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## CHARACTERISTICS OF VERTIGO REHABILITATION

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### Abstract

*Aim.* Dizziness is the sensation of disturbed or impaired spatial orientation without a false or distorted sense of motion. Imbalance or unsteadiness is the feeling of being unstable while seated, standing, or walking without a particular directional preference.

*Methods.* 40 subjects were diagnosed with disorders other than benign positional vertigo (BPV) [vestibular migraine (VM), Ménière's Disease, vestibular schwannoma, unilateral or bilateral peripheral vestibular loss].

*Results.* Once a patient has been assigned to one of the five syndromic categories, further differentiation of the ten underlying disorders is based on the following:

- Type of vertigo
- Duration of attacks (min./max.)
- Frequency of attacks
- Triggers/modulating factors
- Associated symptoms
- Reeducation programme

*Conclusions.* Although not commonly used in clinical practice, recording the barbecue maneuver may be useful in subjects with positional vertigo that is refractory to conventional bedside treatments.

*Keywords:* Rehabilitation, vertigo, gait

### Introduction

Benign positional vertigo (BPV) is a common and correctable cause of episodic vertigo triggered by otoconia dislodged from the otolith membranes of the utricle into the semicircular canals. Movement of the otoconia activates semicircular canal (SCC) receptors and produces a unique pattern of nystagmus that is specific to the affected canal (Brandt et al., 2005, Aw Stet all, 2005).

BPV can result from canalolithiasis where the otoconia are freely floating in the duct of the semicircular canal or cupulolithiasis where the otoconia are adherent to the cupula. Typically, a patient with canalolithiasis will experience a paroxysm of vertigo which is induced by head-tilt and resolves rapidly.

In contrast, cupulolithiasis is characterized by persistent vertigo and nystagmus which does not subside until the patient moves away from the provocative position (Bisdorff et al., 2001).

BPV most commonly affects the posterior canal, accounting for 60-90% of patients; horizontal

canal BPV is less common and accounts for 5-30% of all patients [Lee JB et al, 2010], while anterior canal BPV is exceedingly rare, accounting for only 1-2.3% (Hornibrook 2011, Nakayama Met al., 2005).

Analysis and comparison of the gait characteristics of patients observed in BPV, other peripheral and central vestibular disorders has not been undertaken thus far. Here we report the gait patterns of 30 patients who were found to have positional vertigo.

### Methods

Between January 2012 and January 2014, 40 patients (27 women and 13 men) aged  $64.5 \pm 16.8$  years (range 16-95) presenting with positional vertigo were recruited from a neurology department of Clinical Hospital of Constanta, to the investigation gait and possibility of influence with physical therapy. All patients were symptomatic at the time of examination and their chief complaint was positional vertigo.

A history was elicited from all patients and a neuro-otological assessment was performed.

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Assessment on the Epley tests, included Dix Hallpike tests, and side lying tests during which the subject was rolled from supine to the right ear down or from supine to the left ear down positions. A majority of subjects were tested in the nose up (supine) and nose down (prone) positions as well. When horizontal canal BPV was diagnosed, upon identification of the affected ear, all subjects were treated with 360° rotations to the unaffected ear in 90° steps.

Our repositioning maneuver consists of four steps, with position changes occurring at 30s intervals. From the head-straight sitting position, a head-hanging maneuver is performed so that the head is brought to at least 30° below the horizontal. For patients who are unable to attain a 30° dependent head position, a tilting examination table or „tilt table” can be used to attain the same head position with respect to gravity.

After 30s, once vertigo and nystagmus provoked by the maneuver cease and while still supine, the patient's head is moved quickly forward „chin to chest”, with the vertex near the vertical axis. After another 30s have elapsed, head and body are brought into the sitting position, remaining there for another 30s. In cases of failure or incomplete remission of symptoms, the same maneuver is repeated.

## Results

### Characteristics of gait

Thirty-one subjects were diagnosed with VPB based on (a) the presence of short-lived spells of positional vertigo (<1 min) and paroxysmal positional nystagmus, which was geotropic and changed direction with either ear down, and (b) complete symptom resolution in response to barbecue maneuvers’.

In all subjects, upon lying with the affected ear down, a paroxysm of horizontal nystagmus was observed almost immediately.

Twenty-nine patients had their gait modification recorded when they change their position during the course of testing. 17 subjects had supine nystagmus, two had no recordable nystagmus. Of the 27 demonstrating nystagmus in the supine position, 20 had horizontal nystagmus beating to the unaffected ear but seven had horizontal nystagmus beating to the affected ear. (i.e. contrary to bow and lean criteria).

All patients were treating with barbecue maneuvers towards the unaffected ear, aimed at shifting the canaliths ampullofugally. Repeat treatment was only offered when the symptoms

persisted 1 week after repositioning. All patients were successfully treated with one treatment only. We give home tests who imite barbecue maneuvers, and they must performed 3 times per week.

10 patients, upon completion of one or more barbecue maneuvers, demonstrated improving gait. Therefore, treatments were ceased and the subjects were instructed to sleep on the unaffected side for ~1 week and reassessed either by a follow-up appointment or phone consultation to ensure the symptoms had abated. The high frequency of resolving vertigo was attributed to the multiple barbecue maneuvers performed on any given subject. None of these subjects had ongoing positional vertigo after 1 week.

### Characteristics of physical treatment

10 subjects were diagnosed with VPB on the basis of persistent positional vertigo. None had associated aural symptoms, focal neurological symptoms or headaches that were temporally related to the vertigo.

Although three patients had a past history of migraine headaches, they responded completely or partially to barbecue maneuvers. 3 (who did not recover after a single maneuver) underwent magnetic resonance imaging of the brain to exclude a central cause.

Testing the subjects with the unaffected ear and rolling the subject onto the affected side, a less intense paroxysm of nystagmus was observed.

All patients were treated with high velocity 360° barbecue maneuvers (in 90° increments) towards the unaffected ear with mastoid vibration applied to the affected ear. 5 patients had resolution of symptoms after a single treatment. 7 patient was treated on two sessions, 8 on three, 8 patient on four. Two patients underwent seven treatments sessions. Three (of nine) patients experienced complete symptom resolution following treatment on the Epley maneuver. One further patient was treated with repeated head shaking in the yaw plane (for a period of 1-2 min. at hourly intervals) over an 8h period, and experienced complete symptom resolution within 1 week. Three patients had partial symptoms.. However, two patients had no improvement after seven treatments, respectively; both were trialled on empirical migraine preventative therapy without significant changes in symptoms.

Positional vertigo with atypical direction changing horizontal nystagmus

5 with positional vertigo and horizontal direction changing positional nystagmus were



diagnosed with disorders other than BPV. These diagnoses were reached on the basis of (a) absence of typical paroxysmal positional nystagmus indicative of canalolithiasis, presence of persistent positional nystagmus and positional vertigo during an examination performed on a symptomatic day; (b) no history of previous recurrent BPV to imply cupulolithiasis; (c) history, examination findings and vestibular function tests indicative of an alternate cause for positional vertigo such as vestibular migraine (VM), endolymphatic hydrops, vestibular schwannoma, unilateral or bilateral vestibulopathy.

4 patients who first presented with positional vertigo were found to have clinically definite Ménière's Disease (MD). After Epley maneuver gait disturbance resolve after their acute episodes.

One subject, who had nystagmus and trouble of gait, with hipoacusia of right ear, was found to have a right-sided vestibular schwannoma with impaired audio-vestibular function on the right side. His vertigo was mild, unresponsive to barbecue manoeuvres, lasted several months and abated spontaneously, leaving residual asymptomatic positional nystagmus.

3 patients, with unilateral vestibulopathy of uncertain origin had a positive response to vestibular reeducation maneuver. One subject with systemic vasculitis, with ear disease with bilateral vestibular hypofunction,) and absent vestibulo-ocular responses to sinusoidal rotation, had persistent horizontal nystagmus with either ear down. The vestibular reeducation programmed was positive.

Table 1. Demographic and clinical data of the enrolled subjects

| PPV  | Men                             | Women                           |
|--|---------------------------------|---------------------------------|
| Basic demographic information                                    |                                 |                                 |
| Gender female:male   | 27                              | 13                              |
| Mean age in years  | 64.5 ± 16.8 years (range 16-95) | 64.5 ± 16.8 years (range 16-95) |
| Whiplash trauma  | 1                               | 0                               |
| Dizziness and subjective balance problems                        | 23                              | 17                              |
| Attacks with exacerbation of symptoms                            | 10                              | 9                               |
| Anxiety and vegetative symptoms                                  | 11                              | 10                              |
| Exacerbation dependent on perceptual stimuli or social situation | 5                               | 3                               |
| Balance and gait scores  |                                 |                                 |
| Median FGA [points] with min; max                                | 20(11,31)                       | 19(10, 30)                      |
| Median BBS [points] with min; max                                | 5(3,7)                          | 6 (2, 7)                        |
| Mean ABC [%] with min; max                                       | 70.1 (21; 87)                   | 63.5 (20; 100)                  |

PPV patients with phobic postural vertigo, FGA functional gait assessment, BBS Berg balance scale, FES-I falls efficacy scale-international, ABC activity-specific balance confidence scale

### Discussion

We present the first detailed comparison of barbecue maneuver, type of vertigo, etiology and profile of patients. The onset latency of positional nystagmus was shorter than that reported in posterior canal BPV and the duration of the paroxysm was

longer than described for the posterior canal (Brandt et al, 2005). The short and relatively symmetrical onset latencies we recorded with the affected and unaffected ears down in canalolithiasis imply a rapid movement of the otoconia in the horizontal canals in response of provocative testing.



The most common variant, posterior BPPV (PC-BPPV) has an up beating-torsional nystagmus on positional testing (Dix-Hallpike). Anterior semicircular canal BPPV (AC-BPPV), diagnosed by observation of a similar nystagmus but in a downbeating direction, is not frequent and therapeutic information on this condition is extremely scarce (Epley, 2001; Epley 1992; Semont, Freyss, Vitte, 1988). Recent controlled studies have clearly established that physical maneuvers based on inner ear biomechanics are highly effective for PC-BPPV. In these maneuver, the head is positioned such that loose otoconia are allowed to sediment within the labyrinth.

It seems highly likely that similar maneuvers should be equally effective for AC-BPPV. However, as the anterior canal follows a different trajectory from the posterior canal, maneuvers to treat AC-BPPV must necessarily differ geometrically from those described by Epley (2001), and Semont (Semont et al., 1988) for PC-BPPV.

In the present study, gait recovery was recorded from all subjects.

Of the patients within the VPB, all they have response to barbecue maneuver. 1 subject had a past history of migraine, and after the reeducation maneuver, remain with migraine. 5 of the 30 subjects diagnosed with vertigo had profound motion sensitivity.

While the classification of these subjects was influenced by their response to preventive therapy vs. repositioning maneuvers, this study highlights the uncertainties surrounding the classification of the patients with persistent vertigo and trouble of gait.

Whether some stages of Ménière's Disease are associated with no changes in reeducation maneuver.

Our observations indicate that reeducation maneuver is very important for vertigo patient.

Studies on patients with mixed vestibular entities demonstrated a reduction of walking speed, which was considered a compensatory strategy of these patients in order to increase dynamic equilibrium (Perring, Summers, 2007). However, studies with homogenous patients cohorts found preserved walking speeds in patients with reduced afferent sensory inputs (Bessot et al., 2012, Cohen et al., 2012).

### Conclusion

A diagnosis of vertigo, dizziness, and imbalance syndromes requires first of all a carefully

patient history. On the basis of our experience, we find that five different categories with the following key symptoms provide a reliable and practical diagnostic guide for the general neurologist and others who manage dizzy patients:

1. Paroxysmal positional vertigo (benign paroxysmal positional vertigo > central positional vertigo and/or nystagmus )
2. Spontaneous recurrent vertigo attacks (vestibular migraine or Menière's disease)
3. Sustained rotational vertigo (vestibular neuritis or central pseudo-neuritis)
4. Frequent spells of dizziness or imbalance (vestibular paroxysmia > superior canal dehiscence syndrome)
5. Postural imbalance without other neurological symptoms (phobic postural vertigo>bilateral vestibulopathy)

Although not commonly used in clinical practice, recording the barbecue maneuver may be useful in subjects with positional vertigo that is refractory to conventional bedside treatments.

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### References

- Aw ST, Todd MJ, Aw GE, McGarvie LA, Halmagyi GM, 2005, Benign positional nystagmus. A study of its three-dimensional spatio-temporal characteristics. *Neurology* 64(11): 1897 – 1905
- Bessot N, Denise P, Toupet M, Van Nechel C, Chavoix C, 2012, Interference between walking and a cognitive task is increased in patients with bilateral vestibular loss. *Gait posture* 36:319-321
- Bisdorff AR, Debatisse D, 2001, Localizing signs in positional vertigo due to lateral canal cupulolithiasis. *Neurology* 57(6): 1085 – 1088
- Brandt T, Dieterich M, Strupp M, 2005, *Vertigo and Dizziness*. Springer Verlag, London
- Epley JM, 2001, Human experience with canalith repositioning maneuvers. *Ann N Y Acad Sci* 942:179–191
- Epley JM, 1992, The canalith repositioning procedure: for treatment of benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg* 107:399–404
- Lee JB, Han DH, Choi SJ, Park K, Park HY, Sohn IK, Chung YH, 2010, Efficacy of the



- “bow and lean test” for the management of horizontal canal benign paroxysmal positional vertigo. *Laryngoscope* 120(11): 2339 – 2346
- Hornibrook J, 2011, Benign paroxysmal positional vertigo (BPPV): history, pathophysiology, office treatment and future directions. *Int J Otolaryngol* 2011(4): 1 – 13
- Perring S, Summers T, 2007, Laboratory-free measurement of gait rhythmicity in the assessment of the degree of impairment and the effectiveness of rehabilitation in patients with vertigo resulting from vestibular hypofunction. *Physiol Meas* 28:697-705
- Semont A, Freyss G, Vitte E, 1988, Curing the BPPV with a liberatory maneuver. *Adv Otorhinolaryngol* 42:290–293