Lazy Eye; A Developmental Disorder

Strabismus, eyes crossing and eye development.

By Craig Stellpflug NDC
Healing Pathways Medical Clinic
Scottsdale, AZ

Amblyopia, Strabismus, Lazy eye, Cross Eyed and Wall Eyed are names for the same basic eye problem; problems with eye convergence. This is a developmental issue where the information taken into both eyes is not correctly integrated and processed in the brain. The brain ends up ignoring the input from one eye and preferring the other eye. Sometimes the brain will switch eyes and alternate which eye it is using for input information. Lazy eye is an issue where the eye that is being ignored wanders off in other directions causing divergence and convergence issues.

Eye convergence is the stage of neuro development where the eyes begin to work together at a higher level of eye function. This begins to happen as the brain is learning how to coordinate the input from both eyes at the same time. Appropriate eye convergence is necessary for reading and math skills, depth perception and many other brain and developmental processes.

Because eye convergence is a developmental issue, the prognosis for medical treatment of strabismus or amblyopia is bleak. This is because the problems with convergence are rooted in neuro development and are not properly addressed with medical treatments like strabismus surgery or putting a patch over one eye. Surgery only works in about 11% of patients while 20% of all strabismus surgery recipients require a second surgery within 3 months of the first surgery[1]. Indiscriminant patching of one eye can severely disorganize the brain and does little to address the root cause of lack of convergence except to help develop a stronger neuro-pathway to the weaker eye without directly correcting the developmental completion of convergence.

[1] *http://www.childrenshospital.org/clinicalservices/Site1763/mainpageS1763P4.html*
http://www.visiontherapy.org/vision-therapy/faqs/vision-therapy-FAQs.html#Q:13

Issues in eye convergence can cause problems in reading, math, coordination, depth perception, brain organization and many other academic and mobility functions. Eye convergence issues can and do affect all levels of global brain development. A strabismus may be particularly evident when the subject is tired or brain glucose levels are low.

How the eyes develop

Eye convergence is just one of many steps in eye development. The development of eye convergence is just as important to the eyes as the

development of the army crawl is important for appropriate mobility skills, or hot and cold sensation development is to proper tactile function.

The brain develops in predictable patterns from lower levels of function to higher levels.

When a baby is born it has pupil reflex to light but does not have a developed outline detail perception, central detail vision or eye convergence.

In the beginning of brain/eye development, the eyes develop individually and by functioning separately. As the baby is nursing on one breast, one eye is naturally occluded and the other eye is taking in visual stimulation. The eye that is exposed to the environment develops as the baby starts to see the outline and eventually the fine details of the mother's face. As the baby is moved from one breast to the other and is flipped around, this gives the opposite eye an equal opportunity for lateral development while occluding the first eye.

The next stage of eye development begins after the baby gains controlled movement of its head. As the baby is on the floor and raising its head to look about, the eyes start to work together as the brain begins to coordinate the signals from both eyes simultaneously. This coordinated eye input generally completes eye convergence development as the baby progresses through the army crawl and then hands and knee crawling.

At this higher level of development called convergence, the eyes, while being at two different locations in the head, will work together to focus on one object giving the brain visual depth perception. The brain can visually triangulate the location of an object this way to determine distance and also track movement.

Another stage in eye development is central detail vision, or macular development where the eyes recognize and correctly interpret the fine details in the central vision of the eye and the brain. Macular vision is where the brain recognizes and interprets first environmental symbols and later progresses to the details and meanings of the alphabet and numerals. When the central detail vision is weak the peripheral vision can become over-stimulated. This causes a lack of ability to attend to or focus on a subject along with various other developmental issues.

A good example of a temporary challenge to the macular vision is the "blue dot syndrome" where you experience an over-stimulation of the macula from the flash of a camera. When this happens the blue dot stays in your central detail vision disrupting normal vision. Imagine if the blue dot never went

away and then you can begin to relate to the challenges a child has with under-developed macular vision.

Sometimes a strabismus will be caused from or exacerbated by poor macular development. This is why prism glasses work on some people to bring appropriate alignment of the eyes but only while wearing the glasses. In these cases the macular development will need to be addressed before the strabismus/convergence issue will resolve.

By the time the child is 3-5 years old the brain hemisphere dominance should emerge giving the child either a right eye, ear, hand and foot preference or a left eye, ear, hand and foot preference. Interestingly, the left hemisphere of the brain controls the right side of the body and the right hemisphere controls the left. To be neurologically efficient and organized the complete dominance of eye, ear, hand and foot should be all on one side of the body.

Even though the brain should ultimately have a dominant, or preferred, eye, it learns to take in and process information from both eyes simultaneously and to coordinate the eyes to track together. The dominant hemisphere of the brain normally houses functions like math, facts, logics and language skills. The dominant eye should be the eye related to the dominant hemisphere of the brain. This way the information taken into the brain via the dominant eye will lodge and be processed in the dominant hemisphere of the brain. When the wrong eye is dominant it will initially take in and store the information into the subdominant hemisphere where emotions, trivia, music and imagination reside.

Mixed eye dominance or wrong eye dominance will often be a source of emotional behavior, inattention, dyslexia, math and academic shortfalls and a host of other developmental challenges.

When the lower levels of eye development progress to completion, then advanced eye/brain skills develop. Basic reading skills evolve into advanced reading skills. Reading and understanding foreign languages is part of advanced eye development. Appropriate eye dominance brings academic success associated with visual learning and visually associated emotional stability. Visual sequential processing skills evolve into advanced memory and recall abilities which another topic for discussion. And fine tracking abilities and visually based quick decision making skills help the individual to develop athletic skills and prowess.

How to Test Eye Convergence

Although in some children the strabismus is fairly obvious (especially when the child is tired), quite often a strabismus will go unnoticed or ignored and

is a cause of brain disorganization in how the brain takes in, stores, retrieves and utilizes visual input.

To test eye convergence, use a small but high interest object or dim flashlight and move it around in front of their face at about 8-10 inches away. Move the object from side to side and up and down in large arcs in front of the face for about 15 seconds while the child attempts to follow the object with their eyes. Stop the object at about 8-10 inches away from the face and in the exact center of the face. Slowly bring the object in towards the bridge of the nose and stop at about 1-1/2 inches away. Notice the eyes as you perform this exercise to see if they track the object together all the way to 1-1/2 inches from the bridge of the nose. If one eye turns either inward or outwards before you reach the 1-1/2" stopping point, this indicates a strabismus. (Inside of about an inch and a half from the nose, the eyes will normally lose convergence and this will not indicate a strabismus but may indicate the dominant eye as the one that continues to track inside of 1-1/2".)

Now cover one of the child's eyes with one of your hands and continue this exercise by making about ten more passes both up and down and side to side about 8-10 inches in front of the child's face. Now, with the one eye still covered, stop the movements with the object at mid-face. Move the object quickly in towards the nose and stop about 1-1/2 inches away from the bridge of the nose. Slowly reverse directions taking about 2 seconds to return to the 8-10 inch starting point at the center of the face and stop the object and hold it still. At this point, quickly uncover the occluded eye while still holding the object in its place. Notice the position of the occluded eye. Was it on track with the other eye or did it drift in or outward during the exercise to snap back into place when you uncovered it? If the occluded eye moves to regain tracking with the uncovered eye after you uncover it then this is indicating a strabismus.

Test the opposite eye in the same manner by covering it up with your hand and repeating the above steps. If an eye drifts inward during this test, it is a convergent strabismus. If it drifts outward it is a divergent strabismus.

To be completed on this level of brain development called convergence, each eye should track together completely and without wandering off course during this test. In other words, the brain should cause the occluded eye to track with the non-occluded eye at all times.

Craig Stellpflug, NDC is a Neuro Development Consultant at Healing Pathways Medical Clinic in Tempe, AZ where he specializes in ADHD drug alternatives, Autism and other brain disorders and traumatic brain injuries. *For more information, call 480-699-7400 or visit HealingPathwaysMedical.com*