

Thesis Title	The Relationships between Extracranial Vertebral Blood Flow and Postural Distortion of the Cervical Spine.
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### Abstract

**Background and purpose** The aim of the present study was to estimate the vertebral blood flow of subjects with signs and symptoms of vertebral artery insufficiency and healthy subjects. To determine the pattern of vertebral flow in the two groups and to determine the relation between the pattern of vertebral flow and the alignment of the cervical spine.

**Method** Using Grass Photoelectric Pulse Sensor to measure the relative amplitude (millivolts) of pulsatile flow of extracranial vertebral artery in 25 vertebral artery insufficiency subjects, aged 22-50 years and 25 age and sex-matched healthy subjects. The procedures were consisted of 1) measurements of vertebral flow were performed when the subjects were sitting with head in neutral, flex, extend and rotate positions. 2) EMG of trapezius muscle at both neck and shoulder was recorded by surface disc electrode. 3) the alignments of cervical spine were evaluated from radiographs of cervical spine at anterior, posterior, lateral and oblique views.

**Results** The extracranial vertebral flow in the patient group was significant lower than the control group. The frequency of vertebral asymmetry (more than 50%)

was significantly higher in the patient group (16 out of 25 subjects) than in the control group (7 out of 25 subjects). In addition, there was significant more subjects (two-thirds) who had larger left vertebral arteries and one-third had larger right vertebral arteries. The vertebral flow was influenced by head movements. Significant reduction of the vertebral flow when the head was flexed, extended and rotated was found in both groups. However, further reduction of the vertebral flow, accompanying changes in head position, in the patient group who initially had low blood flow, frequently resulted in dizziness, neck pain and blurred vision. The present result revealed that attenuation of the vertebral flow in patients, was associated with significant increase in contraction of trapezius muscle. The frequency of mild cervical spondylosis was similarly found in the both groups (6 out of 20 in the control group and 10 out of 20 in the study group). However, the vertebral flows of these 16 subjects with mild cervical spondylosis were significantly lower than the normal subjects.

**Conclusion** The present results clearly showed that the patient' s transient attacks of dizziness, vertigo, tinnitus and blurred vision during head rotation were possibly resulted from reduction in vertebral flow. Reduction in vertebral flow was related to muscle spasm. Finally, we may conclude that measurements of vertebral flow by Grass photoelectric pulse sensor may be more sensitive in predicting vertebral artery compression than plain radiograph of the cervical spine.