

MOTION SICKNESS

Essay

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INTRODUCTION

Motion sickness is a specific disorder which is evoked in susceptible persons and animals when they are subjected to movements which have certain characteristics.

Tyler and Bard (1949) stated that Irwin, 1881, appears to have been the first to use the expression. He suggested that seasickness might more correctly be termed motion sickness, "for not only does it occur on lakes and even on rivers, but as it well known, a sickness identical in kind may be induced by various other motions than that of turbulent water." He thus introduced a convenient and accurate general term, but it did not gain wide use until Tyler and Bard (1949) grouped under the term motion sickness "a variety of conditions akin to seasickness and due to frequently repeated oscillatory movements of the body."

Since that time and until now many papers have

been written, many experiments were done and several ideas and theories have been evolved about motion sickness.

The interest about this phenomenon increased in recent years as a major concern in manned space flight, and as an intriguing clinical entity on its own right.

AIM OF THE ESSAY

The objective of this essay is to review the voluminous literature dealing with this disorder, with the purpose of clarifying the various factors concerned in its causation, clinical features and the best lines of its management.

DEFINITION

Motion sickness is a syndrome characterized by nausea and malaise and initiated by movements with acceleration and deceleration. Motion sickness encompasses seasickness, airsickness and car sickness. The clinical features include malaise, nausea, excessive salivation, cold sweating, and vomiting. The individual becomes quiet, pale and may, with severe motion sickness, exhibit a facies associated with circulatory collapse. Blood pressure and pulse exhibit no characteristic change. The aftereffects consist of lassitude and mild nausea which may persist for 24 hours.

A psychic influence and optic stimuli may contribute to the illness. It has been shown that the causation of motion sickness is mainly due to vestibular organ's stimulation. The utricles, rather than the semicircular canals had been incriminated as the site of stimulation.

ETIOLOGY AND PATHOGENESIS

Information about our ongoing spatial orientation is provided by a variety of sensory channels. Normally, the vestibular, visual, auditory, somatosensory and proprioceptive cues provided by these channels are synergistic, specifying vertical information about our relation to the environment.

Each sensory input contributes to our awareness of the environment so that, even when blindfolded, we still know with considerable accuracy - on the basis of vestibular, proprioceptive and somatosensory cues - whether we are uprighted or tilted.

Incidence

The belief that susceptibility to seasickness is confined to a relatively small and special fraction of the population has been dispelled, as Parker (1979) stated "it appears that almost every normal individual can be

made sick by motion."

It is commonly observed that in some individuals a given kind and intensity of motion may produce no symptoms or only mild ones, while in others it evokes severe symptoms.

Mathewson (1942) reported that of 2682 air crew trainees 15 % were sick at least once during their training.

As regards seasickness, Hill (1936) estimated that over 90 % of inexperienced persons will become ill under severe conditions.

Individual Predisposition and Adaptation:

It has been pointed out that there are great variations among individuals in susceptibility to motion sickness. Failure to control this factor in experimental studies has resulted in some errors.

Cramer (1977) stated that children under 2 years of age and elderly persons show less susceptibility than

those of intermediate age. He also stated that the incidence is higher in females than in males and that there are differences between races.

Many deaf-mutes, and persons with internal ear damage are immune.

Susceptibility appears to depend on a constitutional capacity to respond to certain patterns of vestibular stimulation. It can be modified to some extent by several extralabyrinthine influences. For example, some tolerate the motions of small boats but others become sick on larger vessels, and vice versa. Certain individuals become sick on a swing but not in an airplane or ship.

Cramer(1977)estimated that about 95 % of all susceptible persons are capable of adaptation to motion.

Adaptation to one type of movement does not necessarily adapt the individual to the motion produced by a different vessel, airplane or experimental device. It appears that the capacity to adapt is minimal or entirely absent in those highly susceptible individuals

who make up perhaps 3 to 5 % of the population.

Experimental Methods of Producing Motion Sickness:

The means which have been effectively used to produce motion sickness experimentally are:

- a) Devices which reproduce artificially the movements of a ship.
- b) Elevators or elevator like machines.
- c) Swings.
- d) Apparatus which subjects an individual simultaneously to rotation and tilting movements of the head.

The basic apparatus used in motion sickness production is the rotating chair designed by Lanker and Graybiel (1979). Prior to beginning rotation all subjects

are instructed that they are to report the occurrence of any symptoms of motion sickness, and that they are to order to stop when they feel it would be too uncomfortable to continue.

Characteristics of Effective Motions:

Lanker (1977) stated that an essential feature of an effective motion is a repetitive change velocity.

Composite motion was found to be more effective than any one of its components.

Wendt (1945) confirmed that the time characteristic of a motion rather than its violence is the feature relevant to motion sickness.

Vestibular Factors:

Pitbaldo and Kirble (1977) stated that Flourens, 1828, showed that motion evokes responses through activation of the labyrinthine receptors, they

also stated that Irwin et al. were probably the first in 1881 to call attention to the similarity between seasickness and Menière's disease and to suggest that the former is caused by stimulation of the labyrinth. This conjecture gained support from the early observations which indicated that many deaf-mutes and others with internal ear damage are immune to seasickness.

Sjoberg (1931) reported that 3 girls from a school for deaf, who showed no responses to severe caloric and rotational vestibular stimulation, were not made ill by exposures of 2 hours to the motion of an elevator, although this same stimulus caused sickness within 30 minutes in most normal individuals.

A question which has been and remains controversial is whether one or more than one of the sense organs of the non-auditory labyrinth discharge the afferent impulses which are essential for the production of the symptoms of motion sickness. There are three schools of thought on this question. One believes that both groups of receptors, the cristae of the semicircular canals and the maculae of the utricles and saccules,

are involved; another school maintains that only the maculae are concerned; a third group holds that the utricle and saccule are not essentially involved and that motion sickness is caused by stimulation of the cristae.

Although it is known that angular accelerations stimulate the cristae of the semicircular canals, and linear accelerations stimulate the maculae of the utricles, there is some evidence that the utricles can be stimulated by very rapid angular rotations.

Indirect evidence in support of the theory that the utricular receptors are the sense organs involved in the production of seasickness has been derived from studies of the types of movements produced by ships. It has often been stated that the vertical movements of a ship are more distressing than the falling movements.

In practically all cases of sickness due to motions of ships, boats, airplanes, elevators and swings, linear accelerations appear to constitute the principal stimuli. However, Potvin (1977) emphasized that when it is said that the effective accelerations produced