MEDICAL THERAPY FOR AMBLYOPIA AFTER OCCLUSION FAILURE

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INTRODUCTION

This paper is an interim report on a prospective trial where ecothiophate is used to stimulate an amblyopic eye and atropine is used to blur the good eye. The treatment has been used where conventional occlusion therapy has failed to give a satisfactory result, or where amblyopia has recurred after such therapy.

PATIENTS AND METHODS

Patients in the trial are either attending the Professorial Unit Out Patient Clinics at the Royal Victorian Eye and Ear Hospital or are private patients of one of us (H.M.). The two criteria for entry into the trials are: (1) failure of previous occlusion therapy (2) return of amblyopia after previous therapy. Visual acuity of 6/9 or less for distance, and any level of near acuity are acceptable. No restrictions are placed on the type of squint, the type of fixation, the age of the child, or the degree of ametropia provided it is fully corrected. Nystagmus, whether latent or congenital, is also acceptable. From previous experience with the method, six months seemed a reasonable time limit for the therapy. If improvement is still continuing at six months, treatment is continued until there is no more change in vision.

The treatment regime used is one drop of 1% atropine eye drops to the good eye at bedtime, followed by one drop of 0.125% Phospholine Iodide (ecothiophate) to the amblyopic eye. To minimise possible pupil cyst formation, 10% phenylephrine HCl was given to the amblyopic eye in addition.

For analysis of the results, criteria of improvement were defined as –

Success : Improved at least two Snellen lines.

Doubtful : Improved one or one and a half Snellen lines or 2 N grades only.

Unchanged : Less than one Snellen line or 2 N grades improvement.

Worse : Any degree of worsening.

The youngest child in this series was aged 2¼ and the eldest 12¼. Length of treatment varied from 2 months to 11 months. Results have been analysed on 34 patients; 11 others are continuing treatment.

Each child was seen by both orthoptist and ophthalmologist at approximately 6 week intervals. A full orthoptic examination was done. The ophthalmic examination included slitlamp checking for possible cyst formation and check on the level of induced myopia. Any other side effects were recorded.

RESULTS

SUCCESS	16
DOUBTFUL	4
UNCHANGED	9
WORSE	0
ABANDONED TRIAL	5
	34
CURRENT	11
	45

Sixteen children were classified as being improved. In some, the maximum improvement was not obvious until they had stopped their drops. This was not related to miotic-induced myopia. Their average age was 8½. This group includes a child of 2¼ who showed reversal of her squint at 6 weeks, and a boy of 11¼ whose vision had remained at an obstinate 6/18 through four years of conventional occlusion therapy, and who achieved 6/5 and N 5 vision after nine months of the drop therapy. One patient was allergic to atropine, and hyoscine ¼% had to be substituted. One child hated the drops much more than wearing a patch. All the others said they preferred the drops to wearing a patch.

FINAL VISUAL ACUITY

	6/9+	$6/12^{pt}$ – 6/9	$6/24^{pt}$ – 6/18	6/36 or less
SUCCESS	11	4	1	0
DOUBTFUL	1	3	0	0
UNCHANGED	2	4	2	1
ABANDONED TRIAL	0	1	3	1

The four children in the "doubtful" group are too few for worthwhile analysis.

The nine failures are a slightly younger group with an average age of 7¼. The range of ages was as for the successful group and the durations of treatment were similar.

Five children stopped too early for any assessment to be made.

One child went overseas. Another's drops were stopped by his parents because he had a sore throat and running nose five days after starting. A previous non-wearer of occlusion, he then decided to tolerate a patch and eventually improved to 6/6. Two girls of 9 declined to allow their parents to instil drops. The fifth child was a boy of 5 who had had a Gunderson flap pulled across his right cornea in infancy because of imminent perforation from an abscess. The miotics closed his pupil in behind the remaining area of flap.

Factors which it was felt might influence results have been analysed in relation to the treatment results, and these are tabulated (Tables 2-6).

ATROPINE VA SUPERIOR TO AMBLYOPIC VA

SUCCESS	10 of 16
DOUBTFUL	1 of 4
UNCHANGED	6 of 9

NEAR VA – ATROPINISED EYE

	N48 – N24	N18 – N10	N8 – N5	?
SUCCESS	3	6	4	3
DOUBTFUL	3	1	0	0
UNCHANGED	4	1	2	2

DISCUSSION

The outcome of the trial so far is regarded as exciting, both in terms of the number of results where other treatments of amblyopia have failed, and also the older than average age of the children in the series. The reason for the method working is not understood – it certainly does not relate to the use of atropine alone. Half the children in each results group had previously failed to respond to the use of atropine alone. It does not relate to the degree of blurring produced by atropine. Tables 3 and 4 show there are no differences in either near or distance visual acuity of the atropinised eyes in any of the results groups. A vision of 6/4 and N 5 in an atropinised eye proved no bar to a 9 year old improving from 6/18 and N 18 to 6/5 and N 5 in his amblyopic eye after six months on the drops.

PREVIOUS FAILED ATROPINE OCCLUSION

SUCCESS	8 of 16
DOUBTFUL	1 of 4
UNCHANGED	5 of 9
DROP OUT	1 of 5

We found the use of single letter optotypes useful in the older children for forecasting how far vision could be expected to come on a conventional Snellen chart, and thereby how long drop therapy should be continued. The appearance of pupil cysts was occasionally worrying in this regard, but in no child did they progress to the point where therapy had to be stopped.

INITIAL FIXATION

	SUCCESS	DOUBTFUL	UNCHANGED
FOVEAL STEADY	0	3	4
FOVEAL UNSTEADY	12 (2 NYSTAGMUS)	0	1
JUXTA FOVEAL	1	1	1
ECCENTRIC	1	0	2
NOT RECORDED	2	0	1

ECCENTRIC FIXATION

Table 6 suggests that an abnormal fixation pattern may be a prime indication for this type of therapy.

SIDE EFFECTS

	SUCCESS	DOUBTFUL	UNCHANGED
NONE	9	2	5
STINGING	1	2	2
IRIS CYSTS	6	1	1
BEHAVIOUR PROBLEM	1	0	2
ATROPINE ALLERGY	1	0	0

SIDE EFFECTS (Table 7)

For a three month period in the middle of the trial no supplies of phenylephrine eye drops were available. Three children developed cysts during this period but these regressed when the phenylephrine was restarted. We have found it important to specify the use of Isopto Phenylephrine eye drops. Only two children have reported any stinging from them, whereas we found the use of other varieties of phenylephrine hydrochloride to be universally associated with complaints of stinging. It is noteworthy that two children found that atropine stung, and tw others found that Phospholine Iodide stung.

The three children listed as having behaviour disorders, included one hyperactive child who became even more hyperactive while on the drops, and two – one a success and one a failure – who became very morose and withdrawn at school because of teasing about unequal pupil sizes.

Reservations have to be expressed on the grounds of the cost. The drops themselves are only a small part of this, but the frequent visits necessary for accurate checking represent a high investment in health care. This must however, be set against the risks of leaving a growing child with an amblyopic eye. It has to be remembered that the use of Phospholine Iodide drops can depress the levels of the enzyme pseudocholinesterase in the blood, and a child who requires an operation up to six months after last having the drops may have a prolonged period of apnoea (failure to resume spontaneous breathing) if the anaesthetist is not aware of this possible complication.

Six children had a second course of drops. Four had done well on the first course but vision had dropped back again – all have picked up, and only their greater improvement is included in the analysis figures. One had been inadvertently stopped too quickly and the sixth was an exotrope who improved two lines on his first course of three months but managed only a further line when it was decided to improve him further – his second course lasted six months at the age of 10. Only his first course is analysed.

Like others who have reported the use of this treatment, we have been impressed by the early change in fixation pattern before visual acuity changes are evident, by its ready acceptance by the children, by its usefulness in the older children and, by the lack of any correlation of length of therapy for success or failure with the age of the child, or with any other parameter we have analysed.

CONCLUSION

An interim report on a prospective trial on the use of Phospholine Iodide to an amblyopic eye and atropine to the dominant eye shows that of 29 children successfully completing a course of therapy, 16 have been significantly improved, four doubtfully improved, and nine unimproved. Treatment periods ranged from two to eleven months and patient ages from two years to twelve years. No factors have been found which influence the outcome of a course of this therapy.

REFERENCES

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LEGENDS

TABLE 1. Results
TABLE 2. Final Visual Acuity
TABLE 3. Atropine VA Superior to Amblyopic VA
TABLE 4. Near VA – Atopinised eye
TABLE 5. Previous failed Atropine Occlusion
TABLE 6. Initial Fixation
TABLE 7. Side Effects