Extrinsic risk factors for compromised blood flow in the vertebral artery: anatomical observations of the transverse foramina from C3 to C7.

Cagnie B, Barbaix E, Vinck E, D'Herde K, Cambier D.

Department of Rehabilitation Sciences and Physiotherapy, Ghent University Hospital, De Pintelaan 185, 6K3, 9000 Ghent, Belgium. barbara.cagnie@ugent.be

The vertebral artery (VA) is often involved in the occurrence of complications after spinal manipulative therapy. Due to osteophytes compressing the VA anteriorly from the uncinate process or posteriorly from the facet complex, the VAs are susceptible to trauma in the transverse foramina. Such altered anatomical configurations are of major clinical significance, as spinal manipulations may result in dissection of the VA with serious consequences for the blood supply to the vertebrobasilar region. The purpose of this study is to describe numerous structural features of the third to seventh cervical vertebrae in order to contribute to the understanding of pathological conditions related to the VA. The minimal and maximal diameter of 111 transverse foramina in dry cervical vertebrae were studied. The presence of osteophytes and their influence on the VA were evaluated at the vertebral body and at the superior and inferior articular facets. The diameter of the transverse foramina increased from C3 to C6, while the transverse foramina of C7 had the smallest diameter. At all levels the mean dimensions of the left foramina were greater than those of the right side. Osteophytes from the uncinate process of C5 and C6 vertebrae were found in over 60% of dry vertebrae. Osteophytes from the zygapophyseal joints were more frequent at C3 and C4 vertebrae. About half of the osteophytes of the uncinate and of the superior articular process partially covered the transverse foramina. This was less common with those of the inferior articular facets. Osteophytes covering the transverse foramen force the VAs to meander around these obstructions, causing narrowing through external compression and are potential sites of trauma to the VAs potentially even leading to dissection. We strongly advocate that screening protocols for vertebrobasilar insufficiency (VBI) be used prior to any manipulation of the cervical spine and should include not only extension and rotation but any starting position from which the planned manipulation will be performed.

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