Occipitalization of the Atlas

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Occipitalization of the atlas, or atlanto-occipital fusion, is one of the most common skeletal abnormalities of the upper cervical spine. According to Yochum,\(^1\) occipitalization represents the most cephalic "blocked" vertebra encountered in the spine.

The onset of neurological symptoms is usually in the third or fourth decade. Younger patients are commonly asymptomatic. Symptoms usually begin insidiously and progress slowly, although sudden onset and instantaneous deaths have been reported with trauma to the region of the craniocervical junction. Trauma has been implicated as a precipitating factor in at least half of reported symptomatic cases, although symptoms associated with trauma may not be as severe as previously mentioned.

Neurological symptoms associated with occipitalization of the atlas are attributed to ligamentous laxity of the transverse ligament about the odontoid caused by repeated flexion and extension of the neck leading to compression of the spinal cord or actual indentation of the medulla. With aging, the central nervous system may become less tolerant to repeated blows from the odontoid. The presence of blocked vertebrae below this level may accelerate this process due to compensatory motion at the atlantoaxial joint. In a study conducted by McRae,\(^2\) fusion of C2/C3 was noted in 17 of 25 patients with occipitalization of the atlas. Additionally, symptoms are attributed to abnormal size and a high position of the odontoid process, leading to compression of the spinal cord or medulla.

The patient will probably be asymptomatic if the odontoid process is located below the foramen magnum. This relationship is best assessed through the use of McRae’s line, which is drawn across the foramen magnum. Normally the odontoid process should not project above this line. According to Greenberg,\(^3\) spinal cord compression always occurs when the sagittal spine canal diameter behind the odontoid process is less than or equal to 14 millimeters. Cord compression is possible when the sagittal canal diameter is between 15 and 17 millimeters, and almost never occurs at a distance of 18 millimeters or more.

Patients with occipitalization of the atlas may have the following physical features: low hairline, torticollis, restricted neck movements, and an abnormally short neck. The presence of these features should alert the chiropractic physician to the possibility of underlying congenital anomalies which may alter the type of manipulative care delivered in the upper cervical region. Neurological examination of the atlanto-occipital
fusion patient may reveal the following clinical findings: headache, neck pain, numbness and pain in the limbs, weakness, and an abnormal head posture. The headaches associated with this condition are characterized as dull and aching, and are located over the posterior two thirds of the skull. The headaches may be precipitated by coughing or by neck movements. Long tract signs, associated with dysfunction to the lateral corticospinal tract, may be present in the upper and lower extremities in the form of hyperreflexia, spasticity, Hoffman’s sign, and Babinski’s sign. Cranial nerve findings associated with occipitalization of the atlas include tinnitus, visual disturbances, lower cranial nerve palsies leading to dysphagia and dysarthria, and downbeat nystagmus. Horner’s syndrome has also been reported in association with atlanto-occipital fusion. Additionally, the neurological symptoms and signs of atlanto-occipital fusion cannot be distinguished from those of the Arnold-Chiari malformation as the pathophysiology of both is essentially the same. Arnold-Chiari malformations may occur in conjunction with atlanto-occipital fusion. The chiropractic physician encountering a patient with atlanto-occipital fusion should carefully assess the integrity of the upper cervical complex and perform a thorough neurological examination prior to application of regional adjustive procedures.

References


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