

FRESNEL PRISMS IN THE MANAGEMENT OF SUNLIGHT DEVIATIONS

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In Queensland, with constant bright sunlight the year through, intermittent exotropia is particularly likely to become manifest out of doors in spite of surgery and orthoptic treatment. Common features of sunlight deviations are —

- eye rubbing
- marked photophobia
- face pulling to bring down the upper lid
- hand over one eye.



Fig. 1. Face Pulling in sunlight.

Parents and friends show concern about these habits. Adults recall difficulty with ball games, especially tennis. One remembered the sun filtering through a paling fence on the way to school as painful and embarrassing. With hand covering the deviating eye he would pass as quickly as possible to avoid comment from his friends.

Initial examination usually reveals the following:

- poor or no fusional amplitude
- dense suppression of the divergent angle
- no diplopia awareness
- on average, a maximum of 20 prism diopters.

The Ravault paper¹ was a welcome answer to my dissatisfaction with our usual methods. In 1974 I treated one patient (who could not have surgery because of anaesthetic risk) with Fresnel prisms along the exact lines described, very successfully. Currently I am treating all suitable patients with Fresnel prisms. Prism correction makes the patient temporarily orthophoric for all normal viewing conditions. Constant binocular stimulation at the divergent angle provides an anti-suppression treatment enabling full fusional amplitude to develop.

Method. The maximum outdoors distance prism is placed on the optical correction or plano lenses. The prism can be divided evenly or with the greater power over the fixing eye to aid the amblyopic or suppressing eye. As the larger powers can blur vision to 6/12 or 6/18 a minimal or no correction on one side is more easily tolerated. The division of power between the two eyes may also be assessed with a view to possible future prism reduction (20 Δ divided 15/5 allows initial 5 Δ reduction). A vertical element can be corrected by using prisms obliquely.



Fig. 2. Right Divergent Squint in Sunlight



Fig. 3. Prism Orthophoria: 20 Δ base in divided on plano lenses,

The strength of the prism is reduced at intervals according to control, so that a state of orthophoria is maintained for near and distance while glasses are worn. Intervals of four to six weeks, especially in the early stages are the general pattern. Widely spaced visits are an advantage to families living a long way from the treatment centre. Six months seems to be the average treatment period. Reductions should not be hurried, especially in the early stages, and reversion to a higher power may be necessary at times. Binocular fixation without prisms for all distances is the ideal.

It is important that the lens be cleaned regularly. Contact lens cleaning solutions are effective. Cutting the lens within 1 mm of the border and positioning it under water prevents bubbles.

The following case is an example of management with Fresnel prisms. It is that of a five year old boy (see figures 2 and 3) with right to alternating divergent squint, particularly noticeable when outside in sunlight. There was right photophobia. Clinical examinations:

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Intermittent RDS manifest at 6 metres and beyond

Prism cover test at 1/3m. : 12^{Δ} exo

6m. : 16^{Δ} exo

over 6m. : 20^{Δ} exo

Fusional amplitude: -4° to $+5^{\circ}$

Prisms 20^{Δ} base in divided ordered on plano lenses.

2 Month Review

Without prisms, intermittent ADS at 6m and beyond, with good control by diplopia recognition.

Fusional amplitude -8° to $+30^{\circ}$

Prisms not altered

4 Month Review

Without prisms, intermittent ADS outside in sunlight, diplopia recognised.

Fusional amplitude: -8° to $+20^{\circ}$

Prisms reduced to 15^{Δ} left eye only,

5 Month Review

Without prism, exophoria to ADS on dissociation at 6 metres and beyond.

Fusional amplitude: -8° to $+25^{\circ}$

Prism reduced to 10 dioptres left eye.

6 Month Review

Exophoria at all distances without glasses

Fusional amplitude: -8° to $+25^{\circ}$

To wear glasses with 10 dioptres left eye when outside only.

8 Month Review

Exophoria at all distances.

To leave glasses off altogether and review in 4 months.

This patient wore the glasses very well throughout the 8 months. He was particularly pleased when the right eye prism was removed.

To date I have thirteen children aged 4 to 10 years wearing Fresnel prisms. The smallest initial correction was 8^{Δ} and the largest 25^{Δ} . The children have worn the prisms quite willingly; only one objected. Three with deviations of 10, 20 and 25 prism dioptres have completed treatment, and now have full control of the deviation without surgery. Time will tell whether their gains are permanent. All those under treatment are developing larger fusion amplitudes with less suppression and better subjective control. Photophobia is presenting less of a problem, and the need to shut one eye is lessening.

Adults with firmly established sensorial anomalies are more difficult to treat. They are more disturbed by the reduced visual acuity caused by the higher prism powers, although some after a few weeks of perseverance have suddenly adjusted well.

It appears that prisms may prove successful in overcoming obstacles to binocular vision for which orthoptic therapy and surgical intervention are inadequate. They certainly go far in eliminating suppression and developing a large fusional reserve in these sunlight deviation cases.

There is much more to be learnt about the possibilities of these prisms and the extent to which anatomical features, the convergence/accommodation ratio, density of suppression, and retinal correspondence, affect their efficacy. Collation of our individual experiences could well contribute to a higher success rate all round.

I wish to thank Drs. Fraser, Kelly and Crawford for allowing me to present data from their cases.

REFERENCE:

RAVAULT, A.P., Bongrand, M., & Bonamour, G., *The Utilization of Prisms in the Treatment of Divergent Strabismus in Orthoptics*. Eds. Mein, Bierlaagh & Brummelkamp-Dons. *Excerpta Medica*. Amsterdam 1972.

ABSTRACT: The Utilization of Prisms in the Treatment of Divergent Strabismus. Ravault, A. P., Bongrand, M., & Bonamour, G., in *Orthoptics*. Eds Mein, Bierlaagh, & Brummelkamp-Dons. Excerpta Medica. Amsterdam 1972

Results are reviewed of prismatic treatment of 20 cases of primary divergent strabismus or of divergent strabismus secondary to esotropia or convergence insufficiency. The treatment was used alone, or with surgery or orthoptics. Four illustrative case histories are given.

Points emphasised in the preliminary investigation are refraction under prolonged atropinisation, and measurement of the AC/A ratio (a high ratio is said to indicate good prognosis), estimation of the maximum deviation by prism cover test, and functional examination. Prisms were prescribed for the exact angle of deviation unless there were abnormal binocular tendencies, in which case over-correcting prisms and alternate occlusion were ordered as the first step.

Regular assessment of the patient was made with a gradual reduction of prismatic correction at each visit. It is hoped the patient will ultimately maintain orthophoria without prismatic correction for all distances of fixation. Failing this, surgery is undertaken. Orthoptic therapy, where necessary, is only given after surgery, to avoid risk of convergence spasm. Binocular visual acuity is noted in each case history.

The study shows that a deviation greater than 30^Δ does not respond successfully to prism therapy. Abnormal retinal correspondence presents a problem in adults. The authors conclude that prismatic treatment is valuable not only for its ease of use, but also for its efficiency, because "it is a permanent anti-suppression treatment, in physiological conditions of use".

Jenny Hunter

ABSTRACT: Prisms as an Orthoptic Tool in the Management of Primary Exotropia. S. Veronneau-Troutman, S. Shippman, & A. C. Clahane, in *Orthoptics, Past, Present and Future*. Stratton, New York. 1976.

In this article, thirty seven cases of primary exotropia seen between 1970 and 1973 are reviewed. All had follow-up for at least six months if surgery was involved, and for up to one year if orthoptics only was used.

She describes the prism correction divided equally between the two eyes or placed with the lesser power over the amblyopic or suppressing eye. The average age of the patients treated was between 8 and 9 years and the angle of deviation in all cases was approximately the same. The average duration of treatment was 3.9 months.

The authors found that the prisms improved the convergence amplitude and the type of retinal correspondence and in general they offer more improvement than exercises alone can achieve. They concluded: "Finally, we consider prisms a useful, and even an essential tool in the management of primary exotropia and emphasize the fact that the use of prisms as well as orthoptics in general requires a thorough knowledge of the sensory and motor aspects of the binocular act."

Anne McIndoe