

메니에르병의 청각학적 진단

고의경 · 이일우 · 전경명

Audiologic Evaluation of Meniere's Disease-Dehydration Test and Electrocochleography

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서론

진단기준

episodic vertigo (recurrent spontaneous hearing loss), (aural fullness) (Table 3), (Table 4), AAOO(1972), AAO-HNS(1985) (Table 2), (staging, (reporting guide line, AAO-HNS(1995)¹⁾ Table 1 1) 2 20 , 2) , 3) 가 , Table 1 가 , 4) (dehydration) (definite Meniere's disease) Table 5 1974 가 . 2)

청력검사

(Fig. 1). 2000 Hz

(peak audiogram)

: , 602 - 739 1가
: (051) 240 - 7332 · : (051) 246 - 8668
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가 (flat audiogram) 3)4) 41~74%

Table 1. Diagnostic tests for meniere's disease

Audiometry
PTA
Speech audiometry
Recruitment test
ERA
Otoacoustic emission
Tinnitus evaluation
Vestibular function tests
Electrocochleography
Dehydration tests
Glycerol test
Peroral
Intravenous
Furosemide test (Lasix test)
Electrocochleography with dehydration
Otoacoustic emission with dehydration

Table 2. Diagnosis of meniere's disease

Certain meniere's disease
Definite meniere's disease, plus histopathologic confirmation
Definite meniere's disease
Two or more definitive spontaneous episode of vertigo 20 minutes or longer
Audiometrically documented hearing loss on at least one occasion
Tinnitus or aural fullness in the treated ear
Other causes excluded
Probable meniere's disease
One definitive episode of vertigo
Audiometrically documented hearing loss on at least one occasion
Tinnitus or aural fullness in the treated ear
Other causes excluded
Possible meniere's disease
Episodic vertigo of the meniere type without documented hearing loss, or
Sensorineural hearing loss, fluctuating or fixed, with disequilibrium but
without definitive episodes
Other causes excluded

5)6) (recruitment test)

가 가 가 가
Fetterman⁷⁾ 50 dB 가
pitch

Table 3. Staging of definite and certain meniere's disease

Stage	Four-tone average (dB)
1	25
2	26 - 40
3	41 - 70
4	>71

Staging is based on the four-tone average (arithmetic mean rounded to the nearest whole number) of the pure-tone thresholds at 0.5, 1, 2, and 3 KHz of the worst audiogram during the interval 6 months before treatment

Table 4. Summary of reporting guidelines

Numerical value	Class
0	A (complete control of definitive spells)
1 to 40	B
41 to 80	C
81 to 120	D
>120	E
Secondary treatment initiated due to disability from vertigo	F

Numerical value=(X/Y) × 100, rounded to the nearest whole number, where X is the average number of definitive spells per month for the 6 months 18 to 24 months after therapy and Y is the average number of definitive spells per month for the 6 months before therapy

Table 5. 메니에르병 진단기준(일본후생성 연구반)

1.	
2.	
3. 1, 2	
I	: 1, 2, 3
II	: 1 3 2 3

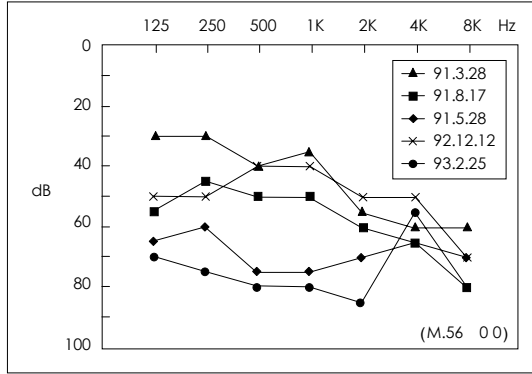


Fig. 1. Audiogram of a typical case of meniere's disease. audiogram showed marked fluctuation of hearing loss.

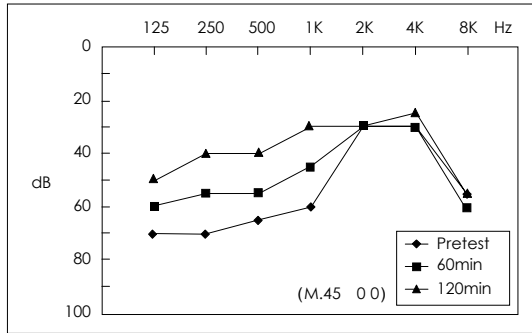


Fig. 2. A typical positive case of meniere's disease in IV glycerol test.

Table 6. Results of IV glycerol test in meniere's disease Cases(%)

Group	Cases	Positive	Negative
Meniere's	20	13 (65.0)*	7 (35.0)
Control	40	11 (27.5)*	29 (72.5)

* : p<0.05

글리세롤검사

1966

Klockhoff Lindholm¹³⁾

2
1.2~1.5 g/Kg 3
14) 250~2000 Hz 2
10 dB (Fig. 2),
가 12%
10 dB 3
5 dB 가 47~
60% 13-15)
2/3 1/3

18% 가

, , 가 13-15)

탈수검사

16)17) 10% 500 ml(Cerol®)
2 30
(Fig. 2)
16)

(Table 6) 65%

(dehydration test)

, furosemide

8-11)

가 (rebound)

가

가
가 1)
, 2) , 3) , 4)
, 5) , 6) , 7)
13-15)

가 . Sakashita Kubo DP)
8) (Transiently
Evoked Otoacoustic Emissions(TEOAEs))
(Distortion Product Otoacoustic Emissions
(DPOAEs)) DPO-
AEs

. Magliulo Cianfrone 9)
(aural fullness) 가
DPOAEs 58%
DPOAEs
minimal dysfunction

가
. Inoue Kanzaki 11)
TEOAEs가
active motile prop-
erty 가

(Caloric test) (speed of
slow component)가 9.4%

14)
가 pendular rota-
tion
(vestibulo - ocular reflex)
(directional preponderance, VOR -
DP) 10% 가
.18) Kobayashi 18) VOR - DP
furosemide VOR vestibular hydrops

전기약우도(Electrocochleography, ECoG)

1930 Wever Bray¹⁹⁾
가 가 (Electro-
cochleography, ECoG)

ECoG 구성 전위 및 그 기원

Furosemide 검사(furosemide test, Lasix® test)
furosemide 20 mg

40 ~1
1)
, 2) ,
, 3) , 가
가 가
14)
가

cochlear microphonics(CM), summa-
ting potential(SP), action potential(AP)

가 CM
CM
displacement distortion
artifactual microphonics

click condensation click rarefaction
 click CM SP 가
 SP CM 가
 nonlinearities distortion accumul-
 ation 가 가 silver ball electrode,²¹⁾ Coat elect-
 negative positive deflection 가 rod²⁵⁾(Table 7), HN - 5²⁶⁾ 가 가
 scala tympani scala media
 negative SP가 . CM alter-
 nating polarity click SP 정상 ECoG
 . SP (adaptation) Fig. 4 and 5 ECoG al-
 .²¹⁻²³⁾ - SP .²⁰⁾²⁴⁾ ternating polarity click CM
 AP ECoG 가 - SP AP
 click AP 50 dB
 . AP 가 60 dB 가
 AP SP 60 dB
 AP 가
 가 .²⁰⁻²²⁾

전극의 위치에 따른 ECoG

가
 ECoG 가
 가 round window recording
 promontory
²⁴⁾(transtympanic recording, Fig. 3)
 가 , SP (Table
 7), (tympanic recording)
 (meatal recording)
 가
 가

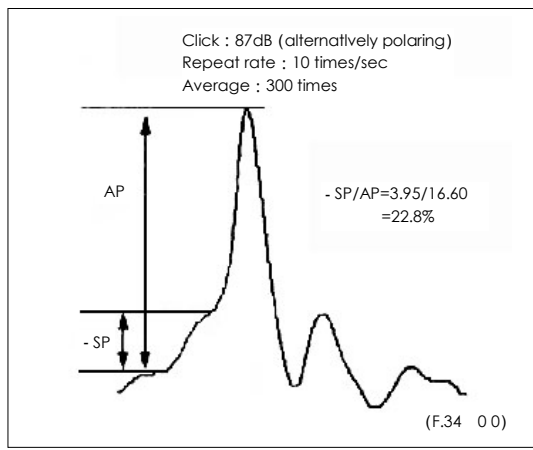


Fig. 3. Transtympanic electrocochleogram. normal finding.

Table 7. Amplitudes and latencies in transtympanic electrode and coat electrode (alternating click, stimulus intensity : 87dB, repetition rate : 10 times/sec) (mean ± SD)

	Amplitude (± μV)		Latency (msec) 0	
	- SP	AP	- SP	AP
Transtympanic	3.70 ± 1.56	13.68 ± 6.11	1.36 ± 0.06	1.75 ± 0.06
Coat electrode	0.58 ± 0.32	2.13 ± 0.73	1.09 ± 0.12	1.66 ± 0.11

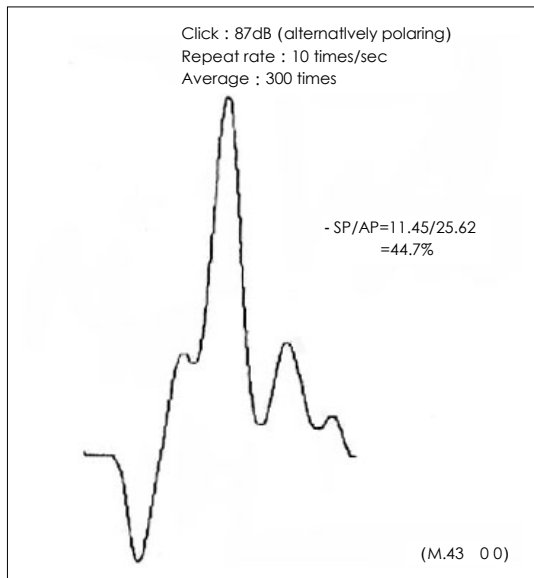


Fig. 4. Normal transtympanic electrocochleogram. me-niere's disease.



Fig. 5. Transtympanic electrode in electrocochleogra-phy.

Table 8. Changes of the SP/AP ratio according to repe-tition time using transtympanic method (intensity, 87dB)

RR	- SP/AP
10	0.27 ± 0.06
30	0.34 ± 0.08
50	0.37 ± 0.07
70	0.40 ± 0.08

Table 9. Changes of the SP/AP ratio according to in-tensity using transtympanic method (repetition rate, 10)

Intensity (dB)	- SP/AP
87	0.27 ± 0.06
80	0.26 ± 0.05
70	0.24 ± 0.09
60	0.19 ± 0.08

(repetition rate) 10 가 가
(10 /sec) Table 9
가 가 AP
가 10 87 dB
가 AP , SP
ECoG (20)24)

ECoG의 특징

- ECoG 1)
- 2) (masking)
- 3)
- 4) (sensitivity)가 (27)
- 1) 가 2)
- 가 , 가 3) AP artifact (27)
- 4) CM

L curve(low response), H curve
(high response) 60 dB
20) - SP 50 dB
가 ,
AP (20)
가 가 AP - SP
, - SP/AP Table 8

메니에르병에 있어서 ECoG의 응용

- ECoG 1) antigenic
- , 2)

challenge ring 3) 1) 3) 4) 가

Table 10. Amplitude of AP and SP (mean ± SD) of electrocochleography using transtympanic electrode

	AP(μV)	- SP (μV)	- SP/AP
Normal	13.5 ± 5.3	3.6 ± 1.3	0.263 ± 0.081
Meniere	14.0 ± 7.2	6.5 ± 3.2	0.462 ± 0.141

Table 11. -SP/AP in normal and meniere's disease group using transtympanic method

	Total	- SP/AP > 0.4	- SP/AP < 0.4
Normal	21 (100%)	1 (4.7%)	20 (95.3%)
Meniere	27 (100%)	19 (70.3%)	8 (29.7%)

Table 12. Results of -SP/AP using transtympanic method and IV glycerol test in Meniere's disease group

	- SP/AP > 0.4	- SP/AP < 0.4	Total
Glycerol (+)	14	3	17 (63.0%)
Glycerol (-)	5	5	10 (37.0%)
Total	19 (70.3%)	8 (29.7%)	27 (100%)

ECoG 1) - SP/AP ECoG - 2) 3) 4) all- 5) 6) 가

ECoG dominant negative SP가 가

scala tympani SP AP 가 -SP/AP가 가

densation rarefaction click AP positive SP Table 6

AP 1.3 μV, 가 0.263 ± 0.081 0.141 10). -SP/AP가 0.37~0.43 0.4 Table 11 sensitivity 70.3%, specificity 95.3%

-SP AP 3.6 ± 1.3 μV, 가 6.5 ± 3.2 μV -SP 0.462 ± 0.141 (Fig 5, Table 10). 22)42)43) 10% 가 5) ECoG 가 82.5% (Table 12)

ECoG contralateral type SP AP 가 -SP ECoG 가

ECoG - SP/AP 가

가
King
,
ECoG
(28)
- SP/AP
- SP/AP
(endolymphatic duct)
(29)30)
는 말
가
중심 단어 :

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