International Journal of Psychosocial Rehabilitation
,Vol.13,Issue01,2009

A morphological study to evaluate variations of foramen transversarium in atlas vertebrae- An Original Research

Dr.DnyandeoKisanChopade

ABSTRACT:

Background*: The only ring shaped cervical vertebra present in human body is atlas, having articulations with occipital and axis vertebra. Present study aimed to find incidence and clinical correlation of accessory foramen transversarium in cervical vertebrae.*

Material and method: *100 dried macerated atlas vertebrae of both the sexes from various bone banks of region were obtained for the study of accessory foramen transversarium.*

Results*: All the 100 atlas vertebrae which were studied showed presence of foramen transversarium as a characteristic feature of cervical vertebra. Out of total, 25 (25.0%) had accessory foramina on the posterior arch. When studied for further detail it was found that out of these 10 had it bilaterally whereas 9 on right side and 6 on left side only. Maximum accessory foramens were found to be extended side to side elliptical in shape (i.e. 66%) whereas oval (15.0%) and vertical elliptical (18.0%) shape too was there. The right sided foramens were with larger sizes as compared to left sided ones and in 28.3% cases they were even of the size of Foramen transversarium.*

Conclusion*: This study is important for clinician/ surgeons to understand incidence, variation and importance of accessory foramen transversarium and its clinical importance to avoid misdiagnosis in their clinical practice.*

Key words: *Atlas, axis vertebra, foramen transversarium.*

I. INTRODUCTION:

Atlas the first cervical vertebra supports the head. It is ringshaped; it has no body no spine, has a short anterior arch, along posterior arch, two lateral masses and two long transverse processes projecting laterally from the lateralmasses containing foramen transversarium, sometimes deficient leaving foramen transversarium incomplete.[1]The transverse process is unusually long which acts as an effective lever for rotatory movements of head. It is pierced by foramen transversarium which lodges the vertebral vessels and sympathetic plexus.[2]Since atlas is an important component of cranio- vertebral joint and has an immense clinical significance, its foramina's are considerable entities. Foramen transversarium has been studied previously by various workers for its functional morphology.[3, 4,5]

[1]*Associate Professor, Department of Anatomy, Peoples College of Medical Sciences & Research Centre, Bhopal, M.P., India*

Received:05March2009|Revised:21April2009| Accepted:25April2009

Presence of an accessory foramen may be in relation to availability of an additional vertebral artery. The vertebral artery may have dual origin which moreover has side by side course with the main vessel.

With increasing incidenceof neck injuries and related syndromes necessitates thePhysicians, Orthopaedicians, Otirhinolaryngologists,Neurosurgeons and Radiologists to know the bony variations of the atlas vertebra and its transverse foramina.Present study aimed to find incidence and clinical correlation of accessory foramen transversarium in cervical vertebrae

II. MATERIAL AND METHOD:

100 dried macerated atlas vertebrae of both the sexes from various bone banks of region were obtained for the study of accessory foramen transversarium. Broken atlases were excluded from the study. Various observations regarding morphometric analysis were made in each case where it was present and recorded.

III. RESULTS:

All the 100 atlas vertebrae which were studied showed presence of foramen transversarium as a characterstic feature of cervical vertebra. Out of total, 25 (25.0%) had accessory foramina on the posterior arch. When studied for further detail it was found that out of these 10 had it bilaterally whereas 9 on right side and 6 on left side only. (Table 1)

Maximum accessory foramens were found to be extended side to side elliptical in shape (i.e. 66%) whereas oval (15.0%) and vertical elliptical (18.0%) shape too was there. (Table 2)

The right sided foramens were with larger sizes as compared to left sided ones and in 28.3% cases they were even of the size of Foramen transversarium.

Table 1: Characteristics of cervical vertebra examined

Total Number of cervical vertebra examined	Vertebra with unilateral accessory foramen tranversarium		Vertebra with bilateral accessory foramen tranversaria	Number of vertebra with accessory foramen tranversaria	% of incidence
	Right	Left			
100	9	6	10	25	25

Table 2: Shape of Foramen transversarium

Shape	Percentage
Elliptical	66
Oval	15
Vertical elliptical	18

DISCUSSION:

As atlas is among the three important constituents ofcraniovertebral junction it is clinically more important dueto grooves and foramina in its posterior and lateral 9 margins.

The presence of an accessory foramen of the atlas showed immense morphometric variability. In the present study, shape of maximum observed atlas vertebrae was of category Type III accordingto Taitz et al.

Received:05March2009|Revised:21April2009| Accepted:25April2009

classification.[6] Complete bilateral or incomplete bilateral foramina were reported while absolute absence of foramina transversarium which is a very rare variation was also found on left side, unilaterally.[8,9,10] It was also reported that an arcuate foramen on the posterior arch of atlas with complete fusion between the lateral masses and occipital condyles.[7] Studies revealed that Accessory FT is most common in 6th cervical vertebra (70%) and rarest at 3rd cervical vertebra (2.8%).[10]In cases of narrow foramen the cause might be attributed to osteophytes that are responsible for it.[11] Even carrying heavy loads on head had marked implications regarding anomalies of atlas vertebra.[11] The shapes of foramina have direct correlation with the tortuosity and dimensions of its major vessels. It was also reported that the tethering of vertebral artery as it passes through the extra canal on posterior arch which may lead to potential posterior circulation stroke.[12]

Nayak in 2007 observed bilateral absence offoramen transversarium.[13]

IV. CONCLUSION:

This study is important for clinician/ surgeons to understand incidence, variation and importance of accessory foramen transversarium and its clinical importance to avoid misdiagnosis in their clinical practice.

REFERENCES

1. Standring S. Gray's anatomy: the anatomical basis of clinical practice.39th edn, Edinburgh: Elsevier Churchill Livingstone; 2005.
2. Wysocki J, Buhrowski M, Reymond J, Kwiastkowski J. Anatomicalvariants of the cervical vertebrae and the first thoracic vertebra inman. Folia Morpho (Warsz) 2003;62: 357-63.
3. Das Srijit, Suri R, Kapur V. 2005. Double foramen transversaria: An osteological study with clinical implications. Int. Med J 12: 311-313.
4. SateeshaNayak B.2008. Abnormal foramina on the posterior arch of atlas vertebra. Int. J. Anat. Variation, 1: 21-22.
5. AkramAboodJaffar, HaydarJavedMobarak, Samir AdilNajm. 2004. Morphology of the foramen transversarium. A correlation with causative factors. Al-kindy Col Med.J. 2(1): 61-64.
6. Taitz C, Nathan H, Arensburg B.1978. Anatomical observations of the forametransversaria. J NeurolNeurosurg Psychiatry. 41: 170-176.
7. Nayak S: Bilateral absence of forametransversaria in atlas vertebra: a case report. Neuroanatomy 2007; 6:28-29.
8. Hasan M, Shukla S, Siddiqui MS, Singh D. Posterolateral tunnels andponticuli in human atlas vertebrae. J anat.2001; 199:339-343.
9. Vasudev N, Kumar R. Absence of foramen transversarium in the human atlas vertebra: a case report. Acta Anat. 1995; 152: 230-233.
10. JarostawWysocki, MariuszBubrowski, Jerzy Reymond, Jan Kwiatkowski 2003. Anatomical variants of the cervical vertebra and the first thoracic vertebra in man. Via medica, 62: 357-363.
11. Barbara C, Erik B, Elke V, Katharina DH, Dirk C.2005. Extrinsic factors for compromised blood flow in the vertebral artery: anatomical observations of the transverse foramina from C3 to C7. Surg.Radiol. Anat 27:312-316.

Received:05March2009|Revised:21April2009| Accepted:25April2009

12. Cushig KE, Ramesh V, Gardner-Medwin D, Todd NV, Gholkar A, Baxter P, Griffiths PD.2001.Tethering of the vertebral artery in the congenital arcuate foramen of the atlas vertebra: a possible cause of vertebral artery dissection in children. DMC 43: 491-96.
13. Nayak BS. Bilateral absence of foramen transversarium in atlasvertebra: a case report. Neuroanatomy 2007; 6:28-9.

Received:05March2009|Revised:21April2009| Accepted:25April2009