

## Total fusion of atlas with occipital bone: a case report

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### ABSTRACT

Atlas is the first cervical vertebra. It does not have a body like other cervical vertebrae. It forms ellipsoidal synovial joints with the condyles of the occipital bone. Rarely, it gets occipitalized, where the condyles of the occipital bone fuse with the lateral masses of the atlas vertebra. In this article, a total fusion of the atlas vertebra has been reported and the knowledge of such a fusion may be of importance for radiologists, anesthesiologists, orthopedic and neurosurgeons because skeletal abnormalities at the craniocervical junction may result in sudden unexpected death. It can result in dysphagia, dysarthria or torticollis because of compression of cranial nerves. *Neuroanatomy; 2005; 4: 39–40.*

**Key words** [atlas] [cervical vertebra] [fusion] [occipitalization] [condyles]

### Introduction

Atlas is the first cervical vertebra. It is ring shaped, without 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 dens 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. In rare cases the lateral masses of the atlas vertebra fuse with the occipital bone.

### Case Report

During the routine osteology demonstration class for medical undergraduates, a total fusion of the atlas vertebra with the skull was seen (Figs 1–4). The lateral masses had fused completely with the occipital condyles. The anterior arch was fused with the basilar part of the occipital bone. The hypoglossal canals were absent. There was a median foramen between the anterior arch of atlas and the basilar part of the occipital bone (Fig 3). The posterior arch was also fused with the squamous part of the occipital bone. There were some perforations between the posterior arch of atlas and the occipital bone (Fig 2). The gap for the vertebral artery to enter the cranial cavity was very small.

### Discussion

Fusion, either partial or complete, of the atlas with the occipital bone may occur in about 1% of cases so-called atlas assimilation [1]. Two cases of occipitalization with

spina bifida of atlas vertebra have been reported recently [2]. Individuals with occipitalization of the atlas may have low hairline, torticollis, restricted neck movements and/or abnormal short neck [3]. The clinical findings may be the headache, neck pain, numbness and pain in the limbs, weakness, abnormal head posture, posteriorly located dull aching headache. Cranial nerve findings associated may include tinnitus, visual disturbances and lower cranial nerve palsies leading to dysphagia and dysarthria [3]. The neurological symptoms and signs of atlanto-occipital fusion can not be distinguished from those of the Arnold Chiari malformation as the pathophysiology of both is essentially the same. Fusion between atlas and occiput usually occurs anteriorly between the arch and rim of the foramen with some segment of the posterior arch of C1 present in some cases. The fusion of posterior arch frequently constricts the spinal canal causing intermittent symptoms depending on the position of the head [4]. The onset of neurological symptoms is usually in the third or fourth decade. Younger patients are commonly asymptomatic. Atlanto occipital fusion reduces the foramen magnum dimension leading to neurological complications due to compression of spinal cord [2].

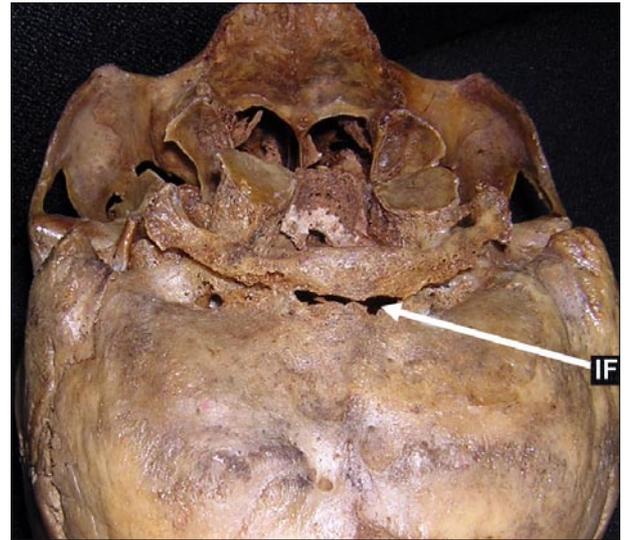
The knowledge of total occipitalization may be of importance to orthopedic surgeons dealing with the pathologies of upper cervical spine. It may be the cause of failure of a cisternal puncture and thus may be of importance for the anesthetist. Neurosurgeons dealing

with the tumours of cerebellum, physiotherapist dealing with the neck pain and the radiologists dealing with the

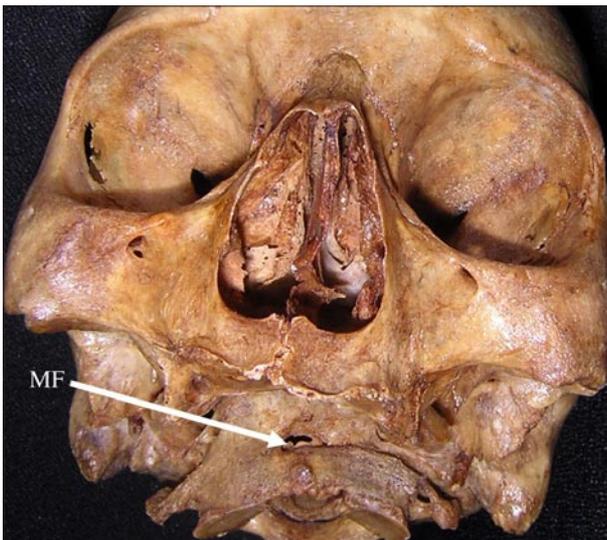
abnormalities of cervical spine must also be aware of this total occipitalization of the atlas vertebra.



**Figure 1.** Base of the skull with totally fused atlas vertebra.



**Figure 2.** Posterior view of the skull with atlas vertebra. (*IF: incomplete fusion of posterior arch with the occipital bone*)



**Figure 3.** Anterobasal view of the skull showing anterior aspect of fused atlas vertebra. (*MF: median foramen*)



**Figure 4.** Posteroinferolateral view of the skull with totally fused atlas vertebra.

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