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Lazy eye

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Amblyopia (“lazy eye”) is defined as a unilateral or bilateral reduction of visual acuity caused by inappropriate brain visual stimulation in the critical period of visual development. Permanent amblyopia can be prevented. It always begins in childhood and can only be effectively treated during this period. It affects between 2 and 5% of the population.

Although eyes are fundamental to see, the organ which really “sees” is our brain, which as a computer without programs: it has the ability and the potential for a series of skills but these will be developed or depending on the received stimuli. Children are not born “seeing”. Eyes are like cameras which capture external world’s images and transform them into electrical stimuli which move in “wires” (optic nerve and the rest of visual channels) up to the brain part which is specialized in vision.

From the moment of being born, an unweaned baby is exposed to visual stimuli which make its visual system mature, increasing visual acuity (ability to distinguish objects which are even smaller from a given distance) and the sensation of depth and volume or stereoscopic vision (commonly known as “3D” or in three dimensions). It is also acquired the ability to join the different images which are received by each eye not to see double, They also learn to focus from different distances (location) and to control eye movements.

Parallel to this functional maturing, the eye grows. The “perfect” eye or emmetropic is the one which is not too short (longsighted) or too long (shortsighted). As nature is very wise, our eye is short when we are born so that we do not become shortsighted as we grow up. This ideal process does not occur in everybody and in every eye. Hence, there are refraction faults in which the image does not form itself properly in the layer which covers the eyeball in its inner part and is the eye’s “noble” area, where visual sensors are, retina.

Shortsighted people cannot see well from a far distance. When an eye is not completely spherical, images are seen distorted and small objects are seen with less clarity. This is called astigmatism, the other big

refraction fault. It can take place isolated or linked to shortsightedness or longsightedness.

Most children are shortsighted but they can see well in short distances because they have a great ability to focus with a lens placed in the eyeball which is called crystalline lens. Shortsightedness can cause problems (sensation of blurred vision, frontal headache, red eyes) if you try to see from short distances too much: reading with low light, abusing screens, specially if you are tired, in the afternoon after school and activities or overcoming an illness, as a common cold. Improving lighting and not abusing screens can improve trouble when they are growing up. In serious situation, short sight glasses can be helpful.

For a normal visual development, to "learn to see", the brain must receive images which are equally focused and clear for both eyes. There are different tests and experiments which prove that, if there is no an appropriate visual stimulus, an anatomical and functional disturbance of the neurons of the cortex of the brain visual area takes place and it does develop properly.

Any factor which interferes in this brain's visual learning process will provoke a higher or lower reduction of visual acuity, which can be even become blindness, depending on precociousness, intensity and duration of its action. This is what we call "lazy eye", (or amblyopia) even though the Essentials fault, as it has been said above, lies on the brain and not on the eye itself. This process does not "close" until the first six years of life. This has a double meaning: if we detect it on time, it can be treated and can be recovered and, the factors which interfere with vision do not cause "lazy eye" after that age.

Therefore, amblyopia is a decrease of visual acuity because of a known cause of lazy eye which does not improve despite of its correction (glasses) and which cannot be explained by other eye problem. Once the factor is corrected (cataract extirpation or glasses prescription, for instance), it is assumed that visual acuity's deficit remaining is due to amblyopia.

To see in three dimensions, we need to see well with both eyes. The brain creates the reality "map" in 3D from the small differences among the images of both eyes. People with lazy eye have no stereoscopic vision. This can be used to detect lazy eye.

Strabismus is both the cause and the consequence of lazy eye. That is the reason why two thirds of children with lazy eye suffer from associated strabismus. Normally, this can be easily noticed and children are taken to doctor because of this. The challenge is the other tirad of amblyopia cases which are not associated to strabismus and can be unnoticed if we do not look for them actively.

Most of amblyopia cases are produced by the important difference in the refracting ability of an eye (normally, one is more longsighted than the other one). The brain tries to correct that but the focus is synchronized in both eyes and with one focused, a blurred image of the other can be see. The degree of amblyopia will depend on this different (100% if the difference is equal to or higher than 3 1/2 diopters) and its duration, reaching the maximum percentage of children with amblyopia when they are three and four.

The child's brain ignores images coming from a badly aligned eye (not to see double) or with blurred vision, this is called suppression. Other less frequent lazy eye causes are cataract (crystalline's opacity) and nystagmus (involuntary eye movements which do not let focus properly on an object).

Permanent amblyopia and strabismus can lead to future restrictions of educational and working type (you cannot be a sailor or a pilot). Amblyopia increases the risk of blindness since an accident or other cause could provoke the loss of vision in the only healthy eye.

Amblyopia treatment is effective if it is early detected (from three years old onwards). From 6 years old, treatment results are worse although an effort is always to be made. That is the reason why many

paediatricians and nurses actively look for lazy eye in our patients with vision test with pictures and 3D vision tests appropriate to the child's age in health exams.

A child who twists an eye from 6-7 months (up to that age it is normal if it is not too exaggerated and permanent), must visit a doctor. Parents can suspect lazy eye if a baby does not mind that an eye is covered (because it cannot see well) and moves a hand away or twist its head if we cover its "good" eye.

Lazy eye can be treated correcting the fault that causes it. Most of the times, glasses are needed but sometimes a cataract or a fallen eyelid can be operated. If, when this fault is corrected, normal vision is not recovered, the "good" eye is penalized (with a patch or with hairspray in a glass or even with some drops of a medicine called atropine which causes blurred vision). Thus, the brain must take the lazy eye into consideration, visual stimuli arrive at brain and the necessary neuronal connections are formed to recover sight. Some strabismus need surgical correction.

More information about this topic (Group of preventive activities from AEPap):

<http://www.aepap.org/previnfad/Vision.htm#internet> ^[2]