CASE REPORT

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Vestibular Activity through Mood Phases in Bipolar Disorder

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Abstract

Vestibular disorders are frequent in the general population. The clinical experience suggests that emotional/mood states could have a physiopathologic role on them, however, there is not yet enough scientific evidence. Bipolar disorder is a neuropsychiatric disorder that shows cyclic changes of mood between depression, euphoria (mania) and euthymic (normal mood). To document the vestibular activity in different mood states, we registered rotary chair vestibular tests with electronystagmography during different affective phases in a woman and man with bipolar disorder.

Keywords: vestibular disorder, rotary chair vestibular test, vestibular asymmetry, mood disorder.

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INTRODUCTION

Vestibular disorders affect a wide percentage of adults and children. Vestibular symptoms are often vague, difficult to define and hard to separate from insight personal and unconscious perceptions. Even though, in the clinical practice, the medical history, the vestibular examination, plus vestibular exams, allow outline the picture to configure a precise diagnose/treatment (i.e. vestibular neuronitis).

When vestibular symptoms do not improve after the prescribed medication/vestibular rehabilitation, clinicians usually attribute it to mental and emotional conditions of the patient, although the scientific evidence supporting it is scarce or null.

In healthy conditions, the vestibular activity is almost symmetric between right and left sides. Vestibular disorders involve the existence of vestibular asymmetry between both sides. Currently, we neither ignore if emotional/mood states can produce a lateralized modulation of the vestibular activity, nor we know which side would be affected or at what level. First, we need to demonstrate if there are changes in vestibular activity in concordance with emotional/mood states to investigate then the possible neurological mechanisms implicated in it.

Prior studies of brain functional images show that central projections of the vestibular system arrive at cortical areas involved in mood. Indeed, vestibular afferents would be constantly feeding neuronal centers like the insular cortex, hippocampus and hypothalamus, modulating their activity resulting in different internal self-feelings states[1,2]. Besides that, the literature shows the existence of descending neuronal pathways coming from mood centers to the vestibular nuclei that control vestibular activity, however, there are few studies showing vestibular changes in concordance with mood states[3-5].

Bipolar disorder is a neuropsychiatric disease with cyclic changes of mental states coming from high/positive mood in the manic phase to negative/pessimistic feelings in depression phase, passing through euthymic states (normal mood states) across the time. Distinct affective states in bipolar disorder are evident and well defined by consensus criteria, providing a cut point for mood classification[6].

To study the possible relationship between vestibular activity and mood, we registered the vestibular function of two BD adults, a man and a woman through several mood cycles along nearly 3 years.

PATIENTS

EA is a 47-year-old man with no vestibular history, diagnosed with Bipolar Disorder at his 29. Since then he presented cycles of profound depressive episodes, manic phases, and several moderate depressive and hypomanic episodes. His body mass index is 41.5. He was diagnosed with metabolic syndrome and obstructive apnea in treatment with CPAP. Medication: Lithium salts 400 mg/day, Lamotrigine 50 mg/day, Venlafaxine 37.5 mgs/day, Atorvastatin 40 mg/day, Enalapril 40 mg/day.

MS correspond to a 40-year-old woman with no precedents of vestibular symptoms, diagnosed with Bipolar Disorder at her 16. Since then she presents approximately one manic episode of about 1 month duration once a year. Medication: She takes regularly Valproic Acid 1000 mgs/day, (she has precedents of Lithium salts intolerance). Manic phases are managed with Olanzapine 5 mgs/day and Zolpidem 10 mgs/day.

METHODOLOGY

We studied the vestibular function in 2 Bipolar Disorder patients; a 40-year-old, left-handed woman and a 47-year-old, right-handed man through different mood states along 3 years. The study was in accordance to the Helsinky Declaration and was approved by the SSMO (West Metropolitan Health Service) Adults Ethical Committee in Santiago, Chile. Both patients signed informed consent. The treating psychiatrist identified mood states according to DSM-V and sent them to "Neurovestibular Center" to assess vestibular exams. No scale for severity of symptoms was applied. To appreciate the vestibular activity, we used rotatory test and electronystagmography. All measurements were taken between 3 and 19 p.m. using Vest Brain Rotary chair, model VB-002.

After sitting the patients in the rotary chair, we attached three silver electrodes to the skin using conducting gel and tape (external eyes angles of and center of the forehead).

To calibrate the eyes movements, subjects look at points (left, central, right, 10° distant from each other) in a parabolic screen in front of them. Eyes movement to the right side is seen as upwards displacement of the register, and movement to the left as downwards displacements correspondingly.

For vestibular registers, we used the rotational step velocity test. While the chair is rotating, the patient's eyes were closed and the room was dark in order to ensure that the subject's eyes do not fixate. We registered the nystagmus during rightward and leftward rotation of the chair at 25°/s2 (per-rotatory nystagmus) and after the detention of the chair at 100°/s2 (post rotatory nystagmus). Right-per rotatory and left-post rotatory slow phase velocity (SPV) of the nystagmus represents right vestibular activity. Left-per rotatory and right-post rotatory SPV of nystagmus, represents the left vestibular activity.

To have an appreciation of the vestibular symmetry we calculated the ratio between right and left vestibular activity (Right-per/Left per; Left-post/Right-post). We used an average of the slow phase velocity (SPV) of 4 or 5 representative nystagmus in each stimulus.

RESULT

EA showed 2 manic and 3 depressive episodes along 3 years of observation. In the two manic phases vestibular activity of the left side was lower compared to right (Right/Left ratio=1.75). In all three depressive phases detected, the right side vestibular activity was lower compared to left (Right/Left ratio=0.66). In euthymic phases the vestibular activity of the right side was similar to the left (Right/Left ratio=1.03).

Along the study, the MS patient presented two evident manic phases preceded by euthymic states, and no clear depressive phase along the 3 years of observation. In the first manic phase, we found lower vestibular activity at the right side compared to left (Right/Left ratio=1.05), similar to that of euthymic phases (Right/Left ratio=0.98). In the second manic episode, that happened 18 months later, we found the contrary; lower vestibular activity at the left side compared to right (Right/Left ratio=1.87).

Table 1. Per and post rotary vestibular activity in two bipolar disorder patients (EA, MS), Slow Phase Velocity (SPV) in mood states.

Right Per	Left Per	Right Post	Left Post
Patient EA			
Depression Phase			
25	35	34	50
16	28	15	30
34	48	60	60
Mania Phase			
29	24	50	34
26	14	30	15
Euthymic Phase			
25	23	37	41
22	20	28	26
Patient MS			
Mania Phase			
38	36	54	62
45	24	45	35
Euthymic Phase			
40	38	45	56
30	28	41	41

The vestibular activity, Per and Post rotatory SPV of nystagmus at different mood states, are in Table 1 and Figure 1.

DISCUSSION AND CONCLUSION

This report shows an association between mood and vestibular asymmetry.

In both patients, we found similar patterns of vestibular asymmetry for each kind of mood. In the depressive phase, the right side was lower than the left, while in the manic phase, we registered the contrary, (right>left). In euthymic phase, we found similar activity between the two sides. In each patient, the vestibular symmetry changed in relation with different mood states along the time.

The finding of a particular pattern of asymmetry for a determined mood state, suggests that specific lateralized brain centers affected in mood disorders, may contribute to modulate the unilateral vestibular activity producing vestibular asymmetries.

This report also allows proposing a possible usage of vestibular tests as an instrument for the investigations of mood and mental disorders.

The results presented here lack of statistical power; however, they open a window for a new form to understand the vestibular system function in view of neuropsychiatric disorders and vice versa.

Here we introduce new parameters to consider for diagnosing and treating vestibular disorders in the future. This study constitutes a first step, a baseline for further investigations that would confirm or deny the association between vestibular asymmetry and mood presented here.

Prior studies showed asymmetries of vestibular activity in major depression[3,4] but this is the first study demonstrating the cyclic changes of vestibular asymmetry in the same person. In addition, we present the first objective register of vestibular activity at different mood states in bipolar disorder.

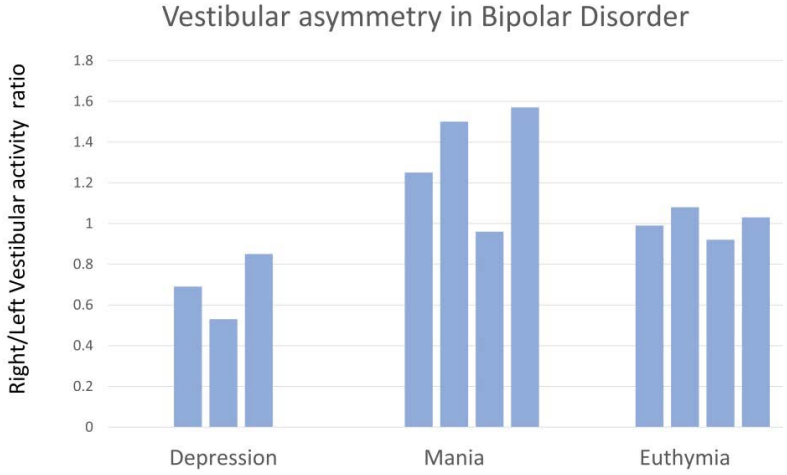

Figure 1. Vestibular asymmetry at different mood phases.

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