

Concurrent Right Horizontal Semicircular Canalolithiasis and Right Posterior Cupulolithiasis Verses Canal Switch: A Diagnostic Otoneurologic Conundrum

Dear Editor,

Benign paroxysmal positional vertigo (BPPV) is solitarily diagnosed by observing the oculomotor responses during positional tests, and the verifying negative positional retests at short-term follow-up confirms the diagnosis.^[1] However, *canal switch* occurs in about 6 to 8 percent of all cases of BPPV treated with repositioning maneuvers, and mostly the posterior semicircular canalolithiasis transforms to horizontal semicircular canalolithiasis.^[2-4] In 1995, Robert Baloh reported two cases of posterior semicircular canalolithiasis that transformed into ipsilateral right horizontal semicircular cupulolithiasis.^[5] The case vignette presented here is unusual because, following treatment with the therapeutic Gufoni maneuver, the transformation from right horizontal semicircular canalolithiasis to right posterior cupulolithiasis occurred, and this has not been reported hitherto.

A 42-year-old man visited our Otoneurology Centre in the mid-summer of 2023, with 18 days history of rotational vertigo on getting up from supine and in either of the lateral recumbent positions. Neither clinical symptoms nor signs suggested a central vestibular disorder, and there were no contraindications to diagnostic or therapeutic positional maneuvers. The general physical and neurologic examination was normal. The otoneurologic examination revealed normal gaze holding, vertical and horizontal saccadic, and smooth pursuit eye movements. The head impulse test on either side was normal. The positional test findings were as follows:

Bow-and-Lean Test (BLT)^[6]: Elicits a horizontal nystagmus directed to the patient's left in the lean positioning and bow positioning. This is rather atypical.

Supine Roll Test (SRT)^[7]: Elicits geotropic horizontal positional nystagmus of less than the 60s on the lateral head roll to the right and left. The lateral head roll to the right elicited a stronger horizontal geotropic positional nystagmus compared with rolling the head laterally to the left. Localization and lateralization to the right horizontal semicircular canal were parsed from the oculomotor responses elicited during SRT.

Ab initio, we diagnosed the patient as having *right long posterior (non-ampullary arm) horizontal semicircular canalolithiasis* [geotropic horizontal semicircular canal BPPV (*geo-HSC-BPPV*)]. *Propter hoc*, therapeutic Gufoni maneuver was undertaken, during which we positioned the patient from short-sitting on the examination table to left lateral recumbent for a minute and then yawed the head downward about 45 degrees, maintaining it for 2 minutes. Thereupon, the

patient was uprighted to the short-sitting position, completing the Gufoni maneuver.^[8] *In toto* 2 sequent, Gufoni maneuvers were performed.

Verifying Positional Tests: After 1 hour, *sitting-to-supine positioning (SSP)* and *right half-Hallpike test (HHT)^[8]* elicit an upbeat right torsional positional nystagmus of more than 60s duration with a positive inversion test, that is, *nose-down to left* lateral recumbent transforms nystagmus to downbeating and left torsional suggestive of the *adherent type of right posterior cupulolithiasis*.^[9] We treated the patient with a session of Brandt–Daroff exercises (BDE)^[10] and instructed the patient to carry through BDE for 4 weeks. The patient was retested with positional tests after 4 weeks, and he was asymptomatic with a resolution of vertigo and accompanying positional nystagmus.

Clinical Otoneurologic Conundrum: As the elicited oculomotor responses, during a positional test, depend on the net effect of force vectors generated by the otoconial debris (free-floating or adherent to the cupula) in all six semicircular canals, it is difficult to determine whether the patient had horizontal canalolithiasis with co-occurring posterior cupulolithiasis at the outset, or a canal-switch eventuated post-Gufoni maneuver. The prolonged duration right torsional upbeat positional nystagmus during SSP and HHT may have been initially masked by the horizontal geotropic nystagmus of co-occurring right long non-ampullary arm horizontal semicircular canalolithiasis. The clot most likely entered the posterior semicircular canal (instead of getting embedded in the gelatinous utricular matrix) during the conclusion of the Gufoni maneuver because it is inferior most during an upright position, as inferred by Occam's razor principle. Thereafter, on losing the way, the otoconial clot adhered to the utricular side of the right posterior cupula, making it heavy and graviceptive [Figure 1].

SUPPLEMENTARY MATERIAL

By clicking the link, the initial BLT, SRT, and HHT and inversion test at short-term follow-up can be viewed. The link is as follows:

<https://youtu.be/y85BJARhm9c>

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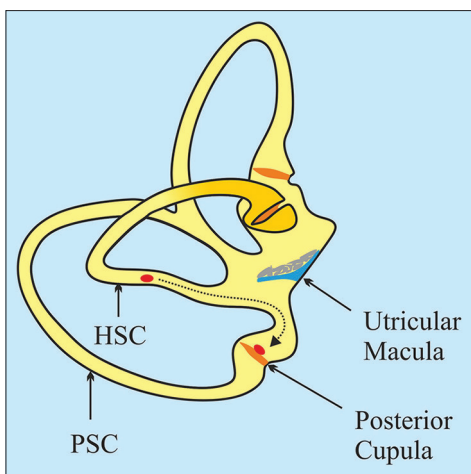


Figure 1: Otoconial clot (in red) in the posterior non-ampullary arm of the right horizontal semicircular canal migrating (dotted line) through the short arm to the utricular side of the right posterior cupula and getting adherent to it (in red)

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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