

Compliance in antiamblyopia occlusion therapy

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Abstract. Antiamblyopia occlusion therapy relies on compliance. We retrospectively reviewed the charts of 496 amblyopic subjects. Measures of non-compliance included patient reporting and patient records of broken appointments. Out of 496 subjects, 92 (18%) failed to follow the occlusion regimen. Compliance with treatment was analyzed by age group, refractive error and type of strabismus. The failure rate was 82.6% for the unilateral high myopia group and 37.5% for the monofixation syndrome group. The risk for non-compliance appeared to be higher in the 1 to 2-year-old group (37%). The χ^2 -test showed the differences to be highly significant ($P < 0.0001$). Children having lower initial visual acuity were also significantly less compliant ($P < 0.007$). Several factors such as age, parental understanding, initial visual acuity and improvement rate seem to be involved in compliance.

Key words: amblyopia - therapy - compliance - monofixation syndrome - high myopia - children - epidemiology.

Non-compliance is one of the biggest problems facing medical practice today. Many reviews have repeatedly emphasized its dramatic magnitude (Blackwell 1972) and its pervasiveness appears clear when one considers that 'at least one-third of the patients in most studies failed to comply with doctor's orders', and that one-third of the studies done reported a non-compliance rate of 50% or more (Gillum & Barsky 1974).

Non-compliance with antiamblyopia occlusion therapy drastically curtails the potential benefits children could gain from treatment. Compliance in antiamblyopia occlusion therapy depends on several factors such as age, parental understanding, initial visual acuity, and improvement rate. To

analyze the weight of these factors we undertook this study to establish the frequency distribution of non-compliance on the basis of age, initial visual acuity, and the type of amblyopia.

Material and Methods

We retrospectively reviewed 496 amblyopic children whose ages ranged from 6 months to 9 years, 230 of them males and 266 females. Children showing a difference of two or more lines on the Snellen chart, between the right and the left eye, wearing the best optical correction were considered amblyopic. In infants and very small children whose visual acuity could not be assessed at the first examination, the diagnosis was based on the presence of a non-alternating heterotropia. We also considered as amblyopic 3 children under the age of 3 years with a marked difference in refraction (Table 1).

We excluded patients with manifest nystagmus, unilateral aphakia or deprivation amblyopia.

Every child underwent an examination that included: unilateral and alternate cover test, prism unilateral and alternate cover test, four diopters base-out test, cycloplegic refraction (two instillations of 2% cyclopentolate eyedrops 5 min apart), subjective refraction and stereotest when possible, and direct and indirect ophthalmoscopy. Each child treated with full-time occlusion was followed for 6 months and examined every month. We classified our amblyopic population into five groups on the basis of age at the beginning of treat-

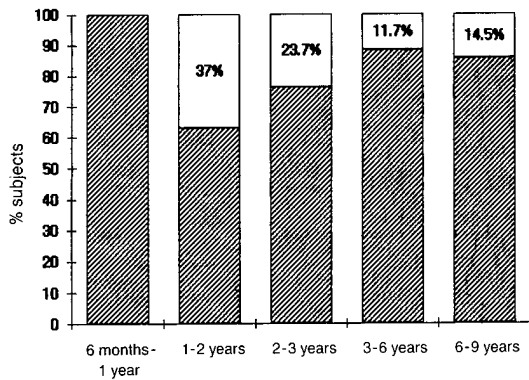


Fig. 1.

Non-compliance (%) according to age. Open columns: non-compliant; hatched columns: compliant.

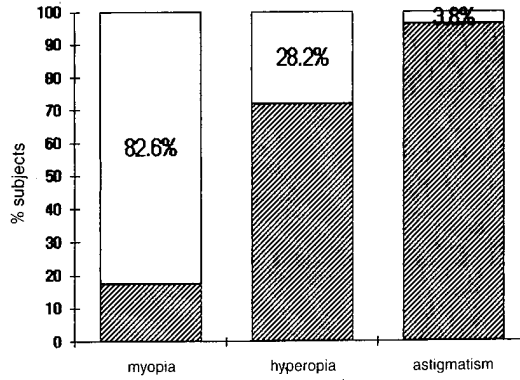


Fig. 2.

Non-compliance (%) according to the refractive error. Open columns: non-compliant; hatched columns: compliant.

ment. According to the possible etiology of amblyopia we divided our patients into two groups: patients with or without strabismus. A further classification was based on the type of strabismus: esotropia, exotropia and monofixation syndrome, and the type of refractive error: hyperopia, high myopia and astigmatism. We decided to disregard esotropia in classifying patients who had unilateral high myopia. We excluded all patients obtaining their best correction only with contact lenses.

Measures of compliance in this study included parental reporting and records of broken appointments. A child was considered compliant when all instructions for patching treatment were carried out and all follow-up examinations were attended. Repeated observations of additional signs such as not wearing the glasses or patch when the child came into the office or chewed spectacle stems were also considered markers of non-compliance. We considered as non-compliant 2 hyperopic patients who showed an unexplained decrease in visual acuity after an initial improvement.

Table 1.

Difference in refractive errors in 3 infants considered amblyopic.

Subject	Age (months)	Spherical equivalent		Compliance
A. S.	25	RE +1.00	LE +6.75	No
F. R.	27	RE +1.25	LE +7.25	No
G. M.	23	RE +0.75	LE +7.50	No

Results

Non-compliance with treatment according to age is summarized in Fig. 1. Children under the age of one were all compliant. Children between 1 and 2 years old were significantly less compliant: 30 out of 81 children (37%) failed to comply with treatment, while in the oldest group (6-9 years) only 20 out of 138 children (14.5%) were non-compliant (χ^2 : 34 568 on 4 df, $P < 0.0001$).

Figs. 2 and 3 show non-compliant children on the basis of the etiology of the amblyopia. Among the refractive errors 19 out of 23 children (82.6%) with unilateral high myopia were non-compliant; non-compliance was significantly lower among hyperopic (28.2%) and astigmatic subjects (3.8%) (χ^2 : 85 780 on 2 df, $P < 0.0001$).

Among the different types of strabismus we found the highest percentage of non-compliance in children with the monofixation syndrome: 12 out of 32 children (37.5%) failed to follow the patching regimen. Only few of the children with esotropia or exotropia failed to follow the patch therapy (χ^2 : 23 714 on 2 df, $P < 0.0001$).

Fig. 4 shows the compliance rate in relation to initial visual acuity: the lower the visual acuity the less compliant were the subjects (χ^2 : 16 132 on 5 df, $P < 0.007$).

Discussion

The importance of compliance has been known for years and reports vary widely in the degree of non-compliance found. Most studies report that at least

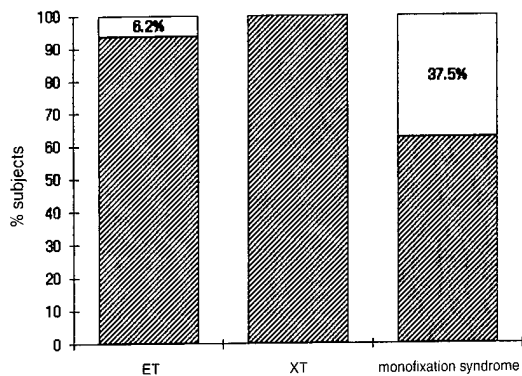


Fig. 3.

Non-compliance (%) according to the type of strabismus. Open columns: non-compliant; hatched columns: compliant.

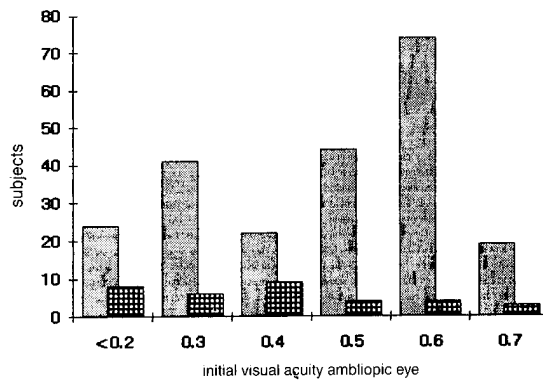


Fig. 4.

Compliant and non-compliant subjects according to the initial visual acuity. Dark columns: compliant; chequered columns: non-compliant.

one-third of the patients failed to comply with instructions and in some studies the rate of non-compliance exceeded 50% (Blackwell 1972; Brownell et al. 1978; Davis 1967; Hussar 1975).

One of the biggest difficulties with non-compliance is its detection. More accurate and sensitive techniques for diagnosing non-compliance are clearly necessary, since today's methods tend to underestimate it. Unfortunately, no method has yet been found that establishes compliance rate with certainty. In this study we tried to improve the routine methods by considering additional signs. For example, non-compliant subjects usually come into the office without glasses or patch, or wearing glasses with chewed stems.

Detection of amblyopia in younger children relied essentially on the presence of non-alternating heterotropia. We included in the examined population 3 children who presented a marked difference in refraction (Table 1). Possibly the use of different criteria in diagnosing amblyopia could have biased the population studied, but we do not believe that the lack of equivalence of these measures of visual function accounts for a major portion of the differences in observed outcome.

We used full-time occlusion of the preferred eye for two reasons: It is considered the most effective method for treating amblyopia and it enabled us to make the groups uniform in terms of therapy (Greenwald & Parks 1990). Only 92 out of 496 amblyopic subjects (18%) failed to follow occlusion therapy. The difference from other reports may be attributed to the following:

- it is a short-term therapy (Greenwald & Parks 1990),
- it can be carefully controlled by the parents (Brownell et al. 1978),
- it is usually quickly beneficial and gratifying (Greenwald & Parks 1990).

The risk of non-compliance becomes greater when the treatment period is prolonged (Hussar 1975), patients tend to become discouraged with extended therapeutic programs. It is a common opinion that the more complicated and long-lasting the regimen becomes, the more likely it is to evoke non-compliance (Gillum & Barsky 1974). However, in amblyopia most of the improvement occurs within the first 3 months of treatment, reducing the risk of non-compliance (Oliver et al. 1986).

Parental understanding and cooperation are crucial to treatment plans that require behavioural change on the part of the patient. The family can supervise the patient more closely, and assist and encourage compliance (Brownell et al. 1978; Eraker et al. 1984).

Another factor in reducing non-compliance in amblyopia therapy is that the patching regimen does achieve results in a short time (Greenwald & Parks 1990; Malik et al. 1975). Visual acuity improvement is usually quite immediate. In our series, achievement of the therapeutic goal within a few months was related to a lower prevalence of non-compliance (Nucci et al. 1990).

The 1-2 year-old age group was the least compliant (37% failure). At this age the child begins to notice the world around him and becomes less tolerant to the occlusion. He is usually able to identify the cause of his discomfort and take it off. The parents, too, are more inclined to comply with the child's demands. None of the infants <1 year old failed the patching regimen, probably because at this age they are more yielding and unable to express their desires clearly. Moreover, all the patients in this age group had congenital esotropia and the parents were more involved in overcoming this manifest and worrying problem.

Patients with unilateral high myopia were the least compliant with a failure rate of 82.6%. Beside stressing the importance of initial visual acuity (Oliver et al. 1986; Mets & Price 1981; Scott et al. 1980; Kivlin & Flynn 1981; Rosenthal & Von Noorden 1971) this suggests that discouraging visual outcomes in this condition are largely related to non-compliance, not to a lack of response to anti-amblyopia treatment. Partially compliant children had lower visual acuity, suggesting that this should be considered as an unfavorable prognostic sign (Nucci et al. 1990). The difficulty of performing daily activities when additionally hampered by low visual acuity of the non-occluded eye justifies the large number of defaulters. Recently Kutschke et al. (1991) reported poorer visual outcomes in treating amblyopia in patients with myopic anisometropia and compound myopic/mixed astigmatism.

Children with the monofixation syndrome were non-compliant in 37.5% of the cases. In this population the costs-benefits ratio of the treatment appeared too high to the parents with regard to an apparently trivial problem. Underestimation of the effects of amblyopia (Somersalo & Heikki 1988) and the belief that patching therapy is too uncomfortable and psychologically disabling for a non-obvious disease are presumably the reasons for this significant failure rate. Subjective perception of severity by mothers of pediatric patients is crucial in non-compliance (Gillum & Barsky 1974).

The findings of this study suggest we should attempt to involve the patients and their parents as much as possible in understanding the need for compliance. Careful selection of the patients and regimen negotiation can effectively help the ophthalmologist to approach non-compliance in anti-amblyopia occlusion therapy.

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