VESTIBULAR EVOKED MYOGENIC POTENTIALS AND VIDEO HEAD IMPULSE TEST IN COCHLEAR OTOSCLEROSIS

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INTRODUCTION

Otosclerosis is a localized hereditary disorder of bone metabolism of otic capsule enchondral bone that leads to progressive hearing loss. It is characterized by abnormal bony remodeling, resulting in bone resorption and deposition. Cochlear otosclerosis refers to lesions involving the cochlear endosteum causing sensorineural hearing loss with or without stapes fixation.

Vestibular symptoms associated with otosclerosis occur in 10-45% of patients and they may be the most distressing and primary symptom in cases with otosclerosis. So the assessment of each component of the vestibular system will facilitate a more complete evaluation. The vestibular evoked myogenic potentials test (VEMP) is used to assesse the saccular and the utricular functions using cervical and ocular vestibular evoked myogenic potentials (cVEMP and oVEMP), respectively. The video head impulse test (vHIT) measures the vestibulo-ocular reflex (VOR) to rapid impulsive head acceleration in the plane of each semicircular canal (SCC) and has allowed quantitative monitoring of individual canal function.

AIM OF THE WORK

The aim of the work was to assess the function of the saccule, the utricle and the three semicircular canals using cVEMP, oVEMP and video HIT in patients with cochlear otosclerosis.

SUBJECTS AND METHODS

Twenty subjects with bilateral otosclerosis were enrolled in this study ranging in age from 30 to 55 years, devided in two groups. One group consisted of 10 adult patients with bilateral conductive otosclerosis. Second group consisted of 10 adult patients with bilateral mixed otosclerosis, without exclusion criteria.

All the patients underwent cVEMP and oVEMP, using a BC 500Hz tone burst stimulus with 40 dBnHL intenisity, rate: 5.1/s, low pass filter: 750 Hz, and high pass filter: 10 Hz 6/oct.

They also underwent vHIT in three planes, left anterior right posterior (LARP), right anterior left posterior (RALP) and lateral semicircular canals planes during brief, passive, unpredictable movements with high acceleration (2000–4000°/s2), intermediate velocity (120–300°/) and slow amplitude (10–20°).

RESULTS

Table 1: Comparison of 500 Hz bone cVEMP amplitude (µV), P_{13} and N_{23} Latencies in the two studied groups

	CHL (n = 10)	Mixed (n = 7)	t	P
cVEMP amplitude (µV)				
Min. – Max.	27.02 – 88.60	12.87 – 42.53	4.145*	0.001*
Mean ± SD.	62.46 ± 20.79	26.88 ± 10.52		
P_{13} Latency				
Min. – Max.	13.42 – 15.50	15.0 – 17.0	2.411*	0.029*
Mean ± SD.	14.95 ± 0.64	15.78 ± 0.78		
n_{23} Latency				
Min. – Max.	22.67 – 25.0	22.33 – 25.24	0.880	0.393
Mean ± SD.	23.63 ± 0.75	23.26 ± 1.01		

SD: **Standard deviation**
*: Statistically significant at $p \leq 0.05$
n = Number of ears

Table 2: Comparison of 500 Hz bone oVEMP amplitude (µV), N1 and P1 Latencies in the two studied groups

	CHL (n = 8)	Mixed (n = 6)	t	P
oVEMP amplitude (µV)				
Min. – Max.	7.12 – 14.85	5.34 – 12.16	2.507*	0.028*
Mean ± SD.	11.06 ± 2.15	8.08 ± 2.29		
N1 Latency				
Min. – Max.	8.30 – 12.40	8.50 – 12.67	0.694	0.501
Mean ± SD.	10.33 ± 1.42	10.93 ± 1.85		
P1 Latency				
Min. – Max.	15.0 – 16.84	15.20 – 17.80	1.300	0.218
Mean ± SD.	15.91 ± 0.73	16.53 ± 1.06		

SD: **Standard deviation**
*: Statistically significant at $p \leq 0.05$
n = Number of ears

Table 3: Comparison of vHIT of lateral, anterior and posterior canal gain in the two studied groups

Gain of	CHL (n = 20)	Mixed (n = 20)	T	p
Lateral				
Min. – Max.	0.89 – 1.17	0.81 – 1.08	3.862*	<0.001*
Mean ± SD.	1.01 ± 0.10	0.90 ± 0.08		
Anterior				
Min. – Max.	0.83 – 1.05	0.82 – 0.95	1.590	0.120
Mean ± SD.	0.90 ± 0.06	0.87 ± 0.03		
Posterior				
Min. – Max.	0.84 – 0.97	0.81 – 0.93	1.715	0.094
Mean ± SD.	0.89 ± 0.04	0.87 ± 0.03		

SD: **Standard deviation**
*: Statistically significant at $p \leq 0.05$
n = Number of ears

CONCLUSION

- Our findings suggested that there are statistical significant differences in the peak to peak amplitudes of cVEMP and oVEMP in the two studied groups and significant increase in p13 latencies only in the mixed group, suggesting that the saccule is more liable to be affected by otosclerosis than the utricle.
- Also, there is a statistical significant difference in the lateral SCC gain between the two groups, but not for anterior or posterior SCCs, with no gain less than 0.8, indicating that the three SCCs are less affected by otosclerosis.