

# A VARIATION IN THE COURSE OF THE HUMAN VERTEBRAL ARTERY: ANATOMICAL AND CLINICAL SIGNIFICANCE

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**Abstract** - The macroscopic study of 31 adult cadavers proved a variation to Matula and Lang's study. In 2 cases (6.4%) a prevertebral segment ran up to C<sub>2</sub>, in one of which (3.2%) the middle cervical ganglion was pierced. This, we believe, is significant not only in diagnosis but also in surgical and endovascular treatment.

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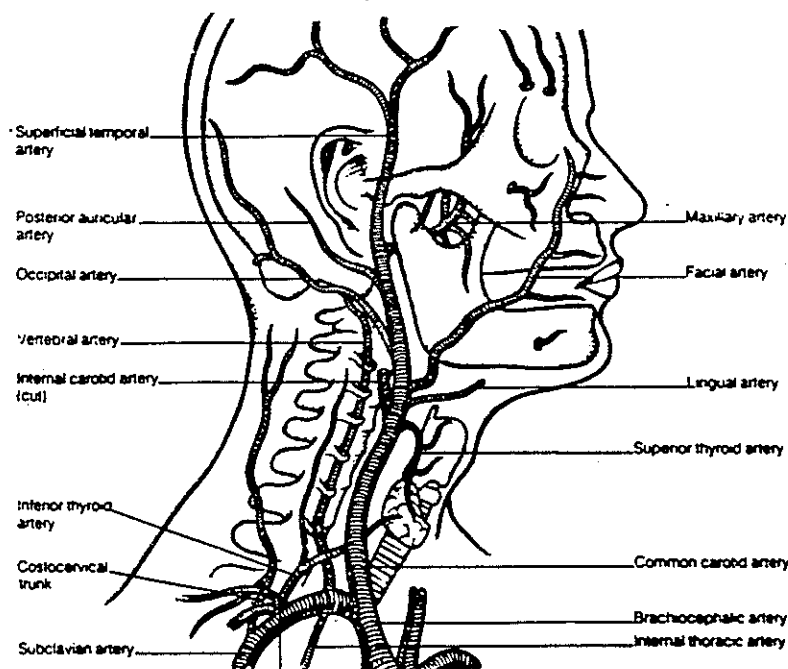
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plexus of nerve fibers derived from the inferior cervical ganglion of the cervical sympathetic trunk (3). The vertebral artery at its origin lies ventral to the prevertebral fascia, but during its ascent in the vertebral triangle to the level of the vertebra C<sub>6</sub>, it pierces the fascia to reach the transverse process of vertebrae C<sub>6</sub> (1,3) (Fig. 1).

Occasionally the vertebral artery may enter the bone at the fifth cervical transverse foramen. The so called pretransverse or prevertebral segment of the vertebral artery is defined from its origin at the subclavian artery to its entry into the respective transverse foramen (1,5,6). The vertebral artery was, therefore, examined in the student course of gross anatomy dissection and intensive dissection on the vertebral artery was performed on a random selected cadaver. The purpose of this study was to confirm Matula and Lang's finding with respect to the course and relationship with sympathetic trunk.

## INTRODUCTION

In many current textbooks of human anatomy, the vertebral artery is said to arise from the superoposterior aspect of the subclavian artery passing through the foramina of all cervical transverse processes except the seventh (1,2,3,4). It is surrounded at its origin by a



**Fig. 1-** Schematic representation of the vertebral artery, showing entry of artery to the bone at the sixth cervical transverse foramen



Fig. 2. A photograph of a dissected vertebral artery, showing entry of artery to the bone at the third cervical transverse foramen and piercing the middle cervical ganglion

## MATERIALS AND METHODS

As materials, 31 Iranian cadavers (29 males, 2 females) were dissected in student courses of gross anatomy dissection of Medical School (1996-1998) one of which was used for intensive dissection, in Tehran University of Medical Sciences. The dissection was performed according to the manual of human dissection by Grant's method of anatomy (7).

### Observations

The vertebral artery was variated in two out of 31 cadavers. In 29 cadavers, the vertebral artery entered the bone at the sixth cervical transverse foramen. In 2 cadavers (male) the vertebral artery ascended in front of prevertebral fascia up to the level of the hyoid bone, at this level it pierced the prevertebral fascia to reach the transverse process of vertebra C<sub>3</sub> (Fig. 2 and 3). Prevertebral artery was found in 2 (6.4%) cases on right side, one (3.2%) of them piercing the middle cervical ganglion.

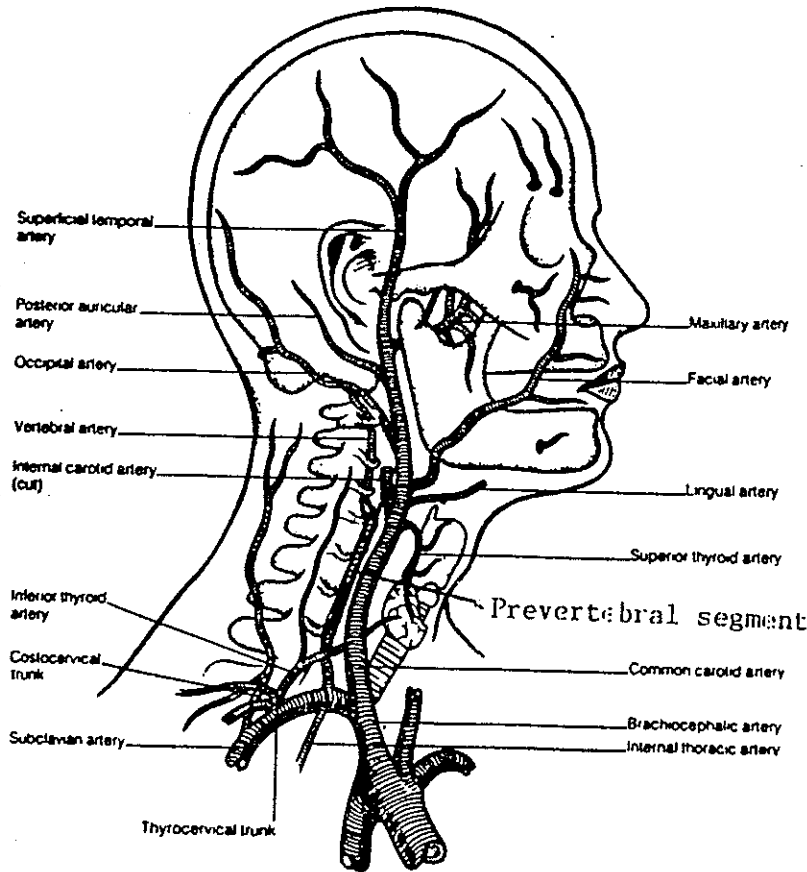


Fig. 3. Schematic representation of the variation in the prevertebral segment of vertebral artery, showing entry of artery to the bone at the third cervical transverse foramen

## DUSCUSSION

Contrary to the descriptions in current textbooks of human anatomy, in this study it was found that the vertebral artery occasionally entered the bone at the third cervical transverse foramen. The middle cervical ganglion is the smallest of the superior and inferior cervical ganglia. The ganglion is occasionally absent and may then be replaced by a minute ganglion in the sympathetic trunk or may be fused with the superior ganglion. It is usually found at the sixth cervical vertebra level, anterior or just superior to the inferior thyroid artery or it may adjoin the cervicothoracic ganglion (1,3). In one case the ganglion was pierced around the prevertebral segment of vertebral artery.

In surgery, angiography, and all noninvasive procedures it is of great importance to know the exact details of the course and the origin of this segment of the vessel as well as real variations in percentage (5,8,9). A 6.4% variation of the course of the vertebral artery was found. The morphologic variation and present frequency of the prevertebral segment of the vertebral artery have many clinical applications in this region's pathologies (6). Knowing these findings seem to be very important not only in diagnosis (angiography, color-coded doppler sonography) but also in surgical and endovascular treatment. According to this article which reveals some variations in the course of vertebral arteries, it is proposed that in surgeries of prevertebral region, the surgeon carefully examine the vertebral artery and middle cervical ganglion, in order to avoid any probable injury to these structures.

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