PERSISTENT GEOTROPIC NYSTAGMUS -
A DIFFERENT KIND OF CUPULA PATHOLOGY

av

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ABSTRACT

In patients with positional vertigo a persistent direction-changing nystagmus (PDCN) of *apogeotropic* direction (a-PDCN) in the supine yaw plane has been described earlier. It has been suggested that the cupula in the lateral semicircular canal has a higher specific weight than the surrounding endolymph making the cupula sensitive to gravity. This condition is known as “heavy cupula”. We have described, in Paper I, a *geotropic* persistent nystagmus (g-PCDN) in patients during vestibular crisis. In addition, when the patient is in the supine position and the head is turned slowly from one side to the other it is possible to discern a zero zone where the geotropic nystagmus is absent. This is accomplished when the head is turned circa 10-20 degrees laterally. Theoretically this occurs when the longitudinal axis of the affected cupula is aligned with the gravitational vertical.

On the assumption that a position dependent nystagmus such as persistent apogeotropic nystagmus is caused by a heavy cupula in one of the lateral semicircular canals (LSCC), thus it could be hypothesized that a g-PDCN can be caused by a cupula that is lighter than the surrounding endolymph. We have called this new diagnostic entity “light cupula”. A similar phenomenon of a PDCN is seen in subjects with positional alcohol nystagmus. This phenomenon is based on the “buoyancy hypothesis”. In order to reproduce a clinical condition where the density of the cupula was lower or higher than the surrounding endolymph we examined the nystagmus pattern in different head positions in unilaterally deafferented patients during the stage of PAN 1 and PAN 2 respectively. We compared results of nystagmus direction during PAN1 with the findings in patients with "light cupula" in the lateral semicircular canal (Paper II). Nystagmus direction in both supine and prone lateral head positions was compatible with that of a “light” cupula. However, the nystagmus directions at head straightforward in prone and supine position as well as the localization of zero zones deviated from the pattern seen in patients with a “light” cupula.

We followed up nystagmus characteristics and nystagmus pattern in Paper III on the labyrinthectomized subjects during the stage of PAN2. This study showed a-PDCN according to the theory. The nystagmus pattern in pitch plane was of opposite to that during PAN1. Nystagmus in supine position was directed to the affected side during PAN2 and to non-affected side during PAN1 but the zero zones in both studies is found on the affected side.

We were interested to see if the results concerning nystagmus direction in the experimental studies could then be applied to patients during vestibular disability with g-PDCN permitting a lateralization of the affected side.

In Paper IV we examined an extended series of 20 patients with g-PDCN nystagmus pattern during acute vestibular disability and at follow up 1-7 years later. The patients were free from CNS disorders. Nystagmus patterns in different head positions were recorded, both caloric and otolith tests were carried out. Concomitant auditory symptoms as an indication of the affected side were rare. The slow phase velocity of geotropic nystagmus was low and of equal intensity and did not present an indication of the affected side according to Ewald’s second law. There was a high prevalence of migraine (40%) and the patients also had problems with recurrent vertigo (80%). The vestibular tests were pathologic in 60% of the patients. With nystagmus analysis we found evidence for a cupula that is sensitive to gravitation, but did not find an applicable pattern for simply determining the affected side by analysing nystagmus direction in the pitch plane and in lateral head positions.