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Atrophy of the hippocampus and postural control are linked in patients with idiopathic bilateral vestibulopathy.

5. Bilateral Vestibulopathy

Olivier Etard¹, *Thomas Caille*¹, *Olga Kuldavletova*¹, *Mikaël Naveau*², *Gaëlle Quarck*¹, *Antoine Langeard*¹, *Marion Hay*¹, *Adela Kola*¹, *Michel Toupet*³, *Christian Van Neche*³, *Charlotte Hautefort*³, *Gilles Clément*¹, *Pierre Denise*¹

¹ Normandie Université, UNICAEN, INSERM, COMETE, CYCERON, CHU Caen

² Normandie Université, UNICAEN, CNRS, INSERM, UAR3408 CYCERON, Caen, France

³ Institut de Recherche en Oto-Neurologie, IRON, Paris, France

Purpose

The controversy surrounding the observed hippocampal atrophy after vestibular injury persists. This may be due to the heterogeneity and small sample size of patients in each study. In this study, we aim to address this issue by analyzing the largest and most homogeneous cohort of patients with idiopathic bilateral vestibulopathy (IBV).

Methods

Thirty patients with IBV and 30 age- and sex-matched controls were studied. Hippocampal subfields were evaluated using a 3T MRI scanner (GE PREMIER). We used ASHS software to segment the substructures from the brain scans. For each subject, segmentation was performed using the combination of a T1-weighted 3D-PRAGE scan (1 mm isotropic) and a T2-weighted 2D-FSE oblique coronal scan perpendicular to the main hippocampal axis (0.4 x 0.4 x 2.0 mm³). Postural control was assessed by having participants stand on a force platform (Synapsys®, 100 Hz) with their eyes open for 60 seconds. The usual posturography parameters were calculated (CoP-length, CoP-Velocity, CoP-Sd...).

Results

As expected, patients with IBV showed worse postural control performance than the control group. Additionally, IBV patients had smaller hippocampal volumes, particularly in the CA1 subfield, compared to controls. Moreover, the IBV group showed a correlation between hippocampal volume and postural performance parameters, while no such correlation was observed in the control group.

Conclusions

IBV patients, who do not perceive gravity via their vestibular system, show impaired postural performance and reduced hippocampal volumes compared to a paired control group. Reduced CA1 volumes found in IBV may be directly related to increased CoP length, underscoring the potential key role of this structure in postural control in the absence of a functioning vestibular system. We propose that the absence of vestibular information may be related to the decrease in hippocampal volume, which subsequently affects postural control.