

# *Directional Preponderance in Patient with Deficit of Vestibular Function: Case Report*

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## SUMMARY

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**Introduction:**

The clinical significance of the Directional Preponderance has been subject of controversies and debated throughout 50 years. The international consensus is that the Directional Preponderance would be associated with an initial compensation process. Many authors believe that the Directional Preponderance could be an evidence of pathology in peripheral and central systems. However, it must be considered that the Directional Preponderance has been observed in normal patients, without any evidence of vestibular system pathology. In Brazil, the Directional Preponderance has been predominantly associated to irritative labyrinth disease.

**Objective:**

To describe a case of a patient with vestibular loss that was evaluated of a sequence vectoeletronystagmography up to one year after the acute vertigo; and discuss the evolution of the initial compensation in the vestibular unilateral loss and the concept of directional preponderance associated to peripheral irritative labyrinth disease.

**Results:**

The case report describes a classic central compensation of patient with vestibular neuronitis.

**Conclusion:**

Directional Predominance does not define if the peripheral labyrinth disease is irritative or deficitary.

**Key words:**

vestibular function tests, vestibular neuronitis, diagnosis.

## INTRODUCTION

Directional Preponderance (DP) was firstly defined by Jongkess (1) as a tendency to a greater intensity of nystagmus to a certain direction in comparison to another. According to some researches, DP is more frequent noticed in patients who present spontaneous nystagmus in the same direction (3,4). Thus, patients present caloric responses resulting nystagmus in the same direction as the spontaneous one. On the other hand, they present low responses in the opposite direction to spontaneous nystagmus. The international consensus is that DP would be associated to the vestibular compensation process (4,6). Even after vestibular compensation occurs, some patients present latent nystagmus, which might remain in the opposite direction to the involved side (7).

Others believe that DP would be such pathology of both vestibular systems: central and peripheral ones. Actually, DP has been observed in restricted disorders at the end of vestibular system, ramifications of the 8<sup>th</sup> cranial nerve, brainstem and cortex (4,5,8,9).

It is also important to mention that DP has also been observed in normal subjects with no evidences of pathology in the vestibular system (3,4,6).

In Brazil, the presence of DP above 33% has been mainly associated to labyrinth disease or irritative syndrome (10), though, an established concept of the latter was not found in the literature.

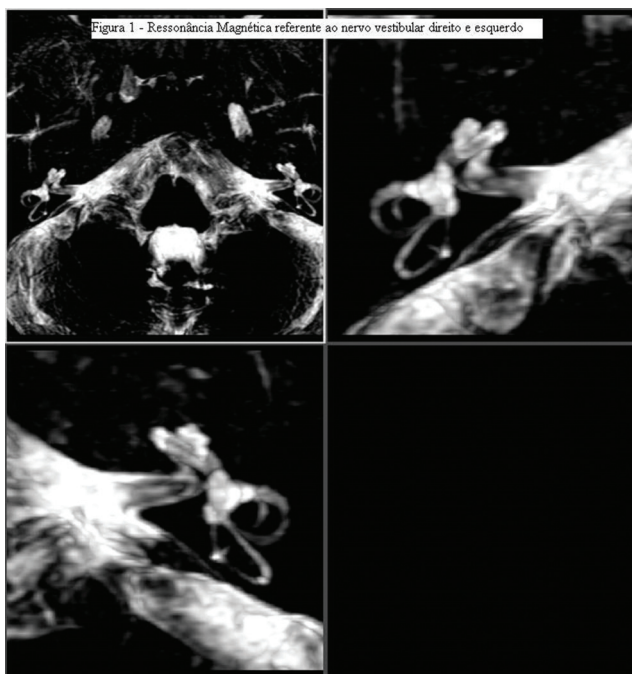
The target of this study is to describe a case of deficient labyrinth disease whose patient was evaluated through vectoeletronystagmography up to one year after an acute crisis. Also, to discuss the evolution of vestibular compensation on unilateral loss of labyrinth function and the concept of directional preponderance associated to irritative peripheral labyrinth disease.

## CASE REPORT

A 46-year-old male patient was examined due to a complaint of a sudden vertigo, lasting more than 24 hours, with no hearing complaint. On the clinical exam, it was observed spontaneous horizontal nystagmus to the right side and Romberg to the left.

Hearing test was in normal condition. The image and laboratory propaedeutic established diagnosis of left vestibular neuronitis (Picture 1).

One month later diagnosis had been done, the first



**Picture 1.** Magnetic resonance imaging of the right and left vestibular nerve.

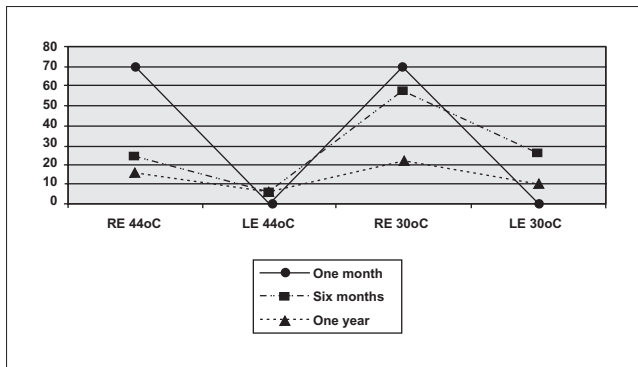
vestibular test was performed. One test was repeated 6 months and one year after the crisis.

Vectoeletronystagmography was a method used to record eye movement. It was used *Contronic do Brasil* version 5.1, Copyright 1993-2000, - *Contronic Sistemas Automáticos da Universidade Católica de Pelotas* (Automatic systems of Catholic University – Pelotas). Previously the vectoeletronystagmography exam, its skin was cleaned in order to place the electrodes, and the triangular disposition of those was used, commended by PANSINI and PADOVAN (1969) (11). Vestibular test consisted of the following steps: eye movement calibration, research of spontaneous nystagmus with open eyes, research of spontaneous nystagmus with closed eyes, research of semispontaneous nystagmus, pendular tracking, research of optokinetic nystagmus and research of post-caloric nystagmus (caloric test in water at 44°C e 33°C). It was used methods of Jacobson et al to perform and interpret vectoeletronystagmography, considering as normal the values up to 20% and 27% regarding labyrinth and directional preponderance of nystagmus respectively.

When examining oculomotor movement, it was observed saccade with normal latency and speed, 2-kind tracing and symmetrical optokinetic nystagmus.

Regarding caloric test, the results were:

One month later acute crisis: left areflexia and right hyperreflexia, above 70°/sec in 30°C and 44°C.



Picture 2. Sequence caloric test.

Six months later: LE44°C=06°/sec, LE30°C=25°/sec, RE44°C=24°/sec, RE30°C=58°/sec, with LP to the right at 45% and DP to the right at 47%.

One year later: LE44°C=06°/sec, LE30°C=10°/sec, RE44°C=16°/sec, RE30°C=22°/sec, with LP to the right at 41% and PD to the left at 4%.

Patient improvement can be seen on Picture 2 that stands for obtained values in each caloric stimulation and on Picture 3 the obtained values for LP and DP.

## DISCUSSION

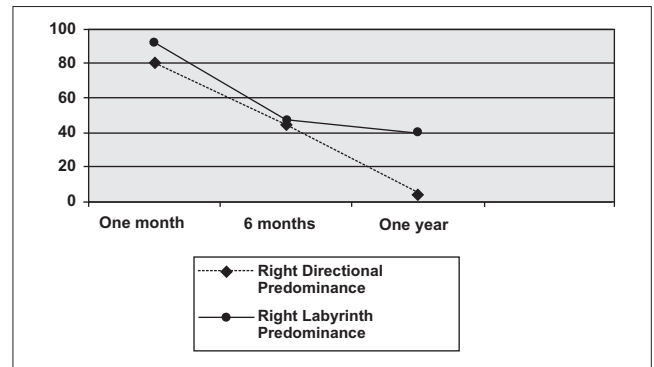
FITZGERALD and HALLPIKE (12) presented the DP phenomenon in their historical article which describe alternated binaural and bithermal caloric tests. The following formula allows calculating the Directional Preponderance:

$$DP = (LE\ 44^{\circ}C + RE\ 30^{\circ}C) / (RE\ 44^{\circ}C + LE\ 30^{\circ}C) \times 100$$

$$LE\ 44^{\circ}C + RE\ 30^{\circ}C + RE\ 44^{\circ}C + LE\ 30^{\circ}C$$

The values of an expressive DP can vary from hospital to hospital depending on the internal standards. It is considered when there is a difference higher than 26% to 30% (2,10,13) between maximum intensity of Angle Shape Speed of Slow Component of the nystagmus to the right (LE 44°C + RE 30°C) in relation to nystagmus to the left (RE 44°C+ LE 30°C) in the caloric test and vice-versa.

The case report describes a classic central compensation in patient who had already had vestibular neuronitis. Left areflexia, one month later the crisis, confirmed the diagnosis. In that moment, hyperreflexia to the right, camouflaging an irritative syndrome, was related to the release of response of the brainstem of the health labyrinth, which occurs at the beginning of vestibular



Picture 3. Values of labyrinth predominance and directional preponderance.

compensation (14). The exam performed after six month present improvement of central compensation.

LP and DP to the right indicate that left labyrinth was under deficient function in relation to the right one and that central compensation was not already established, because there was a LP to the right. The test performed one year later the crisis presents a balanced patient (normal DP), with asymmetric labyrinth function, due to vestibular neuronitis, which led to a partial loss of the left labyrinth, though irreversible.

Thus, one might be sure that DP to the right after one year, under the amount of 81%, refers to liberation of the contralateral vestibular core. After some time, it is possible to observe a decrease of such value, due to a partial vestibular compensation that is completed after one year later the labyrinth crisis, which made the LP remain to the right, indicating a definite lesion on the left labyrinth with a decrease of the function on this side.

## CONCLUSION

DP does not define if peripheral labyrinth disease is either irritative or deficient. That is why it is important to consider clinical history and a follow-up of the patient.

DP can be observed in peripheral vestibular lesions, central ones or even in normal patients.

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