

AMBLYOPIC TREATMENT BY MEANS OF PLEOPTICS.

BY

HERNANDO HENAO R. O.D.

Bogotá — Colombia

A definition of Pleoptics may be the following: A physical procedure used to obtain the recuperation of visual acuity on eyes with absolute as well as relative amblyopic problems.

The Pleoptic field has advanced tremendously in the last four years; this field has been pioneered mainly, by Bangerter, who was the first to use rationally all of the acknowledges and investigations as well as to establishing new therapeutical sources in the amblyopic treatment. The publication of his book, about amblyopia, (1953) has been very useful. Extensive studies about the Physiopathology of binocular vision and the physiopathology of strabismus has been carried on by Cüppers, who has also introduced very good therapeutical principles.

In this paper I shall try to present a review of practical concepts about the techniques, as well as the instruments, used by these two men. I shall consider only visual acuity and change of fixation, when they relate to the recuperation in the treatment of amblyopia. Other very important factors, such as anomalous retinal correspondence, scotomas of inhibition etc, will not be discussed here, but they are of much importance in the conduction of cases treated by means of pleoptics.

The efficiency of this therapy is controversial among practitioners, but it is my belief that the unsuccessful treatment is quite often due to the lack of proper studies and consideration of conditions such as anomalous retinal correspondence and scotomas of inhibition, which are quite often found in amblyopia. Several attitudes, from juveniles and older patients must be considered: a) Economical; b) Age; and c) Occupation.

The goal to be obtained may be summarized into the following:

- a) Change in fixation.
- b) Proper spatial orientation as a result of the new foveal projection.
- c) Adequate recuperation of the motor coordination (hand-ear-eye).
- d) Overcome suppression and associated problems.

One of the first and most important concepts, to be considered in amblyopia is FIXATION. This can be classified into the following:

1. Foveal (stable or unstable)
2. Para-foveal (stable or unstable)
3. Macular (stable or unstable)
4. Para-Macular (stable or unstable)
5. Eccentric, (stable or unstable)
6. Lack of fixation

Note: In nystagmus cases, I believe there is a close relationship between visual acuity and the type of fixation.

There is definite correlation between the ability to induce a change in the site of fixation and the age of patient: The younger the patient the easier it is to induce a change in fixation.

To my knowledge there are two modern instruments to determine the kind of fixation. One of them is the Visuscope (Oculus) designed by Cüppers and the other is the regular ophthalmoscope (Oculus) with Bangerter's modification in the light green filter.

There is a correlation between the site of fixation and the visual acuity. This is due to a rapid decrease in the number of cones as one moves from the center of the fovea toward the periphery.

The determination of the exact site of fixation has brought about drastic modifications in the conduct and prescription of occlusion. The occlusion of a non-amblyopic eye for several weeks or even months is still used today. However, this merely strengthens the fixation in eccentric fixation cases. We now occlude the amblyopic eye for several weeks or months to devalue the eccentric fixation site, and it is believed that a better field of action is furnished in order to restore central fixations.

This change in fixation generally coincides with an improvement of visual acuity: Occlusion of the non-amblyopic eye is only indicated in amblyopias with central fixation.

The two most common systems are used by us today in the field of Pleoptics. Generally speaking, the two procedures come from the before mentioned pioneers: Prof. Bangerter of St. Gallen, Switzerland and Prof. Cüppers of Nissen Germany. In our private practice we have combined their instruments and we have used them on our patients by coordinating both systems and techniques.

In the treatment of the amblyopic patient, Bangerter has developed a well organized system, adapted to the degree of the conditions, as well as to the age of the patient. Bangerter uses a series of methods which stimulate the amblyopic eye. This technique takes into consideration the so called *Preliminary Steps* to be used in cases of non-alternate strabismus, on patients 1-2 years of age. He uses on the directing or dominant eye, atropine at weekly intervals, in order to observe if an alternability can be obtained in the strabismus. This is used to obtain, in as much as possible, a relatively equal functional development of both eyes. The second consideration in this method is the *Preparatory Visual Education* which is carried on in patients of 2-4 years of age. The good eye is occluded 15 minutes a day and simple exercises of localization are carried on. If one can presume the presence of eccentric fixation the localization exercises (to show things) are not performed. At this stage he corrects the ametropias, the deviations over 35 degrees, and any pathological interference which may ultimately cause any degree of amblyopia (cataract leucomas etc.) The third step in Bangerter's system takes in to consideration the so called *Basic Visual Education*, which is performed on patients from the 5th year of age with pronounced amblyopic problems. This phase is conducted principally by means of the Pleoptophor, which gives a strong macular excitation, (blinding stimulation effect) which induces a blocking effect in the site of the eccentric fixation, followed by the use of an instrument called "ZENTROPHOR". The Zentrophor causes a spiral effect, within a small lighted box, through which the eye looks, projecting the visual direction into a screen with calibrated, well illuminated directional visual acuity optotypes. The Pleoptophor is the advanced development of a series of three instruments, formely used to obtain this effect on this objective phase. The last phase in the treatment of amblyopia, according to Bangerter, is the so called *Principal Vision Education*, in which the Pleoptics and the Orthotics are closely connected, in order to establish well-organized visual skills and proper sensory binocular conditions. This phase is conducted by means of several instruments, some of which are used to obtain a coordination of vision to other senses and faculties, such as hearing, touch, and memory. This last period is conducted by means of the following instruments: Localizator, Mnemoscope (Several types), Perforator, and Corrector, mainly.

The Trenngustrainer is an instrument which allows one to vary the spaces between exchangeable directional optotypes. This allows the patient to practice the dissociation power. Also, under this phase of treatment, binocular exercises are used by

means of Maddox Cheriscopes, Troposcopes, etc. when the visual acuity level is better than 20/50. Cüpper's system, in the treatment of ambliopia, is carried out basically by means of the Euthyscope and Koordinator. He uses them not only for the conduction of the case but as well for diagnostic purposes. These two instruments are used in the treatment to assure basically the following concepts:

1. Restoration of foveal fixation with its direct spatial projection.
2. Coordination of the ocular movements with the new foveal projection.
3. Coordination of the body members to the new foveal projection (Specially when it is related to hand and eye coordination.)
4. Abolishment of the inhibition processes of the amblyopic eye, in order to secure adequate binocular vision. The duration of the Euthyscopic after-image effect will last according to the cooperation of the patient and according to the degree of inhibition of the amblyopic eye.

The Euthyscopic treatment can be performed in patients of 4-5 years of age. The Koordinator is based on the phenomena of the "Houpes of Haidinger" which can be seen only by the fovea. This entopic phenomena represents the foveal projection of the patient, and this method has an exceptional value for the restoration of the correct localization. Its use is indicated in all cases of eccentric fixation, and in cases where the foveal projection is found altered; its use can also be applied in the motor coordination of the hand and eye. Two main factors must be kept in mind to use the Koordinator, and these are: The eccentricity of the fixation must not be over 7 degrees and the visual acuity must be at least 20/200. Arruga introduced in 1959 a modification in the Koordinator, which makes possible the projection of the Hopupes into a screen.

In our practice we have associated both techniques and instruments (Bangerter and Cüppers), in the application of Pleoptics, to all patients over four years of age. Careful studies are made of possible errors, skills, problems, and fixation anomalies. We are using the Euthyscopic treatment with the association of the light Intervalometer. This makes the effect of the after-image last longer, and gives very good light contrast. In 1958 we also introduced the use of the Koordinator, to treat the eccentric fixation.

Our routine at the present time is as follows:

- a) Determination of the refractive status under cycloplegic effect as well as non cycloplegic, and study of the visual skills.
- b) Prescription of the desired optical correction by means of regular glasses when the anisometric problem does not exceed three diopters. In cases over three

diopeters we are prescribing the patient with contact lenses. It is our belief that anisometropic factors over the mentioned amount induce suppressions. If, after Pleoptic treatment, this induced aniseikonia continues, it will make possible the establishment of a relative and show progressive degrees of amblyopia, induced by the lack of proper binocular functioning; thus losing the advantages gained with the Pleoptic treatment.

c) Carefull study of the fixation, by means of the Visuscop and/or the Oculus Ophthalmoscope with Bangerter arrangement. The exact site of the fixation as well as the stability of the same is of great importance. The eccentric fixations considered stable are, in our practice, quite uncommon and rare.

d) Occlusion of the amblyopic eye is indicated in all cases noncentral fixation, even for periods of weeks before treatment. This causes a devaluation of the eccentric fixation point, as I mentioned before.

e) In treatment of eccentric fixation with the pleoptophor, a 1% atropine solution is used in order to have absolute visual control of the fovea.

f) A control of fixation is made immediately after each session. At the present time we use routinely the Oculus Ophthalmoscope with Bangerter's modification. With this instrument we can accurately determine the fixation and its changes during the course of treatment.

g) Immediately after the Pleoptophor the patient is seated in front of the Koordinator.

h) After the Pleoptophor, when changes are noticed toward central fixation, we give sessions with the Localizer. Under strict control of the corneal light reflex, and with the occlusion of the good eye, an operator can assure awareness of the new sense of localization by means of a point and light. In some instances a session of the Koordinator is given immediately following the Localizer.

i) When more or less an absolute central fixation is observed, the patient is placed in front of the Disparator in order for him to begin to build up visual acuity. This also assures the stabilization of the fixation.

j) At this time the occlusion is changed from the bad to the good eye and the patient is now treated with the Euthyscope, accompanied by the intervalometer. At this point the atropine is suspended.

k) When the patient is on a level of 20/40 vision, we begin with the combined phase of orthoptics and pleoptics. We used our own group of slides in the AO Troposcope, giving the patient peripheral fusion first. The standard of fusion is increased according to the increase in visual acuity.

HERNANDO HENAO R.

REFERENCES:

SAMPAOLESI R. Archivos de Oftalmología de Buenos Aires - Tomo XXXV 2-31.

MOCORREA J. Archivos de Oftalmología de Buenos Aires - Tomo XXXV 2 -31.

CIANCIA A. O. *Las Secuelas Sensoriales del Estrabismo* - 1960. 27 - 28 - 35 - 46 - 49 - 50.

TELLEZ C. Comunicación personal. - Bogotá - Dic. 1960.

→ BARRAQUER J. I., ARIZA E., REINOSO S. Arch. Soc. Amer. Oftal. Optom. - 1 - 39 - 58

Calle 58 N° 13-08