Research Paper

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Sixth cervical vertebra with unilateral double foramen transversarium and non-bifid spine : A rare case

Medical Science

KEYWORDS : Foramen Transversarium, cervical vertebrae, Vertebral artery, Spinous process

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ABSTRACT

The foramen transversarium (FT) is the characteristic feature of cervical vertebrae, which differentiates them from other vertebrae. The vertebral artery, vertebral vein and sympathetic plexus passes though these foramen. Variation in shape, size & number affects the anatomical course of the vertebral vessels and consequently may cause pathological conditions like Vertebrobasilar insufficiency. Knowledge of variations in foramen transversarium is very important for neurosurgeons and radiologists for reporting and planning for surgeries around the cervical spine and avoiding complications after surgeries. In the present case, we observed very uncommon finding of unilateral double foramen transversarium along with a nonbifid spinous process in sixth cervical vertebra. Right as well as left main foramen transversarium are rounded in shape but right sided foramen is slightly larger than the left. Finding of present study is helpful for spine surgeons in planning surgery around the cervical vertebrae. These variations are also of importance and helpful for anatomist, anthropologist and radiologist.

INTRODUCTION:

The foramen transversarium (FT) in transverse process is the characteristic feature of adult cervical vertebrae, which differentiates them from other vertebrae. The vertebral artery, vertebral vein and sympathetic plexus passes though these foramen. Variation in shape, size & number affects the anatomical course of the vertebral vessels and consequently may cause pathological conditions. Vertebrobasilar insufficiency is among one of them, which occurs as a result of compression of vertebral artery during neck movements, which is characterized by headache, migraine and fainting attack.[1] Since, blood supply of inner ear also comes from vertebral and basilar arteries, so any spasm of these arteries due to irritation of sympathetic plexus, may causes labyrinthine or hearing disturbances along with neurological symptoms.[2] The transverse process has ventral and dorsal bar, which terminates laterally as corresponding tubercles. These tubercles are connected, lateral to the foramen, by the costal (or, intertubercular) lamella.[3] The anterior tubercle of the sixth cervical vertebra is longest, known as carotid tubercle of Chassaignac. The carotid artery can be compressed in the groove formed by the vertebral body and this tubercle. The spinous process is present in all cervical vertebrae except first i.e. atlas. This spinous process is bifid in all typical cervical vertebra i.e. C3 to C6 vertebrae and nonbifid & longest in C7 vertebra, which is known as vertebra prominence, commonly used as bony landmark in counting vertebral levels. The absence of bifid spinous process in third, fourth and sixth cervical vertebra is an extremely rare variation and these findings may be of clinical interest to neurologists, radiologists, orthopedic surgeons, anthropologists and forensic personnel.[4]

CASE REPORT:

During the routine osteology demonstration classes of cervical vertebrae for the undergraduate medical students at the Indira Gandhi Institute of Medical Sciences (Patna, Bihar, India), we found a unilateral right sided double foramen transversarium in sixth cervical vertebra (Figure:1). One is main and other is accessory foramen transversarium. Right as well as left main foramen transversarium are rounded in shape but right sided foramen is slightly larger than the left. Accessory foramen transversarium is complete. Carotid Tubercle is present on each transverse process, which is characteristic feature of sixth cervical vertebra. In present case, we also observed nonbifid spinous process (Figure 1) and length of spinous process is 12 mm.

DISCUSSION:

Many studies have been carried out on the variation in shape, size & number of foramen transversarium. In one of the study, which was done on 22 Byzantine cervical vertebrae by Kaya et al[1] , five cervical vertebrae (22.7%) was found having double foramen transversarium in which three cases were unilateral & two cases were bilateral. Patil et al[5] studied on 175 cervical vertebrae and found double foramen transversarium in 5.71% cases, in which 3.42% cases were unilateral & 2.28% cases were bilateral. Das S et al[6] found only two cases (1.5%) of double foramen transversarium during their study of 132 dried human cervical vertebrae. In an another study conducted by Muralimanju et al [4] on 363 cervical vertebrae, only six cervical vertebrae (1.6%) showed bilateral accessory foramina and only one cervical vertebrae (0.3%) showed unilateral accessory foramina. Laxmi C et al[7] observed only 10 cases (4.76%) of double foramen transversarium during study of 210 cervical vertebrae, among them unilateral double FT was found in 8 vertebrae (3.80%) while the bilateral double FT was found only in 2 vertebrae (0.95%).The accessory foramina transversarium were most common at the lower cervical vertebrae (i.e. C5, C6 & C7), mostly in the sixth cervical vertebra according to El Shaarawyet al.[8] Murugan M et al[9] studied 150 cervical vertebrae & reported 19 cases (12.6 %) having bilateral double FT. Mishra GP et al[10] reported a sixth cervical vertebra with bilateral double foramen transversarium and non-bifid spine while in present study, we found unilateral double foramen transversarium in sixth cervical vertebra. Sharma et al[11] observed accessory foramina transversarium in 16 among 200 cervical vertebrae. Among C3 to C6 vertebrae, incidence of double FT was higher in C6 in their study. In an another study on 480 foramen transversarium by Taitz et al[2] , double FT only shown in 34 cervical vertebrae. Among that only six vertebrae (C6, C7) were of equal size while in other vertebrae, the accompanying foramen were small in size. In our study, we found unilateral double foramen transversarium in sixth cervical vertebra with nonbifid spine. These variations is helpful for spine surgeons in planning surgery around the cervical vertebrae & to avoid post-operative complications. These variations are also of importance and helpful for anatomist, anthropologist and radiologist.

Figure 1: Unilateral right sided double foramen Transversarium with nonbifid spinous process in sixth cervical vertebra

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