

## **EXOTROPIA AND VERTIGO - SOME REMARKS**

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### **1. Summary**

The study of cases of automobile drivers complaining of dizziness after driving about one hundred kilometers brings us to describe a new syndrome:

*"The transient oculomotor dizziness syndrom".*

### **2. Introduction**

The importance of the ocular stability in the maintenance of equilibrium is well known. A sudden internuclear opthalmoplegia, a paralysis of one of the oculomotor muscles induces dizziness. Except in case of strabismus, to my knowledge, dizziness associated with latent exotropia has never been described until now.

And so PHORIA is a latent deviation of the visual axes when sensory fusional mechanisms are temporarily interrupted by covering one eye. Therefore if the deviation is constant in all directions of gaze, it is called "concomitant" and if the amount of deviation changes according to the direction of gaze, it is called "non concomitant" and may be due to extraocular muscle weakness.

TROPIA (or HETEROTROPIA) is a misalignment of the visual axes when both eyes are viewing a single target:

*exotropia* is a deviation temple ward, not kept in check by fusion

*isotropia* is a deviation in nasal ward

*hypertropia* is a vertical deviation

*excyclotropia* is a torsional deviation, upper pole temple ward

*incyclotropia* is a torsional deviation, upper pole nasal ward.

### **3. Method**

**3.1.** Several tests are proposed to study phoria and tropia. They are realized by opthalmologists. Among them and to help the comprehension of these abnormalities, I will describe:

#### **3.1.1. The modified Landcaster red-green test (Zee).**

The patients wears goggles with a red filter in front of the right eye and a green filter in front of the left, thus the patient sees the image of a red light with one eye and the image of a green light with the other. The test prevents fusional vergence. There are two flashlights in use. The examiner holds one and the patient the other. The separation of red and green light at various points in the vertical and horizontal meridians is measured. The inferred positions of the right and left eyes can then be plotted on a graph.

### 3.1.2. *The covered test*

A target which requires a visual discrimination must be used to ensure a fixed accommodative state. With the use of a transluder occluder which is opaque to the patient but transparent to the examiner it is possible to see the eye under cover. The test consist of covering one eye and then to observe the movement of redress of the other eye. The tests is then resumed with the other eye. It must first be performed to determine if a tropia is present, if it is not, then movement of the eye, when the cover is removed, indicates a phoria. A modification of this test is the alternate covered test where the occluder is quickly transferred from one eye to the other, each eye being covered for at least two seconds. It is possible to measure the angle of deviation with the aid of a prism.

### 3.2. All the patients receive a complete otoneurological examination:

- anamnesis
- clinical examination of eyes and ears
- audiometric testing and stapedius reflex testing
- Brainstem evoked response audiometry
- vestibular examination and static posturography as previously described (Boniver)
- oculomotricity:

For this test we use a new technique of examination. Movements are produced on a screen controlled by a monitor connected to a computer. This system the "OPTIMAX" was created by a Belgian company called "MUMEDIA". The distance between the screen and the patient is calculated to avoid convergence problem. The tests are conducted with optical corrections, if need be, in darkness: to obtain the best optical stimulation by the target on the screen. Each eye movement is recorded separately by silver electrode.

- saccadic movement:
  - Amplitude: several choices
  - Frequence: fixed or variable
  - The target may be a number that the patient has to persue with his eyes, to maintain a good level of concentration.
- pendular pursuit movement:
  - the diameter of the target is measured to obtain a true foveal stimulation
  - amplitude: several choices
  - frequence fixed or variable.
- optokinetic stimulation:
  - several patterns of stimulation are possible: variable speed, frequency
  - we use for optokinetic stimulation, the movement of parallel bands of 2 cm in width and superimposed over a landscape, as defined by Samain and Demanez to obtain the best gain of the optokinetic system.

- parameters measured are:
  - for saccades: - amplitude
    - speed: average of the speed of right and left saccade and measurement of the maximal and minimal speed
  - precision: undershooting and overshooting
  - gain: - eye speed (right and left)
    - target speed
- for pursuit movements:
  - gain
  - the distortion of the movement
  - saccades during the pendular movement
- for optokinetic test:
  - speed, amplitude, frequency
  - gain
  - directional preponderance concerning speed and frequency.

### 3.3. Subjects

- 21 patients:
    - sex:
      - 20 males
      - 1 female
    - age:
      - 35 - 55 y.o.
    - optical known defects:
      - 13 myopias
      - 1 astigmatism
      - others: normal.
  - characteristics: all complain of dizziness in driving after a time variable from half an hour to two hours.
- The intensity of complaints was variable but sometimes they were obliged to stop for a few seconds and in one case for a few minutes.
- the symptoms are inconstant: they always appear during periods of tiredness or stress.
  - none of them had ever experienced a vestibular or a neurological problem. They were free of any disease.

### 4. Results

We found in all cases:

- disturbances of the oculomotor and vestibular testing due to latent weakness of the right medius oculomotor in one eye;
- asymmetry in responses to caloric and rotatory proofs giving a directionnal preponderance syndrome due to an oculomotor problem only (monocular registration).

- alterations of the eyes tracking tests:
  - *saccades*:
    - slowness of saccades in the direction of the latent paresis
    - hypometry of the adduction saccade.
  - *pendular testing*:
    - asymetry of the gain and alteration of the distorsion of the coefficient.

The ophtalmologic examination demonstrates the existence of a exotropia of one eye. Several tests are often necessary because the exotropia is only from 5 to 7 degrees and transient.

### **5. Discussion**

The anamnesis of a patient presenting transient dizziness when he is driving allows the practitioner to pay particular attention to the analysis of eye movements and to make a detailed study of the oculomotricity.

A meticulous ophtalmological examination reveals in these cases a little degree of exophoria, due to a transient weakness of the right medius oculomotor muscle probably from congenital origin.

This transient paretic deviation causes a dissociation of the subjective visual and somatosensory information resulting in a mismatch in the nervous central integrators inducing the dizziness.

In only one of our cases optical prism correction was possible but in the majority of cases, prism is uncomfortable due to the fact that the paresis is latent and transient.

We call this syndrome:

"The Transient Oculomotor Dizziness Syndrome"

**- The TODS !**

### **References**

1. BONIVER R. DEMANEZ J.P.  
Etude comparative des differents systemes d'examen vestibulaire assistes par ordinateur.  
*Acta Oto-Rhino-Laryngologica Belgica*. 1989, 43: 83-89. Fasc. 1.
2. BONIVER R.  
Micro-ordinateurs et eng: etat actuel.  
*Acta Oto-Rhino-Laryngologica Belgica*. 1989, 43: 603-607. Fasc. 6.
3. BONIVER R., NORRE M.E.  
Symposium. Expertise Medico-Legale en ORL.  
*Acta Oto-Rhino-Laryngologica Belgica*. 1988, 42: 723-770. Fasc. 6. Paris, september 26, 1988.
4. BONIVER R.  
Posture et posturographie.  
*Acta Oto-Rhino-Laryngologica Belgica*. 1989, 43: 593-601. Fasc. 6.

5. BOUVRON-MADIGNIER M., VETTARD S., BAILLY G.  
Etude des saccades horizontales. Application a l'ophtalmologie.  
La Revue d'ONO. 1990: 15-17.
6. BRANDT, Th., PAULUS W., STRAUBE A.  
Vision and posture  
In: Disorders of Posture and Gait Elsevier Science Publisher B.V. 1986: 157-175.
7. LANCASTER, W.B.  
Detecting, measuring, plotting and interpreting ocular deviations.  
Arch. Ophtalmol. 1939, 22: 867-880.
8. LEIGH R. J., ZEE D.S.  
The Neurology of Eye Movements. Edition 2.  
F.H. Davis Company - PHILADELPHIA 1991.
9. SAMAIN Ph., DEMANEZ J.P.  
Nystagmus optocinetique et champ visuel stimule.  
Acta Oto-Rhino-Laryngologica Belgica. 1988, 42, 483-493.
10. ZEE D.S., CHU F.C., OPTICAN L.M., CARL J.R., REINGOLD D.  
Graphic analysis of paralytic strabismus with the Lancaster red-green test.  
Am J. OPHTALMOL. 1984, 97: 587-592.