Orthostatic vertigo and vertebral artery hemodynamics

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Abstract

[Objectives]
Some patients complain of vertiginous symptoms such as rotary sensation, lightheadedness or faintness when rising to the standing position. These symptoms, named orthostatic vertigo (OV) in this study, are believed to occur due to hypoperfusion of the brain. However, the exact mechanism underlying the onset of OV is not clearly known.

Since the vertebral artery (VA) supplies the central vestibular system, which is involved in the onset of vertigo, we performed the extracranial ultrasonic doppler test (ECD) to examine VA blood flow, in order to determine whether orthostatic changes in VA hemodynamics affect the incidence of OV.

[Subjects and Methods]
In 209 out of 788 patients with vertiginous symptom who visited our clinic from 2005 to 2006, extracranial doppler sonography (ECD) (DFM-4500; Hayashi Electronic, Japan) was performed to measure the VA blood flow velocity (VAFV), located on the cervical intervertebralis C5-6, in the supine and standing positions. The mean VAFV was obtained from 5-counts recorded of ECD signals.

Each patients stayed in supine position for 10 minutes before the measurement. After the measurement in supine position, they stood up and the VAFV in upright position was measured (Fig. 1).

We investigated the orthostatic decrease in VAFV and the laterality of orthostatic decrease in VAFV calculated as follows: Orthostatic decrease in VAFV (cm/s) = bilateral mean VAFV (supine position) standing position)

Laterality of orthostatic decrease in VAFV (%) = (|∆R−∆L|/(∆R+∆L)) × 100

(∆R or ∆L: orthostatic decrease in VAFV of right or left side).

The patients were classified into two groups, group A and group B, with and without OV, respectively. Orthostatic change in VA hemodynamics were examined in both groups.

[Results]
Some patients complained of vertiginous symptoms such as rotary sensation, lightheadedness or faintness when rising to the standing position. These symptoms, named orthostatic vertigo (OV) in this study, are believed to occur due to hypoperfusion of the brain. However, the exact mechanism underlying the onset of OV is not clearly known.

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Discussion
In this study, the patients with OV showed the significantly greater orthostatic decrease in VAFV than those without OV. This suggests that the orthostatic decrease in VAFV involves the incidence of OV.

Cases with rotary sensation, floating sensation or swaying sensation except for faintness and deviational sensation showed the significant orthostatic decrease relative to control cases without OV (group B). These results suggest rotary sensation, floating sensation and swaying sensation were involved in VA hemodynamics.

[Conclusion]
The results in this study suggest that ECD is a useful examination to determine OV cases, and the orthostatic changes in VA hemodynamics affect the incidence of OV.