



ORHTOPTIC EXERCISE-1

IN AMBLYOPIA (CENTRAL SUPPRESSION ,
FUSIONAL RESERVE AND RELATIVE
ACCOMMODATION

جامعة ساوة

كلية التقنيات الصحية والطبية

قسم تقنيات البصريات

المرحلة الرابعة

رقم المحاضرة السابعة

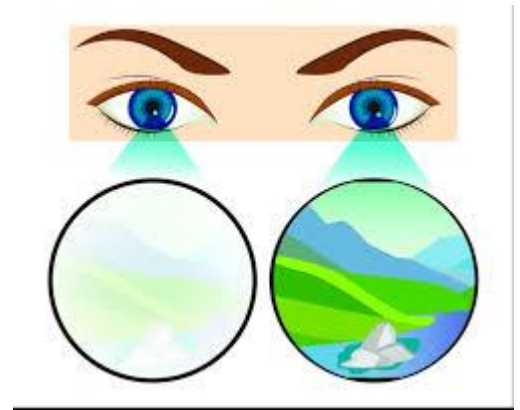
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Lazy eye (amblyopia) is reduced vision in one eye caused by abnormal visual development early in life. The weaker — or lazy — eye often wanders inward or outward.

Amblyopia generally develops from birth up to age 7 years. It is the leading cause of decreased vision among children. Rarely, lazy eye affects both eyes.



Importance of Early Intervention(treatment)

Early intervention is crucial because amblyopia is most effectively treated **during the brain's plastic period**—typically up to **age 7 or 8**, when the brain is highly adaptable to changes in visual input. **After this period**, treatment becomes **less effective** as the brain's adaptability decreases.

Without intervention(treatment), amblyopia can lead to:

- 1-Permanent visual impairment** in the affected eye.
- 2-Reduced depth perception** and difficulty with tasks requiring binocular vision, such as reading and sports.
- 3-Increased risk** of vision loss in the stronger eye due to injury or disease.

Early treatment options include:

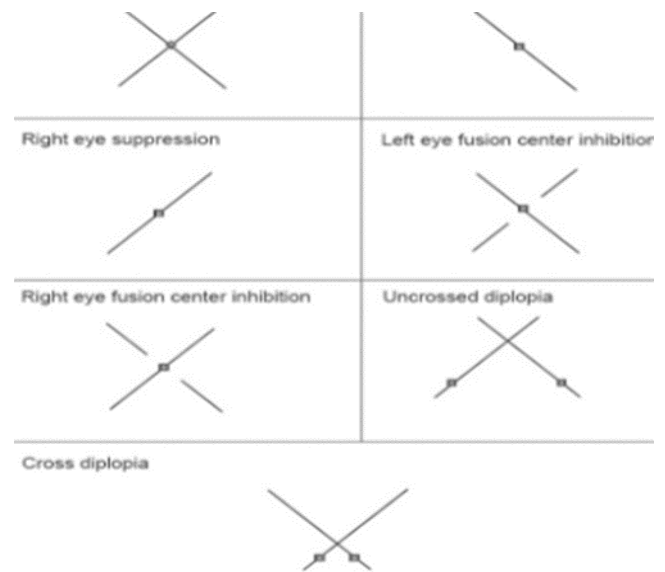
- 1- patching,
 - 2- corrective glasses,
 - 3- orthoptic exercises,
- all aimed at stimulating the amblyopic eye and encouraging the brain to develop proper visual connections

In the treatment of amblyopia, these exercises play a crucial role in

1- enhancing visual acuity

2- **promoting the development of binocular vision**, which allows for effective **depth perception** and a single, cohesive visual experience.

Central suppression in amblyopia is a defense mechanism the brain develops to prevent double vision. This suppression occurs primarily in the central area of the retina (fovea), where visual acuity is highest, and is especially noticeable when focusing on fine details.



effect of Central suppression on Binocular Vision

- 1- Loss of Depth Perception:** With one eye's central vision suppressed, binocular function is compromised, which limits depth perception and the ability to judge distances accurately.
- 2- Reduced Visual Acuity:** Since the amblyopic eye is not fully engaged, its central vision remains underdeveloped. This leads to persistent blurry vision in that eye, as the brain doesn't "learn" to see details clearly through it.
- 3- Difficulty with Fusion:** Fusion is the brain's process of merging images from both eyes into a single, cohesive picture. Central suppression disrupts this process, preventing the brain from achieving binocular fusion.

Exercises to treatment central suppression, such as:

- 1- *Patch therapy:* Covering the dominant eye to stimulate the amblyopic eye.

- 2- *Anti-suppression therapy*: Using techniques like red-green filters or synoptophore exercises to challenge the amblyopic eye.
- 3- *Near-far fixation exercises*: Shifting focus between distant and near objects to reduce suppression.

Fusional Reserves and Binocular Stability:

Fusional reserves** refer to the eyes' ability to maintain single, aligned vision despite small misalignments or differences in visual input. These reserves are critical for the brain to seamlessly merge images from each eye into one clear, stable picture, ensuring comfortable binocular vision. Fusional reserves are usually categorized into

****convergence reserves**** (ability to maintain single vision for close objects)

****divergence reserves**** (ability to maintain single vision for distant objects).

Role of Fusional Reserves in Binocular Vision

1. Preventing Double Vision (Diplopia)
2. Supporting Depth Perception
3. Enhancing Eye Flexibility
4. Compensating for Heterophoria

Exercises to enhance fusional reserves, like:

- 1- *Base-in and base-out prisms*: To strengthen convergence and divergence reserves.

- 2- *Vergence exercises*: Slowly improving the ability to maintain single vision while merging two images.

Relative Accommodation:

Relative accommodation is the eye's ability to adjust focus between different distances while maintaining a clear, single image. This function is essential for tasks that require rapid changes in focus, such as shifting between a book and a distant object or reading on a digital screen.

Relative accommodation is divided into two key components:

1. **Positive Relative Accommodation (PRA)**: The ability to increase lens power for focusing on close objects while keeping distant images clear.
2. **Negative Relative Accommodation (NRA)**: The ability to relax lens power to focus on distant objects without losing focus on nearer objects.

Exercises to improve accommodation, such as:

- 1- *Push-up and push-down exercises*: Moving objects towards and away from the eye to strengthen accommodative response.
- 2- *Lens flippers*: Switching between plus and minus lenses to stimulate accommodation.

thank you