FUSION OF AXIS WITH THIRD CERVICAL VERTEBRA

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ABSTRACT

BACKGROUND

During the embryological development if there is any fusion of the contiguous vertebra, it will result in the distraction or failure of normal development. The fusion of the vertebra may be congenital or acquired. However, the acquired is rare. Major problem with block vertebra is that they restrict the movements and results in several neurological disorders.

MATERIALS AND METHODS

This study is carried out in Department of Anatomy, Krishna Institute of Medical Sciences, Karad. We have observed 28 vertebrae and the axis was found to be fused with 3rd cervical vertebra. This fused vertebra was assessed and the photograph of the specimen was taken.

RESULTS

Among a total of 28 vertebrae examined, we identified 3 specimens of block vertebra which accounted for a total incidence of 0.10%. Figure 1 and 2 shows photographs of all 28 vertebrae and block vertebra taken from anterior and posterior aspects. The fusion included facet fusion, vertebral arch fusion and vertebral body fusion.

CONCLUSION

The observed incidence of fused cervical vertebrae in the present study was 0.10%. As the fusion of cervical vertebrae is associated with several clinical manifestations, early diagnosis is recommended. Further, more studies have to be undertaken in this area to understand and to diagnose early and also to develop more effective management techniques for the benefit of the society in general.

KEY WORDS

Vertebra, Fusion, Block Vertebra, Clinical Anatomy.

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BACKGROUND

There are total seven cervical vertebrae, out of which cervical vertebra three to six are considered as typical and cervical vertebra 1, 2, 7 are considered as atypical as they have different characteristic features.¹ The process of development is more complex for second cervical vertebra.² During the embryological development if there is any fusion of the contiguous vertebra, it will result in the distraction or failure of normal development.³ It was reported that there will be change in the craniofacial morphology if there is any failure of normal development of vertebra due to the fusion.⁴ In fact there may be severe pain in the neck and even leads to sudden death.⁵ The fusion of the vertebra may be congenital or acquired. However, the acquired is rare.⁶ Major problem with block vertebra is that they restrict the movements and results in several neurological disorders. However, the severity depends on the extent and number of vertebra involved. Hence, understanding the abnormalities in vertebra

is not only an academic interest, but also important at clinical point of view as this is a topic of interest in clinical subjects like orthopaedics, neurology and neurosurgery. Blocked vertebrae may result in increase in the biomechanical stress in the adjoining segments and cause to degenerative changes. Further, it causes the rupture of ligaments and also tear of intervertebral disc. The current study was undertaken to observe the incidence of fusion of axis with third cervical vertebra.

MATERIALS AND METHODS

Study Setting

The present descriptive study was carried out in Department of Anatomy, Krishna Institute of Medical Sciences, Karad.

Methods

We have observed 28 vertebrae and the axis was found to be fused with 3rd cervical vertebra. This fused vertebra was assessed, and the photograph of the specimen was taken.

RESULTS

Among a total of 28 vertebrae examined, we identified 3 specimens of block vertebrae which accounted for a total incidence of 0.10%. Figure 1 and 2 shows photographs of all 28 vertebrae and block vertebrae taken from anterior-posterior aspects. The fusion included facet fusion, vertebral arch fusion and vertebral body fusion.

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Figure 1. Photographs of all 28 Vertebrae and Block Vertebra taken from Anterior and Posterior Aspects

Figure 2. Photographs of Block Vertebra taken from Anterior and Posterior Aspects

DISCUSSION

Abnormalities during the time of development leads to fusion of the vertebra. Further, decrease or total absence of blood supply during the development also contributes for abnormal segmentation.⁷ As the fusion may be congenital or acquired, it is mandatory to differentiate the cause. This can be identified through observing the presence of trauma if any and also observing the x-ray evidences.⁸ The intervertebral disc is absent in case of fusion due to congenital cause.⁹ It was reported that the incidence of fusion of the vertebra was fusion of second and third cervical vertebra when compared to other vertebral fusions.¹⁰ This type of vertebral fusions result in abnormalities in the posture and also cause prolapse of disc.¹¹ Hence, the fusion of the vertebra has both embryological and clinical significance. The present study was undertaken to observe the incidence of fusion of axis with third cervical vertebra. The incidence observed was 0.10 percentages. Earlier studies reported that the incidence of fused second cervical vertebra with third was 0.5%.¹² Another study conducted by Sharma M et al, 6.25% of cervical vertebrae fusion in 48 dried adult vertebral columns.¹³ Soni et al reported that the observed incidence of fusion was 0.4 - 0.7 percentage.¹¹ Our study results are in accordance with earlier studies.

The fusion must be diagnosed in the early stages because the result of the fusion may vary from myelopathy, limitation of the neck movements or muscular weakness, atrophy and neurological sensory loss or associated with Klippel-Feil

syndrome.¹⁴ It was reported that the fused vertebra not only structurally, but also functionally acts as one.¹⁵ Early detection and diagnosis helps to manage the symptoms through advising the patients to change the lifestyle. Earlier studies suggested increasing the awareness regarding the vertebral fusion.¹⁶ Interestingly, it was observed that there was no gender difference in the incidence of the fusion of the vertebra.¹⁷

CONCLUSION

The observed incidence of fused cervical vertebrae in the present study was 0.10%. As the fusion of Cervical Vertebrae is associated with several clinical manifestations, early diagnosis is recommended. Further, more studies have to be undertaken in this area to understand and to diagnose early and also to develop more effective management techniques for the benefit of the society in general.

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