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Short Communication

Active Prisms What is It?

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Abstract

Note: This paper is a conceptual report for Ophthalmologists on the concept of active prisms and their benefits, with an emphasis on the importance of training ophthalmologists in this new area of knowledge. Formal scientific papers will later be published after the readers assimilate these new concepts. The author is the pioneer of this technique.

A prism is a lens which deviates light towards its base and, as a consequence of this, the image deviates in the opposite direction.

Ophthalmologists are using this kind of lenses to eliminate diplopia, which occurs mainly in cases of oculomotor palsies.

In this case, prisms work as compensatory elements. It is a method that is not used to cure, but to eliminate the discomfort caused by diplopia. I call this kind of prisms passive prisms.

To understand what active prisms are, it is important to know their history:

In 1977, the French scientist Jean Bernard BARON came to Lisbon to visit our clinical research team. He was an ophthalmologist and neurologist and the director of the scientific research laboratory at Saint Anne Hospital in Paris-France.

A few months before, Prof. Martins da Cunha, a rehabilitation medical doctor, head of the Physiatry and Rehabilitation Service at Hospital of Santa Maria in Lisbon invited me to join him for a clinical research.

I was the head of the strabismus and orthoptic unit of the University Hospital of Santa Maria.
Prof. Martins da Cunha was discovering a new syndrome, that he named Postural Deficiency Syndrome (PDS). It was a multiform syndrome presenting multiple symptoms.

At that moment, Martins da Cunha was concentrating his attention on a particular objective signal: patients sometimes would look at him sideways as if they were suspicious of him. Since he could find no reason for that behavior, he asked for help from top ophthalmologists to discover an ophthalmological explanation for it, but they were not able to discover any kind of oculomotor pathology.

He was desperate because he knew that something had to be wrong and bought a Maddox Wing for further research. On exam, the arrow below the number zero was referred by the patients as being below different even numbers (up to number 22), depending on the cases.

Reading the scale of the Maddox wing, these results would indicate exophoria. These results lead him to send these patients to the Strabismus and Orthoptic Unit (SOU) for further study.

The SOU performed the cover test and the classical tests used in oculomotor study and

stated NO EXOPHORIA and no oculomotor palsy.

This generated a conflict between the two units, because the Rehabilitation Unit needed the SOU's cooperation, but the SOU considered it to be a loss of time.

Meanwhile, I became the head of the SOU and received a recommendation from the Director of the Ophthalmology Unit to cooperate.

I asked Prof. Martins da Cunha to make a joint observation of a patient classified as suffering from PDS. In the Maddox Wing test, the patient referred that the arrow was pointing to the number 16. I did the cover test, but no deviation was observed, no movement of refixation nor any sensation of image deviation. The near convergence test showed a convergence insufficiency. Diagnosis was convergence insufficiency and not exophoria.

So, my suggestion to Prof. Martins da Cunha was to perform a statistical study comparing the number of convergence insufficiency cases in PDS patients to the convergence insufficiency cases in overall population. This seemed like a perfect solution to help Prof. Martins da Cunha and reconcile the two Units.

However, Prof. Martins da Cunha started to manipulate the patient by repositioning body segments according to the position he considered to be perfect. After manipulation, he showed the Maddox wing again to the patient, who referred that the arrow was now below the number ZERO.

I was astonished and couldn't help but ask Prof. Martins da Cunha "what did you do, Professor?". His reply was flabbergasting: "It is YOU who must explain to ME what I am doing because YOU are the expert in ocular motricity".

And this was a matter of fact, since I was the head of the unit, the person responsible for teaching residents and fellows, and solve the most complex cases of strabismus. But this observation was unbelievable, as this subject had never been referred in any textbook or in any published paper.

A researcher has no right to deny facts that he can observe, but he has the right to confirm them. So, I asked to see another patient and asked Prof. Martins da Cunha to try to give him the best information he could. Prof. Martins da Cunha brought in another patient and tried to explain the best he could, but he seemed anxious and walking back and forth in the room. I was staring at the patient and the patient was staring at Prof. Martins da Cunha. I noticed that, when Prof. Martins da Cunha walked to the left side of the patient, the patient would follow him by turning his eyes to the left, but, when Prof. Martins da Cunha walked to the right side of the patient, he would turn his head to the right side, and not his eyes.

I decided to study the eyes while looking straight, in dextroversion and in levoversion, using a synoptophore. In this case, I used a Clement Clark Synoptophore equipped with simultaneous slides G3 and G4 (the big lion and the big cage)

I verified that, when looking straight and in levoversion, the patient referred seeing both images in full, but, in dextroversion, he referred that a part was missing of both the lion and the cage. This case had previously been classified by Prof. Martins da Cunha as left limb support.

After this, we studied a right limb support and verified that both images were complete in primary position and in dextroversion, but not in levoversion.

Finally, it was time to say EUREKA! A new ophthalmological technique was born**.** It was now possible to detect types of PDS by using an ophthalmological device.

We continued our research and, when the French scientist J. B. Baron visited us, we had already identified six types of PDS by using this new technique.

At the end of Baron's visit, he asked me to show him a patient with a diagnosis of convergence insufficiency being treated at the orthoptic unit.

Baron placed a low-powered prism in front of the left eye but base out.

He repeated the near convergence test and this patient's condition improved.

This was a surprise for me because literature, at the time, stated that, to improve a convergence insufficiency with prisms, you need to prescribe a base in prism. However, Baron left Lisbon without an acceptable explanation for this fact. But it was indeed a fact, and a researcher can´t ignore a fact, even when he can´t understand it. The next day, I saw another patient for treatment of convergence insufficiency and placed the same prisms recommended by Baron. This prism did not work. Why, if it is the same disease?

I placed the prism base out as well, but in front of the right eye. This time, the patient improved his convergence.

Concerning image deviation, placing a base out prism in front of the left eye and placing the same base out prism in front of the right eye is the same. So, why are the clinical results different?
I studied the two cases with a synoptophore and verified that the first case was a left limb support type case and the second case was a right limb support type case.

A base out prism should aggravate these conditions, but it actually improves it. In truth, what was important was not the image deviation alone, but also the specific target muscle that must respond to the image displacement.

A new concept was born!

The convergence insufficiency was not an independent disease in those cases, but a manifestation of an underlying condition. The treatment does not consist of treating directly the manifestation, but of treating the underlying condition.

Our research allowed us to discover six types of PDS and each type needs a specific set of prisms.

Concerning symptoms, PDS is a multiform syndrome and each form appears to be a specific disease. In our practice, we observe PDS cases that are misdiagnosed as Neck Dizziness, Vestibular Migraine, BPPV, Mal de Débarquement, Fibromyalgia, Organic Dyslexia, Oculomotor Discoordination, Chronic Fatigue, Post-traumatic syndrome.

What is common in all the forms of PDS:

1- Same positive proprioceptive tests, which include general body proprioceptive tests and ophthalmological proprioceptive tests, such as eye-hand egocentric localization tests, directional scotometry and tonic convergence test.
2- Immediate response to active prisms

Our innovation consists in identifying the cause as a proprioceptive dysfunction and treating the symptoms by treating the cause.

Active prisms have the following characteristics:

1. Low-powered (1 to 4 diopters);
2. Prescribed according to objective rules; readers can check these rules in the COVD Journal of June 28, 2019, under the title “Eye and Proprioception”;
3. Not indicated to correct any heterophoria, but to eliminate PDS symptoms.

PDS symptoms are multiple and they include pain in several parts of the body, including headache, back pain, neck pain, chest pain, and plantar pain. Headache on the top of the head and migraine are very common, as well as limited articular movement (difficulty elevating arms, rotating and extending the head), cold but sweaty hands, face pallor, Raynaud’s Syndrome, paresthesias, bumping against objects, biting of the inner mouth, dizziness, lack of balance, nausea and vomiting.

Children often come to our practice due to learning difficulties (even in intelligent children), calf pain, epigastralgia, dyslexia, dyslalia, dysgraphia, dysortographia, nocturnal enuresis (sometimes after the age of 8 years old).

When a PDS patient comes in for ophthalmological reasons, this happens for three conditions:

1. Asthenopia and photophobia
2. Monocular diplopia
3. Oculomotor discoordination

Usually, ophthalmologists are not trained to recognizing these symptoms as PDS symptoms and they can’t treat them properly. Trained ophthalmologists perform our proprioceptive tests and are able to classify the type of PDS and prescribe the active prisms necessary to eliminate these PDS symptoms.

Brain mapping shows a high level of absolute power, but only in low-frequency bands.

A few minutes later, with active prisms, these low-frequency bands become normal and similar to the absolute power of the remaining frequency bands.

Conclusion:

The concept of proprioception is not new, since it was well described in 1906 by the Physiologist and Nobel prize winner Sir Charles Sherrington.

The relationship between eye muscles and skeletal muscles by the proprioceptive system is not new as well. It was well described in 1955 by the French Neuroscientist J. B. Baron, an ophthalmologist and neurologist, in his thesis presented at the Sciences Academy in Paris-France.

What is new is the following:

1. The knowledge that many symptoms seen as independent diseases are, actually, symptoms of a proprioceptive dysfunction.
2. The knowledge that ophthalmologists have the possibility to treat many symptoms that they could not before.
3. Active prisms are a must in the ophthalmological activity, which allow professionals to recognize PDS patients and treat them.
4. About 10 per cent of the population suffers from PDS, which represents a population larger than glaucoma and strabismus together in terms of number of cases.