

## A Liberatory Maneuver for the Treatment of Horizontal Canal Paroxysmal Positional Vertigo

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**Objective:** The purpose of this study was to determine the effectiveness of a new liberatory maneuver in the management of the geotropic variant of horizontal canal paroxysmal positional vertigo (HC-PPV).

**Study Design:** Case review.

**Setting:** Outpatient clinic.

**Patients:** The diagnosis of HC-PPV was based on the history of recurrent sudden crisis of vertigo associated with bursts of horizontal geotropic paroxysmal nystagmus provoked by turning the head from the supine to either lateral position. The patients were 11 men and 21 women ranging in age from 30 to 85 years (average 55.43 years), and the average duration of symptoms was 7.68 days.

**Interventions:** All patients were treated with a liberatory maneuver based on the hypothesis that the syndrome is caused by the presence of free-floating dense particles inside the en-

dolymph of the posterior arm of the semicircular horizontal canal. The maneuver favors their outmigration into the utricle. Patients were reexamined immediately after the treatment and again 2 days later.

**Main Outcome Measure:** The treatment outcome was considered as responsive when, after one or more liberatory maneuvers, the clinical signs of PPV disappeared at the end of physical therapy.

**Results:** The liberatory maneuver resulted in a complete remission of the positioning vertigo and nystagmus in all patients after the first session.

**Conclusions:** This approach represents a simple and effective approach to the management of the geotropic form of HC-PPV.

**Key Words:** Paroxysmal positional vertigo—Horizontal semicircular canal—Canalithiasis—Physical therapy.

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Horizontal canal paroxysmal positional vertigo (HC-PPV) is a syndrome characterized by sudden attacks of intense vertigo precipitated by turning the head from the supine to either lateral position (1–5). The diagnosis is based on the history and features of the positioning nystagmus provoked by a quick turn of the head to either side with the patient lying supine.

The typical features are these:

- Very short latency (a few seconds).
- Paroxysmal character.
- Duration <1 minute.
- Purely horizontal (geotropic or apogeotropic direction changing) position and greater intensity on one side.
- Not fatigable with repeated positioning, as observed also by other authors (5–10).

In the majority of cases, the nystagmus is directed toward the undermost ear (geotropic) in both sides and is more intense with the head turned toward the affected

side. In fewer cases, the nystagmus is directed toward the uppermost ear (apogeotropic) in both sides and is more intense on the unaffected side.

The condition is caused by heavy debris, probably fragments of otoconia detached from the macula of the utricle, within the endolymph of the posterior (geotropic variant) or anterior (apogeotropic variant) arm of the horizontal semicircular canal (4–8).

In recent years, some authors have tried to manage HC-PPV with positioning maneuvers to clear the canal of this heavy debris when it is inside the posterior arm of the canal.

Most of the maneuvers consist in quickly rolling the supine patient toward the unaffected side. In this way, the otoconial debris is shifted ampullofugally and outmigrates through the nonampullated end of the horizontal canal into the utricle. In 1993, Baloh et al. (5) tried unsuccessfully to liberate the affected horizontal canal from otoconial debris by rolling two patients from supine to prone with a single 180° rotation toward the normal side.

In 1994, Lempert (9) and Lempert and Tiel-Wilck (10) successfully treated two patients with a 270° rotation around the yaw axis (barbecue rotation) toward the un-

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affected side, performed in rapid steps of 90° with 30-second intervals.

In the same year, Baloh (11) successfully treated two patients with a 360° rotation toward the unaffected side in 90° quick steps with 60-second intervals, and Vanuccchi et al. (12) proposed with excellent results the maintenance of a forced prolonged position on the unaffected side for 12 hours to favor outmigration of otoconial debris by gravity.

In 1995, Epley (13) suggested rolling the supine patient 360° toward the unaffected side in 90° steps, with the head turned toward the affected canal, but the author did not report any result.

We report a liberatory positioning maneuver proposed by Asprella et al. (14) to immediately clear the horizontal canal of otoconial debris.

## SUBJECTS AND METHODS

From May 1998 to November 1999, we examined 32 patients with the geotropic form of HC-PPV. There were 11 (34.37%) men and 21 (65.62%) women, ranging in age from 30 years to 85 years (average 55.43 years). The patients fitted the clinical history and examination findings of geotropic HC-PPV, and we identified the affected ear by the side on which the nystagmus was more intense.

The time interval from the onset of PPV to the performance of the liberatory maneuver ranged from 1 day to 55 days (mean 7.68 days). The time interval was designated as lasting from the onset of symptoms to the physical treatment. Of course, HC-PPV symptoms often last longer if untreated. Ethical considerations precluded the use of a control group of untreated patients.

Of the 32 patients, 16 (50%) had idiopathic PPV, 9 (28.12%) were affected by 1 or more cardiovascular risk factors (arterial hypertension, obesity, ischemic cardiopathy), 4 (12.5%) had ipsilateral ear diseases (chronic suppurative otitis media, neurorhinopharyngitis), and 3 (9.37%) had undergone head trauma in the previous 24 hours (Table 1).

After PPV diagnosis, each patient was treated with the maneuver as follows (Fig. 1):

1. The patient sits on the side of a treatment table with the head straight ahead.
2. The patient is very quickly moved into a sidelying position on the unaffected side and remains in this position 1 minute after the end of the geotropic nystagmus.
3. The head of the patient is very quickly turned 45° downward, and this position is continued for 2 minutes.
4. The patient slowly returns to the sitting position.

At the end of the maneuver, the positioning that provoked the vertigo and nystagmus was immediately repeated to verify that treatment had been effective in controlling them. If vertigo and nystagmus were still present, we repeated the liberatory maneuver up to a maximum of two times. Afterward, we suggested no positional restriction to our patients. Last, all patients were reexamined 2 days after treatment to evaluate the effectiveness of this physical therapy.

## RESULTS

At reexamination with provoking positioning immediately after the liberatory physical therapy, 25 (78.12%)

**TABLE 1.** Clinical features and presumed causes of geotropic variant of horizontal canal paroxysmal positional vertigo

Patient	Age/Sex	Duration of symptoms (days)*	Presumed cause
1	51/M	5	Idiopathic
2	50/M	1	Idiopathic
3	30/F	20	Ear disease
4	75/F	10	Ear disease
5	40/F	2	Idiopathic
6	35/F	1	Idiopathic
7	68/F	6	Cardiovascular disease
8	81/F	1	Cardiovascular disease
9	64/F	7	Cardiovascular disease
10	50/M	8	Idiopathic
11	51/F	4	Idiopathic
12	33/F	10	Idiopathic
13	30/F	1	Idiopathic
14	50/F	6	Idiopathic
15	62/F	2	Cardiovascular disease
16	66/F	5	Cardiovascular disease
17	58/M	1	Idiopathic
18	50/F	1	Idiopathic
19	54/M	3	Idiopathic
20	78/M	3	Idiopathic
21	32/M	2	Ear disease
22	66/F	51	Cardiovascular disease
23	33/F	20	Head trauma
24	84/M	6	Cardiovascular disease
25	39/M	1	Idiopathic
26	65/M	1	Ear disease
27	68/M	1	Head trauma
28	85/F	5	Cardiovascular disease
29	46/F	3	Idiopathic
30	74/F	1	Head trauma
31	45/F	3	Cardiovascular disease
32	61/F	55	Idiopathic

\*Duration of symptoms is considered from the onset of symptoms to the execution of the liberatory maneuver.

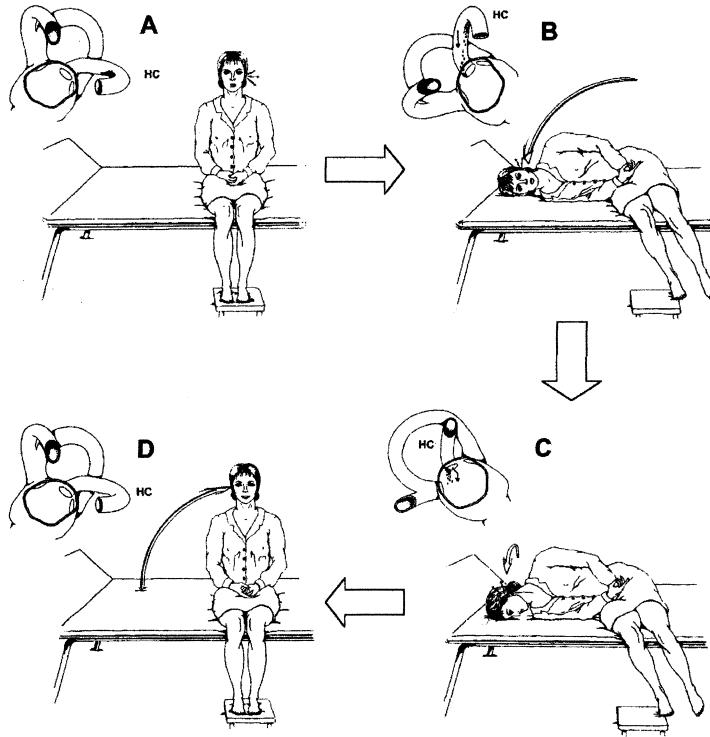
patients had no further positioning vertigo and nystagmus. The seven (21.87%) patients with persistent positioning vertigo and nystagmus healed after a second liberatory maneuver performed in the same session of physical therapy.

At follow-up 2 days after the treatment, all patients had been cured.

## DISCUSSION

The liberatory maneuver proposed by Asprella et al. (14) is based on the hypothesis of the presence of free-floating otolithic debris in the posterior arm of the horizontal semicircular canal.

When the patient rolls over onto the affected side, the otoconial debris precipitates toward the bottom of the canal, provoking an ampullopetal excitatory deflection of the cupula and vertigo with paroxysmal geotropic horizontal nystagmus. When the patient rolls over onto the unaffected side, the debris moves in the opposite direction, inducing an ampullofugal inhibitory deflection of the cupula with less intense vertigo and paroxysmal geotropic horizontal nystagmus.



**FIG. 1.** Four positions of the liberatory maneuver for geotropic left horizontal canal paroxysmal positional vertigo. **A:** Patient seated. **B:** Patient is quickly brought to the unaffected sidelying position. **C:** The head of the patient is quickly turned 45° downward. **D:** Patient is returned to the sitting position. Positions B and C are maintained for 2 minutes. The top right of each illustration shows the orientation of the left labyrinth as observed by the examiner standing in front of the patient. The arrows indicate the position of the debris within the canal during the different stages of the maneuver. HC, horizontal canal.

The pathophysiologic mechanism underlying this diagnostic procedure has been proposed to be dependent on two possible causes. Pagnini et al. (4) suggested that according to Ewald's second law, for high accelerations the excitatory stimulus is more intense than the inhibitory stimulus. In the horizontal semicircular canal, the excitatory stimulus is produced by an ampullopetal endolymphatic flow, whereas the inhibitory stimulus is provoked by an ampullofugal flow. Thus, admitting the presence of debris inside the nonampullary arm of the horizontal semicircular canal, an ampullopetal excitatory endolymphatic flow is elicited by rolling onto the affected side.

An additional explanation has been proposed by Baloh et al. (5), who hypothesized that debris present in the nonampullary arm of the horizontal semicircular canal (cause of the symptoms) is situated in an asymmetric position, so that its movement after rotation toward the affected side is greater than that caused by movement toward the unaffected side. The diverse widths of the movement of the debris produces diverse amounts of endolymphatic flows, thereby justifying the gradient of symptoms.

The maneuver is performed to rotate the head of the patient to favor the outmigration of the otolithic fragments by inertia and gravity from the posterior arm of the canal into the utricle.

When the patient is quickly placed into the sidelying position on the unaffected side, the horizontal canal of the affected side displaces on the vertical plane, and the canaliths move by rapid deceleration and gravity toward its nonampullated end. This induces an ampullofugal en-

dolymph flow with a consequent inhibitory deflection of the cupula away from the vestibule, resulting in the observed vertigo and horizontal nystagmus toward the ground.

In the second stage of the maneuver, the patient's head is quickly turned downward 45°. This induces the ampullofugal outmigration of the canaliths by inertia into the utricle.

We believe that spontaneous remission of the syndrome and a placebo effect of the treatment can be ruled out, because the clinical resolution was always immediate and was associated with the disappearance of the nonfatigable positioning nystagmus.

Gufoni's new maneuver is easy to perform in comparison with those of Baloh and Lempert. These latter require a barbecue rotation of 360° and 270° (for Baloh and Lempert, respectively) in 90° quick steps. This rotation is often difficult to perform in old or fat people and in patients affected by cervical stiffness. In comparison with the physical treatment of Vannucchi et al., the maneuver is also less time-consuming (12 hours versus a few minutes).

## CONCLUSION

This maneuver seems to be very effective physical therapy for HC-PPV, resulting in rapid and complete remission of the symptoms in all treated patients. In our current therapeutic protocol, we use this liberatory maneuver as the initial approach to the management of the geotropic variant of HC-PPV. If this initial treatment is ineffective, the maneuver can be repeated as often as

needed because of its noninvasiveness and the usual absence of side effects. A larger sample of patients is now needed to confirm our data in the experience of other clinical centers.

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