Clinical usefulness of Rotary Chair Test, Electronystagmograhpy and Computerized Dynamic Posturography in dizzy patients with normal Caloric response

Hye-Youn Youm, MD ; Ho-suk Chu, MD ; Won-Ho Chung, MD, PhD
Samsung Medical Center, Sungkyunkwan University School of Medicine

ABSTRACT

Clinical Role of Rotary Chair Test, ENG and CDP
Hye-Youn Youm, MD ; Ho-suk Chu, MD ;
Won-Ho Chung, MD, PhD

*** Objective :**
To classify functional status of vestibular system in dizzy patient with normal caloric response using other vestibular tests (Rotary chair test, ENG and CDP)

*** Study design :**
Retrospective case review

*** Setting :**
Academic tertiary care center

*** Patients :**
Sixty nine dizzy patients evaluated with bithermal binaural caloric and sinusoidal and step-velocity rotary chair (RC) tests and dynamic posturography

*** Intervention :**
Caloric and RC test, ENG, CDP

*** Results :**
46 patients were categorized 5 subgroups on the basis of specific VFT findings - (1) visual dependency; (2) Imbalance of vestibular tonus; (3) Chronic peripheral vestibulopathy ; (4) Abnormality of Vestibulospinal tract ; (5) Abnormality of Oculomotor system

*** Conclusion:**
We suggest new classification of abnormal vestibular functional status in the dizzy patients with normal caloric response. They are comparable according to their clinical features and thought to be helpful managing and counseling dizzy patients.

CONTACT

Won-Ho Chung, MD, PhD
Dept. of ORL-HNS, Samsung Medical Center,
Sungkyunkwan University School of Medicine

Email: whchung@skku.edu
Phone: 82 2 3410 3579

INTRODUCTION

Caloric test has been known to be the most useful laboratory test in evaluating dizzy patient for the responsiveness of a peripheral labyrinth. However, it is limiting that it is testing only the horizontal semicircular canal with the stimuli of non-physiologic frequency. Therefore, the normal caloric response does not mean the patient's functional status of vestibular systems is entirely normal.

In this study, we tried to investigate the role of Rotary chair test, Electronystagmography (ENG) and Computerized Dynamic Posturography (CDP) in dizzy patients with normal caloric response.

We classified "functional status" of vestibular system in dizzy patients into several categories on the basis of above three test modalities and found out its clinical relevance .

METHODS AND MATERIALS

A retrospective review of clinical records was conducted in 69 dizzy patients of various etiologies with normal caloric response (it was defined as canal paresis less than 25%).
Among them, 23 patients were excluded because they had history of head trauma and erroneous or atypical test result.
They were evaluated with bithermal binaural caloric test, rotary chair test (slow harmonic acceleration (SHA) test, visual fixation (VFX) test, visual vestibulo-ocular reflex (VVOR) test), electronystagmography (ENG) and computerized dynamic posturography (CDP).
The five categories were made according to the possible explanation of vestibular impairment. Clinical characteristics in each group were also evaluated.

RESULTS

Category I : Visual dependency (12 patients)

They showed higher gain at lower frequencies in SHA test and showed prolonged time constant in step velocity test . Clinically, they suffered from lightheadedness and motion intolerance, and 7 out of 12 patients were diagnosed as migrainous vertigo.

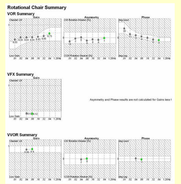
Shin OO (F/53)

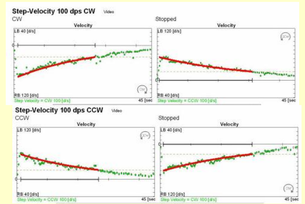
Dizziness : whirling -> non whirling type dizziness
- duration: a few hours, frequency: 2-3/mon, associated sx.: migraine, N/V

ENG : Positional N(+)(->subjective dizzy(-)), HSN(+): RB
CP : Rt. 21% weak, DP 6% weak
Step velocity test : Lt. 9% weak
VOR : High gain at lower frequencies, long Tc on Step velocity

Assumed underlying mechanism : Visual dependence

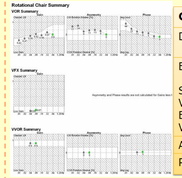
Presumed diagnosis : R/O migraine associated dizziness





Category II: Imbalance of vestibular tonus (14 patients)

This group was divided into two subgroups; 6 patients showed only asymmetry on VOR, while 8 patients had phase lead and low gain with asymmetry. Clinically migraine associated dizziness and Meniere's disease were most commonly diagnosed. Off-balance state of vestibular tones can happen on the disease course temporarily.



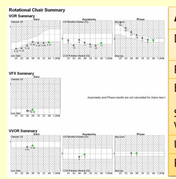
Gong OO (F/48)

Dizziness : whirling type dizziness
- duration: a few hours, frequency: 4/yr, associated sx.: nausea

ENG: All (-) findings
CP : Rt. 6% weak, DP 24% weak
Step velocity test : Rt. 11% weak
VOR : Asymmetry (Rt.)
ECOG : SP/AP ratio Lt.= SP/AP = 0.282 , Rt.= SP/AP = 0.242
VEMP : AR= 0.3 % (Left weaker) Threshold= Rt. : 80dB, Lt. : 80dB

Assumed underlying mechanism : Vestibular tonal imbalance

Presumed diagnosis : R/O Rt. Meniere's disease



Ahn OO (M/65)

Dizziness : Recurrent Lightheadedness
- duration: one hour, frequency: 1/months, associated sx.: mixed H/L

P/Ex: Spontaneous nystagmus to Lt.

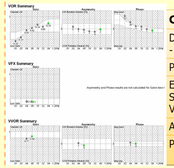
ENG: Saccade test (Abnormal)
CP : Lt. 22% weak, DP 28% weak
Step velocity test : Lt. 9% weak
VOR : Asymmetry (Lt.) Gain (Low) Phase (Lead)

Underlying mechanism : Vestibular tonal imbalance

Presumed diagnosis : R/O Peripheral vestibulopathy

Category III : Chronic peripheral vestibulopathy (2 people)

They showed lower gain and phase lead without asymmetry on SHA test.
Clinically chronic peripheral loss was diagnosed.



Chae OO (M/76)

Dizziness : whirling type -> lightheadedness (prev. BPPV Hx.(+))
- duration: whole day, frequency: 1-2/wk, associated sx.: headache

P/Ex : Positional test (+) to Rt. , Head shaking test (+) to Rt.

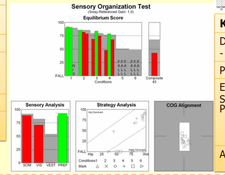
ENG: CP : Lt. 10% weak, DP 13% weak
Step velocity test : Lt. 4% weak
VOR : Gain (low) Phase (lead) VVOR (low gain)

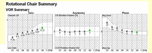
Assumed underlying mechanism : Vestibular hypofunction

Presumed diagnosis : Rt. LSCC BPPV

Category IV : Abnormality of Vestibulospinal tract (7 people)

We suspected the presence of abnormality on the pathway of vestibulospinal tract in 7 patients who showed abnormal results only at posturography, except 2 who were suspicious of peripheral vestibulopathy.





Kim OO (M/67)

Dizziness : whirling type
- duration: 2-3min, frequency: recurrent , associated sx.: nausea

P/Ex : Spontaneous nystagmus to Lt.

ENG: CP : Lt. 8% weak, DP 20% weak
Step velocity test : Rt. 11% weak
Posturography : SOT - vestibular function abnormal
visual function abnormal
somatosensory function abnormal
MCT- WNL

Assumed underlying mechanism : Abnormality in vestibulospinal tract

RESULTS

Category V : Abnormality of Oculomotor system (11 people)

The 4 patients of 11 who showed abnormality in oculomotor system or failure of fixation suppression. They were highly suspicious of central lesion.

Park OO (M/57)

Dizziness : non-whirling type
-duration: continuous, frequency: recurrent , associated sx.: none
-balance-disturbed when he stands up, turn left or right

P/Ex : Spontaneous nystagmus to Lt.

ENG: higher gain on VOR
Caloric test : fixation suppression failure
VFX : fixation suppression failure
lower gain on OKN

Presumed diagnosis : R/O central oculomotor dysfunction

CONCLUSIONS

We suggest new classification of abnormal vestibular functional status in the dizzy patients with normal caloric response. These are comparable according their clinical features and thought to be helpful in managing and counseling the dizzy patients.

	Category I (12)	Category II (14)	Category III (2)	Category IV (7)	Category V (11)
Age Distribution	18~75 (mean 50)	5~73 (mean 55)	75, 77 (mean 76)	28~66 (mean 53)	10~79 (mean 59)
Clinical Character-istics	Dysequilibrium Lightheaded-ness	Vertigo Floating sense Motion sickness	Dysequilibrium Lightheaded-Ness	Dysequilibrium Floating sense	Dysequilibrium Lightheaded-ness
Possible Mechanism	**Visual dependency**	**Imbalance of vestibular tonus**	**Chronic peripheral vestibulo-pathy**	**Abnormality of vestibulo -spinal tract**	**Abnormality of oculomotor system**
Possible Diagnosis	Migraineous vertigo (7) Motion sickness (1) BPPV (1)	Migraineous vertigo (5) Meniere's disease(3) BPPV (2) Motion sickness (1)	BPPV (1) Meniere's disease (1)	Migraineous vertigo (3) Aging process (1)	Aging process (1) Visual vestibular mismatch (1)

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