

# COVID-19 and spectrum of vestibular dysfunctions: A case report

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**Introduction:** COVID19 infection had shown to affect multiple systems. I am reporting a positive COVID19 case with multiple vestibular problems with its management and review of the literature.

**Case presentation :** This is a 63-year-old lady who was a Category 5 COVID-19 infection patient with organising pneumonia 25-50%, complicated with bilateral segmental & subsegmental pulmonary embolism. She had underlying hypertension and hypothyroidism. She was intubated for fifteen days. Her COVID-19 infection was complicated by right frontoparietal infarct, left isolated mononeuropathy causing foot drop and persistent dizziness lasting hours to days in the first month after extubated. She was referred by Rehabilitation Physician to the vestibular clinic as vestibular rehabilitation did not resolve her dizziness. Upon presentation to the vestibular clinic at 5-month post extubation, she was just weaned off from home oxygen supplement and her complaint was dizziness lasted few seconds on turning laterally or when changing position. She denied aural fullness, tinnitus, reduced hearing, imbalance or headache. Initial Dizziness Handicap Inventory (DHI) showed Physical 18 points, Functional 20 points and Emotional 12 points and total points of 50 (moderate severity). Initial clinical vestibular assessments showed no spontaneous nystagmus, normal smooth pursuit, abnormal horizontal saccade, negative Skew test, fistula test and headshake test. GANS Sensory Organisation Performance (SOP) test showed sway at all steps 1 to 6. Fukuda test was positive to the left and she had high stepping gait on the left side. She had positive left posterior benign paroxysmal positional vertigo (BPPV) (upbeating rotatory nystagmus) on Dixhallpike test. During Epley manoeuvre, there were canal conversion to anterior canal which was resolved with deep head hanging manoeuvre. However, as the patient was vomiting, the canal repositioning manoeuvre was resumed after two days, and her dizziness reduced tremendously. Her hearing assessment is shown in Figure 1.

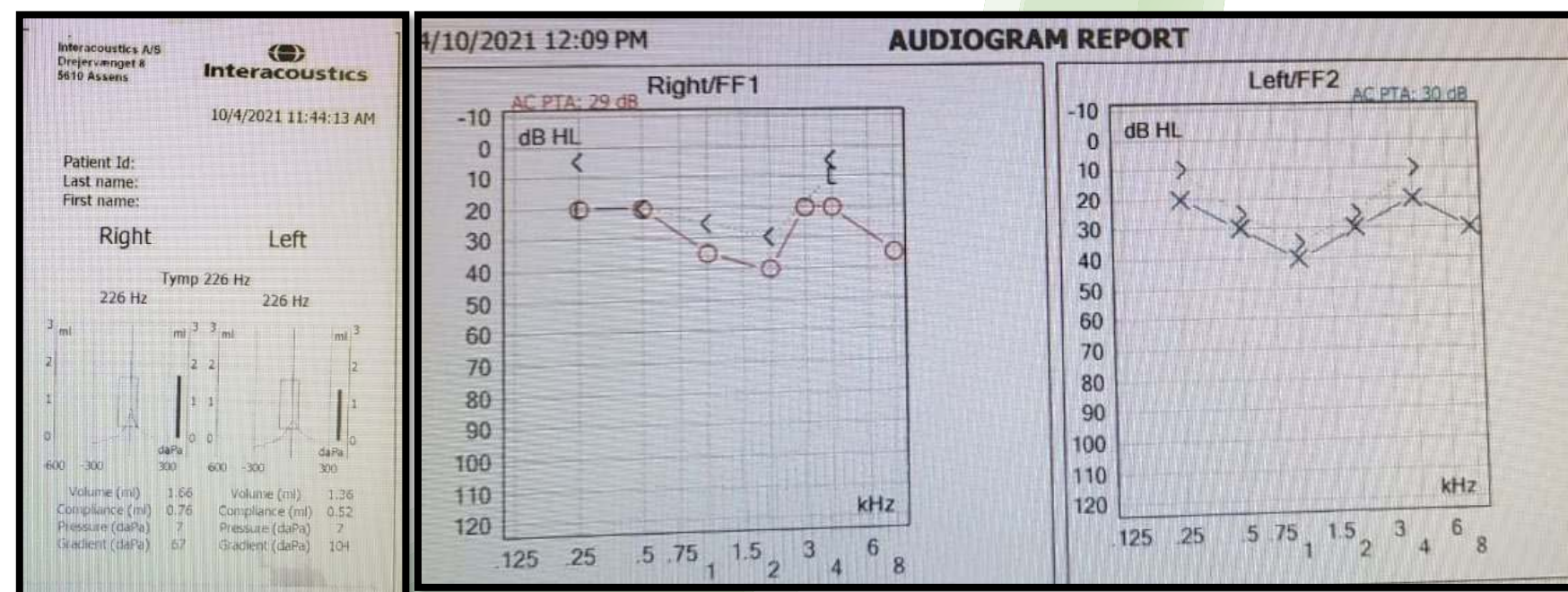


Figure 1: Tympanometry showed type A bilaterally with bilateral mild sensorineural hearing loss

Her Video Head Impulse Test showed abnormalities in all canals bilaterally, rotatory chair showed lateral vestibular weakness and videonystagmography showed abnormal smooth pursuit, saccade and optokinetic suggesting central lesion. The cervical Vestibular Evoked Myogenic Potential (VEMP) and ocular VEMP were normal indicating normal saccular and utricular function. Magnetic Resonance Imaging of the Internal Acoustic Meatus (IAM) showed bilateral vascular loop with no cerebellopontine angle tumour Figure 2.

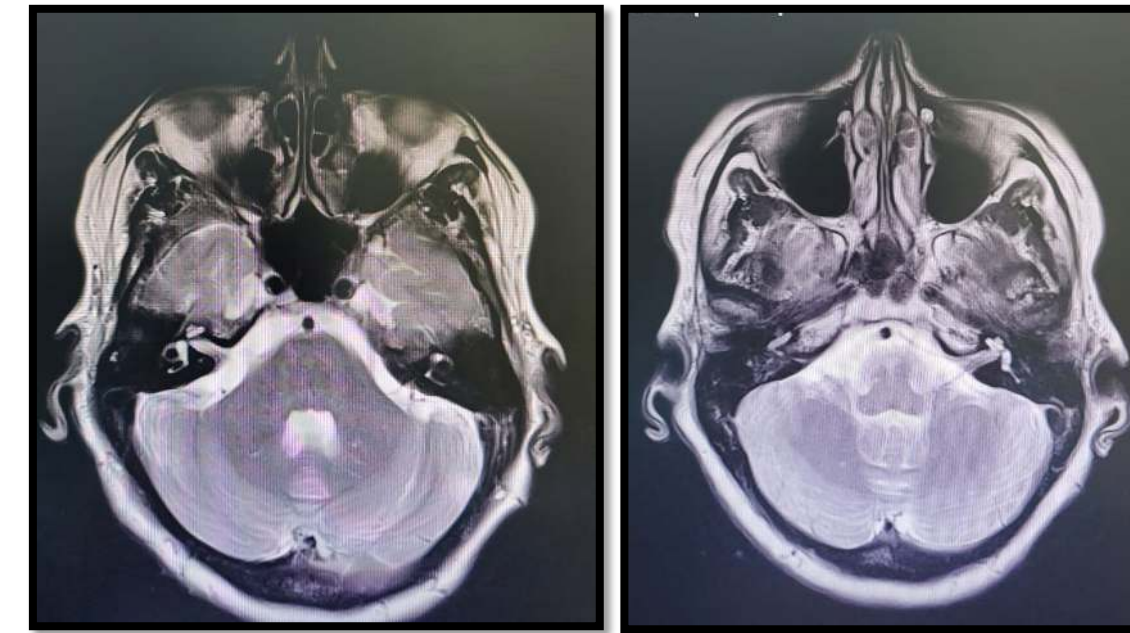


Figure 2: MRI IAM showing bilateral vascular loop

After a serial of canal repositioning manoeuvres, she was given Tablet Betahistine 24mg bd to be taken until her next follow up.

Upon review three months later, the patient was asymptomatic of vestibular complaint with normal DHI and DASS21 score. Her foot drop had also resolved.

## Discussion:

The incidence of dizziness in patients with COVID-19 ranges from 7 to 12%<sup>1</sup>. Multiple hypotheses had been highlighted on the pathology of vestibular symptoms in COVID-19 patients. This can be attributed to the “Pandemic Effect”, where prolonged isolation and working from home caused changes in emotional, somatosensory, metabolic process and sleep quality as well as cervical pain and tension, contributing to the symptoms of vertigo/dizziness regardless of vestibular involvement by the virus. Vestibulotoxic and ototoxic effects of medication used in COVID-19 patients are still unknown. The effect of the virus in the balance neural pathways are possible, causing vestibular neuritis similar to the pathophysiology of anosmia. Direct involvement of the inner ear and vestibular nerve structures by the virus are hypothesized via the virus dependency on the angiotensin-2 converting enzyme receptor and the transmembrane serine protease 2 to enter cells. In rats, the receptors for these enzymes are presented in the Eustachian tube, middle ear mucosal epithelium and inner ear. Thus, these receptors could act as a gateway for SARS-CoV-2 to enter the inner ear and affect the vestibular nerve, causing vertigo. Other hypotheses are potential inflammatory involvement of the inner ear vessels, eventually causing vasculitis or endothelitis. Vascular damage is also postulated to be the cause, because inner ear structures are particularly susceptible to ischemia, due to their characteristics of terminal vasculature and high energy requirements. Persistent inflammatory picture, production of proinflammatory cytokines that can impair inner ear functions, triggering an immune response mediated by the presence of the virus.

**Conclusion:** The COVID-19 infection can present with multiple peripheral and central vestibular problems and the clinical course varies with possible complete recovery of symptoms.

## References:

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