General

Case Report

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An uncommon cause of headache and dizziness after cruise travel: case report of Mal De Debarquement syndrome

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Abstract: Mal de Debarquement syndrome (MdDS), also known as disembarkment syndrome, is a benign neurological condition characterized by a feeling of rocking, bobbing, or swaying, usually presenting after an individual has been exposed to passive motion as from being on a cruise, long drive, turbulent air travel, or train. Clinical awareness about this condition is limited, as is research; thus, many patients go undiagnosed. In this case report, the authors describe a case of a severe headache as a major presenting symptom of MdDS in a 46-year-old woman who eventually attained full resolution of symptoms. This report aims to highlight this unique presentation and make practitioners more aware of the cardinal clinical features, to assist in prompt diagnosis of this disorder.

Keywords: disembarkment syndrome; disequilibrium; headache; MdDS; travel.

Mal de Debarquement syndrome (MdDS) is a benign neurological condition characterized by a feeling of rocking, bobbing, or swaying that usually presents after an individual has been exposed to prolonged passive motion. This

association between prolonged motion or travel and subsequent MdDS symptom onset has been well documented [1–6]. Normally, individuals experience a short-lived sensation of movement after cessation of the inciting events, which could be a cruise, long drive, air travel, or train ride; the sensation of movement usually resolves within 24 h [1–6]. For a subset of individuals, mostly women (>90%, according to Mucci et al.'s retrospective study [5]), this illusion of movement persists and may last for weeks, months, or years [6].

Growth in scientific interest has led to a somewhat better understanding of the biological basis of the condition. However, the cost to obtain a diagnosis of MdDS remains disproportionately high (approximately \$3,000 USD per patient) and requires a large number of healthcare practitioner visits, with only 2/3 of patients receiving a diagnosis after more than three months [7]. These factors clearly support the need for increased awareness about MdDS amongst practitioners to help reduce diagnostic delay and costs; we hope this case report will contribute to that increased awareness.

Report of case

Consent was acquired from this patient to retrospectively review her case and clinical management protocols.

A previously healthy 46-year-old Black woman presented to her primary care physician with chief complaints of headache and dizziness. Her past medical history was notable for irritable bowel syndrome associated with constipation, but those concerns had been adequately managed without recent flares. Her surgical history was positive for a laparoscopic sleeve gastrectomy and a hysterectomy. The patient's family history was notable for diabetes and cardiac disease but negative for any neurological disorders. The patient, her husband, and their two children had recently been on a weeklong cruise to the Caribbean. She reported onset of headache and dizziness within hours of disembarking the

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cruise ship. The patient described the headache as severe, left-sided, throbbing in nature, and constant throughout the day. She described her dizziness as bobbing and swaying in nature. The patient also reported associated symptoms of blurry vision, severe fatigue, and insomnia, but she denied tinnitus, tingling, numbness, fever, vomiting, or diarrhea.

On physical exam, the patient was in no acute distress. Her vital signs were normal. She had a horizontal nystagmus; however, her vision was intact without eye redness or eye drainage. Her tympanic membranes were clear bilaterally, and she presented without any gross auditory deficits. The patient’s cardiopulmonary examination was unremarkable and her physical exam was grossly normal otherwise. Her reflexes were normal and motor examination demonstrated no focal weakness. The patient was prescribed meclizine for vertigo and instructed to return if symptoms persisted while blood work was pending.

Two weeks later, she returned to her primary care physician’s office reporting persistence of her symptoms. The patient was referred to a local emergency department where a head computed tomography scan, electrocardiogram, and chest radiograph were found to be normal. Subsequently, the patient was transferred to a tertiary medical emergency department for further neurological evaluation, where she was eventually admitted. Upon arrival, she was managed proactively with intravenous prochlorperazine, ketorolac, and diphenhydramine. She also received intravenous magnesium sulfate, prednisone, and diazepam, which provided some symptomatic relief.

The neurology department was consulted; neurological evaluation revealed normal findings on examination of cranial nerves II–XII, motor strength, and muscle stretch reflexes. The patient demonstrated normal stride length, arm swing, and width. The patient was able to walk on her toes and heels, but had some difficulties with tandem gait. Romberg test was negative.

In the setting of largely normal lab tests, imaging, and the patient’s unique history as well as negative evaluation

for other diagnostic considerations, she was diagnosed with MdDS. She was then initiated on a two-week course of 0.5 mg clonazepam twice per day as needed. The patient noted taking her prescription regularly, and at follow up 2.5-weeks later, her symptoms had resolved.

Discussion

The patient described here reported the cardinal symptoms of MdDS, which include a constant sensation of rocking, swaying, bobbing, and bouncing when walking or when lying down, with resolution of her symptoms when back in motion, as during a car ride [1–8]. She also reported symptoms of heightened sensory sensitivity, head pressure, nausea, brain fog, fatigue, and anxiety. She initially displayed cognitive slowing that waned over time, as well as visual-motion sensitivity, both which have been associated with MdDS [8]. The differential diagnosis of MdDS may include etiologies such as otologic causes of dizziness, vestibular migraine, and motion sickness [9]. Though the patient denied a lumbar puncture, meningitis was less likely on her differential diagnosis given her lack of nuchal rigidity and fever as well as a normal white blood cell count. Vestibular neuritis was certainly of concern given her disequilibrium, nystagmus, and slight gait disturbance, but the headache, fatigue, and delayed cognition were more pronounced in this patient. In addition, her nystagmus had resolved prior to admission. An initial diagnosis of migraine with aura was considered, but she had no personal or family history of that and there were no known reports to her primary care physician of similar subsequent symptoms.

In Table 1, a diagnostic guideline is provided for patients with motor travel or spontaneous onset MdDS, as refined with elements adapted from 2018 publication by Mucci et al. [5] and 2016 guidelines from Van Ombergen et al. [10]. This guideline may serve as a tool in the diagnosis of MdDS.

Table 1: MdDS diagnostic guidelines for patients with motor travel or spontaneous onset, refined with elements adapted from Mucci et al 2018 [5] and Van Ombergen 2016 [10] guidelines.

(1) Onset of symptoms >one month (e.g., rocking dizziness, bobbing, or swaying movements)	
(2) Unwavering perception of constant motion, usually beginning: <tr><td>a. After cruise travel, but also after air travel or prolonged travel on land = motor travel onset (more common)</td></tr>	a. After cruise travel, but also after air travel or prolonged travel on land = motor travel onset (more common)
a. After cruise travel, but also after air travel or prolonged travel on land = motor travel onset (more common)	
b. Without precipitating travel event = spontaneous onset (rare)	
(3) Symptoms only present when not in motion (i.e., not during a car ride, cruise, or flight)	
(4) Normal head CT/MRI or normal inner ear function evidenced by normal electronystagmography, videonystagmography, and audiogram excluding age related or other minor hearing loss	
(5) Symptoms not better explained by other vestibular pathologies or other diagnoses made by a physician or other provider	

CT, computed tomography; MdDs, Mal De Debarquement Syndrome; MRI, magnetic resonance imaging.

It is well documented that patients with MdDS are significantly burdened by depression and anxiety, which further decreases their attention to spatial information and working memory [11, 12]. The initial psychiatric screening for depression in this patient was negative, but during the period surrounding her disease course, she reported significant anxiety. Of note, during the disease course, the patient was not able to resume work activities and required minimal to moderate assistance with her functional activities. Psychosocial manifestations are common for MdDS patients and should be addressed during MdDS management [11]. It has been noted that patients with MdDS require an average of 19 physician visits to obtain a diagnosis and that they experience low quality of life in both physical and emotional realms, associated with an annual economic burden of approximately \$15,000 USD (based on 2020 inflation adjustment valuation) [11, 12].

Although a definitive treatment for MdDS does not exist, various medical management protocols are currently in use to help relieve the symptoms of MdDS [10, 13–15]. As in this patient's case, benzodiazepine treatment remains widely utilized for symptomatic relief in patients with MdDS, and most patients report a positive benefit [10]. Other evidence suggests that success and symptom management strategies between benzodiazepines and antidepressants do not differ; both are used as primary treatments [14]. MdDS and migraines share common pathophysiologic mechanisms, so some practitioners have found success treating MdDS with more cost-effective options such as a vestibular migraine protocol that includes lifestyle changes and prophylactic migraine pharmacotherapy with verapamil, nortriptyline, topiramate, or a combination [15]. Managing patients' stress has also proven to be an important component of treatment. Ghavami et al. [15] reported that 11 of 15 patients (approximately 73%) noticed a significant reduction in symptom severity with prophylactic migraine therapy combined with lifestyle changes such as stress reduction and engagement in physical activity.

Considering that osteopathic physicians are trained to incorporate a holistic approach to their practice, they may well be suited to treat this patient population's symptoms of disequilibrium together with the concomitant socioeconomic impacts. A deeper understanding of environment and lifestyle along with concurrent medical management could be greatly beneficial. Modulating neuronal circuits with repetitive transcranial magnetic stimulation (TMS) over the dorsolateral prefrontal cortex has been reported to decrease the rocking and dizziness of MdDS [16]. Furthermore, it has been suggested that the vestibulo-ocular reflex (VOR) may serve to treat the postural instability associated with MdDS

[17]. A study by Dai et al. [17] suggested VOR resetting by rolling the head from side to side coupled with optokinetic stimulation, which showed 78% immediate improvement in 120 patients with classic MdDS. As noted, these previous studies were relatively small in sample size and, in most cases, were not rigorously controlled trials, so further research is needed.

Conclusions

This case report highlights the clinical course of MdDS, which remains a poorly recognized, poorly understood, and likely underdiagnosed condition in the medical community. Workup usually reveals no findings and diagnosis is based on history and examination findings. As the first point of contact, family physicians and emergency physicians play a critical role in early suspicion and diagnosis of MdDS. This is especially important, as a delayed diagnosis is common and contributes to the significant social and economic burden associated with MdDS. Despite some progress, clinical trials on the efficacy of approaches to MdDS treatment and management are still in early stages, and definitive treatment still remains modest at best. With a focus on the body as a unit, osteopathic physicians could provide benefits to this patient population based on their holistic approach to care.

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Informed consent: Informed consent was obtained from the patient included in this study.

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