

Study of Abnormal Foramen Over the Posterior Arch of Atlas Vertebra

Estudio de Forámen Anormal sobre el Arco Posterior de la Vértebra Atlas

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SUMMARY: The aim of this research was to study the anatomical aspects of abnormal foramen over the posterior arch of atlas vertebra. Posterior arch of atlas vertebrae was studied for abnormal foramen in sixty-seven adult human atlas vertebrae and findings were noted. In 2.98% of cases, unilateral complete abnormal foramen on the posterior arch of atlas vertebra was found. Clinicians should be aware about this variation on posterior arch of atlas, which may produce headache, vertigo, vertebrobasilar insufficiency and shoulder pains.

KEY WORDS: Atlas; Vertebra; Posterior arch; Foramen; Bony bridge; Groove.

INTRODUCTION

The first cervical vertebra is called as atlas vertebra which does not have a body. It has two arches, anterior and posterior. The posterior arch is longer than anterior arch and represents a groove on its superior surface for third part of vertebral artery and dorsal ramus of first cervical spinal nerve. Normally third part of vertebral artery comes out of foramen transversarium of atlas vertebra and lies on the groove over the superior surface of posterior arch. In some cases, this groove on the posterior arch may get converted in to complete or partial bony foramen (Standring, 2005). This abnormal foramen is studied in detail.

MATERIAL AND METHOD

Sixty seven (67) dry, adult human atlas vertebrae collected from north Karnataka region were studied for abnormal

foramen on the superior surface of posterior arch of atlas vertebra and location, extent, unilateral or bilateral, type of foramen, whether completely or partially formed were studied.

RESULTS

Sixty seven adult human atlas vertebra were studied. Out of these, in 2 cases (2.98%) completely ossified unilateral bony foramen was found over the superior surface of posterior arch. In this case one was on left side and the other was on right side of posterior arch. which were roughly circular in shape, 3mm from the root of posterior arch, measuring 4-5mm in diameter. It is shown in photo 2 with tying threads.

In two vertebrae, partial or incompletely ossified bilateral abnormal foramen was found on right arch (Fig. 1).

DISCUSSION

Among the cervical vertebrae, atlas vertebra shows many variations with respect to foramina transversaria, abnormal foramen on the posterior arch and fusion of atlas vertebra with occipital bone (Nayak *et al.*, 2005). Hasan *et al.* (2001) classified this abnormal foramen in to six groups.



Fig. 1. Partial or incompletely ossified bilateral abnormal foramen in the atlas.

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Many authors have studied about this foramen previously and have found its occurrence in 9.8-25.9% of cases (Young *et al.*, 2005; Mitchell, 1998).

Paraskevas *et al.* (2005) noted higher occurrence of complete canal for vertebral artery in labourers compared to that of nonlabourers, revealing chances of protective mechanism of the bony canal. He also noted the higher incidence of canal in the 5-44 years of age group.

Taitz & Nathan (1986) proposed a hypothesis that carrying heavy objects on head and other mechanical factors may play a role in development of these bony foramen. He also found the occurrence of partial posterior bridging of atlas in 25.9% and complete bridging in 7.9% of cases.

Bergman *et al.* (1988) reported that atlas vertebra may show incomplete ossification of anterior and posterior arches and posterior arch may show defect or tunnel for vertebral artery. Ossification of ligaments, foramen of bony bridges around vessels may produce compression effects and may interfere with regional surgeries (Limousin, 1980). Cushing *et al.* (2001) noted the tethering of the vertebral artery in the abnormal bony canal.

Clinicians should have awareness regarding this bony abnormal foramen in patients with neck pain, shoulder pain, vertigo, and headache complaints. Cervical spine radiography is helpful to make out arcuate foramen (Cakmak *et al.*, 2005).

This abnormal bony foramen may lead difficulty for instrumentation in this area. It may also hinder the blood flow in vertebral artery (Bilodi & Gupta, 2005).

In conclusion, although some authors proposed hypothesis that presence abnormal bony foramen may have a protective role for vertebral artery, but it may also produce compression effect and may hinder blood supply to vertebral artery. physicians, surgeons, neurologists, neurosurgeons, anaesthetists and radiologists should be aware about this variation on posterior arch of atlas vertebra which may produce head ache, vertigo, vertebrobasilar insufficiency and unexplained shoulder pains.

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RESUMEN: El objetivo fue observar los aspectos anatómicos de un foramen anormal presente sobre el arco posterior del atlas. Se estudiaron 67 vértebras atlas de humanos adultos. En el 2,98% de los casos, se encontró un foramen unilateral anormal completo sobre el arco posterior del atlas. Los clínicos deben estar conscientes de esta variación anatómica, la cual podría producir cefalea, vértigo, insuficiencia vertebrobasilar y dolores en los hombros.

PALABRAS CLAVE: Atlas; Vértebra; Arco posterior; Foramen; Puente óseo; Foramen.

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