

# A Case Series of Vertigo: Red Alert and the Importance of Thinking Ahead

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## Abstract:

*Vertigo can be central or peripheral causes. However, determining the cause can be difficult as central vertigo may mimic the presentation of peripheral vertigo. Hence, we report three cases of central vertigo, to highlight the importance of early recognition and clinical suspicions in managing the aforementioned cases which may present with debilitating daily living.*

**Keywords:** vertigo, central nervous system.

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## Introduction:

Vertigo is the illusion of body or environment spinning and the majority of cases rise from a vestibular problem. Vertigo is subtypes of dizziness that can affect about 20% to 30% of general population<sup>1</sup>. It is usually associated with the history of otorrhoea, ear pain, hearing impairment and previous history of ear surgery. The most common peripheral disorder with vertigo is benign paroxysmal positioning vertigo (BPPV), viral labyrinthitis and Meniere's disease. However vertigo also can be caused by central lesions like cerebellopontine (CP) angle tumour, cerebrovascular disease, migraine, neoplasm and multiple sclerosis<sup>1</sup>. Any unilateral symptoms, diplopia, new visual, sensory or motor losses, headaches, facial weaknesses or paresthesia, incoordination may indicate central causes.

## Case Series:

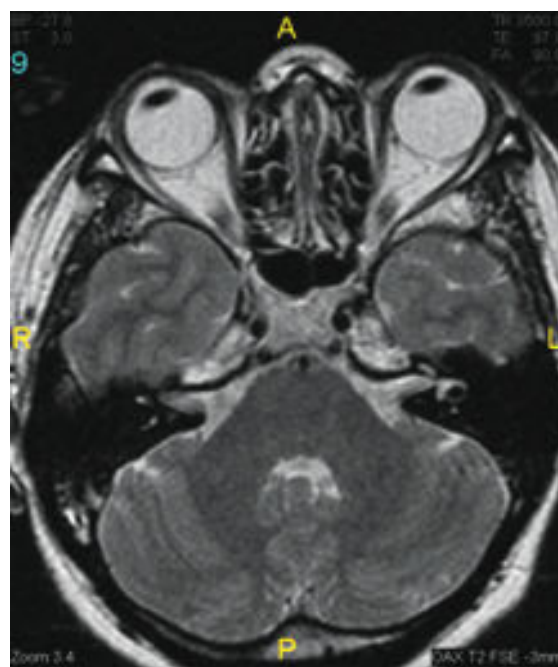
### Case 1:

A 40-year-old Malay lady was referred to our center with history of unilateral tinnitus in the right ear for a one year duration. Her condition was worsened with floating and spinning sensation for 3 weeks especially when lying down on the right side. Patient has no rhinitis symptoms and able to do reading as passenger in the moving car.

On examination, no nystagmus seen. Soft cushion test and Fukuda test were negative. Head shake and head trust test was also negative. Dix-Hall pike test was done with positive finding only on the right side. The patient had floating sensation but no giddiness during the Dix-Hall pike test. Pure tone audiometry result shows normal hearing of left ear and mild to severe sensorineural hearing loss in the right ear.

Magnetic Resonance Imaging (MRI) of the brain was done to rule out cerebellopontine (CP) angle tumour in view of unilateral sensorineural hearing loss. There was a bony outgrowth or calcification seen at the Internal Acoustic Meatus (IAM) measuring 0.3 cm x 0.3 cm. The right vestibulocochlear nerve is indented by the lesion causing angulation of the nerve. Other structures were normal with no evidence of CP angle tumour.

She was started on Amitriptylline at night and later on change to Carbamazepine. Since then, her symptoms slightly improved. Her case was also referred to neurosurgery. However, she opted for no operation.



**Figure 1:** Axial view of MR CP angle in T2WI-FSE shows rounded hypointense lesion at the right IAM, similar signal intensity with adjacent bone. This lesion indenting the right cranial nerve VIII. Left IAM shows normal cranial nerve VII and VIII.

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**Case 2:**

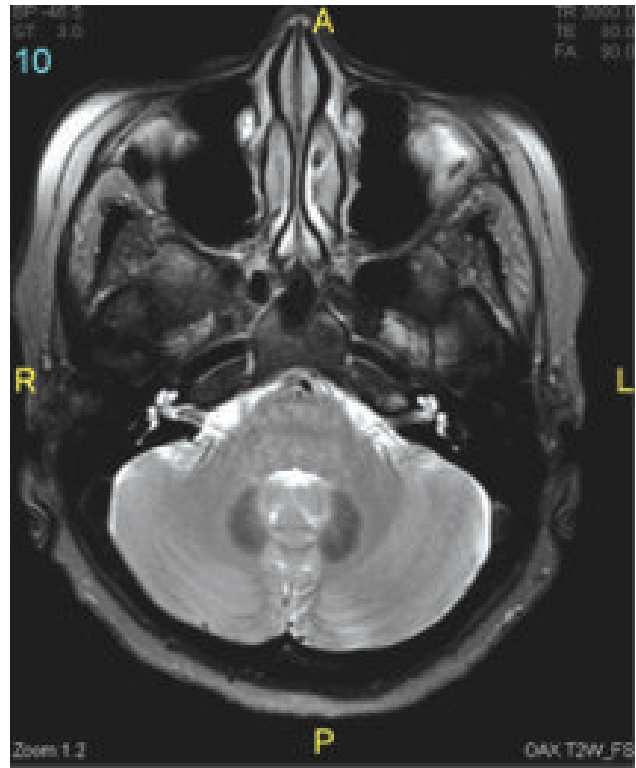
A 61-year-old lady with background history of allergic rhinitis complaint of occasional spinning sensation for the past 10 years that can last for one hour with no relation to tinnitus and hearing impairment. The spinning sensation alleviated if the eyes are open. She always having pressure in the head, had tendency to fall and had drifting sensation on bending backward. She felt nauseous but has no vomiting episode. There were no otological and neurological symptoms. She had no recent viral infection or head injury.

On examination, patient had no nystagmus with normal otological examination and pure tone audiometry. The Fukuda test was negative. There were no nystagmus on Dix-Hall pike test. However, patient complaining of dizziness and nausea during the test on both sides. Other examination were normal including cerebellar examinations. Provisional diagnosis of benign paroxysmal positioning vertigo (BPPV) was made on patient's first visit. She responded well to canalith repositioning maneuver and her dizziness symptoms greatly improved. Other than her history of long standing occasional dizziness, she did not have neurological signs to suggest central system involvement. She was seen again two times afterward and discharged with an open appointment, which is to come again if the symptoms reappears.

For next 5 years, she was lost to our follow up. During those years, the symptoms reappeared and gradually worsen. However, due to logistic matters (she stays quite a distance to our center), she sought treatment at nearby health clinic but no avail. Finally she referred herself to our center. She presented with reduced hearing on the right side with unsteady gait and tendency to fall to the right upon walking. Patient also complained of vertigo upon turning to the right and tinnitus of the right ear. There were no facial weakness. MRI was then requested at the earliest date available.

MRI brain was performed to rule out central cause of vertigo. The imaging revealed right anterior inferior cerebellar artery (AICA), which has abnormal course, loop within the right IAM extending more than 50% of the canal. The right AICA was in close proximity with the intrameatus part of the cranial nerv VII and VIII with no obvious bending or displacement of the cranial nerves. The vessels exit the IAM and course posteriorly at distal part after making loop in the IAM. No vascular loop on the left side. Other structures were normal.

Case was referred to neurosurgery. However, patient not keen for any operation suggested. Despite being on Amitriptylline 25mg at night, her floating sensation still persist with occasional spinning sensation. Currently, patient is taking regular Carbamazepine 200mg daily with betahistine 24mg BD for symptomatic control .



**Figure 2:** Axial view of MRI CP Angle in T2 weighted image demonstrating abnormal course of right AICA, its loop within the right IAM extending more than 50% of the canal, with close proximity with the intrameatus cranial nerve VII and cranial nerve VIII.

**Case 3:**

A 38-year-old male with no known medical illness complained of the self spinning sensation described as vertigo for almost 5-year duration. The symptom worsened in the past one month. He described symptom as persistent spinning sensation with lightheadedness, especially on changing position that lasted in minutes and resolved spontaneously by sleeping.

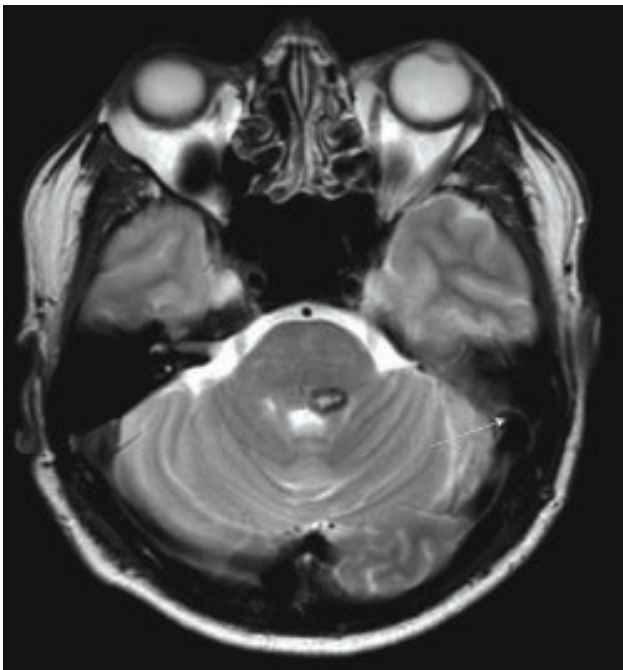
The attack was almost every day, but he still able to perform his daily activities. It was aggravated or induced by stress at work or because of sleep deprivation. Previously, he experienced vertigo only about 3 to 4 times in a year that lasted for 30 minutes each time, along with nausea but no vomiting episode. He had no recent ear infection or other infection and no hearing and speech complaint. He also had no history of a headache or neck pain. Off note, he was not able to read in a moving car.

The other associated symptom complaint was numbness over the left cheek, left preauricular area and left side of the tongue. There were no otalgia, no otorrhoea, no tinnitus or hearing impairment, no nasal symptoms or throat symptoms.

On examination, there was no spontaneous or induced nystagmus with normal eye movements. The ear findings on otoscopy and tuning fork examinations were normal. The other endoscopy examinations were normal. The hearing test with pure tone audiometry and tympanometry were also normal.

The Dix-Hallpike test was bilaterally normal. However, the patient had giddiness upon sitting up after the test. Soft cushion test was normal. The gait was unsteady with a tendency to sway to the right side. Other cranial nerves examinations were normal except for trigeminal nerve. There was numbness over the maxillary distribution of the trigeminal nerve (V1) on the left side. There was no pyramidal sign. However, he has a mild cerebellar sign which was clumsy during a finger-to-nose test on the right side. This symptom concluding towards a central type of vertigo.

MRI brain was performed. There was a well-defined popcorn-shaped appearance lesion measuring 0.7cm x 1.0cm x 1.2cm (P x W x CC) at the left middle cerebellar peduncle which was heterogeneously hyperintense in the center on T1 and T2 with a hypointense rim that not suppressed on FLAIR, and no enhancement post contrast seen. There was the presence of blooming artifact on GRE in keeping with hemosiderin deposition. No restricted diffusion is seen on DWI/ADC. No other focal lesion in the brain parenchyma. Other brain structures were normal. The features were in keeping with left middle cerebellar peduncle cavernous malformation (cavernoma).



**Figure 3:** Axial view of the MRI brain on T2 weighted image showed left middle cerebellar peduncle lesion. It also shows low signal intensity along the pontine course of the trigeminal nerve and also enhancement at the site of the main trigeminal sensory nucleus on the right (arrow).

He was referred to neurosurgery. He was advised for low-stress activity. Up to today, about 4 years, the patient was doing well, under follow up when required and conservative management with neurosurgery and vertigo clinic.

#### **Discussion:**

Vertigo commonly associated by peripheral cause or vestibular in origin. Any sensation of motion such as spinning or tumbling usually indicate a vestibular problem and commonly caused by BPPV, viral labyrinthitis and Meniere's disease. However, the cases highlighted above, though the patients presented with symptoms suggestive of peripheral vestibular disorder, because of the accompanying symptoms, it was highly possible of a central involvement as well. Therefore, it is important to be cautious of other factors to avoid missing the central causes of vertigo. Central causes of vertigo may include cerebrovascular accidents (CVAs), tumours and multiple sclerosis (MS) apart from causes highlighted in the cases above.

In our first case, the patient complaining of floating and vertigo sensation. On further examination, the Soft cushion test and Fukuda were normal, with some findings during Dix-hallpike test. The alarming feature, in this case, was the persistent unilateral tinnitus and hearing impairment during the hearing assessment and it pointing towards acoustic neuroma<sup>2</sup>.

In addition, our second case despite having initial improvement of symptoms with medication, the patient later presented with worsening and persistent of vertigo with tinnitus. This warrant further imaging to be performed to rule out any intracranial lesion.

Furthermore, in the third case, central vertigo is more apparent with the accompanying symptoms of numbness over the left cheek, left preauricular area and left side of the tongue. Further examination leads to central cause of vertigo rather than peripheral as the Dix-Hallpike was bilaterally normal, the unsteady gait and isolated involvement of the left trigeminal nerve distribution with mild cerebellar sign.

The cases highlighted important features that point toward central causes of vertigo in history are presentations that associated with neurological symptoms like weaknesses, dysarthria, sensory or motor changed, ataxia or confusion<sup>3</sup>. In one epidemiological study, the sensitivity and specificity of the history and clinical examination in differentiating central and peripheral vertigo were almost 100%<sup>4</sup>. Therefore needless to highlight the importance of both.

However, from the cases reported, the presentation may initially mimic the peripheral vertigo. After further examination and investigations with imaging, it turned out

to be central vertigo. Therefore, further suspicions over central causes of vertigo required additional investigation and imaging study including MRI.

The cases also emphasized other causes of vertigo. The causes include right IAM bony outgrowth causing angulation of the right vestibulocochlear nerve (case 1), right vestibular paroxysmia (case 2) and with left middle cerebellar peduncle cavernous malformation or cavernoma (case 3). Vestibular paroxysm is assumed to arise from neurovascular compression of the eighth cranial nerve in the vicinity of the brainstem due to epithetic cross-talk between partly demyelinated axons. It is also explained the possible pathology of tinnitus and vertigo in case 1<sup>5,6</sup>. Therefore, these causes should be considered in the differential to avoid inadequate management.

#### **Conclusion:**

Vertigo usually peripheral in origin. Accompanying symptoms usually suggest the opposite. Special attention to additional and rare symptoms, together with sound knowledge of the signs and anatomy is important to clinical suspicion. This

suspicious will eventually lead to a further investigation that will shed light to actual diagnosis.

**Conflict of interest:** None.

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