



Amblyopia¹

(Also see reports on Strabismus and Refractive Errors)

Characteristics of the Condition

Amblyopia is the condition where one eye has not developed vision as fast or as completely as the fellow eye. The eye with the poorer vision is called the amblyopic eye; it is commonly referred to as "lazy eye." Usually only one eye is affected by amblyopia. Amblyopia is common, affecting two or three out of 100 people, and amblyopia is the leading cause of monocular vision loss in adults between 20 and 70 years old (Kemper, Margolis, & Downs, 1999). Because amblyopia is a developmental problem that can be treated and prevented if detected early, a screening test is recommended for all children between three and four years of age to determine if amblyopia is present.

Amblyopia is caused by any abnormality that interferes with normal use of the eyes during the critical early years of development. There are three major causes of amblyopia.

(1) Strabismus. Amblyopia occurs most commonly when the eyes are misaligned, crossed, or when one eye "wanders." The brain "turns off" inputs from the misaligned eye to avoid double vision, and the child usually uses only the straighter eye. If the eyes are not aligned correctly, light cannot be focused on each macula simultaneously and therefore only one eye is used at a time. Some children alternate which eye they prefer and can avoid amblyopia, but most will develop a preference for one eye and vision and alignment will become reduced in the fellow eye.

(2) Anisometropia: A refractive error of unequal focus. Refractive errors refer to those eye conditions that can be corrected by wearing glasses. When the refractive error is similar between the two eyes, then both have equal focus (isometropia). They may both be nearsighted (myopia,) or farsighted (hyperopia,) or have an astigmatism, but if they are the same, the brain does not prefer either eye and amblyopia does not develop. However, when there is a refractive difference between the two eyes, amblyopia will occur. When one eye is out of focus because it is more nearsighted, farsighted, or astigmatic than the other eye, the brain "turns off" inputs from that eye and amblyopia results. Because the eyes appear normal, this type of amblyopia is the most difficult to detect and requires careful measurement and testing of vision.

(3) Deprivation: Any factor that blocks a clear image. Any condition, such as a cataract or droopy eyelid, that blocks vision during the critical period of visual development may prevent proper focusing and cause a child's eye to become amblyopic. Because of its constant nature, the brain

¹ Dennison, E.M. (2003) *Eye Conditions in Infants and Young Children that Result in Visual Impairment, and Syndromes and Other Conditions that May Accompany Visual Disorders*. North Logan, UT: Hope Incorporated





never receives good input from the deprived eye and a dense amblyopia develops. This is often the most severe form of amblyopia.

Treatment

The best time to correct this problem is during infancy or early childhood, and treatment must be attempted while the visual system is still developing. This period extends to at least age 7, but visual improvement may be possible as late as 10-11 years of age with aggressive therapy. Treatment should be coordinated by an ophthalmologist familiar with amblyopia, and must address two challenges: first, to develop vision in the amblyopic eye, and second, to correct the underlying cause.

To develop vision, the child must be made to use the weak eye. This may be done by patching, or covering, the better eye a few hours a day for weeks or months. Patching the better eye forces the brain to use the inputs from the weaker eye and helps the weak eye to develop better vision. In children who are unable to patch reliably, amblyopia may be treated by blurring the vision in the better eye with eye drops or lenses. This is also effective in forcing the child to use the weaker eye.

In most cases, the younger the child, the shorter the time the eye has been lazy and the less time it will take for treatment. Even after vision has been restored in the weak eye, part-time patching may be required over a period of years to maintain the correction. Once patching has begun, it is important to follow the ophthalmologist's instructions carefully and have frequent appointments to monitor progress. Even when vision has improved in the lazy eye, until visual development is complete the vision can become worse again. Unmonitored or too heavy patching can reduce the vision in the better eye, so the treatment must be monitored carefully.

A study was conducted and reported in 2002 by the Pediatric Eye Disease Investigator Group at Children's Hospital in Columbus, Ohio on patching as compared to use of atropine to blur the vision in the better eye. They found that in children with severe amblyopia, patching works faster. But, with children who have moderate amblyopia (20/40-20/100), the use of atropine eye drops produced improvement of similar magnitude to patching. Their conclusions were that both are appropriate modalities for initial treatment of moderate amblyopia in children aged three to less than seven years. Therefore, most ophthalmologists should be willing to take parental preference into account when prescribing therapy.

The second essential part of treatment must address the cause of the amblyopia. Strabismus surgery to align the eyes is often necessary. If unequal refractive error exists, corrective lenses will be prescribed and must be worn faithfully. If occlusion is the problem, then this must be addressed (a droopy eyelid lifted or a cataract removed). But even after surgery or getting glasses, one must always remember that amblyopia cannot be cured by treating the cause alone. The weaker eye must be made stronger in order to see normally, and this usually involves patching (occlusion therapy) or drops that de-focus the better eye (penalization).





Successful treatment of amblyopia depends upon how severe the amblyopia is and how old the child is when treatment is begun. If amblyopia is first discovered in an older child, treatment may not be successful. Vision loss from strabismus or unequal refractive errors may be treated successfully at a much older age than the amblyopia caused by occlusions in the tissue in the eye.

Often the conditions associated with amblyopia may be inherited. Children in a family with a history of "lazy eye," crossed eyes, or amblyopia should be checked by an ophthalmologist in the first year of life and every year thereafter until normal vision in both eyes is certain.

Possible Effects on Visual Functioning

Amblyopia is often difficult to recognize. Unless a child has a grossly misaligned eye or obvious abnormality, there is nothing to suggest that anything may be wrong. Amblyopia is detected by finding a difference in vision between both eyes. Most children are not aware of having a strong eye and a weak eye until it is too late. If amblyopia is not treated, the amblyopic eye may become worse and the acuity in that eye could decrease and become untreatable.

Even with both eyes open, amblyopia results in a permanent loss of depth perception and some visual field loss. Stereo acuity is never normal in untreated amblyopia, and certain occupations must exclude individuals with amblyopia because of their poor depth perception. In the worst case, the better eye may become diseased or injured and then the individual must rely on the amblyopic eye, and a lifetime of poor vision may be the result.

Visual Adaptations and Other Considerations

When working at near with reading and writing material, the child may lose their place, experience some eye fatigue and blurring of vision and have difficulty concentrating. Therefore, frequent rest periods will be needed. Seating should favor the student's better eye. Materials with good contrast should be used and glare reduced as much as possible. When up and moving about, the child may have difficulty with drop-offs and steps and reaching accurately, so they may need more time to adjust to new situations. Familiarization with the environment can help the child anticipate distances and heights as they move about.





References for Further Reading

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Kemper, A., Margolis, P., Downs, S., & Bordley, C. (1999). A Systematic Review of Vision Screening Tests for the Detection of Amblyopia. Pediatrics, Vol. 104, No. 5.

Newell, F. (1992). Ophthalmology: principles and concepts. St. Louis: Mosby Yearbook.

Rosner, J., & Rosner, J. (1990). Pediatric Optometry (2nd ed.). Maine: Butterworth Pub.

Sources for Eye Patches

Local drugstores

Check out the website: www.patchpal.com

Booklet for Caregivers

"My New Eye Patch" available from Institute for Families of Blind Children, 1300 North Vermont Ave., Los Angeles, CA 90027, 323/669-4649

