

# Sudden Onset of Vestibular Migraine Complicated with BPPV and Mal de Debarquement Syndrome – a Diagnostic Dilemma

Perković R.<sup>1</sup>, Maslovara S.<sup>2,3</sup>, Kovačević Stranski K.<sup>4</sup>, Buljan K.<sup>1</sup>, Tomić S.<sup>1</sup>, Jurić S.<sup>1</sup>

<sup>1</sup>Department of Neurology, J.J. Strossmayer University, Osijek University Hospital Centre, Osijek, Croatia; <sup>2</sup>Department of Otorhinolaryngology, Vukovar County General Hospital, Vukovar, Croatia; <sup>3</sup>Department of Otorhinolaryngology and Maxillofacial Surgery, Medical Faculty, J.J. Strossmayer University, Osijek, Croatia; <sup>4</sup>Department of Rheumatology, Immunology and Allergology, J.J. Strossmayer University, Osijek University Hospital Centre, Osijek, Croatia  
<sup>1,3,4</sup>Trg Svetog Trojstva 3, 31000, Osijek, Croatia; <sup>2</sup>Županijska 35, 32000, Vukovar, Croatia

*Vestibular migraine is combination of migraine and vestibular symptoms. In clinical examination it can be replaced with benign paroxysmal positional vertigo (BPPV) cupulolithiasis, but also BPPV is common comorbidity in migraine patients. There is also high association between vestibular migraine and Mal de Debarquement syndrome. Patient came to hospital with vertigo that was diagnosed as left PC-BPPV canalolithiasis. After first Epley's maneuver symptoms didn't resolved. Week after, at second Epley's maneuver performed patient developed left PC-BPPV cupulolithiasis. Month after, at third Epley's maneuver BPPV resolved but patient developed Mal de Debarquement syndrome. Laboratory testing showed hyperhomocysteinemia and homozygous MTHFR C677T and PAI, with low vitamin D. After reviewing the vestibular symptoms in the first attack which was misdiagnosed as BPPV canalolithiasis, and history of migraine, patient was diagnosed with vestibular migraine. Patient well responded to migraine diet and supplementation with B complex. Vestibular disorders are similar to each other and they can overlap. More attention in taking detailed medical history should be given to patients with vertigo or dizziness.*

**Keywords:** vestibular migraine; BPPV; Mal de Debarquement syndrome.

**Contact:** Romana Perković; [romana.per@gmail.com](mailto:romana.per@gmail.com)

**For reference:** Perković R, Maslovara S, Kovačević Stranski K, et al. Sudden Onset of Vestibular Migraine Complicated with BPPV and Mal de Debarquement Syndrome – a Diagnostic Dilemma. *Nevrologiya, neiropsihiatriya, psikhosomatika* = Neurology, Neuropsychiatry, Psychosomatics. 2021;13(6):139–141. DOI: 10.14412/2074-2711-2021-6-139-141

Vestibular migraine (VM) is combination of migraine and vestibular symptoms such as dizziness or vertigo. Migrainous headaches begin earlier than vestibular attacks in most vestibular migraine patients [1]. VM can occur with or without an actual headache. Patients can also have an attenuated headache when they start to have vertigo, as compared with their migraine headache before [2]. The etiology is still unknown. Both cortical spreading depression and trigemino-vascular theory were accepted as they can explain part of symptoms.

Vestibular symptoms commonly seen in VM are spontaneous vertigo, positional vertigo, vertigo on exposure to complex visual stimulations, head motion induced vertigo, ataxia, dizziness, lightheadedness and extreme sensitivity to motion of variable duration from seconds to days. Accompanying symptoms are nausea, phonophobia, photophobia, osmophobia, neck stiffness, scalp allodynia, tinnitus, visual aura, nystagmus and headache. There is no specific diagnostic toll for VM. During attacks, patients with VM can have peripheral or central features of nystagmus, or a mixture of both [3]. Highly suggestive of VM is low-velocity sustained nystagmus during positional testing on a symptomatic day [4]. Neurological and otological findings between attacks are usually normal. There is no right cure for VM, the treatment options include migraine prophylaxis and lifestyle changes.

**Woman, 30 years old,** complained that she felt short violent rotational vertigo with nausea after waking up and twice again in the

afternoon. Next day when she laid on her left side she felt violent rotational vertigo which subsided when she seat upright, but vertigo started every time she closed her eyes. The patient was referred to an emergency clinic where Dix-Hallpike was performed with positioning nystagmus (PN) when turning left and right followed by subjectively fast intensity of rotational vertigo, more when lying on her left side. After two Epley's maneuvers were done with 5 minutes intervals, there was no satisfactory recovery and the patient was told to come to the emergency clinic in a week for another Epley's.

During the second Dix-Hallpike maneuver, one week after, PN was also seen when lying on the left and right side with subjectively twice as fast rotatory vertigo when lying on the left side than during the first examination. Upon arriving home, the patient noticed that she had a short rotatorional vertigo during each bending of the head with worsening of symptoms with each attempt to lie on her back, especially when turning her head to the left. Because of short latency and extended duration of the attack suspicion had been raised that cupulolithiasis of the posterior canal (PC-BPPV) was caused by the last Epley's maneuver. Between the short episodes of daily rotational vertigo, the patient had gait instability, nausea, pallor, and occasional sweating. One month after the onset of symptoms, the patient was examined by an ENT specialist who also underwent Dix-Hallpike. There was apogeotropical vertical-rotatory PN nystagmus on the left side after a latency of about a few seconds, lasting up to 30 seconds, and also apogeotropic PN on the right, after a latency of 15 seconds, for more than 30 seconds and less than 60 seconds. Upon repositioning, the patient developed ataxia and nausea.

Medical history raised the suspicion of vestibular migraine after the patient said she had occasional photophobia and a visual aura for the past month. Migraine headaches subsided when vestibular symptoms started.

Two days after the last Epley's maneuver the nausea and ataxia were reduced, rotatory vertigo had no longer occurred when the head was bent down, but photophobia, phonophobia and visual aura worsened. Disequilibrium and oscillopsia started. Oscillopsia (moving objects from one side to another) lasted for 3 months without a break. Disequilibrium was episodic, only at the peak of vestibular migraine attack. There had also been continuous swaying or rocking in sitting or standing position. Symptoms have been accompanied by anxiety and avoidance of leaving the house. The patient noticed that her symptoms only subside if she ride a bike, walk or ride in a car for a short time. When exiting the vehicle or stopping on the traffic lights swaying and rocking started again. She was diagnosed with persistent Mal de Debarquement syndrome because of continuously presented rocking and swaying, more than one month, which temporarily reduced with exposure to passive motion.

In medical history she has had motion sickness in childhood, migraine headaches up to four times a month last 10 years and BPPV attack seven years earlier which completely recovered after one Epley's maneuver. She also had a history of frequent head and neck trauma: couple of car accidents, 15 years of martial arts practice and one time strike by lightning while laying down — lightning hit by her left ear leaving her with transient pain on left side of face and transient slight hearing loss.

In laboratory were found homozygous mutation of the flavoenzyme 5,10-methylenetetrahydrofolate reductase (MTHFR) and plasminogen activator inhibitor (PAI), which resulted in hyperhomocysteinemia (18  $\mu\text{mol/L}$ ). A low amount of vitamin D3 of 22 nmol/L (reference interval 20–100 nmol/L) was also found. Complete blood count, biochemical, immunological and hormonal processing was normal. Head CT, brainstem audio-evoked potentials and audiological testing were normal.

Patient took the analgesics but because of persistent everyday symptoms, she had started preventive treatment with erenumab 70 mg s.c. She was hypersensitive to the drugs and erenumab had the fewest recorded side effects. First two weeks she felt better with less symptoms, then her migraine transformed into hot flushes and high intensity neck spasms accompanying with depressive thoughts. After four weeks of erenumab, symptoms were subjectively 30% less but we discontinued the medication because of depression side effect. After stopping erenumab, depression subsided but all vestibular and migraine symptoms returned with the same intensity. She received antiemetic drugs on three occasions due to nausea, after each intake she developed mild extrapyramidal side effects including hand tremor and jaw spasms which subsided immediately after the drug was excreted.

Due to drug hypersensitivity, the patient began a migraine diet and supplementation with magnesium 400 mg, B complex and vitamin D 400 i.u. The visual aura disappeared three weeks after starting the migraine diet. After four months of diet, the vestibular symptoms slowly decreased in our patient. After six months of waking up every couple of hours with spinning sensation in the sleep she had again good sleep quality.

### Discussion

Vestibular migraine is frequently unrecognized but it is the most common cause of central, spontaneously occurring, episodic vertigo. VM is diagnosed by ruling out all other conditions

and then by following diagnostic criteria published by International Barany Society and the International Headache Society. Diagnostic criteria includes at least 5 episodes of vestibular symptoms of at least moderate severity lasting between 5 minutes to 72 hours, a current or previous history of migraine, and migrainous symptoms involved in at least two vertiginous attacks [2]. In VM patients motion sickness history and anxiety are common.

Our patient also developed symptoms and met criteria for BPPV and Mal de Debarquement syndrome probably caused by positional testing. Migraine has been found to be three times more common in patients with idiopathic BPPV than in patients with BPPV secondary to trauma or surgical procedures [5]. In BPPV, attacks of rotational vertigo are recurrent, short and provoked by head position changes.

There is diagnostic dilemma because there are close similarities between BPPV cupulolithiasis and VM. They both can be presented by positional nystagmus in the Dix-Hallpike maneuver, with short latency and prolonged duration with sense of vertigo in the provoking position. Our patient stopped having recurrent rotational vertigo when bending down after Epley's maneuver, so we lean to the side that she developed cupulolithiasis more than this was just vestibular migraine symptom. Pathophysiological link between migraine and BPPV could be repetitive vasospasms or disturbance of vestibule-cochlear microvasculature might play a role in inner ear insult, resulting in damages of the epithelium in the vestibule, causing dislodge of the otoconia from utricular macula into semicircular canal, and thus give rise to BPPV [6].

Mal de Debarquement syndrome is also frequently unrecognized. On average, patients must undergo 19 visits to a various doctor offices before receiving a diagnosis [7]. MDSS is subjective perception of self-motion following exposure to passive motion (motion triggered MDSS), or can occur spontaneously (spontaneous-onset MDSS). Most common trigger for MDSS are boat trips or a cruise, air travel and land travel. Other triggers are stress, positional changes, head movements and hormonal changes [8]. Most common symptoms of MDSS are rocking, bobbing and swaying that is often accompanied by unsteadiness and disequilibrium. There are no findings on diagnostic tests that are pathognomonic of MDSS. There is high association between MDSS and migraine, but also MDSS and motion sickness, from which our patient had suffered before [9].

Diagnostic criteria for MDSS includes non-spinning vertigo characterized by an oscillatory perception («rocking», «bobbing», or «swaying») presented continuously or for most of the day, onset which occurs within 48 hours after the end of exposure to passive motion, symptoms temporarily reduced with exposure to passive motion, symptoms continued for >48 hours and symptoms not better accounted for by another disease or disorder [10].

Symptoms during vestibular migraine attacks for patients that have MDSS and VM (MDSS-VM) are intracerebral spinning, lightheadedness, floating, ground-shifting, unsteadiness, oscillopsia, visually induced vertigo, spinning, retro-orbital headache, occipital headache, fullness/pressure in ears, muffled hearing, blurry vision, neck ache, cognitive slowing (brain fog), fatigue, nausea, photophobia, phonophobia, osmophobia, visual aura and orthostatic hypotension. Self-reported triggers for MDSS-VM ictal episodes are stress,

menses, sleep deprivation, missing meals, prolonged computer use, following prolonged drives, weather changes, heat, seasonal allergies, bright lights, strong odors, noisy environments, neck pain and dietary triggers [11]. Relieving factors are exposure to passive motion, lying down, rocking chair use, moving around and exercise. MDDS-VM patients appear to be more disabled than patients with only MDDS, in terms of severity of dizziness, job impact, and number of symptoms, but have good potential for improvement with migraine prophylactic treatment [12].

In laboratory search for potential cause of vestibular and migraine disorders we found that our patient has hyperhomocysteinemia and is homozygous for MTHFR C677T and PAI. The MTHFR has a main role in the pathogenesis of migraine and hyperhomocysteinemia, he regulates the flow of folate (vitamin B<sub>9</sub>). Cause of hyperhomocysteinemia is abnormal methionine biosynthesis which occurs because of deficiencies vitamin B<sub>9</sub>, vitamin B<sub>12</sub>, and vitamin B<sub>6</sub> [12]. Studies [13, 14] reported that supplementing with B<sub>6</sub>, B<sub>9</sub>, B<sub>12</sub> vitamins significantly reduce homocysteine levels and also reduce the severity of migraine headache and disability among migraineurs when compared to placebo. Carriers of the C allele of the MTHFR C677T variant, compared with those with TT genotype, show better results in reductions of homocysteine levels and in reduction of migraine symptoms.

We had great success introducing B complex vitamins which would speak in favor of hyperhomocysteinemia as one of the causes of the symptoms. B complex reduced frequency and intensity of attacks which is based on previous studies in patients with MTHFR C677T variant such as our patient.

Also the symptoms were reduced with the help of a migraine diet. Migraine diet is temporary restrictive diet with low tyramine, low histamine, without food additives especially monosodium glutamate (MSG) and without nuts, chocolate, alcohol, aged cheese and caffeine, also there are some restrictions in certain fruits and vegetables. Main goal of the migraine diet is identifying triggers in food, so you can eliminate that food and increase your threshold which will reduce the severity, frequency and intensity of attacks. Our patients also went gluten free and dairy free. After four months of diet, specific food can be slowly introduced back and see if it is still trigger for migraine.

### Conclusion

Vestibular disorders are similar to each other, they can overlap and patients can have normal neurological and otological findings. Path to diagnosis is long and demanding and requires a multidisciplinary approach. Due to the severe disability that goes with vestibular disorders, more attention in taking detailed medical history should be given to patients with vertigo or dizziness.

## REFERENCES

- Dieterich M, Brandt T. Episodic vertigo related to migraine (90 cases): vestibular migraine? *J Neurol*. 1999 Oct;246(10):883-92. doi: 10.1007/s004150050478
- Neuhauser H, Lempert T. Vertigo and dizziness related to migraine: a diagnostic challenge. *Cephalalgia*. 2004 Feb;24(2):83-91. doi: 10.1111/j.1468-2982.2004.00662.x
- Von Brevern M, Zeise D, Neuhauser H, et al. Acute migrainous vertigo: clinical and oculographic findings. *Brain*. 2005 Feb;128(Pt 2):365-74. doi: 10.1093/brain/awh351. Epub 2004 Dec 15.
- Polensek SH, Tusa RJ. Nystagmus during attacks of vestibular migraine: an aid in diagnosis. *Audiol Neurotol*. 2010;15(4):241-6. doi: 10.1159/000255440. Epub 2009 Nov 5.
- Ishiyama A, Jacobson KM, Baloh RW. Migraine and benign positional vertigo. *Ann Otol Rhinol Laryngol*. 2000 Apr;109(4):377-80. doi: 10.1177/000348940010900407
- Chu C-H, Liu C-J, Lin L-Y, et al. Migraine is associated with an increased risk for benign paroxysmal positional vertigo: a nationwide population-based study. *J Headache Pain*. 2015;16:62. doi: 10.1186/s10194-015-0547-z. Epub 2015 Jul 4.
- MacKe A, LePorte A, Clark BC. Social, societal, and economic burden of mal de debarquement syndrome. *J Neurol*. 2012 Jul;259(7):1326-30. doi: 10.1007/s00415-011-6349-6. Epub 2012 Jan 10.
- Van Ombergen A, van Rompaey V, Maes LK, et al. Mal De debarquement syndrome: a systematic review. *J Neurol*. 2016 May;263(5):843-54. doi: 10.1007/s00415-015-7962-6. Epub 2015 Nov 11.
- Cha YH, Brodsky J, Ishiyama G, et al. Clinical features and associated syndromes of mal de debarquement. *J Neurol*. 2008 Jul;255(7):1038-44. doi: 10.1007/s00415-008-0837-3. Epub 2008 May 30.
- Cha Y-H, Baloh RW, Cho C, et al. Mal de debarquement syndrome diagnostic criteria: Consensus document of the Classification Committee of the Barany Society. *J Vestibul Res*. 2020;30(5):285-93. doi: 10.3233/VES-200714
- Beh SC, Chiang H-S, Sanderson C. The Interconnections of Mal de Debarquement Syndrome and Vestibular Migraine. *Laryngoscope*. 2021 May;131(5):E1653-E1661. doi: 10.1002/lary.29214. Epub 2020 Nov 2.
- McCully KS. Homocysteine, vitamins, and vascular disease prevention. *Am J Clin Nutr*. 2007 Nov;86(5):1563S-8S. doi: 10.1093/ajcn/86.5.1563S
- Lea R, Colson N, Quinlan S, et al. The effects of vitamin supplementation and MTHFR (C677T) genotype on homocysteine-lowering and migraine disability. *Pharmacogenet Genomics*. 2009 Jun;19(6):422-9. doi: 10.1097/FPC.0b013e32832af5a3
- Menon S, Lea RA, Roy B, et al. Genotypes of the MTHFR C677T and MTRR A66G genes act independently to reduce migraine disability in response to vitamin supplementation. *Pharmacogenet Genomics*. 2012 Oct;22(10):741-9. doi: 10.1097/FPC.0b013e3283576b6b

Received/Reviewed/Accepted  
19.07.2021/02.09.2021/05.09.2021

### Conflict of Interest Statement

The investigation has not been sponsored. There are no conflicts of interest. The authors are solely responsible for submitting the final version of the manuscript for publication. All the authors have participated in developing the concept of the article and in writing the manuscript. The final version of the manuscript has been approved by all the authors.