

LETTER TO THE EDITOR

Lateral Semicircular Canal Benign Paroxysmal Positional Vertigo diagnostic signs

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I read with interest the article entitled *Converting apogeotropic into geotropic lateral canalolithiasis by head-pitching manoeuvre in the sitting position* by Califano et al. ¹. The Authors describe their experience in transforming the apogeotropic LSC BPPV (Lateral Semicircular Canal Benign Paroxysmal Positional Vertigo) into a geotropic one performing "a quick 60° forward flexion and a slow maximal backward-extension of the head" in the sitting position. Furthermore, many diagnostic tests and clinical signs concerning the diagnosis of the affected side in LSC BPPV are mentioned.

I would like to clarify some points regarding a few statements in the above-mentioned paper.

The Authors refer to the converting technique from apo to geo either as a "manoeuvre" or as a "test", but it would be more correct to call "test", the clinical procedure used to define clinical diagnostic signs and "manoeuvre", the therapeutic procedure. Besides, there is a clear difference between the Head Pitch Test already described ² to make the differential diagnosis between the Pseudo-Spontaneous Nystagmus and the Spontaneous Nystagmus, and the Head Pitch Manoeuvre described by the Authors as a procedure to reach the conversion of LSC BPPV from apo to geo. The former is performed by slowly bending the head 60° forward and then 30° backward, the latter is performed by a "a quick 60° forward flexion and a slow maximal backward-extension of the head". As far as concerns the diagnosis of the affected side, in LSC BPPV, a misleading list of clinical signs, improperly called "accessory signs of laterality" is given. In this regard, I should like to elucidate the following points:

1. The nystagmus observed in the upright position in LSC BPPV, known as Pseudo-Spontaneous Nystagmus (PSN), was first described in 2003 (Asprella-Libonati personal communication, cited by Nuti et al. ³) and it was observed in a large series of patients in 2005 ⁴. This latter article pointed out the clinical value of this sign in diagnosing the affected side and identified a pathophysiological theory, attributing the PSN to the slow floating of the otoliths along the LSC bent 30° compared to the horizontal plane, so that it acts as an inclined plane on which the otoliths can gravitate following the same direction as the gravitational vector. The nystagmus (PSN) direction changes, induced by

flexing and extending the patient's head in the upright position, were described in 2006 ⁵.

2. A single pathophysiological theory explaining the PSN, its directional changes evoked by changing the head bending angle and its relation to other clinical diagnostic signs such as the nystagmus evoked by the Seated-Supine Test was described in 2008 ². This same paper emphasizes the importance of the Head Pitch Test in the upright position in order to perform the differential diagnosis between the PSN and Spontaneous Nystagmus.
3. The main concept is a single theory: the nystagmus observed in LSC BPPV, in the upright position, with its modifications induced by slow flexing and extending the head (Head Pitch Test), and the nystagmus induced by the Seated Supine Positioning Test should be considered as the biological response to a single physical phenomena: the otoliths gravitate along the inclined plane of the Lateral Semicircular Canal. The only variable is the size of the gravity vector component which is parallel to the LSC plane, this is the only efficacious force vector in moving the otoliths along the LSC. Thus the acceleration, due to gravity on the debris, varies from zero (neutral point) when the LSC is orthogonal to the gravity axis (head flexed 30° forward in upright position), to the maximum when the LSC is parallel to the gravity vector (supine position, straight ahead head flexed 30°). The force of gravity (f) is: $f = W g \sin s$ (W = mass of the otoliths, g = Acceleration due to Gravity = 9.81 m/sec², s = bending angle of the LSC plane with respect to the horizontal plane [Fig. 1]), so that $s = 0^\circ$ when the LSC plane is parallel to the horizontal plane and, in this case, the force of gravity has null effect $f = W g \sin s = W g \sin 0 = 0$; while $s = 90^\circ$ when the LSC plane is orthogonal to the horizontal plane and, in this case, the force of gravity has the maximum effect $f = W g \sin s = W g \sin 90 = W g 1 = W g$. If s is between 0° and 90° , f is between 0 and $W g$, so that the gravitational pull increases with the bending angle of the LSC.

That being stated, I suggest to use the same terminology naming the LSC BPPV nystagmus observed in the upright position and its modifications by performing the Head Pitch Test as "Pseudo-Spontaneous Nystagmus". In my opinion, definitions such as "bow and lean Ny", "head bending Ny" are misleading and should be removed.

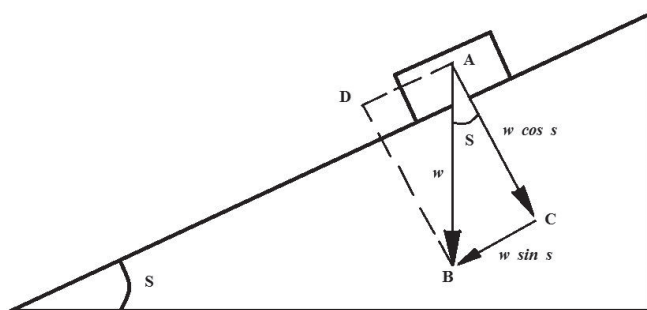


Fig. 1. The force of gravity (f) is: $f = W g \sin s$ (W = mass of the otoliths, g = Acceleration due to Gravity = 9.81 m/sec², s = bending angle of the LSC plane with respect to the horizontal plane).

References

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- ² Asprella-Libonati G. *Pseudo-Spontaneous nystagmus: a new sign to diagnose the affected side in lateral semicircular canal benign paroxysmal positional vertigo.* Acta Otorhinolaryngol Ital 2008;28:73-8.
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- ⁴ Asprella Libonati G. *Diagnostic and treatment strategy of lateral semicircular canal canalolithiasis.* Acta Otorhinolaryngol Ital 2005;25:277-83.
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LETTER TO THE EDITOR

Dear Professor Chiesa,

Thank you for offering us the possibility to reply to the Letter to the Editor and we also thank Dr. Asprella Libonati for the interest shown in our article *Converting apogeotropic into geotropic lateral canalolithiasis by head-pitching manoeuvre in the sitting position* which was recently published in *Acta Otorhinolaryngologica Italica*. I fully agree with Dr. Asprella Libonati's comments concerning the need to offer (if possible, I would add) a theory related to the phenomena observed in lateral canalolithiasis, a concept which is, in fact, expressed also in our article: "The pathophysiology of Pseudospontaneous Nystagmus (Fig. 1), Bow and Lean Nystagmus (Figs. 2, 3), Positioning Nystagmus from sitting to supine position (Fig. 4) and the transformation from apogeotropic to geotropic canalolithiasis, are in keeping with the theory of canalolithiasis ... They (Otoliths) move as if they are on an inclined plane and their movement provokes the Bow Nystagmus towards the healthy side, and the Pseudospontaneous Nystagmus, the Lean Nystagmus and the Positioning Nystagmus from the sitting to the supine position towards the affected side".

As can be seen, we mentioned and evaluated, the mechanism of the inclined level, moreover, not neglecting, in our article, to quite rightly refer to (including also the titles in the list of References) the important work performed by Dr. Asprella Libonati in this particular field.

We also agree with his having pointed out the various modes and the meaning of diagnostic "Head-Pitching" (Head-Pitching Test) compared with the therapeutic aspects (Head-Pitching Manoeuvre), both as far as concerns the meaning from a terminology viewpoint but also from a practical point of view, indeed the title of our article refers to the "head-pitching manoeuvre".

On the other hand, we do not completely agree with the proposal to combine, in a single definition "pseudospontaneous nystagmus", all the types of non-paroxysmic nystagmus observed in lateral canalolithiasis.

This for two reasons:

1. The forms of nystagmus defined as "Bowling (or Bending) Nystagmus", "Leaning Nystagmus" and "Sitting to supine positioning Nystagmus (or Lying-down nys-

tagmus)" may be present also in the absence of "Pseudospontaneous Nystagmus" thus as defined by Dr. Asprella Libonati, with the patient in a sitting position with his/her head straight and aligned with the body. In my opinion, therefore, these signs are autonomous, also as far as concerns the unifying theory of canalolithiasis and of the otolithic movement on an inclined level resulting from, on the one hand, the initial position of the otoliths in the canal and, on the other, the positioning of the head, and consequently of the canal, in the planes of the space.

2. These forms of nystagmus have been described in the Literature and, therefore, with due respect to those Authors who proposed them, they should be correctly cited, when reference is made to them.

In closing, just one last observation. Reading between the lines of the article, it was our intention, to point out the possibility of the conversion from lateral apogeotropic canalolithiasis to the geotropic form by means of the Head-Pitching manoeuvre, not so much for its effective practical usefulness (other manoeuvres, in our opinion, in particular the first step of Gufoni's therapeutic manoeuvre towards the affected side, are more efficacious for this purpose), but inasmuch as it represents, as far as concerns the lateral apogeotrope forms, further confirmation of its usefulness, at least in the majority of cases, of the pathogenetic interpretation, held by Italian Authors, of the "free-floating otoliths" in the ampullar arm, compared to that of the "cupula-adherent otoliths", preferred, on the other hand, by authoritative foreign Authors.

In other words, our intention was to offer a further contribution, by means of a description of a phenomenon, which had, so far, not been reported, to that hypothesis of the otolithic sliding along a sloping plane being a moment which determined the endolymphatic currents responsible for the excitatory or inhibitory canalar stimuli which trigger the paroxysmic and non-paroxysmic nystagmic ocular movements characteristic of lateral canalolithiasis.

With kindest regards,

Luigi Califano

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