

CENTRAL RETINAL LESIONS AND ORTHOPTICS: A report on a visit to a Swiss clinic

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Abstract

An account is given of work done by Professor Dr. med. J. Otto and by orthoptists and students as observed by the author during an eight weeks visit to the East Switzerland Pleoptic and Orthoptic School (OPOS).

People having damage to the central retina due to organic lesions, for example macular degeneration, are likely to adopt eccentric fixation, which seriously disrupts their orientation in space. In many cases there are still undamaged areas or "islets" on the macula which can be utilised for central fixation. Patients are given a course of "visual retraining" exercises by which central fixation and correct orientation are reestablished.

In every case observed there was an improvement in visual acuity and spatial orientation when exercises were given. The results however were not permanent if the retina further deteriorated due to the nature of the disease.

Key words: Macular degeneration, re-orientation, localisation, eccentric fixation, scotoma.

The purpose of the visit to the East Switzerland Pleoptic and Orthoptic School (Ostschweiz Pleoptik und Orthoptik Schule or OPOS,) was to observe the treatment given to patients with ocular organic lesions, such as macular degeneration.

The main aims of the orthoptist are to try to improve visual acuity and to re-establish central fixation. If one of these aims can be achieved then the other may be achieved automatically, because the best vision is at the central retina. Better spatial orientation will then follow. Eccentric fixation achieving the best visual acuity possible is only encouraged when the central retina is too severely damaged.

Orthoptic Investigation

The problems and signs will vary from patient to patient according to the type and severity of the retinal damage.

Fixation

It is well known that patients with defective vision due to organic lesions have poor or eccentric fixation. Fixation of the eyes is observably eccentric. The eyes do not appear to be looking at the fixation object and often there are unsteady eye movements when an attempt is made to fixate an object.

When patients begin to use eccentric fixation they lose the ability to execute precise eye movements and the use of optical aids to see things will often only magnify the problem.

Orientation

One can observe how well a patient can orient himself in space. For example, does he bump into things or walk hesitantly? Does he make eye contact with you when talking to you? Patients' movements and reactions can also be observed when doing the investigative tests.

Often head movements are present as if the patient is trying to see around something. Comments are volunteered on orientation problems in everyday life.

For example, a patient does not know how or when to grasp an object, what height a step is, or how many steps there are to be climbed.

Visual Acuity

Visual acuity is measured each eye, with correction, at a distance of five metres. Near visual acuity is tested and assessed to find out if the patient can read better with additional correction to his reading glasses.

Because of the poor visual acuity of the patients, the 5 metre charts are used at 50 centimetres and the patients are given a +2.00 D.S. addition to their glasses so that a linear visual acuity test can be done. Most patients find it difficult to read a progressive text.

Following Movements

Following movements depend largely on intact foveal perception. If the latter is deficient, movements cannot be accomplished on a continuous basis despite good ocular musculature. This becomes apparent in patients with early childhood functional amblyopia, patients who have been operated for congenital cataracts and also patients with diseases of the retina or optic nerve, e.g. macular degeneration, Fuch's spot, temporal atrophy.

Otto¹ frequently found a pattern when examining patients with macular degeneration:

In primary and horizontal positions, where the eyes are moved most in daily life, the object of fixation is followed jerkily and irregularly. If one, however, directs following movements into unaccustomed positions of gaze, one is surprised to see that the eye movements suddenly become continuous and smooth.

Otto¹ says that this behaviour signifies that there must be still, within the damaged sector of the macula, activated "islets" capable of perception, the functioning of which is less hampered in unaccustomed directions of gaze than in the more frequently used directions.

Localisation Tests

There are two diverse visual requirements here:

- (a) A flat object is presented without any particular requirements as to distinguishing it. To be observed:
 - (i) The orientation of the eye.
 - (ii) The behaviour of the eye and hand when the patient is required to touch the centre of a plain surface with his finger.
- (b) An object to be distinguished is presented, e.g. the examiner's finger tips. Once again one observes:
 - (i) The orientation of the eye.
 - (ii) The behaviour of the eye and the hand when asked to touch the object to be recognised.

During these tests, two types of characteristic behaviour are distinguishable:

The stimulation on the retina, induced by the large surface, allows the eye to adapt physiologically, because no macular or foveolar perception is required. The patient localises correctly and it is of no importance in this regard that he see the centre as distinctly as the other areas (correct localisation due to intact retinal periphery).

In the second case, macular perception demands are registered and provoke:

- (a) Agitation and uncertain adaptation of the eye.
- (b) Uncertainty or error in the attempt to touch the object of fixation. The patient is conscious of his lesion and therefore employs a peripheral sector of the retina to see, thus losing his security in orientation.

Binocular Functions

Convergence, Worth lights, synoptophore assessments may be done as part of a general orthoptic investigation. Throwing and catching a ball is one way of assessing depth perception and eye orientation.

Colour perception may be tested grossly, using graded, coloured dice or by using the Ishihara colour plates.

THERAPY

At the OPOS, exercises are generally given once a day, everyday for two weeks. In this time, the patients, depending on their eye condition, may be given retrobulbar injections, blood transfusions which have extra oxygen in them, oxygen to breathe to strengthen their immunity to disease and to improve blood circulation and supply to the eyes. Amnion, which is absorbed slowly, may be retrobulbarly injected every two months for the prevention of allergies.

Exercises are usually given before or at least three hours after the injections, as the eye becomes very swollen.

During the fortnight, the patients either stay at the OPOS or in a hotel.

Exercises

When both eyes are afflicted, the better eye is usually given the exercises first, unless that eye has a strongly functioning eccentric fixation point.

Exercises should be undertaken as if the macula had not undergone any alteration, that is, as if orientation were more important than the results of perception. The exercises are made to be as natural as possible.²

"E" Cards

Cards made from 15 centimetres square white cardboard, are edged in black which serves as a boundary. In the centre of each card is a single "E", or letter or number. The sizes are graded. The patient is asked to identify the symbol, which is shown from varying distances and directions.

When the patient has difficulty in seeing, the fixation of the eye becomes unsteady and head movements are noticed. At this point, the patient must be told not to move his head and perhaps to close his eye when fixation falters.

Accommodation can blur vision. This sometimes occurs when the patient becomes nervous and tense. In some cases, a small plus lens correction is given when the patient cannot relax.

When following movements have proved to be defective, the patient practises reading linear charts at 5 metre, 50 cms, and at reading distance.

The patient practises tracing broken lines with a fine pointer, learning to stop and start exactly where the line stops and starts.

Miniature counters with coloured beads are used to encourage smoother eye movements. The orthoptist changes or rearranges the number of beads and the patient must count them. Here you can stimulate the same functions needed for reading.

The patient may practise reading words printed on a blackboard from 1 metre to 5 metres away.

He then practises reading graded print or pictures and progresses to reading books in a range of sized print and styles.

Based on the principle that the best ability to perceive colour is at the macula, there are many exercises done with colours to stimulate central fixation.

Sometimes a sheet of light green plastic is placed over the print the patient is reading.

Playing cards of different sizes are presented to the patient and their colour and symbols must be identified. The orthoptist may present the cards from different distances and directions. Similarly, coloured dice of different sizes may be presented. Green cards with red symbols in the centre may be presented to be identified.

A game of dominoes may be played or just used to identify the colour and number of dots.

In all of these exercises, a close regard must be paid to the orientation of the eye, as fixation becomes unsteady when the patient cannot see well enough or loses confidence.

Orientation

The patient practises identifying, locating and naming the colour of various objects in the room, e.g. the telephone, a book on the table, a potplant. The same thing is done when you take the patient outside for a walk, e.g. flowers, cars, buildings.

Most patients have more success in improving their near visual acuity. In the distance, there

TABLE 1
Results of Visual Retraining in 10 cases of bilateral macular damage with loss of spatial orientation. (Translated and modified from a table in Otto and Safra.³)

Patient number	Name	Age (in years)	Sex	Diagnosis (all bilateral)	Orientation disturbances:					Therapy:				
					In the street	Unable to read	Unable to recognise colours	Failure to gain benefit from optical aids	Vision (in single symbols)	Number of sessions	Orientation	Recognition of colours	Vision (in single symbols)	
1.	K.T.	75	F	S.M.D. (atrophic form)	R	+	+	+	R	0.6 @ 1 m	37	+	+	2.0 @ 1 m
					L				L	0.7 @ 1 m	31	+	+	2.0 @ 1 m
2.	M.F.	55	M	S.M.D. (atrophic form)	R	+	+	+	R	0.1 @ 0.2 m	11	+	+	0.1 @ 0.4 m
					L				L	1.0 @ 0.5 m	7	+	+	0.6 @ 5 m
3.	R.F.	62	M	S.M.D. (atrophic form)	R	+	+	+	R	0.1 @ 5 m	6	+	+	0.7 @ 5 m
					L				L	0.1 @ 1 m	8	+	+	
4.	B.B.	34	F	J.M.D.	R		+	+	R	0.1 @ 5 m	28	+	+	0.4 @ 5 m
					L				L	0.1 @ 5 m	16	+	+	0.2 @ 5 m
5.	W.S.	64	F	Junius-Kuhnt	R	+	+	+	R	0.3 @ 0.3 m	9	+	(+)	0.3 @ 3 m
					L				L	0.1 @ 2 m	9	+	+	0.4 @ 5 m
6.	W.F.	65	M	Fuch's spot in high myopia	R	+	+	+	R	0.1 @ 1 m	12	+	+	0.1 @ 5 m
					L				L	0.1 @ 1 m	9	+	+	0.1 @ 5 m
7.	W.W.	50	F	Fuch's spot in high myopia	R	+	+	+	R	0.1 @ 1 m	14	+	+	0.2 @ 5 m
					L				L	0.1 @ 1 m	9	+	+	0.1 @ 5 m
8.	S.F.	50	M	Optic atrophy	R	+	+	+	R	Amaurotic		+	+	0.3 @ 5 m
					L				L	0.4 @ 1 m	6	+		0.7 @ 1 m
9.	V.R.	14	F	C.C.P.	R	+	+	+	R	0.2 @ 3 m	10	+		0.2 @ 5 m
					L				L	0.3 @ 3 m	10	+		0.6 @ 5 m
10.	H.E.	38	M	C.C.P.	R	+	+	+	R	0.4 @ 1 m	17	+	+	0.3 @ 5 m
					L				L	0.3 @ 2 m	11	+	+	0.3 @ 5 m

Abbreviations: SMD=Senile macular degeneration; JMD=Juvenile macular degeneration; CCP=Choroiditis centralis peracta.

Additional notes on patients:

1. Single housewife with bed and breakfast boarders, was booked for a nursing home, is now independent again.
2. Merchant: having recovered ability to read slowly, is again managing his own business.
3. Flower trader: again independently judges the quality of his flowers.
4. Nursing sister: had planned to have education for the blind, instead has trained for physiotherapy, her near vision sufficing for normal training.
5. Librarian: again able to carry on her profession.
6. Director of a publishing house: again able to carry out full activities.
7. Housewife: again able to read and to help her husband in the office.
8. Reverend: again able to work; can read liturgical texts.
9. Student: again attending normal secondary school, can play music again, reading music freely.
10. Labourer: has reliable orientation without the previous compensatory head posture.

is all too often the problem that objects in a middle distance range cannot be identified as they become lost in the scotomata. Large objects are more easily seen because they are outside a scotoma and very fine objects are "in between" the damaged areas on the retina and so can be seen. Therefore a patient will often learn to orientate centrally when doing indoor activities or close work, but head movements, jerky eye movements and faulty

localisation recur when the patient looks at things that "fall" into a blind spot. Unfortunately, this includes people's faces, types of cars and other socially important objects.

Not all patients seen have spatial orientation difficulties. If this is the case, the exercises are aimed at improving visual acuity and binocular functions.

The result of the two week course of exercises and other treatments was that every patient

improved to some degree in spatial orientation and visual acuity. Where damage to the retina was very extensive, results were not miraculous, but the patient learned to read large print instead of no print at all. Patients may return annually or bi-annually for therapy, as their disease may constantly cause deterioration of the retina and therefore of the vision.

CONCLUSION

The success of the therapy is dependent on a number of factors. The patient needs to be motivated enough to concentrate on the exercises. Sufficient intelligence is also required to perform the exercises. Good health is advisable as are financial capabilities in order to attend the therapy course.

Patients often become discouraged or tense, so the orthoptist must be able to relax and encourage the patient. The skill of observing the fixation of the eye requires a lot of experience.

Reference to Table 1 leads to the following conclusions:

The type of disease of the central fundus is of no vital importance in re-education.

Patients suffering from visual orientation problems were, after therapy, able to move around alone and with relative safety along the street and in unfamiliar places.

The majority of patients treated can once again read regular sized print. Slowly, of course, but without any special optical aid.

Many patients treated have been able to return to their professional occupations.

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