Reading capacity in cases of ‘cured’ strabismic amblyopia

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Summary

Fifty cases of cured amblyopia were examined in relation to distance vision, near vision, and reading capacity. Occlusion had been abandoned at age 8; the examination was made at age 12. Although linear vision for distance and near was full, reading capacity was markedly impaired. In order to prevent this ‘reading amblyopia’, sneaking-out or tapering-off occlusion with alternating calibrated filters is continued until the child can read fluently with each eye.

The question, ‘when is an amblyopia really cured?’, must be asked time and again. When judging the results it is imperative to know which criteria were used. Usually the distant linear vision is used. As one of us stressed some time ago (Lang, 1974), the reading capacity is even more important than the linear vision. So the cardinal question is: How does the reading capacity after treatment compare with the linear vision?

Method

With this question in mind, we examined fifty cases of ‘cured’ amblyopia, in which treatment had been stopped between the ages of 7 and 9 years, when the distance linear vision was 1.0. These patients were re-examined once a year up to the age of 15 years. Even without any further treatment, they had good distance and near vision with linear optotypes.

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Patients

Treatment was started at age 5. Thirty patients had eccentric fixation and twenty had central fixation. Fourteen were treated by pleoptic methods, 33 by total occlusion, and thirteen by filter occlusion. After treatment fixation was central in all fifty cases. In 26 cases there was microtropia, in 22 cases the angle of squint was more than 5°, and two showed consecutive divergence. Of the fifty patients 33 were operated on. One patient with emmetropic, ten had an isometropia. 28 had a small anisometropia of 1 dioptr or less, six had an anisometropia of more than 1D and five of more than 2D.

Results

In comparing the relationship between distance and near linear vision and reading capacity, we obtained the following results (Figs 1 and 2):

The average distance linear vision with numbers was

The average near linear vision with Landolt rings was

0.94
The average near linear vision with numbers was 0.76. The average of near reading vision was 0.56.

In the fixing eye, of course, vision was 1.0 for all four of the above tests. This difference between the reading capacity and the visual acuity with optotypes in line we call 'reading amblyopia'.

**Discussion**

One must bear in mind that reading and recognizing optotypes have quite different mechanisms. While we are reading, we do not separate every single letter visually, but the eye 'skips' along the line in leaps and saccades. The more experienced the reader, the less reading saccades per line are made, and the more regular they become.

In addition, if one compares the distance between the optotypes, it becomes clear that this distance differs from one test to another. For example, in the near reading test of Birkhäuser 1.0, the distance between the test-letters is eighteen times smaller than in the correspond-
ing test with numbers, and even thirty times smaller than between the Landolt rings (Fig. 3).

The crowding phenomenon, which in amblyopia is responsible for the difference in visual acuity between single optotypes and optotypes in a line, plays an even greater role in reading. Moreover a paracentral, temporal scotoma exists in microtropia and this can be demonstrated by Amsler charts. The influence of this scotoma on reading is illustrated by this joyful phrase taken from Duke-Elder:

WINE WOMEN AND SONG

One can see that, in microtropia of the left eye, the first letters of a word are blurred, and in microtropia of the right eye the last letters are blurred.

With twenty of our patients we recommended treatment at the age of about 10 to 11 years, hoping to cure the reading amblyopia. Depending on the case, we prescribed a calibrated filter or a part-time occlusion for the fixing eye, but after this long break in treatment it was very difficult to motivate the patient and his parents, and the cooperation was therefore totally unsatisfactory, and the results were poor. In seven cases vision did not improve, eight patients had poor improvement of vision 0.1 to 0.2, and only five patients were reading better by 2 or 3 lines.

In our orthoptic department we have drawn the following lesson from these findings:

We do not stop the treatment of amblyopia before the patient is able to read fluently with each eye. We therefore continue the therapy with graduated density filters as an alternating sneaking-out or tapering-off occlusion. With this kind of occlusion the patients can develop fusion and stereopsis with their anomalous correspondence. We chose the treatment with gradually decreasing occlusion using Bangerter’s partial filters, because this treatment is easy to implement. In our experience the calibrated filters are worn more consistently than the part-time occlusion.

In considering the whole problem of amblyopia, it becomes clear that one should not stop treatment midway, but must continue until the child can read fluently and equally well with each eye.

References