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MOTION SICKNESS
PART I

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Motion Sickness Part I

Motion sickness is an intolerance to movement resulting from a conflict between sensory, vestibulo-visual, or intravestibular information. It is a physiological response to certain movement stimuli, but can be triggered or aggravated by peripheral or central vestibular changes.

THE FEELING OF DISCOMFORT IS OFTEN ASSOCIATED

with air, land, or sea travel, and often arises from amusement park rides, some video games, virtual reality headsets, flight simulators, riding in lifts, treadmills, or exercise bikes.

Descriptions of motion sickness date back to 400 BC in ancient Greek texts that mention symptoms of "sea sickness" – nausea, vomiting, fainting, and difficulty concentrating.

In motion sickness there is a conflict of sensory inputs that can be divided into two main categories:

a) Angular conflict between the semicircular canals and the linear vestibular input of the otolith organs, and

b) Conflict between visual input and vestibular input.

The discrepancy in sensory information can result in extremely uncomfortable signs and symptoms such as:

- Headache;
- Dizziness;
- Seasickness;
- Chills or sweating;
- Discomfort or fatigue;
- Nausea and vomiting;
- Pallor;
- Blurred vision;
- Drowsiness;
- and others.

Although motion sickness is common, there is a difference in its incidence among sections of the population:

- **Childhood: between 35% and 76%;**
- **Young adults (under 30 years): between 14% and 50%;**
- **Elderly (over 61 years): between 7% and 12%.**

Furthermore, the prevalence of motion sickness is higher in those with a vestibular disorder, such as vestibular migraine, because they have a hypersensitivity to sensory inputs.

Children generally present a higher number of cases compared to adults.

Changes in the auditory system (otitis media or hearing loss) can be a triggering factor. A limitation with children is that they often have difficulty explaining what is wrong, making the diagnosis and intervention more difficult. Furthermore, there are reports that children with untreated motion sickness can progress to migraine in adulthood, although further studies are needed.

PEOPLE SUFFERING MIGRAINE OR VESTIBULAR MIGRAINE TEND TO HAVE ASSOCIATED NAUSEA, ESPECIALLY IN WOMEN BETWEEN 35 AND 50 YEARS OF AGE, AND SO THEY CAN EASILY ACQUIRE MOTION SICKNESS AS A SIDE-EFFECT OF A PERIPHERAL OR CENTRAL PATHOLOGY.

According to the Bárány Society Classification Committee, secondary hormonal factors – such as oral contraceptive use, menstruation, pregnancy, or cortisol levels – correlate with susceptibility to motion sickness in women, further complicating the link between motion sickness and vestibular migraine or migraine.

Genetic studies have been done with the aim of understanding motion sickness. Some studies have found that genes responsible for regulating insulin and glucose levels play a role in issues relating to body balance and motion sickness. Genes responsible for low oxygenation can also be associated with motion sickness, which might explain why some people experience discomfort in high altitude cities. In general, research suggests there seems to be a genetic susceptibility to motion sickness.

When testing and evaluating a person for motion sickness, the practitioner needs to consider certain signs and the patient's clinical history.

The Bárány Society has established standard clinical diagnostic criteria for visually induced motion sickness, and motion sickness in general, and these define when these conditions constitute a disorder. The criteria were developed by scientists and therapists from the Bárány Society who were specialists in otoneurological evaluation in order to assist in topodiagnosis. The work also suggests protocols for caring for individuals with high susceptibility to motion sickness as well as the general public.

Chang et al. (2012) analyzed the presence of motion sickness in children and adults who played video games on consoles. A relevant finding was that, in both children and adults, changes in body movement precede motion sickness. With advances in game technology, current devices should be able to easily detect movement of the players, and hence should be able to warn them of incipient motion sickness.

In terms of treating motion sickness, studies show that patients may benefit from rehabilitation of vestibular function. At the same time, we again note that motion sickness and vestibulopathies in general are not easily recognized in children. This is because it is difficult for children to understand the concepts of vertigo and imbalance, and hence they often cannot verbalise the signs and symptoms. Vestibular changes are often ignored in children, since they can be readily attributed to failure in motor coordination or to behavior. Nevertheless, vestibulopathies in children can have negative consequences on motor development, and on the acquisition and development of oral and written language, thereby impairing school performance, communication and learning skills, and behavior.

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