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SYNOSTOSIS OF ATLAS WITH OCCIPITAL BONE-OCCURRENCE AND CLINICAL APPLICATION.

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ABSTRACT: Synostosis also known as occipitalization of the atlas is a rare congenital malformation at craniovertebral junction. Atlas, the first cervical vertebra forms the ellipsoidal synovial joints with the condyles of the occipital bone. Rarely it gets occipitalized where the condyles fuse with the lateral masses of the atlas. During the morphometric study of hundred skulls in Department of Anatomy, Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah, two skulls showed the incomplete occipitalization of the atlas vertebrae. The partial or complete assimilation of atlas may have resulted due to the disruption in the separation of caudal part of the first sclerotome from the cranial part of the first sclerotome.

Key Words-Synostosis, Occipitalization, Ellipsoidal, Atlas.

INTRODUCTION

Craniovertebral abnormalities have been recorded in morphological and radiological studies for many years.[1,2,3]Occipitalization is the failure of the segmentation and separation most caudal occipital sclerotome and first cervical sclerotome during the first week of the fetal life.[4] Incidence ranges from 0.14% to 0.75% of population with equal sex distribution. [4]It represents the most cephalic blocked vertebrae encountered in the spine[5]. and is characterized by complete or partial fusion of bony ring of atlas to the base of the occipital bone.[6] The first neurological sigh and symptoms occur usually in the second decade of life [7]and are due to odontoid projection into the foramen magnum causing pyramidal tract, anterior bulbar and cranial nerve involvement.[8]

Case Report

During the morphometric study of hundred dry human adult skulls of North Indian origin, taken from Department of Anatomy, Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah (Amritsar) two skulls showed partial occipitalization of the atlas vertebrae. In the first specimen, the parts of anterior arch are found fused to the anterior margin of the foramen magnum. The posterior arch on the right half of the posterior margin of the foramen magnum is also found fused with it. The part of right lateral mass is found attached to the right side of the right condyle of the skull. The second specimen showed fusion of the anterior arch to the anterior margin of the foramen magnum. No other variation is seen in this specimen.

Review of Literature

The atlantooccipital fusion or occipitalization of the atlas has been studied by craniologists. The various symptoms noted by different author are given in table 1.

Table1-Symptomatology noted by different Authors

Sr No	Author	Year	Symptoms	
1	Mc Rae	1953	Headache, neck pain, cranial nerve finding, causing dysphagia and dysarthria	
2	Lopez et al	1964	Tonic and clonic contraction	
3	Spano and Darling	1982	brain sten anoxia, due to vertebral artery stenosis	
4	Bailey	1983	Similar to Arnold Chiari Malformation	
5	Hensinger	1986	Vertebral artery stenosis	

DISCUSSION

The first cervical vertebra supports the skull and is there called the atlas(after the mythical Greek god who supported the globe).[13] Atlas assimilation which may be partial or complete occur in 1% of cases.[14] It may be associated with the spina bifida[15]. These individuals have low hair line, abnormal short neck, torticollis, cranial nerve finding include tinnitus, visual disturbances, lower cranial nerve palsies leading to dysphagia and dysarthria[6]. The occipital bone is derived from basioccipital, exoccipital and supraoccipital portions all of which surround the foramen magnum. [16] The basioccipit goes on to develop into four occipital somites. The caudal part of first cervical somite along with the cranial part of the second cervical somite goes to form atlas and odontoid process of axis.[17] In a small number of caes, disruption of this merging process result in atlantooccipital assimilation.[18] The atlanto occipital fusion reduces the foramen magnum dimensions leading to the neurological complications due to compression of spinal cord [15], nerves, vessels or instability and mechanical immobility. [2]Thus head and neck surgeons should be aware of such an anomaly as serious consequences of upper cervical spinal manipulative therapy may arise if the clinical assessment is missed. The physical therapists, chiroppactors must have appropriate diagnostic study for structural integrity of the cervical spine before any treatment can be rendered.

Conclusion

The knowledge of this congenital anomaly is important for orthopaedic surgeons for upper cervical spine pathology, for anaesthetist for failure of cisternal puncture, neurosurgeons, physiotherapists and radiologists. It also reduces the foramen magnum dimensions leading to spinal cord compression.

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