a very rare variation. Absence of foramen transversarium unilaterally [3] and bilaterally [4] have been reported. The transverse process of atlas is an important landmark for head and neck surgeons [5]. Lateral to the transverse process, sits the posterior belly of the digastric muscle, the stylohyoid muscle, and the occipital artery. Anterior to the transverse process, the styloid process can be exposed. The internal jugular vein and cranial nerves 10, 11, and 12 lie between the styloid process and the transverse process of atlas. Superior to the transverse process, tracing the carotid sheath upward, the carotid canal and jugular foramen can be reached. Anteroinferior to the jugular foramen, the hypoglossal nerve emerges from the cranial cavity through the hypoglossal canal. Posterior to the transverse process, the suboccipital triangle can be recognized. In cases of absence of the foramen

transversarium, there may be confusions in reaching these structures. The fusion of atlas vertebra with occipital bone might produce clinical problems such as cerebellar infarction [6] and Bow hunter's stroke [7]. In the case that we have reported here, the atlas assimilation was incomplete and asymmetrical. The reduction of the size of foramen magnum might result in neurological disorders due to the pressure on the medulla oblongata. The sharp projections of the posterior arch also might cause in damage to the medulla and may lead to sudden death. Hence the case is noteworthy for various disciplines like neurosurgery, orthopedic surgery, radiology and anthropology.

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