

БЪЛГАРСКИ ОФТАЛМОЛОГИЧЕН ПРЕГЛЕД

BULGARIAN REVIEW OF OPHTHALMOLOGY

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AMBLYOPIA TREATMENT

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Abstract

Purpose: to compare patching and atropine as treatments for moderate amblyopia in children 3 to ≤ 7 years old.
Material and methods: prospective study of two groups of patients treated with patching or atropine (each group of 30 patients). The patients were from 3 to 7 years old and the visual acuity was measured with E test. The groups consisted of patients with strabismic and /or anisometropic amblyopia. The visual acuity of the amblyopic eye was $\leq 0,5$ to $\leq 0,2$. The visual acuity of the healthy eye was $\geq 0,5$. Inter eye acuity difference ≥ 3 lines. The visit schedule for the first 6 months was on the 5 week, the 17 week, the 26 week, and every 6 months.

Results: Patient characteristics: 47% female. Cause of amblyopia: strabismus 38%, anisometropia 47% and combine-mechanism 24%. The other results of the study will be discussed further in the paper.

Conclusions: both patching and atropine are effective treatments for moderate amblyopia in children 3 to ≤ 7 years of age. Patching produces more rapid improvement and possibly slightly better outcome. Atropine has easier administration. Both treatments were well tolerated.

Key words: amblyopia, strabismus, anisometropia, deprivation, patching, atropine

Introduction

The most common cause of visual impairment in children is amblyopia. Amblyopia is a serious medical condition, with a prevalence of 1% to 5%, affecting tens of millions of individuals around the world (1).

Amblyopia means a blunt sight in Greek. Amblyopia is defined as a reduction in vision, as a result of interruption of normal visual development during the sensitive period of childhood (2).

But the most common and completed definition of amblyopia comes from Von Norden: Unilateral or bilateral decrease of visual acuity caused by vision deprivation and/or abnormal binocular interaction for which no structural cause can be detected by the physical examination of the eye and which, in appropriate cases, is reversible by therapeutic measures (2).

For the bigger part amblyopia is correctable, assuming that it is promptly recognized and vigorously treated. Amblyopia is a preventable form of blindness, as that amblyopic treatment must be intensified and individualized between the ages of 15-30 months when compliance is poorest. It is generally accepted that occlusion of the non-amblyopic eye is the mainstay

treatment of amblyopia (2,3). In fact occlusion therapy has been the mainstay since 18th century (1).

Amblyopia may result from deprivation, anisometropia, strabismus and ametropia (bilateral high refractive error) in infants and young children

Basic research in animal models has shown that the major pathologic changes in amblyopia occur in the visual cortex of the brain to be dysfunctional. Functional imaging studies confirm processing abnormalities in area VI of humans and hint at deficits within higher cortical areas (2,4).

Study objectives

1. To compare patching and atropine as treatments for moderate amblyopia in children 3 to ≤ 7 years old.

Material and method

The patients were examined at the University Eye Clinic in Skopje in the period from November 2003 until the end of April 2006. There were 2 treatment groups. One group (30 patients) treated with patching, and 30 patients treated with atropine.

Eligibility - the patients were 3 years old to ≤ 7 years old and the visual acuity was able to be measured with E test- opt

types. Examination includes a monocular vision test with E test opt types, cover test, fixation test, binocular motility and a test of stereopsis. The children had strabismic and/or anisometric moderate amblyopia. Strabismic amblyopia is when there is heterotropias at distant or near or history of strabismus surgerv, with anisometropia less than combined. Anisometric amblyopia is when there is anisometropia of 1,00 D or astigmatism difference of $\geq 1,50$ D. Combined amblyopia is when there is strabismus plus anisometropia of 1,00D or astigmatism difference $\geq 1,50$ D.

The visual acuity in the amblyopic eye was from $\geq 0,5$ to $\leq 0,2$. The visual acuity limit in the amblyopic eye was set to 0,2 because atropine is not though to be as effective treatment for worse acuities. The visual acuity in the sound eye was $\geq 0,5$. Inter-eye acuity difference was ≥ 3 lines.

Primary outcome: Visual acuity at 6 months.

Initial patching treatment was at least 6 hours per day. After 17 weeks, subsequent patching we prescribed:

- if $\leq 0,66$ and, ≤ 3 line improvement, increased up to all or all but one hour

- if $\geq 20/30$ or ≥ 3 line improvement, we decrease patching to a minimum of 1 hour per day

Initial atropine treatment was 1 drop atropine 1% daily in sound eye. After 17 weeks of atropine treatment the subsequent treatment of ambliopia was:

- if $\leq 0,66$ and, ≤ 3 line improvement, we replace hypermetropic lens of sound eye with plano lens
- if $\geq 0,66$ or ≥ 3 line improvement, we decrease atropine to twice weekly.

Visit schedule during the first 6 months was on the 5 week, the 17 week and the 26 week.

Visit schedule from 6 months to 2 years was on a minimum of a visit every 6 months.

Masked outcome exams were performed from the ortooptician at 6 months and 24 months.

At the 5 week visit, a questionnaire evaluating the impact of treatment on the child and parent was completed.

Results

Number of patients in both groups were 60. 47% of patients were female.

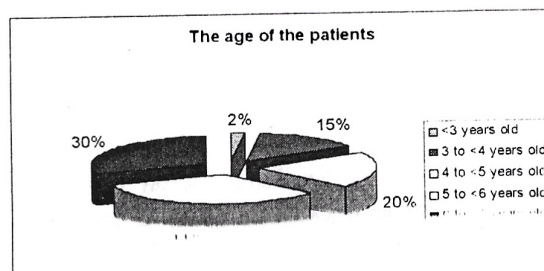


Chart no.I: The age of the patients in the two groups (60 patients)

The main age at the baseline was 5,4 years.

For each patient amblyopia was classified as either strabismic, anisometric or combined mechanism to indicate the presumptive cause of amblyopia.

The cause of ambliopia in the both groups (60 patients) was 39% strabismus, 36% anisometropia, and 24% combined mechanism.

Amblyopic eye acuity in both groups was: 0,20c.c. (23%), 0,25 c.c. (22%), 0,33c.c. (24%), 0,40 c.c. (20%); 0,50 c.c. (11%).

Mean amblyopia eye acuity at baseline was approximately 0,33. Visual acuity was equal in the two treatment groups, mean 0,33 in each. The two treatment groups were well balanced on all baseline factors. Inter-eye difference (mean) 4.5 lines

Patching Prescribed

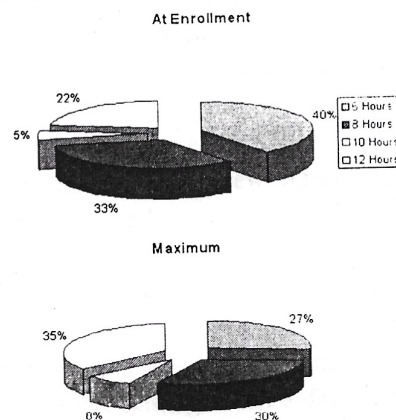


Chart no.II: The ours of patching prescribed at the enrollment and after 6 months

The number of hours prescribed at baseline was the maximum for 78% patients.

For 2,5 patients (12%) patching time during follow up was increased from a lesser amount to 12 or more hours a day.

There were 2 patients who should have been, but were not prescribed at least 12 hours per day of patching as dictated by the protocol for an incomplete response to a lesser amount of patching

A spectacle occluder was prescribed as a substitute for patching in 3 patients who could not tolerate the skin patches.

Atropine treatment

To all patients we prescribed one drop of 1 % atropine daily. A plano spectacle lens was prescribed for the sound eye during the follow up for 5 patients.

There were 2 patients who should have been but were not prescribed a plano lens for the sound eye as dictated by the protocol for an incomplete response to atropine.

Homatropine 5% was prescribed as a substitute for atropine in two patients who developed an adverse reaction to atropine.

Vision acuity of the amblyopic eye improve 3 line from baseline or 0,6 at 6 months visit 77% in the patching group and 72% in the atropine group.

Amblyopic Eye at 6 Months

Vision	Patching	Atropine
0,2	2%	2%
0,25	4%	4%
0,33	3%	6%
0,4	10%	13%
0,5	19%	22%
0,66	20%	23%
0,8	26%	19%
1,0	16%	11%

Table no I: The mean visual acuity in the amblyopic eye at six months.

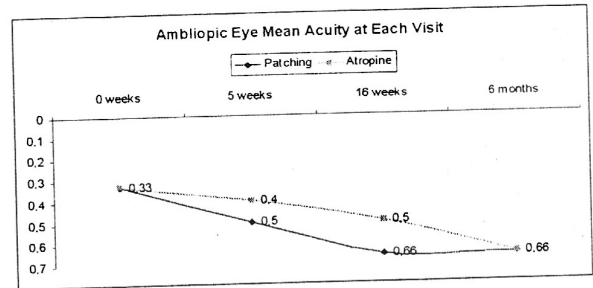


Chart no III: Amblyopic Eye Mean Acuity at the beginning, 5 weeks, 16 weeks, 6 months.

The more rapid improvement in acuity in the patching group was more pronounced when 10 or more hours per day of patching were prescribed.

Effect of treatment was similar in subgroups based on age, cause of amblyopia: and baseline visual acuity in amblyopic eye.

At the 6 months visit, a decrease in visual acuity of 1 or more lines, in the sound eye was found in the patching group - 3 patients (10%) and in the group treated with atropine - 8 patients (25%). Some cases were due to improper refractive correction or residual cycloplegia.

Of the 3 patients (10%) with decreased sound eye acuity of 1 line only 2 patching patients had further follow up beyond 6 months. 2 of the 3 patients had subsequent sound eye acuity the same or better than baseline and 1 patient had no further follow up (one line worse than baseline at 6 months).

Of the 8 patients (25%) of the atropine group with decreased sound eye acuity at six months all 8 patients had further follow up beyond 6 months. 7 of the 8 patients had subsequent sound eye acuity the same or better than baseline. This patients resolved while still on atropine with the same refraction (3 patients) and 4 patients with the new refraction. 1 patient had persistent sound eye decrease (one line worse than baseline).

The effect of the amblyopia treatment on ocular alignment was: 1 patient in the patching group and 2 patients in the atropine group had an increase of > 10 p.d. in a pre-existing distance deviation.

Table no.II and no.III: The side effects of the treatments reported at any visit in first 6 months.

Patching side effects	
Skin irritation	Mild 41%
	Moderate/Severe 6%
Total	47%

If patient had both mild and moderate/severe reported at different visits in first 6 months, only moderate/severe is tabulated.

Atropine side effects	
Ocular	Lid/conjunctivae irritation 4%
	Photophobia 18%
	Eye pain/headache 2%
	Other 2%
Facial Flushing	2%
Total	28%

The treatment compliance was graduated as poor, fair, good and excellent

Treatment Compliance

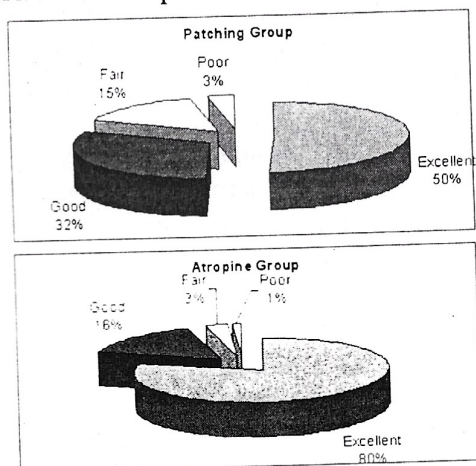


Chart no IV. Treatment compliance

The pie charts report the average compliance score calculated over visits on treatment in the first six months before the outcome exam.

A questionnaire evaluating the impact of treatment on the child and parent was completed at the 5 week visit(5). Questionnaire of 9 items, each scored from 1 to 5, with 5 representing the most difficulty was establish for the evaluation of

the amblyopia treatment index. Three subscales were measured:

1. Adverse effects of treatment.
2. Difficulties with compliance.
3. Social stigma of treatment.

Items were summed to create each subscale score, then scaled to a common range.

Completed at the 5 week visit prior to the child examination (i.e. without knowledge of the visual acuity).

In both treated groups the questionnaire results indicated that treatment was tolerated well. The scores were consistently higher (worse) on all three subscales in the patching group compared with the atropine group.

Amblyopia treatment Index

Subscale	Median Score	
	Patching	Atropine
Adverse effects	2,25	2,0
Treatment compliance	2,20	1,80
Social stigma	3,0	2,0

Summary

There was substantial improvement in amblyopic eye visual acuity with both treatments. Improvement was more rapid in the patching group. In the literature, some practitioners are reported to favour full time occlusion (2,3) while others just a few minutes occlusion each day (6). But from our examination we have concluded that the more rapid improvement with patching was most pronounced when 10 or more hours a day were prescribed.

There are studies that have shows success in treating amblyopia with atropine penalisation (7). In our study we had show that atropine improve the visual acuity in the amblyopic eye successfully, also. Von Norden write that patching is most commonly prescribed but atropine may,be as good for moderate degrees of amblyopia and may be more acceptable (2) But atropine is not preferred

first choice treatment for either strabismic or anisometropic amblyopia (8).

At six months the difference in amblyopic eye acuity was small in both groups.

Both treatments were well tolerated, and few patients changed treatment because of side effects.

Summary-adverse effects

The adverse effect of atropine treatment on visual acuity in the sound eye appeared to be transient.

Nearly all patients (7 of 8 patients) with decreased sound eye acuity at six months subsequently tested equal to or better than baseline.

Conclusion

Both patching and atropine are effective treatments for moderate amblyopia in children 3 to less than ≤ 7 years of age.

Patching produces more rapid improvement and possibly slightly better outcome. The more rapid improvement with patching was most pronounced when 10 or more hours a day were prescribed.

Atropine has easier administration, lower social stigma and lower cost.

The initial choice of treatment can be made by the ophthalmologist and parent. The understanding and good cooperation of the parents were also a must for successful amblyopia therapy.

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