

ABNORMAL SPICULES ON THE INFERIOR ASPECT OF ANTERIOR ARCH OF ATLAS VERTEBRA

Das S*, Suri R*, Kapur V*

* Maulana Azad Medical College, New Delhi, India.

ABSTRACT

Anterior arch of the atlas vertebra is known to exhibit various developmental anomalies. Bony outgrowths, osteophytes, clefts and aplasia of the anterior and posterior arches of the atlas have received special attention by research workers. To the best of our knowledge, not many osteological studies have defined the spicules on the anterior arch of the atlas. The present study describes an abnormal atlas vertebra with 2 spicules on the inferior aspect, 2 additional facets inferior to the superior articular facets and a peculiar facet to the left of the posterior tubercle. These abnormal spicules may cause dysphagia or involve atlanto-occipital movements. Such anomalies may be misinterpreted in routine X rays as a degenerative disease. However, asymptomatic cases remain undetected throughout life. Such anomalies may be important in radiological, clinical, forensic and anthropological studies.

Key Words: Atlas, Anterior Arch, Anomaly, Spicules, Vertebra.

INTRODUCTION

Past research studies have reported the greater incidence of anomalies involving the posterior arch as compared to those of anterior arch.¹ The reported common defects in the anterior arch of the atlas are clefts, aplasia, osteophyte formation and outgrowths. Presence of such defects are associated dysphagia, spondylosis, altered atlanto-occipital and atlanto-axial movements. X ray and CT scans confirm the diagnosis. However, asymptomatic cases remain undetected throughout life.

The present case describes 2 abnormal spicules on the inferior aspect of the anterior arch of the atlas which were detected during routine osteology teaching. The presence of 2 additional facets on the inferior aspect of the superior articular facets may be viewed as an evidence of associated developmental defect. The presence of abnormal bony spicules may possibly be linked with altered morphology and orientation of anterior longitudinal ligament. Presumably, this unusual osteological profile may interfere with neck movements.

Address for correspondence :

Dr. Srijit Das

Maulana Azad Medical College, Bahadur Shah Zafar Marg, New Delhi - 110002, India.

Email: das_srijit23@rediffmail.com

Received Date : 21st Apr, 2005

Accepted Date : 25th Aug, 2006

CASE REPORT

During routine osteology teaching of the undergraduate medical students in the department of anatomy, we detected an anomalous atlas vertebra. The atlas bone was studied in detail and appropriate photograph and skiagram were taken.

Observations (Fig.1)

Anterior Arch: The anterior tubercle was very prominent. There were 2 abnormal spicules projecting from the inferior aspect of the anterior arch of the atlas. These spicules measured 0.5 cm × 0.5 cm. The facet on the posterior aspect of the anterior arch of the atlas, meant for articulation with odontoid was very prominent and measured 0.8 cm transversely. The superior articular facet measured 2.5 cm and 2.2 cm as maximum length on the left and the right sides respectively. The superior articular facet on the left side displayed an elongated pear shaped outline where as it exhibited an inverted L shaped outline on the right side. There were 2 additional facets each of 0.6 cm width, situated below the left and right superior articular facets respectively.

Posterior Arch: There was an additional facet to the left of posterior tubercle on the posterior arch of the atlas.

Foramen Transversarium: The transverse diameter of the foramen transversarium was found to be 0.7 cm and 0.6 cm on the left and right sides respectively.

DISCUSSION

The anterior arch of the atlas vertebra is reported to ossify from 2 centres in the first year of life.² Rarely, it may be formed from a single centre or from the extension of the lateral mass ventrally.² Often there is a failure of fusion of these 2 centres and it results in congenital cleft formation.² This anomaly has received much attention because of its resemblance to fractures in routine X rays.

At birth the anterior arch is cartilaginous but 20 % of the newborns have ossification centres at this point.³ During the first year, one or more ossification centres appear.³ At around 6-8 years, the anterior arch fuses with the lateral mass.³ Authors have underlined the role of inductive signals from the notochord and ventral neural tube which may induce a protuberance in the bone.⁴ Past research studies have described clefts, aplasia, osteophytes but very few reports on the osteological studies could be found in literature.

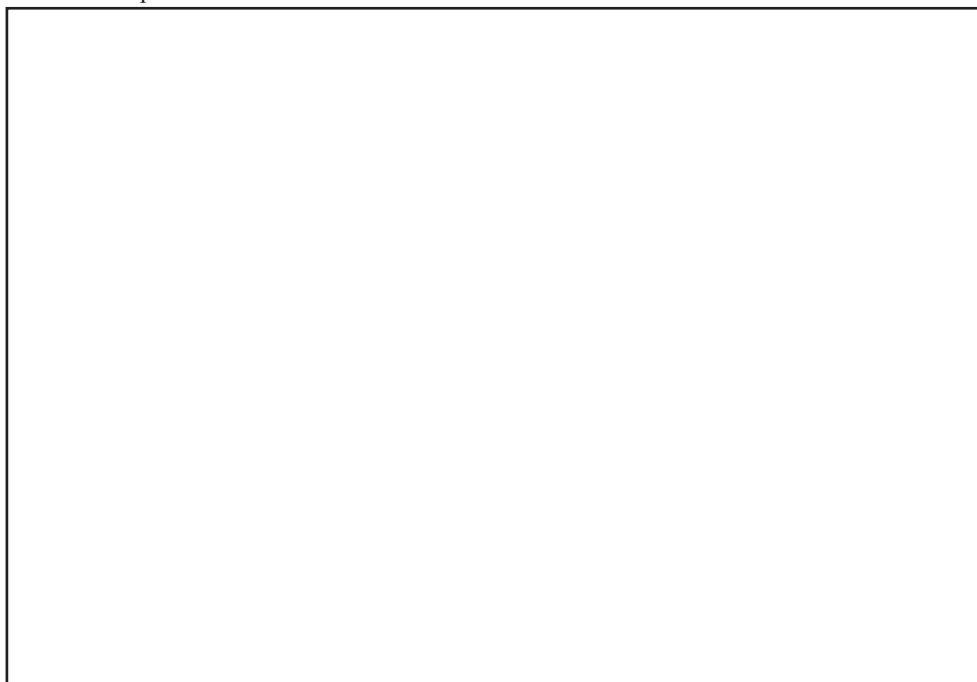


Fig. 1: Photograph of atlas vertebra (superior view) showing - 1. Spicules, 2. Superior articular facets 3. Additional facets, 4. Foramen transversarium, 5. Posterior tubercle, 6. Single additional facet.

A past study has described ossicle in the anterior arch of the atlas which had its base superiorly and the apex pointing inferiorly.⁵ The present case also describes the spicules to be projecting inferiorly.

The presence of 2 additional facets inferior to the superior articular facets as seen in this case may be due to the attachment of the transverse ligament on either sides, or they may be also related to any abnormal articulation between any bony extension from the occipital bone or from the axis vertebra. The difference in size of the foramen transversarium and the superior articular facets on the left and right sides respectively, suggests the possibility of some developmental defect. Clinically a change in the diameter of the foramen transversarium may have clinical significance because there are research reports describing the change in size of foramen transversaria as a result of the tortuosity of the vertebral artery passing through it.⁶

Such bony abnormalities may be detected in X ray and CT scan. In the present case, we obtained the skiagram of the bone (Fig.2) which did not reveal any osteophyte formation or exostosis.

The presence of additional facet to the left of the posterior tubercle on the posterior arch of the atlas may be due to excessive pull by the rectus capitis post minor muscle or may be a developmental defect. Such defects are rarely seen in atlas vertebra. The abnormal spicules as seen in this case, may have involved the anterior longitudinal ligament or the longus colli muscle causing associated symptoms. There have been past reports of ossicles formation within the anterior longitudinal ligament.⁷ The abnormal spicules may impinge upon the atlanto-occipital membrane thereby causing impairment in the movement, mainly that of flexion. The spicules may project into the pharynx thereby causing interference in deglutition, dysphonia and dyspnoea and these symptoms have been reported earlier by various research workers.^{8,9,10}

The presence of such anomalies are important for radiologists and clinicians in order to differentiate it from other pathological, traumatic and degenerative diseases. Such anatomical variations may also be relevant in forensic and anthropological studies.

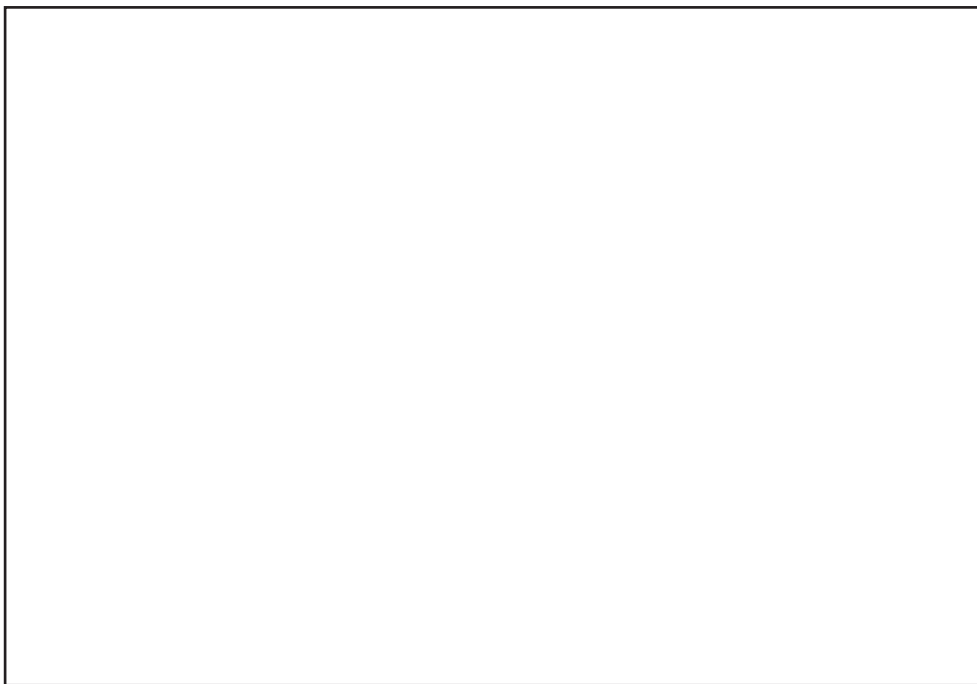


Fig. 2: Photograph of skiagram of atlas vertebra showing spicules (S) projecting inferiorly from the anterior arch of the atlas vertebra.

REFERENCES

1. IndiraDevi B, Shenoy SN, Panigrahi MK, Chandramouli BA, Das BS, Jayakumar PN Anomaly of arch of atlas- A Rare Cause of Symptomatic Canal Stenosis in Children. *Pediatr Neurosurg* 1997; 26: 214-218.
2. Walker J, Beggs I. Bipartite atlas and hypertrophy of its anterior arch. A case report. *Acta Radiologica* 1995; 36: 152-3.
3. Gehweiler JA Jr, Daffner RH, Roberts L Jr. Malformations of the atlas vertebra simulating the Jefferson fracture. *A J R* 1983; 140: 1083-1086.
4. Ilbay K, Evliyaoglu C, Etus V, Ozkarakas H, Ceylan S. Abnormal bony protuberance of anterior atlas causing dysphagia. A rare congenital anomaly. *Spinal Cord* 2004; 42: 129-31.
5. Kohler A, Zimmer FA (1956) *Borderlands of Normal and Early Pathologic in Skeletal Roentgenology*. New York: Grune & Stratton, Inc.
6. Hyyppa SE, Laasonen EM, Halonen V. Erosion of cervical vertebrae caused by elongated and tortuous vertebral arteries. *Neuroradiology* 1974; 7 : 49-51.
7. Keats TE. The Inferior Accessory ossicle of the Anterior arch of the atlas. *The American Journal of Roentgenology Radium Therapy & Nuclear Medicine* 1967; 101: 834-836.
8. Granville LJ, Musson N, Altman R, Silverman M. Anterior cervical osteophytes as a cause of pharyngeal stage dysphagia. *J Am Geriatr Soc* 1998; 46: 1003-1007.
9. Hilding DA, Tachdjian MO. Dysphagia and hypertrophic spurring of the cervical spine. *New England Journal of Medicine* 1960; 263: 11-14.
10. Maiuri F, Stella L, Sardo L, Buonamassa S. Dysphagia and dyspnea due to an anterior cervical osteophyte. *Arch Orthop Trauma Surg*

