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Amblyopia

Matt's failure on the kindergarten vision screening test had been totally unexpected. His parents were sure he could see just fine; he could find the smallest specks on the floor and the farthest planes in the sky. The pediatrician's nurse had tested his eyesight just one year before and found it normal.

On the recommendation of the pediatrician, Matt's parents took him to an eye doctor. Sure enough, Matt had a problem—his left eye was legally blind. The doctor told Matt's parents that he had amblyopia, which people often call "lazy eye." His right eye was fine; that's why no one suspected that anything was wrong. The doctor prescribed glasses, but the vision in Matt's left eye was still poor.



Amblyopia is defined as poor vision in an otherwise normal eye that begins in childhood. So how had Matt passed the eye test the year before? In all likelihood, he had peeked with his right eye. He hadn't meant to cheat; he was just trying to do what the nurse had asked, to name the figures on the chart.

Both of Matt's eyes were straight. It would have been better if his left eye had crossed. Then his problem would have been recognized and he would have been treated sooner. There is an old saying about amblyopia: "The doctor sees nothing and the patient sees little." In other words, amblyopic eyes typically look as if they should see well. But the condition can cause a lifetime of poor vision.



Amblyopia is the most common reason for children to have less-than-normal corrected vision. The disorder is so common, in fact, that it accounts for more cases of vision impairment than all other causes

The visual acuity of an amblyopic eye can range from nearly normal to worse than 20/400, and it cannot be corrected with glasses.

combined (as many as 3%, or 9 million, Americans are affected). It occurs more often in children who have close relatives with amblyopia, and almost always affects only one eye.

Amblyopia begins during the first few years of life, when vision is developing. For some reason the child prefers the other eye, so the affected eye does not develop normal vision. The visual acuity of an amblyopic eye can range from nearly normal to worse than 20/400, and it cannot be corrected with glasses. With early treatment, however, the chance that a child will recover vision is very good.

Types of amblyopia

All children with amblyopia have had some kind of abnormal visual experience during the first years of life. The nature of that experience determines the type of amblyopia.

Strabismic amblyopia The most common type of amblyopia is called strabismic because it affects a deviated eye. Vision in that eye is unconsciously suppressed to prevent double vision. It does not matter whether the eye turns inward, outward, or vertically, deviates markedly, or drifts only slightly.

Not all children with strabismus develop amblyopia. Some, for example, alternate the use of their eyes, in a way exercising each, so that amblyopia does not have the opportunity to develop.

Deprivation amblyopia This type of amblyopia is the most severe. It develops when a young child's eyes are deprived of normal visual experience by some condition that prevents light from reaching the retina.

Cataracts are the most common cause. Infants whose corneas are clouded at birth or who have other opacities in their eyes, or eyelid growths that cover the pupil and are left untreated for many months, may also develop deprivation amblyopia. (Mild partial cataracts, especially in older children, and ptosis [droopy eyelids] that only partly close the eye will normally not cause an eye to become amblyopic.)

Urgent treatment may be needed. A dense cataract, for example, should be removed even in the first days of life. Delay could result in extremely poor vision despite successful surgery. (After the cataract is removed, optical correction must be provided in the form of glasses, contact lenses or intraocular lenses.)

Anisometropic amblyopia The most difficult amblyopia to detect is anisometropic amblyopia, a condition in which the eyes have different refractive errors, making one eye out-of-focus compared to the other. Whether that eye is nearsighted, farsighted, or astigmatic,

it is not used and so it fails to develop good vision. This is the kind of amblyopia Matt had.

No one, not the parents, the family doctor, nor the pediatrician, has any reason to suspect a problem when the eyes are perfectly straight and the good eye sees normally. So the amblyopia typically remains undiscovered and treatment is delayed until the child has a vision screening test. As in Matt's case, this often happens in kindergarten.

Bilateral amblyopia Amblyopia usually affects only one eye. But there are a few conditions that can cause bilateral amblyopia.

Bilateral cataracts and similar conditions can block light from reaching both retinas. Another cause is a strong refractive error in both eyes. This type (*isoametropic amblyopia*) is especially likely to develop when the refractive error remains uncorrected until late in childhood. Like its one-eyed cousin, anisometropic amblyopia (*above*), isoametropic amblyopia is treated with optical correction as early as possible. Patching is not usually needed. In most cases the vision gradually gets better when the child wears the proper glasses, but sometimes it doesn't improve to 20/20.

Treatment

For all types of amblyopia, early treatment is best. Vision scientists believe the parts of the visual system that are defective in amblyopic children are actually in the brain. Faced with continued suppression, visual deprivation or unfocused images, the brain cells connected to the amblyopic eye (or eyes) gradually stop working. Once this happens, it may become impossible to reverse amblyopia.

Deprivation amblyopia from a dense cataract, for example, tends to become permanent by several months of age. On the other hand, depending on the kind of abnormal visual experience and how bad it was, amblyopia treatment may be effective even years after its onset. A few children with anisometropic amblyopia can be improved as late as 12 years of age. Strabismic amblyopia may even be reversible in adults who have lost the use of their good eye.

Prescribing glasses or surgically removing a cataract is sometimes the only treatment required. Unfortunately, surgery to align a strabismic eye cannot make it see better.

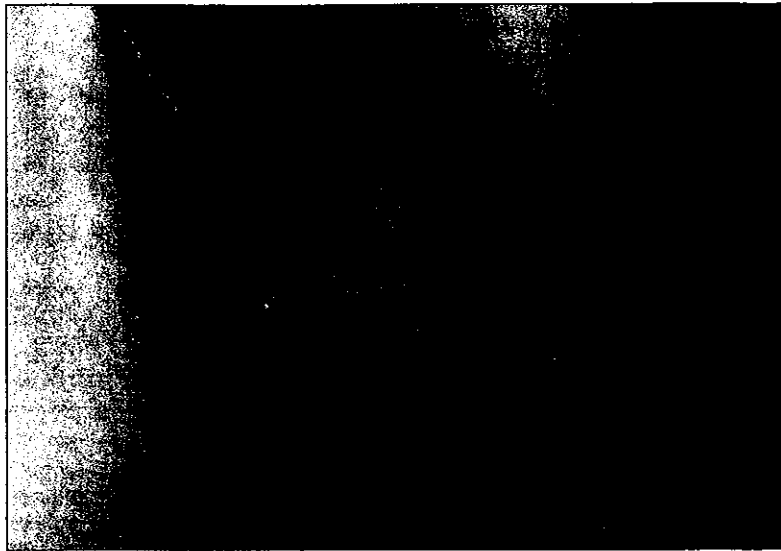
For most children, it is necessary to cover the normal eye with a patch or similar device in order to force the child to use the weak eye and strengthen its vision. If glasses are prescribed for the amblyopic eye, they are worn with the patch. Patching should be prescribed by an eye doctor, and its effects should be monitored at regular intervals.

Keeping the patch in place: Often children object to patching and try their best to get the patch off or to peek around it, especially at

Vision scientists believe the parts of the visual system that are defective in amblyopic children are actually in the brain.

All children wearing an eye patch need to be monitored by an eye doctor at regular intervals. The patch prevents light from reaching the retina and too much patching may cause an amblyopia in the good eye.

PATCHING FOR AMBLYOPIA. If the right eye is amblyopic, forcing a young child to use that eye will almost certainly improve its vision.



first. Remember, the patch forces the child to use the “bad” eye, and it may be pretty bad indeed until the treatment starts to work. There is no easy solution to this problem. Distraction tends to work best for infants and toddlers, especially when the patch is first applied. Lots of attention, play, hugging and support will be required until the child gets used to the patch and begins to see better. Bribery is effective with toddlers, and older children may be persuaded to listen to reason.

Some parents are more successful maintaining occlusion by using a device that fits onto the glasses and prevents the child from peeking with the good eye. Elbow restraints are useful for really resistant children. The inflatable cuffs that are used for swimming can work just as well if they are positioned across the elbows. In some cases, cycloplegic eyedrops or defocused glasses can blur the “good” eye, taking the place of a patch. This approach is called “penalization” of the dominant eye.

If all else fails, parents may have to stop the patching for several weeks or months, then try again. Perhaps by then they will have increased their resolve to be firm. Or perhaps the child will be in a new stage of development and will be less resistant.

Avoiding irritation from the patch: Some children experience skin irritation from the adhesive patch. This is rarely due to an allergy, but if it is, a different brand of patch should solve the problem. More often the irritation is the result of moisture from perspiration, and abrasion of the skin every time the tape is pulled off. Attaching the occluder to the glasses is one solution to this problem. Another useful trick is to apply tincture of benzoin or Skin Prep® to the skin. This forms a protective coating, so the tape sticks to the coating rather

than to the tender skin around the eye. (It's important to keep the skin preparations away from the eye itself.) Both products are available from pharmacies without a prescription.

Length of time required: Patching usually begins on a nearly full-time basis. Many pediatric ophthalmologists prefer to allow a brief "time off" each day to reduce the possibility that too much patching will cause amblyopia in the good eye. Certainly it's not necessary to patch the eye when the child is asleep, though some parents find it easier just to leave the patch on, especially through naps.

Vision is then re-assessed after a period of time determined by the age of the child. Generally the eye doctor will schedule a follow-up visit at a frequency of 1 week for every year of age—that's every 3 days for a child of 6 months, but every 2 months for a child who is 8 years old. (The visit intervals can be lengthened when patching is performed part-time.) The advantage of early patching is obvious: not only is it more effective, it works more quickly as well.

Intensive patching is continued until the amblyopic eye becomes as good as the other eye or until it stops improving. Children with strabismus may start to cross the eye that had been the straight one. Many parents find this alarming, but they can actually be pleased to see this change. It means that the child is able, for the first time, to use either eye. (Occasionally it may be necessary to switch the patch to the other eye.)

Results: The goal for every child is to achieve the best possible vision in each eye. In mild cases, 20/20 vision is often possible. In more severe cases, a plateau is reached and then there is no further improvement.

In about half the children treated, the improved vision will remain stable without patching. They will need only occasional re-checks. The other half will "slip"; their amblyopia will recur, but usually to a lesser degree than before. They will need patching again, either full- or part-time, until the lost vision is regained.

All children should be followed until they are about 9 years old. After that age, the vision in the amblyopic eye tends to remain stable, even if the child uses the good eye all the time.

When treatment doesn't work Some cases of amblyopia are resistant to treatment. Perhaps there is something structurally defective in the eye. Children who have severe physical or developmental problems should perhaps not even start treatment, or should have only a brief therapeutic trial.

Parents must always remember that, although vision is important, we must consider the whole child, not just an eye. The decision to stop treatment can be difficult, but it is sometimes best for both the child and the family. For children with useful vision in only one

eye, safety glasses and sports goggles are prescribed to protect that eye. As long as the eye remains healthy, such children see normally in almost every respect.



Certainly by age 5, and ideally by age 3 or 4, all children should have their vision measured, separately in each eye, by their primary care provider. When amblyopia is found in younger children, the treatment can be dramatically successful. It is not unusual for a 2-year-old who is legally blind from strabismic amblyopia to achieve completely normal vision in less than a month.

The challenge is to find very young children with amblyopia who don't have strabismus. Some of the most exciting research in pediatric ophthalmology involves screening of large populations for amblyopia. One method involves photographing the pupils of infants and toddlers. Perhaps such photorefractions, which may uncover amblyogenic factors early, will prevent stories like Matt's from being repeated so often in the future.