Case Report

Left arteriae vertebralis canal in atlas — Kimmerle anomaly

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ABSTRACT

Atlas, the ring form of vertebra bears sulcus over posterior arch for third part of vertebral artery. We report a case of presence of osseous bridge on the left side of human atlas, connecting posterior part of superior articular process to the posterior arch of atlas. Sulcus vertebralis for third part of vertebral artery over superior aspect of posterior arch of atlas, converted into foramen. Also considered as ponticulus posterior of the atlas, an anatomic variant – is a retrogressive and morphological phenomenon considered as Kimmerle anomaly. Complete ossification of ligamentous free margin of posterior atlanto-occipital membrane can lead to complete arcuate foramen. Knowledge of this variant prevents complication during lateral mass screw fixation, posterior laminectomy, endovascular surgery. © IJAV 2010; 3: 130–131.

Key words  [atlas] [superior articular process] [ponticulus posterior] [foramen arcuale] [Kimmerle anomaly] [vertebrobasilar insufficiency]

Introduction

A surgery pertaining to atlantoaxial complex has always posed a challenge to surgeons because of complex anatomy and biomechanics of this region of spine. The sulcus arteriae vertebralis is situated over the superior surface of posterior arch of atlas at its junction with the lateral mass. The sulcus is occasionally converted into a foramen or a canal by a bony arch [1].

The foramen –foramen arcuale– formed houses vertebral artery, vertebral venous plexus and suboccipital nerve [2].

Case Report

We report a variant of unilateral left arteriae vertebralis canal in atlas in a dried human atlas bone, connecting posterior part of superior articular process to the posterior arch of atlas (Figure 1).

Discussion

Foramen of the posterior ponticulus, the terms ‘foramen sagittale’ and ‘foramen atlantoideum’ were coined by Loth-Niemiryze in 191, but were never widely used [3].

The term ‘Kimmerle’s variant’ coined by Kimmerle in 1930 is more frequently used in literature. Many synonyms have been used ex, ‘foramen retroarticular’ superior’ (Broacher, 1955), ‘canalis vertebralis’ (Wolff Heidegger, 1961), retroarticular vertebral artery ring (Lamberty & Zivanovic, 1973), ‘retroarticular canal’ (Mitchell, 1998) and ‘retrocondylar vertebral artery ring’ (Mitchell 1988) [3].

The sulcus/groove for third part of vertebral artery on the dorsal aspect of the atlas that is completely covered by an abnormal ossification is termed the ponticulus posticus. The resulting foramen contains the vertebral artery referred as arcuate foramen. The arcuate foramen, an osseous variant of the atlas should be considered during lateral mass screw fixation [4].

Complete ossification of ligamentous free margin of posterior atlanto-occipital membrane can lead to complete arcuate foramen. Clinical complaints such as vertigo, neck pain of discopathy are reported. Ponticle formation stated by many authors is a regressive and morphological phenomenon; furthermore this anatomical variation is not related to an increase in degenerative changes synonymous with aging. These characteristics not only serve as anthropological data but may also help in identifying the impact of complete arcuate foramen on the signs and symptoms of vertebrobasilar insufficiency [5].

Foramen arcuale is associated with Barre-Lieou syndrome, which represents symptoms of headache, retro-orbital pain, vasomotor disturbance of the face and recurrent disturbances of vision, swallowing and phonation due to alteration of blood flow within the vertebral arteries and an associated disturbance of periarterial disturbance of periarterial nerve plexus [6].

Foramen arcuale is a potential clinical/surgical significant anatomical variant of the atlas; leads to symptomatic entrapment, additional compression of the vertebral...
Figure 1. Foramen arcuale of atlas. (1: osseous bridge connecting posterior part of condylar process and posterior arch of atlas; 2: foramen arcuale; red arrow: route for the third part of vertebral artery to pass through the foramen arcuale; 3: posterior tubercle; 4: superior articular process; 5: foramen transversarium)

References


artery by a lateral ponticle could very likely result in stenosis of the vertebral artery [7].

The groove for vertebral artery on posterior arch of atlas may be bridged forming a canal through which artery passes, knowledge of this variant is a must for surgeons performing posterior laminectomy of atlas [8].

Foramen arcuale may be protective against vertebral artery injury, discovery of variant may necessitate change in surgical management, and could even increase the rate of surgery-related complications [8].

MacAlister has asserted that the foramen arcuale is a direct homologue of superior oblique process in some mammals. Tartz and Nathan have stated that foramen arcuale might be considered as an accessory transverse foramen of atlas. The foramen arcuale is an anatomical variant that the neurosurgeon should consider when undertaking endovascular surgery at posterior atlas [9].