



Subdivisional Pathologies in Peripheral Vestibular Disorders

Sung Huhn Kim

Department of Otorhinolaryngology, Yonsei University College of Medicine, Seoul, Korea

Recent progress in laboratory vestibular function tests, such as the video head impulse test (vHIT) and cervical/ocular vestibular evoked myogenic potential (cVEMP and oVEMP), has enabled physicians to discriminate pathological lesions in subdivisions of the vestibular organs. Analyzing combinations of each test result enables subdivisional pathology to be identified in greater detail. For example, separate or combined lateral canal, superior canal, and utricular pathology can be identified by examining the results of the superior semicircular canal and lateral canal in vHIT together with the results of oVEMP. Many studies have used this method to identify subdivisional pathologies of vestibulopathy. It was reported that the superior vestibular nerve (SVN) territory was more frequently involved in patients with acute vestibulopathy [1]. Several studies have also investigated the involvement of inferior vestibular nerve (IVN) pathology in acute vertigo [2-4]. The SVN territory was most likely found to be more common because the symptoms of SVN pathology were more severe in acute vestibulopathy. However, we should notice that acute or chronic pathology of the IVN territory can also contribute to mild dizziness, which is sometimes ignored in primary care settings. Most of the above studies were performed in patients with acute vestibulopathy, and there are still few reports on subdivisional pathologies in peripheral vestibular organs in larger populations of patients with acute, subacute, and chronic dizziness.

Lee et al. [5] found that abnormal test results were more common in the IVN territory than in the SVN territory in the patients with vestibular disorders who experienced various severities of dizziness. This finding suggests that degeneration or chang-

es in the vestibular organs in the IVN territory might be more common than in the SVN territory. Among the vestibular organs in the IVN territory, isolated saccular dysfunction was found more frequently than dysfunction in other locations. Those findings could result from anatomical factors and/or differences in the sensitivity and specificity of vHIT and VEMP, as the authors pointed out. It is reasonable to assume that both tests had different sensitivity and specificity based on the findings for the correlation between the tests. Even when each test had normal results, cVEMP and posterior semicircular canal gain in vHIT showed a linear correlation. This may indicate that pathologies in the IVN territory can be proximal and can be represented as separate pathologies at certain points due to differences in sensitivity and specificity between tests. A separate pathology can progress to common IVN pathology with time. Meanwhile, the saccule can initially be more vulnerable to injury than the posterior semicircular canal ampulla, and saccular pathology can be detected earlier than pathology in the posterior semicircular canal ampulla. Therefore, patients with abnormal findings of the posterior semicircular canal vestibulo-ocular reflex in vHIT are likely to have saccular pathology, as demonstrated by the strongest correlation between the tests in that study. Nonetheless, it remains difficult to resolve the issues of sensitivity and specificity in clinical research. In future studies aiming to identify real subdivisional pathologies of the vestibular periphery, more detailed parameters and analytical methods should be identified. The results of this study provide valuable information for clinicians and researchers regarding the importance of IVN pathologies in patients with dizziness and the currently available laboratory vestibular function tests.

• Received August 2, 2022
Accepted August 8, 2022

• Corresponding author: **Sung Huhn Kim**
Department of Otorhinolaryngology, Yonsei University College of Medicine,
50-1 Yonsei-ro, Seodaemun-gu, Seoul 03722, Korea
Tel: +82-2-2228-3604, Fax: +82-2-393-0580
E-mail: fledermaus@yuhs.ac

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

Copyright © 2022 by Korean Society of Otorhinolaryngology-Head and Neck Surgery.

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID

Sung Huhn Kim <https://orcid.org/0000-0003-4408-3066>

REFERENCES

1. Taylor RL, McGarvie LA, Reid N, Young AS, Halmagyi GM, Welgampola MS. Vestibular neuritis affects both superior and inferior vestibular nerves. *Neurology*. 2016 Oct;87(16):1704-12.
2. Park JS, Kim CH, Kim MB. Comparison of video head impulse test in the posterior semicircular canal plane and cervical vestibular evoked myogenic potential in patients with vestibular neuritis. *Otol Neurotol*. 2018 Apr;39(4):e263-8.
3. Skoric MK, Adamec I, Pavicic T, Pavlovic I, Ruska B, Crnosija L, et al. Vestibular evoked myogenic potentials and video head impulse test in patients with vertigo, dizziness and imbalance. *J Clin Neurosci*. 2017 May;39:216-220.
4. Walther LE, Blodow A. Ocular vestibular evoked myogenic potential to air conducted sound stimulation and video head impulse test in acute vestibular neuritis. *Otol Neurotol*. 2013 Aug;34(6):1084-9.
5. Lee JM, Lee HJ, Kim J, Shin SH, Na G, Shim DB, et al. Saccular pathology is most commonly found in patients with general vestibular disorders. *Clin Exp Otorhinolaryngol*. 2022 Aug;15(3):213-9.