Our experience about seackness therapy

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ABSTRACT

Seasickness can be very crippling and its medical treatment disappointing.

Here is a synthesis about our experience on naupathia treatment on one hundred and ten sailors suffering from acute symptoms with incoercible vomiting and no results with classical therapeutics.

Once evaluated the motion sickness according to Graybiel & Miller's scale, those marines were proposed optokinetic stimulations based on 10 sessions of thirty minutes per week.

After sailing for over a month, the evolution of results are quantified using the Graybiel & Miller's scale and a three item- questionnaire.

Today, we are able to say that Optokinetic stimulation rehabilitation in preventing naupathia found significant improvements. Not all patients can be cured, of course, but improvements are noticeable.

KEYWORDS

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INTRODUCTION

Seasickness affects many people to varying degrees. It can be a real handicap for sailors and lead to a definitive inability.

Confronted with the failure of naupathia pathology test (Erausto, 2009) and incomplete medical results, we wonder if astronauts and fighter pilots training programs on vestibular function could be adapted to seamen (Clément, 2001, Lucertini, 2004).

By definition, seasickness corresponds to a neurovegetative imbalance with variable intensities usually linked to water motion.

It is an old disease, as old as humanity. Indeed, four years before J.C, Hippocrates used to write about the effects of sailing on the sea has on the human body.

In fact, it is only during the 20th century, more precisely during the Second World War that care and therapy started, when a considerable amount of soldiers were moved by sea.

We estimate to a third the amount of inoperationnal soldiers, due to seasickness, during D-Day (Lavenaire, 2000).

Nowadays, industrial development and leisure society increase more and more the risk of kinetosis.

PATHOPHYSIOLOGY

Balance is based on three types of information:

Eyesight with the peripheral retina which allows us to situate ourselves in the space.

The inner ear and specifically its posterior part: the vestibule is an accelerometer.

Proprioception which allows us to adapt to ground motion through the sole of the feet.

These three informations to the brain are essentials to stimulate muscles and start moving.

When a person is confronted to unstable motions, the conflict between these information starts.

At sea, this conflict is increased. The sailor can be compared to a cork on the water surface. Swell will be perceived differently from each one of the sensory entries.

In naupathia, the inner ear is the most sensitive organ and only people with no labyrinth never encounter those disorders; this is why deaf and mute persons with bilateral agenesis (James in 1882), or animals who have had a labyrinthectomy can't be seasick (Taillemite, 1997).

Swell creates a random modification on the gravitational vector.

The movements of pistons are the most unpleasant and create hypo gravity which leads to vestibule's incapacity of controlling proprioceptive disturbances (Tal, 2007). In a skyscraper, a person going down the lift will feel the exact same physical sensation.

Futhermore, head movements in comparison to the rest of the body with boat motions accentuate the discomfort due to Coriolis effect.

Finally and most importantly, low frequency stimulations (0,1 à 0,3 Hertz) would not be perceived correctly by the vestibular system. This one wouldn't be able to differentiate inclination from translation movements (Merfeld, 2007).

The second sensorial entry is the eye:

For humans, sight prevails over the other senses meanwhile hearing is the most accurate for dolphins.

Therefore, visual information will bring « a visual anchor point » to the seaman on the deck.

When a sailor is in a cabin, this visual anchorage is not possible and the kinetosis gets worse.

The third entry is proprioceptive:

Movement perception from the deck to the sole of the foot is in adequacy with the swell's perception within the inner ear.

The sailor will be able to reduce this conflict by anticipation through leg flexion, for example (Owen, 1998).

Thus, seasickness results from variable degrees of conflicts:

An inter-sensorial conflict between visual and proprioceptive entries.

An inner ear conflict linked to the gravitational vector perception.

And also, a conflict within the brain between the information received and the one integrated through previous experiences. It's the « neural-mismatch » concept of Reason (Reason, 1978).

Stress, Tiredness and olfactory stimuli will increase that phenomenon.

Contributory factors sollicitate two parts of the brain: the amygdala which is the centre of affectivity controlled by the prefrontal cortex and the hippocampus an area of the brain associated to emotional memory experience.

In a normal case study, adaptation or mooring will allow the person to overcome this conflict.

With a patient, adaptation will be difficult. The rehabilitation aim will enable this adaptation by creating sensorial conflicts as close as possible to conditions at sea.

POPULATION STUDIED:

We chose a cohort of 110 sailors (Trendel, 2012). This group is composed of 72 sea professionals and 38 regular pleasure boaters.

The average age is 32 years old (the extremes 11-75 years old and the median 28, 5 years old) with 63% of men and 27% of women.

The survey is based on sailors with years of experience on different type of boats with strong operational constraints of more than one hundred days at sea per year all around the world for the national navy and regular ocean racing for boaters.

This is a gage of accurate and reliable assessment on illness intensity.

All these sailors have suffered from severe naupathia. They experienced complete therapy failure and suffered from secondary effects from medical treatments.

INITIAL REPORT:

The initial report aim was to evaluate the naupathia intensity with the Graybiel and Miller scale (Graybiel, 1968). All our patients reached the fourth degree on that scale. This means, the highest degree of illness with uncontrollable vomiting.

This initial report includes also a clinical and paraclinical vestibular examination with systematic video-nystamography and EQUITEST in order to avoid any vestibulopathy symptoms. It takes also in account a psychological consultation to evaluate the personal context and each sailor's motivation. Finally, the seasickness mechanism is explained to each individual to facilitate patient understanding of what we are trying to accomplish with their individualized rehabilitation program and allow them to become actors of their own cure.

REHABILITATION:

Rehabilitation takes place in 10 sessions of 30 minutes each, once or twice a week often fragmented due to professional obligations. It is carried out by a doctor or the physical therapist of the ENT department.

Vestibular rehabilitation starts with exercises on a rotating chair:

The patient is sat, eyes closed, and he is subjected to five clockwise rotations to a speed of less than one hundred degrees per second.

The chair is stopped brutally and the time needed to find a fixed point on the wall measured. We repeat this exercise again but in the opposite rotation.

We observed, at the end of the exercise, that the nystagmus time constant post-rotation decreased from 30 to 5 to 7 on each side.

These sessions generally finished by a 5 minutes optokinetic exercise.

This exercise takes place on a rotating chair during the first two reeducation sessions to slow-down the vestibular stimulation thanks to visual information, thereby lessening the retinal slippage.

The second exercise aims to induce the optokinetic reflex:

The patient is standing up without support in a dark room facing a blank wall. A planetarium turning between 20 ° and 40 ° per second on the left and on the right to stimulate the peripheral retina.

First, horizontally and progressively from oblique to vertical. Then we increase the sensory conflict by creating a pseudo coriolis effect with head movement during the optokinetic stimulation.

Progressively we reduce the proprioceptives information with the exercise on a cushion and then on an instable platform.

The optokinetic reflex will stabilize on the retina a target which moves linearly at a constant speed. It consists of a series of slow ocular target following movements interrupted by jerky restarts. We try to imitate swell motion with lasting visual effects, performing large motions at low frequency and in multiple directions.

RESULTS:

In this selection, the average number of rehabilitation sessions was 8,3 per patient (extremes: 5-11; median: 8). The collect of these results is taken about 17.2 months after that experimental protocol with improvements over a period of almost nine years.

To appreciate these results, we compared the score reached on Graybiel scale with a three item-questionnaire:

Did you notice a sensible improvement in your seasickness?

Did you notice any improvement in other modes of transport?

Will you recommend this method to relatives?

The results from the Graybiel scale and the questionnaire give

75 % of patients are satisfied, as vomiting at sea stopped.

51 % of them spoke about a noticeable improvement in motion sickness in other modes of transport and 92 % of them would recommend this cure to relatives.

DEBATE:

These scores interest us as we know that 75 % of the professionals were able to go back and handle on-board activity better.

This test in comparison to others was made out of 110 individuals much more that the traditional out of 10 (Lucertini, 2004, Tal, 2007).

There are no side effects with this treatment which is not usually the case with medical therapeutics which causes drowsiness, adaptation trouble and impedes sailors at work.

This treatment guarantees durable results. Sailors who have been for a few years on land can go back to sea with no sickness (Trendel, 2010).

Finally, these results seem objective. However we also presented a study versus the placebo which is in favor of rehabilitation.

As seen, it is a treatment that gives results equally in other kinetosis. This is explained without doubt by the fact that motion sickness corresponds to a major sensory conflict in comparison to other kinetosis.

Lastly, it is a treatment that requires the active participation of the patient; it is a very important factor in an illness where movement anticipation and psychological state count.

Meanwhile, all the problems are not solved.

Firstly, the patients are not fully healed because the vomiting has stopped; for the most part the patients still have moderate symptoms after reeducation. Also, in our study, 65 out of 83 patients healed kept a mild motion sickness (stage II on the Graybiel scale).

Finally, we find 27 patients (25 %) in therapeutic failure; it is difficult to define the cause. There is no other subgroup that can be identified of the same age, sex and sailor's motivation is equal.

The Future will no doubt be in the optimization of the optokinetic rehabilitation sessions by creating more sensorial conflicts closer to those experienced on the sea and personalizing the reeducation programs through relaxation and breathing control sessions (Sang, 2003), cognitive behavioral therapy and even advice on variable diets from one patient to another.

CONCLUSION:

This study is in favor of optokinetic reeducation for the treatment of motion sickness. It is for us the best treatment for the professional sailors as a long medical treatment is unsuitable due to side effects. It is also a solution proposed for pleasure boaters who are in treatment failure with other classical methods.

In our department we have opened for the last five years a pluridisciplinary consultation for motions sickness with an ENT doctor, a psychiatrist and a vestibular therapist taking into account the entirety of the person and personalizing the treatment to confront this complex kinetosis.

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