

DiZZcOVER

Systematic discussions on specific neurotology topics

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*An online presentation of a neurotology case
held on the last Friday of every month*

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1. Issue in Focus: Anterior canal BPPV

1.1 A rare variety of Benign Paroxysmal Positional Vertigo:

Anterior canal BPPV was first described by Dr Katsarkas. A in 1987. It is considered the least frequent form of semicircular canal BPPV, accounting for roughly 1-2% of all cases¹.

This form of BPPV has a low incidence because the anterior canal is placed higher than both the posterior and horizontal canals, making it less likely for the otoconial debris to enter the canal against gravity (Fig 1). The non-ampullary arm of the anterior canal descends directly into the common crus and onward into the vestibule. This anatomical orientation also facilitates self-clearance of the otoconial debris due to gravity.

Anterior canal BPPV is often found in post-traumatic head injury cases and people practicing yoga poses or exercise regimes like headstand. A Down-beating positioning nystagmus with a torsional component toward the ipsilateral ear (clockwise for left canal, counter-clockwise for right canal) is typical for this type of BPPV.

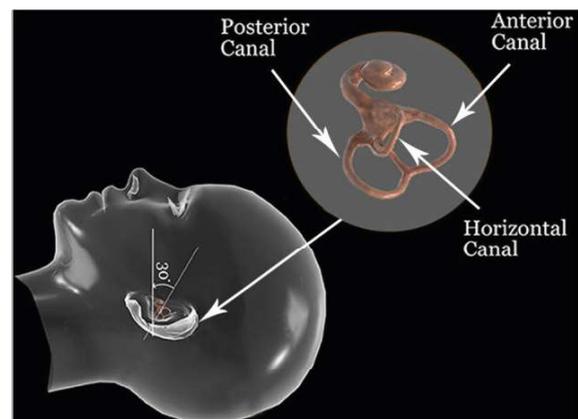
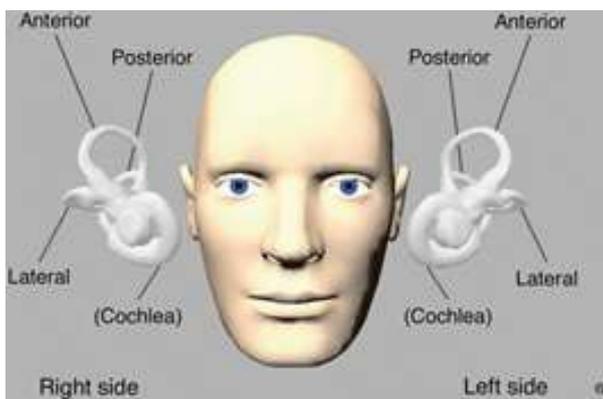


Fig. 1

DIAGNOSTIC CRITERIA OF ANTERIOR CANAL CANALOLITHIASIS:

(BARANY SOCIETY 2015)²

- Recurrent attacks of positional vertigo or dizziness
- Duration of attacks < 1 min.
- Positional nystagmus elicited immediately or after a latency of one or few seconds by the Dix Hallpike maneuver (on one or both sides) or in the supine straight head-hanging position, beating predominantly vertically downward and lasting < 1 min.
- Not attributable to another disorder.

DIAGNOSTIC MANEUVERS FOR ANTERIOR CANAL BPPV

• SUPINE STRAIGHT HEAD EXTENSION TEST:

This is a sensitive test for Anterior canal BPPV³. A predominantly down beating nystagmus with mild torsional component is characteristic of anterior canal BPPV. The side of torsional component indicates the involvement of ipsilateral anterior canal.

1. Sit with head straight and looking forward.
2. Lying on couch with head extension of minimum 30 degrees. Observe nystagmus for 1 min.
3. Back to sitting position.



Fig. 2

• DIX HALLPIKE TEST:

The nystagmus produced in supine straight head extension test is the same as seen in the Dix Hallpike tests. As the plane of the head motion is the same for the ipsi-lateral posterior canal and contra-lateral anterior canal, the side of involvement is determined by the direction of torsional component of nystagmus.

DIFFERENTIAL DIAGNOSIS

1. Apogeotropic variant of opposite side posterior canal BPPV⁴.
2. Central causes for down beating positional nystagmus.

REPOSITIONING MANEUVERS

• **YACOVINO MANEUVER:** non side specific. Both anterior canals can be corrected in same procedure³.

1. Sit with head straight looking forward.
2. Lying back with head extension of minimum 30 degrees for 1 min
3. Chin to chest position for 1 min.
4. Sit straight with head bending forwards.

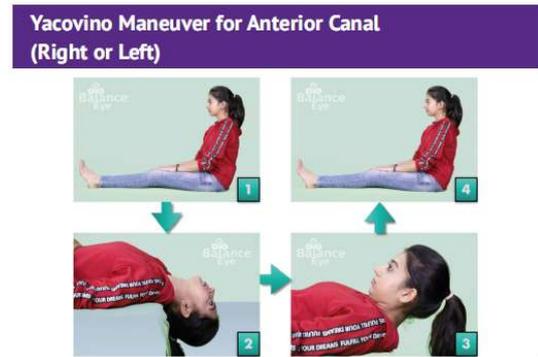


Fig. 3

• **REVERSE EPLEY MANEUVER:** Side of involvement should be known.

Following picture shows correction of left anterior canal BPPV¹

- A. Sit straight with head turning towards healthy side ear for 45 degrees.
- B. Lying back with head extension up to 30 degrees.
- C. Turn head towards involved side.
- D. Turn head down looking towards ground.
- E. Sit back with head turned towards involved side.

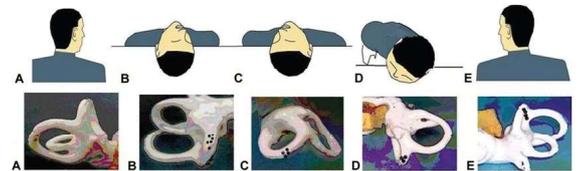


Fig. 4

SHORT CANALOLITH REPOSITIONING PROCEDURE (CRP): Similar to Epley's maneuver with following steps for right anterior canal BPPV⁵

1. Sit with head turning towards involved side 45 degrees
2. Lying back with head extension.
3. Turn head towards opposite side.
4. Sit back with head turning towards opposite side.

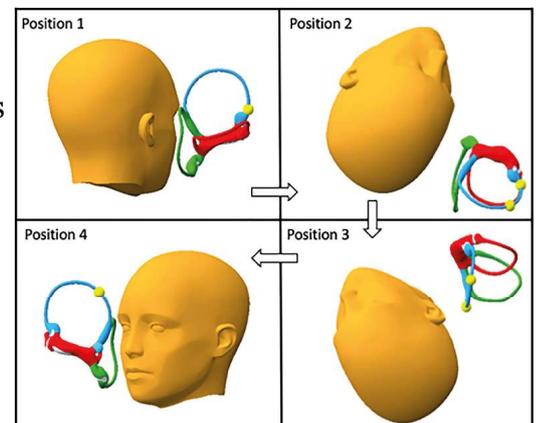


Fig. 5

References

1. *Diagnostic and Therapeutic Maneuvers for Anterior Canal BPPV Canalithiasis: Three-Dimensional Simulations*, Anita B, et al., *Front Neurol.* 12: 740599 (2021)
2. *Benign paroxysmal positional vertigo: diagnostic criteria*. Von Brevern M et al., *J Vestib Res.* 25:105–17 (2015)
3. *Clinical and VNG Features in Anterior Canal BPPV—An Analysis of 13 Cases*, Prateek Porwal, et al., *Front.Neurol.* 12:618269 (2021)
4. *Anterior Canal BPPV and Apogeotropic Posterior Canal BPPV: Two Rare Forms of Vertical Canalolithiasis*. Califano Et al., *Acta Otorhinolaryngol Ital.* 34(3):189-97. (2014)
5. *Short CRP for Anterior Canalithiasis: A New Maneuver Based on Simulation with a Biomechanical Model*. D'Albora Rivas R, Et al., *Front Neurol.*13;11:857 (2020)

2.1 Case Presentation of Anterior canal BPPV

A 67-year-old male patient presented with history of giddiness - 2 years. Main complaints include constant unsteadiness and recurrent episodes of severe spinning triggered by bending forward, looking up and lying down with each episode lasting few seconds.

Patient was very apprehensive; he was avoiding neck movements. He had previous consultations with Neurologists and ENT specialists. The brain imaging led to normal results complicating the diagnosis. Epley's maneuver was performed earlier by other clinicians but there was no improvement in the symptoms.

On Examination:

Oculomotor findings are normal. No spontaneous nystagmus.

Positive Findings on VNG:

- Positional tests:

There was a very mild down beating with right torsional nystagmus on pitch forward and backward, in both side Dix Hallpike tests.

- On Supine straight head extension test:

Down beating right torsional nystagmus was noted. The nystagmus persisted without reversal upon sitting up.

The patient was diagnosed as RIGHT ANTERIOR CANAL BPPV depending on the history and above findings. He was treated with the YACOVINO MANEUVER. Symptomatic improvement was observed after repositioning twice.



Dr Anusha

Consultant Vestibular Specialist,
DizzyEazy Clinic, Cyclops Medtech.
INDIA

VERTIGO Grand Rounds

2.2 Discussion Pearls



Dr Anirban Biswas
Senior Neurologist and
Vertigo Specialist
INDIA



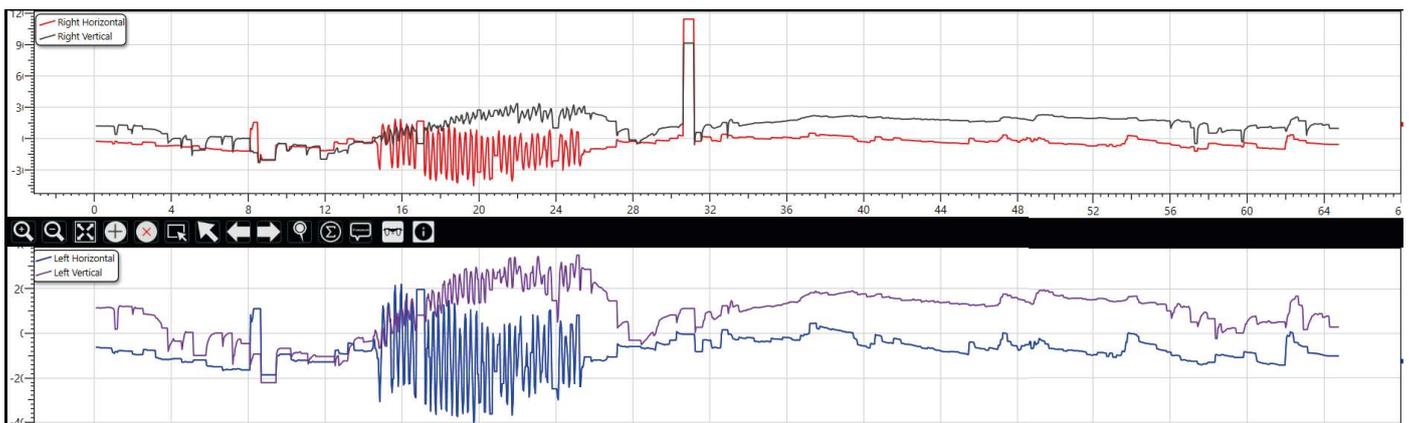
Dr Ravi Nayar
Co-founder & Chief Scientific Officer
Cyclops MedTech
INDIA

Q: R.N.: How frequently have you come across anterior BPPV in your practice?

A: A.B.: Not very frequently, less than 5%.

Q: A.B.: Why this 67-year-old patient also has constant unsteadiness? Anterior canal BPPV can have positional vertigo but it's rare to have constant unsteadiness. Patient had mild right beating nystagmus on post high frequency head shake. This might indicate left vestibular hypo-function? or is it functional? what is your opinion Dr Anusha?

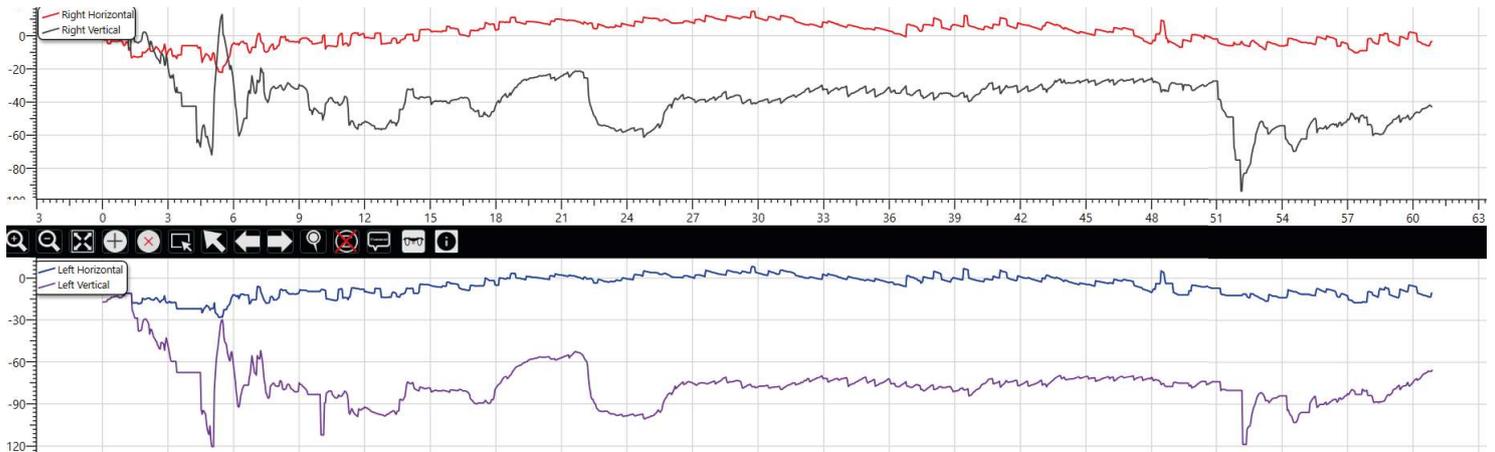
A: Dr. Anusha: Headshake nystagmus was very minimal and I think the constant unsteadiness might be functional or due to psychological apprehension from positional triggers of severe giddiness. Patient might slowly develop PPPD (persistent postural-perceptual dizziness).



Q: Dr. Rajesh Kumar: The Down beating nystagmus was not clear from the video?

A: Dr. Anusha: We can refer to graphical representation of nystagmus when it's difficult to appreciate in video or while live testing. In cases like this VNG will be very helpful to decide on the nystagmus.

VERTIGO Grand Rounds



Q: Dr. Roxana Mazilu: How can you establish the affected side in the SSC BPPV if the nystagmus occurs in both sides at Dix Hallpike maneuver?

A: The side of the involvement for Anterior canal BPPV will be the side of torsional component of down beating nystagmus on Dix-Hallpike testing or Supine straight head extension test. It doesn't depend on side of the testing ear. In the present case as we have the finding of down beating nystagmus with right torsional component in both side Dix-Hallpike and Supine straight head extension test, hence we can diagnose it as Right anterior canal BPPV.

A.B: It does not matter which side the anterior canal BPPV affects. This is because the Yacovino maneuver is the same for both sides.

Q: Dr. Sugirtha Anand: Reversibility of Nystagmus? Can that be shown again?

A: Reversibility of nystagmus on sitting is common in typical posterior canal BPPV cases. It's very rare in Anterior canal BPPV and also apogeotropic variant of posterior canal BPPV. The present case had no reversal of nystagmus on sitting.

Q: Dr Rajesh Kumar: How did you suspect AC -BPPV? How in routine practice, ENT surgeons can suspect it?

A: Although its rare, Anterior canal BPPV can be found in post-traumatic head injury cases, patients practicing yoga poses like head stand. History of positional vertigo and down beating nystagmus on Dix-Hallpike and/or supine straight head extension test can give a clue for Anterior canal BPPV.

Comment by Dr Vats: I have been treating anterior canal BPPV since 2011 and feel that I can justly claim only 5 patients with this diagnosis in the last 13 years. In fact, most downward vertical nystagmus is more likely to be apogeotropic nystagmus of the opposite posterior canal.

This is because of the superior position of the anterior canal renders it unlikely for the otoconia to migrate upwards or if they do, not return spontaneously. When otoconia do migrate, it is most likely due to trauma or head low positions during exercise or yoga. The classic nystagmus is a slow crescendo-decrescendo pattern and is often associated with imbalance which is non positional for longer periods.

Q: What is your protocol for diagnosis and management of these cases?

A: I do the Dix Hallpike maneuver on both sides and the straight head hanging test and attempt corrective maneuvers at the same setting. I review after 1 hour and if it has improved this is a confirmation of my diagnosis.

Q: Does the nystagmus of apogeotropic BPPV reverse on sitting up position?

A: Not in my experience, though there have been some reports in recent publications, Dr. Califano has reported a large series in 2021 and I invite him to share his experience.

Dr. Califano: I agree that apogeotropic BPPV of the contralateral canal is more common. All my attempts to correct anterior canal BPPV is in a way an attempt to induce the otoconia to move to the posterior canal. This is helped by headshaking or use of vibrator and head positioning. We also warn the patient that the hither to mild symptoms may become temporarily worse. But that this can be corrected.

Note that it is essential to rule out central causes of this nystagmus. The VHIT test is very beneficial in this regard.

Lastly, though the Yacovino maneuver is useful Dr. Anita Bhandari's demonstration of the single change in position from lying to sitting is quite effective too.

Q: How often is it required to repeat these maneuvers?

A: A.B: Very often, and it is likely that the reason is partly because the Yacovino maneuver is not as effective as the others and the diagnosis itself is not often clear.

Q: How does one differentiate between anterior canal BPPV and apogeotropic posterior canal BPPV.

A: A.B: If a torsional element is seen in the nystagmus, posterior canal can be suspected. Clinical history is important and central causes often confuse the doctor.

Q: Do you use VHIT, to differentiate central versus peripheral?

A: A.B: In my opinion, VHIT picks up VOR gain abnormalities. If the VOR gain was compromised, there would not be nystagmus in the first instance. Hence, VHIT has little role to play.

Q: Dr. Vats: Could you kindly give your opinion on this issue.

A: Dr. Vats: In my earlier presentation I showed many cases of anterior canal BPPV where the VHIT test was negative, however in the publication from Italy, their experience was different. The explanation was that the particles from the anterior canal were blocked in the crus commune and that would lead to abnormal VOR in that canal and hence a positive VHIT.

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VERTIGO Grand Rounds

2.3 Online VGR Video

Scan the below QR Code



to watch the complete Vertigo Grand Round Session

POSTURA^{DR} Static Posturography /
Stabilometry

Postura - DR comes with dozens of calibrated exercise protocols as well as interactive games to rehabilitate every aspect of balance. Patient's progress can be measured from one visit to another.



3. Journal Scan

1. Diagnostic and Therapeutic Maneuvers for Anterior Canal BPPV Canalithiasis: Three-Dimensional Simulations, Anita B, et al., (2021)

DOI:<https://doi.org/10.3389/fneur.2021.740599>

Editorial Comment:

The authors proposed accurate 3D simulation models for supine straight head extension test, Yacovino, reverse Epley, short CRP manoeuvres. With simulation they noted that the reverse Epley maneuver is less effective than the others.

2. Clinical and VNG Features in Anterior Canal BPPV—An Analysis of 13 Cases, Prateek Porwal, et al., (2021)

DOI:<https://doi.org/10.3389/fneur.2021.618269>

Editorial Comment:

The authors stated that the most consistent diagnostic maneuver is supine straight head extension test. They recommended a testing protocol that includes Dix-Hallpike testing on both sides and supine straight head extension test. McClure Pagnini testing may also evoke Down Beating Nystagmus with or without the torsional component.

The Yacovino maneuver is effective in resolving Anterior canal BPPV.

3. A Novel Manoeuvre for Diagnosis and Treatment of Torsional-Vertical Down Beating Positioning Nystagmus: Anterior Canal and Apogeotropic Posterior Canal BPPV. Garaycochea O, et al., (2020)

DOI: [10.1016/j.bjorl.2020.09.009](https://doi.org/10.1016/j.bjorl.2020.09.009)

Editorial Comment:

The authors stated that the down beating torsional nystagmus on Dixhallpike test can be explained by ipsilateral anterior canal BPPV or contralateral apogeotropic variant of posterior canal BPPV. They proposed a novel method to differentiate the two types. By applying a novel manoeuvre (Fig 6) anterior canal BPPV could be corrected, apogeotropic posterior canal variant can be converted to geotropic typical variant which can later be repositioned by Epley's manoeuvre.

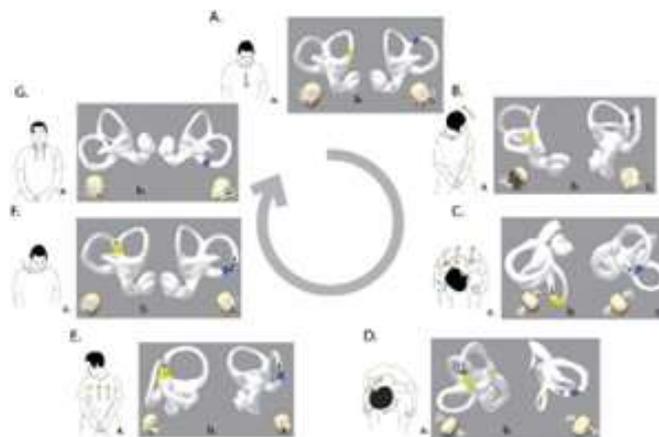


Fig. 6

4. Anterior Canal BPPV- A Rare Form of Vertical Canalolithiasis: Series of 11 Cases. Patel, R., Lele, P. (2024)

DOI: <https://doi.org/10.1007/s12070-024-04686-9>

Editorial Comment:

A case series of 11 cases diagnosed as anterior canal BPPV by torsional down beating nystagmus on deep hanging / supine head extension test. Authors found that Yacovino manoeuvre is effective in repositioning. They also experienced the conversion of anterior canal BPPV to Posterior canal BPPV after repositioning with Yacovino manoeuvre.

5. Salafia F, Mazzone S, Melillo MG, Califano M. Anterior canal BPPV and apogeotropic posterior canal BPPV: two rare forms of vertical canalolithiasis. Califano L et al. PMID: 24882928

Editorial Comment:

This study investigated two rare forms of BPPV: anterior canal (AC) and apogeotropic posterior canal (APC). Using specific eye movement patterns, the authors diagnosed 2.5% of patients with APC and 1.2% with AC. Yacovino and Quick Liberatory Rotation (QLR) manoeuvres effectively resolved these BPPV subtypes. Positional vertigo with down beating torsional nystagmus was observed in both AC and APC. In this article, authors also proposed a grading system for diagnosis of AC and APC: "certain" when a canal conversion in typical ipsilateral posterior canal BPPV is obtained; "probable" when APC or AC are directly resolved; "possible" when disease is not resolved but cerebral neuroimaging is negative for neurological diseases.

6. Apogeotropic Posterior Semicircular Canal BPPV-A Case Series from South Rajasthan. Vats AK et al. (2023)

DOI: [10.4103/aian.aian_706_23](https://doi.org/10.4103/aian.aian_706_23).

Editorial Comment:

This case series attempts to differentiate apogeotropic posterior canal BPPV (apo-PSC-BPPV) from anterior canal BPPV (ASC-BPPV). Both variants share similar down beating nystagmus on positional testing, but a short-term follow-up for benefit after physical manoeuvres will help to clarify the diagnosis. The authors present seven cases (including bilateral presentations) to analyse clinical features and short-term treatment outcomes.

4. History



Robert Barany is credited with the initial description of Benign Paroxysmal Positional Vertigo (BPPV) in 1921. His paper, “Diagnosis of Disease Symptoms in the Area of the Otolith Apparatus. Acta Otolaryngol (Stockholm) 1921; 2:434–437”, outlined a method of diagnosing inner ear disorders by positioning the patient's head and observing eye movements. This work was crucial in recognizing and understanding BPPV, a condition causing brief vertigo episodes. While Barany didn't identify the specific cause of BPPV (later found to be displaced crystals), his description facilitated ongoing research and treatment development. Barany's groundbreaking work on the inner ear earned him the 1914 Nobel Prize in Physiology/Medicine

Dix and Hallpike built upon the initial description of Benign Paroxysmal Positional Vertigo (BPPV) by providing a more comprehensive account in 1952. Using a positional test they showed that the undermost ear caused the characteristic rotational nystagmus. Their findings were documented in two publications: "The investigation of vestibular function" (Br Med Bull 1956; 12:131-142) and "Pathology, symptomatology and diagnosis of certain disorders of the vestibular system" (Proc R Soc Med 1952; 45:341-354).



Anterior canal BPPV (ac-BPPV) was first described in 1987 by **Dr. Athanasios Katsarkas**, a Greek-born otolaryngologist (ear, nose, and throat specialist). He is a professor at McGill University's Faculty of Medicine located in Montreal, Quebec, Canada. He heads the Dizziness Clinic and co-directs the Vestibular Research Laboratory at Royal Victoria Hospital. Dr. Katsarkas has extensive experience researching the vestibular system (balance system) and dizziness. He collaborates with various researchers and has published over 100 articles in scientific journals. His clinical expertise and research findings, includes the use of mathematical models to assess vestibular function



Dr. Dario Yacovino is an Argentine otolaryngologist who is known for developing the Yacovino maneuver, a repositioning maneuver used in the treatment of benign paroxysmal positional vertigo (BPPV). His maneuver is designed to address certain types of BPPV, particularly those affecting the anterior and horizontal semicircular canals of the inner ear. He published his maneuver in the paper “Yacovino DA, Hain TC, Gualtieri F. New therapeutic maneuver for anterior canal benign paroxysmal positional vertigo. J Neural 2009;256:1851–5.”



5. Gallery - Art of the month



*Coronation of Chhatrapati Shivaji Maharaj,
by Dr. Chetna Naik*



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