

FUSED C6 AND C7 CERVICAL VERTEBRA AND ITS CLINICAL IMPLICATIONS - AN ANATOMICAL VARIATION

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ABSTRACT

Introduction: Vertebral column is called a spinal column which protects the spinal cord, provides attachment to muscles, supports the trunk (etc). Fused C6 and C7 bones cause loss of neck movement, high risk of fracture due to which it leads to nerve compression causing the forelimbs to be affected (paralysis and anesthesia). The intention of this osteology based study was to estimate the C6 and C7 bone and its clinical implications.

Materials and Methods: The given study was led at the Department of Anatomy, Saveetha Dental College and Hospitals. The study was conducted by examining 27 dry human C6 and C7 bones.

Results: Out of 27 C6 and C7 bones one fused C6 and C7 bone was observed. This may lead to shortening of cervical spine, lowered hairline, osseous malformation leading to sensations like pain, burning sensations, cramps (etc). The uncus bone was fused in the superior surface of C6 bone and from lateral view it was observed that the superior articular and inferior articular facet was completely fused.

Conclusion: Fused C6 and C7 bones were observed and clinical implications were noted. Awareness About cervical fusion may reduce the risk of complications. If this bone related

anomalies are diagnosed in prior stage, it might assist in the development of life through undergoing correct treatment.

Keywords: C6 vertebra, C7 vertebra, Ossification, Abnormal fusion, Clinical implications, anatomical variation.

INTRODUCTION

Vertebral column consists of 33 vertebrae out of which 7 is cervical, 12 is thoracic, 5 is lumbar, 5 is sacrum and 4 is coccygeal vertebrae. The cervical spine is found between cranial and thoracic vertebrae. The thick cylindrical body located at the front of the vertebra is called the vertebral body. It is said to carry most of the loads of the body. There are intervertebral discs between 2 vertebral bodies to provide cushioning and act as shock absorber. The only cervical vertebra without a vertebral body is the first cervical vertebra which is also known as atlas. The atlas connects the occipital bone to support the skull and to form the atlanto-occipital joint (1). It is helpful in the forward and backward movement of the head and neck. The second vertebrae is an axis which forms a long protrusion which fits the ring shaped atlas above it (2). The C6 and C7 vertebrae are said to form the lowest cervical spine. The function of C6 and C7 bone is back and forth and sideways movement. The seventh cervical vertebrae is said to be the largest of all the cervical vertebrae (3)(4). The seventh cervical vertebra is also called vertebra prominens, is considered as a unique cervical vertebra and has the most prominent spinous process. Fusion of cervical vertebrae can be congenital or acquired(5)(6).

Congenitally due to primary malformation of chorda dorsalis where there is failure in the segmentation of cervical vertebra (3)(4). Acquired is due to tuberculosis, rheumatoid arthritis and trauma (5). Trauma in spines can aggravate problems in the fused cervical region (7). The fused cervical vertebrae are silent in the early stage but in the advanced stage degenerative changes occur in the non-segmental curve regions. This leads to hypermobility and deterioration in the fused cervical vertebral region below and above it. Fusion of C6 and C7 leads to restriction of spine. This will make a webbed like appearance in neck due to side eminence of trapezius muscle which may give restricted movement at the neck region, lowered hairline, osseous malformation (not in normal shape, poor alignment) leads to peripheral nerve irritation which shows signs of pain, burning sensations, cramps or nerve compression leading to anesthesia, paralysis, fibrillations and reduced deep reflexes (6). Bony

fusions are quite uncommon in several aspects but when present causes alarming pathologic complications in many cases. In some conditions it remains asymptomatic. Our scientist experts with their encompassing information, research experience, data has transformed to several publications globally in well reputed indexed Journals (8–15),(16),(17),(18),(19,20),(21),(22),(23–27). The aim of this study was to report an abnormal fusion of sixth and seventh cervical vertebrae and to analyse its clinical complications.

MATERIALS AND METHODS

This study was done in the Department of Anatomy, Saveetha Dental college and Hospitals, Chennai. The study was conducted by examining 27 dry C6 and C7 bones. The fused vertebrae were studied with normal cervical vertebrae and were analysed and photographed from different aspects. The broken C6 and C7 bones were excluded from these studies. The sampling method used here is Random sampling method. Fused C6 and C7 bones cause less movement of the neck and have high chances of fracture due to which the forelimb system is affected.

RESULTS

A fused C6 and C7 bone has been obtained from a sample of 27 dry C6 and C7 bones. The fused C6 and C7 cervical vertebrae viewed from different aspects are shown in Figure 1. In the anterior view the uncal bone of the superior C6 vertebrae was completely fused with the body and the inferior surface of C7 bone was flat. From a lateral point of view the superior articular facet of sixth cervical vertebral bone (C6) and inferior articular facet of seventh cervical vertebral bone (C7) bone are completely fused.

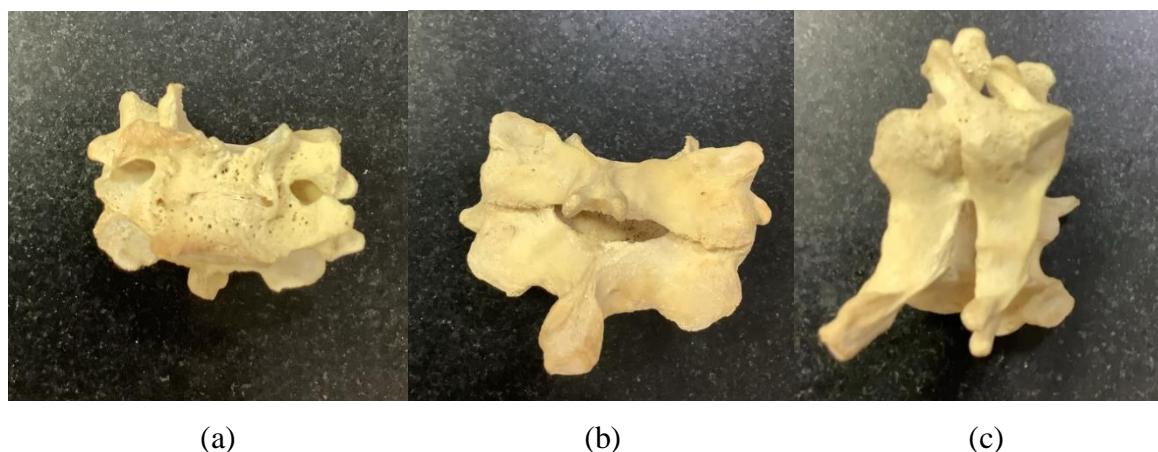


Figure 1: Shows the fused C6 and C7 cervical vertebrae. (a) Anterior view; (b) Posterior view; (c) Lateral view

DISCUSSION

In this study we observe that the C6 and the C7 bone have been fused due to which there are high chances of fracture. The C6 nerve roots pass through the vertebral column between C6 and C7 vertebra which controls the movement of the muscles in the forearm and wrist (3)(28). When the bones are fused it leads to nerve root compression due to which it hints to anesthesia and paralysis of the forearm and wrist (4). In the previous research in the fused C6 and C7 bone the superior articular facet and inferior articular facet were partially fused whereas in the present research the superior and inferior articular facet were completely fused. The fused cervical vertebrae does not show symptoms in the early stage but in the advanced stage it leads to degeneration in the non-segmental region due to which it hints to hypermobility and deterioration in the fused cervical vertebral region below and above it (3). Klippel Feil syndrome (KFS) is also known as cervical vertebral fusion syndrome which is a rare congenital condition caused by abnormal fusion of two of the seven bones present in the neck (29). Some of its signs are a short neck and lowered spine. Awareness of these anomalies can reduce the risk of anesthesia and paralysis (30). Early diagnosis helps in the progression in patients' lives by encouraging the subject to modify their lifestyle by evading undue stress.

Limitations of the study: The obtained cervical vertebrae were obtained as individual isolated bones. Hence the conditions of other cervical bony fusions are not clear.

Future Scope: The fused bones can be analysed by other computed assisted radiographic tools for accurate regions of ossification and fusion.

CONCLUSION

The human skeleton shows several abnormal fusions which some times may be asymptomatic and non-pathological, but in some other times it causes alarming pathological conditions with or without symptoms. The fused C6 and C7 bone have been observed and its clinical implications are elucidated. The studies need to be further continued to find a better method to avoid the fusion and awareness needs to be created about the clinical implications to avoid severe complications in the neck region.

AUTHOR CONTRIBUTIONS

Author 1: Dhivya Sarathi carried out the study by collecting data and drafted the manuscript.

Author 2: Karthik Ganesh Mohanraj, aided in conception of the topic, designing the study and supervision of the study, correction and final approval of the manuscript.

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CONFLICTS OF INTEREST

None declared.

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