00528

VERTIGO & BALANCE DISORDERS

Preoperative factors of developing chronic dizziness after vestibular schwannoma resection.

Masafumi Ueno[12], Makoto Hosoya[12], Marie Shimanuki[12], Takanori Nishiyama[12], Hiroyuki Ozawa[1], Naoki Oishi[12]

[1)] Department of Otolaryngology, Head and Neck Surgery, Keio University School of Medicine, Tokyo, Japan

[2)] Keio Otology&Audiology Center, Tokyo, Japan

Keio Otology & Audiology Center

Abstract

We have conducted retrospective study including 45 Vestibular schwannoma (VS) patients who underwent resection to clarify preoperative factors of developing chronic dizziness after resection. According to the postoperative Dizziness Handicap Inventory (DHI) score, patients were divided in a chronic dizziness group (CD) and non-chronic dizziness group (nCD). The rate of abnormal result of preoperative vestibular function tests (caloric test, cVEMP) including other factors were compared. Furthermore, univariable logistic regression analysis was performed with the DHI score at 3 months as dependent variable. The rate of participants with abnormal cVEMP results was significantly lower in the CD group. Other factors, including caloric tests, did not show significant differences. From the univariate analysis, only cVEMP result tends to correlate with postoperative DHI score. As a result, VS patients who have normal cVEMP preoperatively tend to develop chronic dizziness after resection than those with abnormal cVEMP.

Objective

Postoperative dizziness in Vestibular Schwannoma(VS) patients

Preoperative factor

Prolong (Chronic dizziness) ≒30 %[1][2]

?

Resolve with Vestibular compensation

We have assessed preoperative factors including vestibular function (cVEMP/ caloric) which correlate with developing chronic dizziness after VS rejection.

Methods and Materials

・A retrospective cohort study was conducted including 76 VS patients who underwent resection at our department between January 2019 and October 2023. 31 patients were excluded from the study, mainly from incomplete data and as a result, 45 patients were included.

・According to the postoperative DHI score, participants were divided into a chronic dizziness group (CD: DHI > 30) and a non-chronic dizziness group (nCD: DHI ≦ 30). The rate of abnormal results in the preoperative vestibular function tests (caloric test and cVEMP) was compared between the groups. Age, sex, tumor size, proportion of participants who underwent hearing preservation surgery, preoperative DHI score, and HADS score were also compared. Regression analysis was also performed to further evaluate the impact of each factor on the postoperative DHI score.

・All study variables except age were compared between the groups using Fisher's exact tests. Independent sample t-tests were conducted to compare age and tumor size. Furthermore, univariate logistic regression analysis was performed with the DHI score at 3 months as the dependent variable. Subjective questionnaires were categorized according to whether the score was high, and vestibular tests were based on whether the results were normal or abnormal. The level of significance was set at $p < 0.05$.

Results

・Among the 45 participants, 14 (31 %) developed chronic dizziness postoperatively. The proportion of participants with abnormal cVEMP results was significantly lower in the CD group (7.1%) than in the nCD group (42%). Other factors, including caloric test results, did not show any significant differences.(Table 1)

Table 1: Comparison of CD and nCD groups

	Chronic dizziness	none	
n	14	31	
Sex(male, female)	(7, 7)	(16, 15)	p>0.99
Age	52 ± 7.6	52 ± 13.2	p=0.79
Tumor size (mm)	20 ± 7.1	19 ± 5.8	p=0.78
CP(affected side)	57%	71%	p=0.50
CP(unaffected side)	14%	9.7%	p=0.64
cVEMP	7.1%	42%	*p<0.05
DHI	14%	3.2%	p=0.23
HAD-A	29%	6.5%	p=0.07
HAD-D	21%	9.7%	p=0.36
Hearing preservation	64%	55%	p=0.75

・In the univariate logistic regression analysis, only cVEMP results (OR=9.39, 95% CI [1.56, 181.3], p<0.05) were significantly associated with postoperative DHI score; and other factors, including caloric tests, were not significant. (Table 2)

Table 2: Univariate logistic regression analyses with postoperative DHI>30 as the dependent variable

Independent variable	OR	95% CI	p-value
Sex	0.94	0.26 - 3.36	0.92
Age	1.00	0.95 - 1.06	0.93
Caloric test	1.83	0.48 - 6.90	0.37
cVEMP	9.39	1.56 - 181.3	0.01*
preoperative DHI	5.00	0.44 - 113.6	0.21
HAD-A	5.80	0.98 - 46.7	0.053
HAD-D	2.55	0.42 - 15.7	0.3
Tumor size	1.02	0.92 - 1.13	0.77
Hearing preservation	1.48	0.41 - 5.78	0.55

Discussion

・VS patients who have normal cVEMP results preoperatively tend to develop chronic dizziness after resection than those with abnormal cVEMP results. One reason for this is that the residual vestibular function of patients with abnormal cVEMP results is lower than that of patients with normal results, leading to an increase in compensation before treatment. The correlation between residual preoperative vestibular function and posttreatment dizziness has also been reported[3][4].

・cVEMP evaluates the function of the saccule which is innervated by the inferior vestibular nerve, which most VS originates from[5][6]. Therefore, cVEMP is more suitable than caloric tests for evaluating preoperative vestibular function in most patients with VS.

Conclusion

Patients with vestibular schwannoma who have normal preoperative cVEMP results tend to develop chronic dizziness after resection compared to those with abnormal cVEMP results. Preoperative cVEMP results enable physicians to predict whether patients with vestibular schwannoma undergoing resection would likely develop chronic dizziness postoperatively, and to counsel patients about the expectations of the postoperative process.

References

1. Abboud, T., et al., *Long-term vestibulocochlear functional outcome following retro-sigmoid approach to resection of vestibular schwannoma.* Eur Arch Otorhinolaryngol, 2016. **273**(3): p. 719-25.
2. Van Laer, L., et al., *Subjective perception of activity level: A prognostic factor for developing chronic dizziness after vestibular schwannoma resection?* Front Neurol, 2022. **13**: p. 925801.
3. Brown, C.S., et al., *Associations of Vestibular Tests With Penn Acoustic Neuroma Quality of Life Scores After Resection of Vestibular Schwannoma.* Otol Neurotol, 2020. **41**(2): p. e241-e249.
4. Lee, D.Y., et al., *Vestibular Schwannoma Tumor Size Is Associated With Acute Vestibular Symptoms After Gamma Knife Therapy.* Otol Neurotol, 2019. **40**(8): p. 1088-1093.
5. Tringali S, C.A., Ould MB, Dubreuil C, Ferber-Viart C, *Characteristics of 629 Vestibular Schwannomas According to Preoperative Caloric Responses.* Otol Neurotol, 2010. **31**(3): p. 467-472.
6. West, N., et al., *Audiovestibular Loss of Function Correlates in Vestibular Schwannomas.* J Int Adv Otol, 2018. **14**(2): p. 161-165.