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ORIGINAL ARTICLE

Anatomical Variation of Foramen Transversarium in Cervical Vertebrae- A Morphological Study

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ABSTRACT

Background: The foramen transversarium (FT) is a identification feature of cervical vertebrae which differentiate it from the other vertebrae. The present study was conducted to assess variation of foramen transversarium in cervical vertebrae. **Materials & Methods:** The present study was conducted in the department of Anatomy. It comprised of 140 cervical vertebrae of either gender. Vertebrae were assessed carefully and photographed. The variation in shape and number of FT was assessed and recorded. **Results:** Typical cervical vertebrae were 128 and atypical cervical vertebrae were 12 in number. Typical cervical vertebrae were unilateral double in 68% and bilateral double in 32%. Atypical cervical vertebrae were unilateral double in 14% and bilateral double in 76%. **Conclusion:** Author found typical cervical vertebrae in maximum cases. Other variation was occurrence of bilateral double vertebrae.

Key words: Cervical vertebrae, foramen transversarium,

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INTRODUCTION

The foramen transversarium (FT) is a identification feature of cervical vertebrae which differentiate it from the other vertebrae. It is present in laterally present process called transverse process. Transverse process directed laterally and forward, every process contain anterior and posterior root, in between two root foramen transversarium present.[1] Vertebral artery most important artery of the body which supply the brain, at the level of pons two vertebral artery fused and form basilar artery which supply the brain.[2] Vertebral artery have four part in which second part of it pass through upper six foramen transversarium of cervical vertebrae along with it vertebral vein and nerve plexus around it pass, vertebral artery is not pass through seventh cervical foramen transversarium it only contain vertebral vein.[3] Foramen transversarium is situated on the transverse process of the C1- C7 cervical vertebrae. It transmits the vertebral artery, veins and sympathetic nerves.

Foramen transversarium is known to exhibit various variations with regard to its size and shape, it may be duplicated or even absent. The present study was conducted to assess variation of foramen transversarium in cervical vertebrae.

MATERIALS & METHODS

The present study was conducted in the department of Anatomy. It comprised of 140 cervical vertebrae of either gender. The study protocol was approved from institutional ethical committee. Broken vertebrae were excluded from the study. Vertebrae were assessed carefully and photographed. The variation in shape and number of FT was assessed and recorded. Results thus obtained were subjected to statistical analysis.

RESULTS

Table I shows that typical cervical vertebrae were 128 and atypical cervical vertebrae were 12 in number.

Table II, graph I shows that typical cervical vertebrae were unilateral double FT in 68% and bilateral double FT in 32%. Atypical cervical vertebrae were unilateral double FT in 14% and bilateral double FT in 76%.

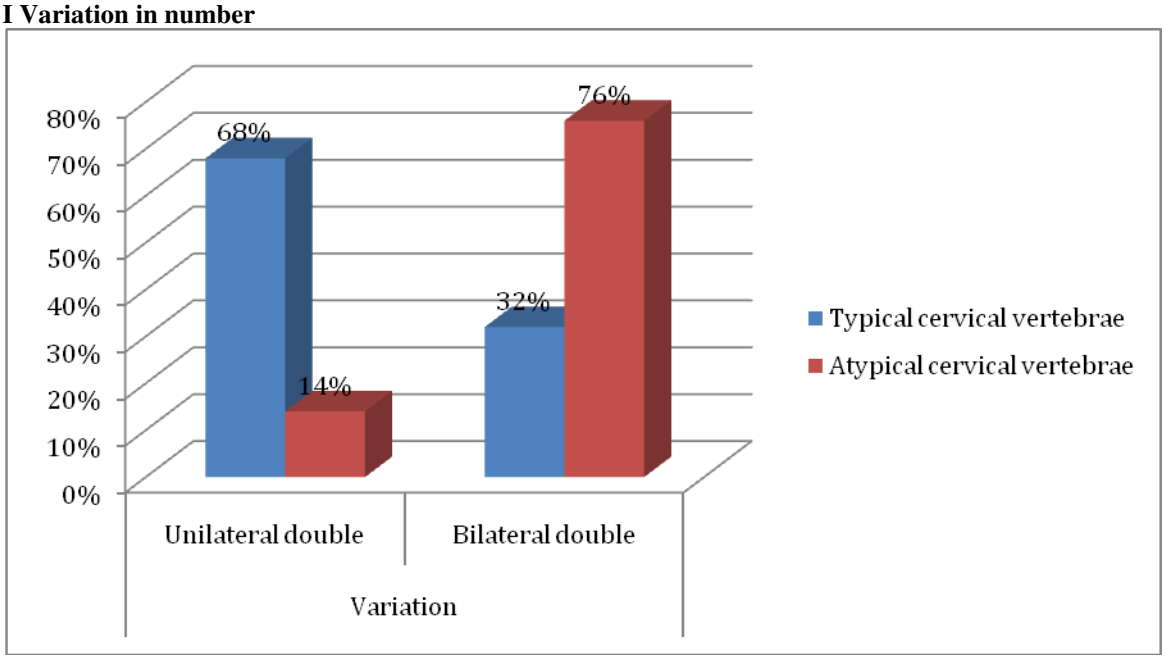
Table I Type of cervical vertebrae

Type	Number
Typical cervical vertebrae	128
Atypical cervical vertebrae	12

Table II Variation in number

Type	Variation	
	Unilateral double foramen transversarium (FT)	**Bilateral double Foramen transversarium**
Typical cervical vertebrae	68%	32%
Atypical cervical vertebrae	14%	76%

Graph I Variation in number



DISCUSSION

The occurrence of vertebrobasilar insufficiency caused by rotation of the head has been reported due to thickened fibroligamentous structures, osteophyte formation, thyroid cartilage compression, and congenital absence of the transverse foramen. The transverse foramina form the passageway through which the vertebral artery ascends to enter the cranium bilaterally.[6]The compression of the vertebral artery as a result of stenosis of the transverse foramen may also lead to clinically important consequences for patients at risk. There is scanty literature available on the diameter of the transverse foramen and its relationship to the uncovertebral joint.[7]The present study was conducted to assess variation of foramen transversarium.

In present study, out of 140 vertebrae, typical cervical vertebrae were 128 and atypical cervical vertebrae were 12 in number. Manoj et al[8] found total 24 vertebrae having double FT out of 175 cervical vertebrae. Which include 12 vertebrae having bilateral double FT and 12 vertebrae having unilateral double FT. In present study we found that typical cervical vertebrae were unilateral double FT in 68% and bilateral double FT in 32%. Atypical cervical vertebrae were unilateral double FT in 14% and bilateral double FT in 76%.

Rathnakar et al[9] found that the mean diameter of the right/left transverse foramen varied from 2.54 mm to 7.79 mm (mean = 5.55 ± 0.87 mm) and from 2.65 mm to 7.35 mm (mean = 5.48 ± 0.77 mm), respectively. The transverse foramen was less than 3.5 mm in three vertebrae on the right and two on the left. The osteocytes observed in 21.3% of specimens and the narrow transverse foramen may place patients at risk for vertebrobasilar insufficiency or thrombus formation. The mean distance of the transverse foramen from the medial margin of uncinate process is an important landmark to avoid vertebral artery laceration and was 5.0 ± 0.87 mm (range: 3.5–7.9 mm) on the right and 5.0 ± 1.0 mm (range: 3.2–7.7 mm) on the left side. No statistically significant difference was observed between the right and left sides. The accessory transverse foramina seen in 24% of vertebrae suggest duplications or fenestrations in the vertebral artery.

The anatomical variation is occur due to main two cause, if any change in development of vertebral artery or development of coastal element and transverse element if any change in this it cause cereberovascular insufficiency which is dangerous. The knowledge of the FT variations are most important for physicians, and radiologist in the diagnosis of the medical conditions. If any abnormal bony growth inside the FT or accessory foramen transversarium which compress the vertebral artery and vertebral vein which cause severe vascular lesion of brain.

CONCLUSION

We found typical cervical vertebrae in maximum cases. Other variation was occurrence of bilateral double vertebrae.

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