

Case Report

Retro-Articular Vertebral Artery Foramen of Atlas Vertebra-A Case Study in Dry Bones

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ABSTRACT

Upper surface of the posterior arch of atlas presents a groove for the lodgement of the 3rd part of the vertebral artery. This groove can be converted into a foramen by a bony spicule extending from the anterior and posterior margins of the groove for the vertebral artery. Sometimes these are referred to as ponticles. The current study used 25 adult atlas vertebrae, which were studied for the presence of complete or incomplete postero-lateral foramen. This knowledge is very useful for the neurosurgeons, orthopaedic surgeons, radiologists & also for anthropologists.

Key Words: Foramen, posterior arch, ponticles, retro-articular, vertebral artery.

INTRODUCTION

Atlas is a ring shaped first cervical vertebra having anterior arch, posterior arch and two lateral masses. The vertebral artery arises from the first part of subclavian artery. Then it ascends through the foramen transversaria present in the upper six cervical vertebrae except the seventh cervical vertebra. It then travels towards the lateral mass of the C1 vertebra. From there it turns posteriorly and laterally & then lies in the groove present on the upper surface of the posterior arch of C1. Thereafter it enters the foramen magnum to supply the structures present inside the cranium. ⁽¹⁾ Due to extra growth from the anterior and posterior end of this groove, it can be converted into a complete foramen for the

passage of vertebral artery. ⁽²⁾ Several synonymus terms were used for this foramen as arcuate foramen, retro-articular vertebral ring, retro-condylar vertebral arterial ring, ponticulus ponticus. ⁽³⁾ This foramen may cause vertebro-basilar insufficiency, so this study is very important for neurosurgeons.

MATERIALS AND METHODS

The current study carried on 25 Atlas vertebrae available in the dept. of Anatomy, Kalinga institute of medical sciences, Bhubaneswar. All the vertebrae were examined for the presence of retro-articular ring both complete and incomplete, results were tabulated.

RESULTS

Features			
Complete ring	Bilateral	Unilateral right	Unilateral left
	0	2	0
Incomplete ring	Bilateral	Unilateral right	Unilateral left
	3	2	4

INCIDENCE:

Complete ring: - bilateral:-0%
 Unilateral right:-8%
 Unilateral left:- 0%
 Incomplete ring: - bilateral:- 12%
 Unilateral right:- 8%
 Unilateral left:- 16%



FIG1:- ATLAS VERTEBRA SHOWING COMPLETE RING FORMATION ON THE RIGHT SIDE ONLY



FIG2:- ATLAS VERTEBRA SHOWING COMPLETE RING FORMATION ON THE RIGHT SIDE ONLY



FIG3:-ATLAS VERTEBRA SHOWING INCOMPLETE RING ON THE LEFT SIDE

DISCUSSION

The presence of this postero-lateral foramen for the passage of vertebral artery is due to the ossification & formation of ponticles in the lower border of the posterior-atlanto-occipital membrane. ⁽⁴⁾

This formation of the canal around the vertebral artery may compress this artery while passing through the foramen transversarium into the foramen magnum situated in the occipital bone ⁽⁵⁾ Compression can be mild to severe & mostly during the rotatory movements of the cervical spine, results in vertebro-basilar ischemia due to reduction in blood flow towards brain. ⁽⁶⁾ In most of the studies it is found that the vertebro-arterial tunnel is complete in case of males and incomplete in case of females. It is thought to be one of the genetic feature may be due to the process of ossification in the course of aging process or can be remnant of the pro-atlas also known as occipital vertebra which represents rudimentary transverse process of the pro-atlas. ⁽⁷⁾

Rekha et al., noticed out of 200 macerated atlas, posterior ponticuli in 62(31%), lateral in 13(6.5%) and posterolateral in 5(2.5), complete ponticuli in 9(4.5%), incomplete in 69(34.5%) and bilateral 34(17%), unilateral in 46(28%), right sided in 24(12%) and left sided in 22(11%).⁽⁸⁾

Radiographic study reveals about presence of ponticulus posticus bilateral complete in 34.5%, bilateral incomplete in 11.6%, one complete and one incomplete 09.5%, unilateral complete in 24.8%, unilateral incomplete in 19.6% and complaints which exhibits in ponticulus posticus, back pain (dorsal, lumbar, sacral) in 36%, headache, vertigo, diplopia in 2.9%, neck, brachial symptoms in 23.7%, hip, leg pain 08.2%, tension, hypeactivity, insomnia, high blood pressure in 04.3%, respiratory illness in 01.7%.⁽⁹⁾

This tunnel when present can make the lateral mass screw fixation difficult. This variation is also of considerable importance to a radiologist as it is visible on radiology and can point towards the underlying disease process.⁽¹⁰⁾

CONCLUSION

This kind of variations should to be kept in mind while planning the surgery in this region of cranio-vertebral junction like screw fixation in the lateral mass of atlas vertebra or any kind of manipulations in cervical spine. This tunnel can increase the possibility of intraoperative complications. It should be kept as a predisposing factor for vertebra-basilar insufficiency, especially on rotating the neck.

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