



Summary of Amblyopia- easy to Understand

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Author's contributions

This work was carried out in collaboration between both authors. Author PHC had wrote the Introduction and Conclusion part of this article. Author BHS had managed the abstract and literature review along with the formatting of the article. Both authors had read and approved the final manuscript.

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ABSTRACT

This paper describes an introduction to amblyopia, its aetiology, classification, characteristics and treatment of amblyopia.

Keywords: Amblyopia; characteristics; treatment.

1. INTRODUCTION

Amblyopia is a condition where improper stimulations are coming from the retina into the brain. The most common time for the eye to be amblyopic is critical period and plasticity period. A critical period is defined as the time since birth to 3 months of age. From 3 months of age to 7 years is known as plasticity period. A critical period is more common time for the eye to

become amblyopic as compared to plasticity period as brain development is faster in critical period than plasticity period. In case of amblyopia, magnocellular and parvocellular cells become affected. This abnormal stimulation is of 2 types: [1]

- A. Pattern Distortion
- B. Cortical Distortion

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It may occur independently. Blur retinal image is one of the most important reasons to develop amblyopia.

Reasons for amblyopia are strabismic amblyopia, amblyopia due to the ocular deviation, due to corneal opacity or due to refractive error. If ocular deviation is present in critical or plasticity period, improper stimulation will be received by the brain from that particular eye, then that part of the brain becomes immature forever and the eye will become amblyopic.

According to this reason, amblyopia is classified as: [2]

- A. Strabismic Amblyopia
- B. Monocular Pattern Distortion Amblyopia
- C. Binocular Pattern Distortion Amblyopia

A. Strabismic Amblyopia

The ocular deviation is responsible for Amblyopia. Here, Amblyopia occurs due to images of an object fall on the parafoveal region and due to anatomical deformity, i.e. a number of cone cells variation, improper stimulation goes to the brain and creates Amblyopia.

Esodeviation is a more reasonable factor for Amblyopia as compared to Exodeviation. It mainly occurs due to the Intermittent stage. Because the duration of Intermittent stage in Eso deviation is very less as compared to Exo deviation

B. Monocular Pattern Distortion Amblyopia

The meaning of the pattern is image blur and distortion is image will be tilted but not blur. In this case, improper and blur image tilted stimulation goes to the brain from one eye.

Examples:

- a) If Right Eye is Plano and ortho with visual acuity 6/6 and Left Eye is having esotropia of 40 prism diopters with the visual acuity of 6/60
- b) If Right Eye has +1.00 D sph with visual acuity of 6/6 and Left Eye is having +6.00 D with visual acuity of 6/18
- c) If Right Eye is having -1.00 D sph with visual acuity of 6/6 and Left Eye is having -8.00 Dsph with visual acuity of 6/18

- d) If Right Eye has +2.00 Dcyl *180 with visual acuity of 6/6^P and Left Eye is having +6.00Dcyl *180 with visual acuity of 6/18^P
- e) If Right Eye is having -2.00Dcyl*90 with visual acuity of 6/6^P and Left Eye is having -8.00Dcyl*90 with visual acuity of 6/18^P

C. Binocular Pattern Distortion Amblyopia

Here, improper, blur and tilted stimulation will go the brain from both the eyes.

Examples

- a) 40 Prism diopter of esotropia with visual acuity of 6/36 in both the eyes.
- b) +7.00 Dsph refractive error with visual acuity of 6/18 in both the eyes.
- c) -10.00 Dsph refractive error with visual acuity of 6/18 in both the eyes
- d) -8.00 Dcyl *180 refractive error with visual acuity of 6/24 in both the eyes
- e) +6.00 Dcyl*180 refractive error with visual acuity of 6/24 in both the eyes.

Amblyopia can be classified as unocular amblyopia as well as binocular amblyopia

It is also classified as amblyopia ex anopsia and organic amblyopia. Amblyopia ex anopsia is reversible, if it is treated properly. Organic amblyopia is irreversible. It occurs due to organ damage like optic atrophy.

Pathological changes are also seen in Amblyopia. They are Lateral Geniculate Nucleus and Striate Cortex. Lateral Geniculate Nucleus consists of 6 nuclear layers, three layers correspond to Right Eye and 3 layers correspond to Left Eye. So, if Right eye is amblyopic, then nuclear layer of that eye fades more compared to Left Eye

2. CHARACTERISTICS

- A. Eccentric fixation
- B. Crowding phenomenon
- C. Neutral Density Filter

A. Eccentric Fixation

When amblyopic patient is trying to see an object, at that time images of an object is falling on the parafoveal region. During ophthalmoscopy, patient is instructed to look at the ophthalmoscopic light, so that the light falls on the foveal region. But in

case of amblyopia, light will fall on the para foveal region. This is an inherent characteristic of amblyopia. Eccentric fixation indicates the severity of Amblyopia. It should be noted that, Abnormal Retinal Correspondence (ARC) and Amblyopia is not same. ARC is always associated with binocular phenomenon while Amblyopia can be monocular or binocular phenomenon.

B. Crowding Phenomenon

Here patient's visual acuity with single optotypes is better as compared to multiple optotypes in a row. There will be a difference of 1 to 2 Snellen lines when asked to read with single optotypes and multiple optotypes in a row. Crowding bars are used sometimes around the single optotype to test crowding phenomenon in Amblyopia.

C. Neutral Density Filter

Neutral density filter reduces the luminance without inducing colour changes. This filter is always placed in front of the sound eye. e.g. visual acuity of right eye is 6/6 and left eye is 6/18, then neutral density filter should be placed in front of the right eye and visual acuity of that eye will deteriorate in that eye upto 6/9 which is 1 line difference. [3]

3. DIAGNOSIS

1. To diagnose amblyopia, at first visual acuity should be measured. Retinoscopy should be performed and full subjective correction should be given. If visual acuity is not improving, then check the pinhole vision. If vision will not improve with pin hole also it can be diagnosed as Amblyopia.

2. Visuoscope

Here, image is attached to the direct ophthalmoscope and patient is instructed to look at that image. It is used to diagnose eccentric fixation. [4]

3. Vertical Prism Test

If visual acuity of Right Eye is 6/60 which is not improving with pinhole and visual

acuity of Left Eye is 6/6, then Right Eye will be amblyopic.

Here, if vertical prism of 15 prism diopter is placed in front of left eye, movement will be seen in both the eyes due to Hering's law

But if vertical prism of 15 prism diopter is placed in front of right eye, no movement will be observed in both the eyes. This happens because stimulation does not reach from the right eye to the brain. [2]

4. Fixation Testing

It is divided into 2 groups: Monocular Fixation Testing and Binocular Fixation Testing. Central fixation is achieved within 2-3 months of age in normal patients. Here, patient is instructed to look at the target. The target should be moved slowly back and forth in front of the child and the eye is noticed. If patient is having central fixation, it indicates that visual acuity is 20/200 or better. If child will not follow the target, no central fixation is present, no ocular discrepancy will be followed. [5]

4. TREATMENT

Full subjective correction along with cycloplegic refraction should be needed for amblyopic patient. Visual acuity should be recorded in Log Mar chart. There are two main ways to correct amblyopia. [2]

- a) To clear retinal image
- b) To correct ocular Dominance

The correct ocular dominance is to stimulate the amblyopic eye, i.e. the amblyopic should be used forcefully by occluding the sound eye.

5. PATCHING THERAPY

Patching therapy should be started in amblyopic eye.

Patch should be placed in front of the sound eye with full correction upto 4 hours depending on the visual acuity. Patch should be placed on the spectacle glass, not directly on the skin.

Sound eye should not be patched for more than 4 hours to prevent reverse amblyopia.

6. PENALIZATION

Penalization is a method where amblyopic eye is forcefully used by blurring the sound eye. It can be achieved by optical penalization or Atropine Penalization. In optical Penalization, over plus power should be given to the sound eye so that amblyopic is stimulated or bounded to use. In Atropine Penalization, cycloplegic drugs like Atropine is used in sound eye so that Amblyopic eye is stimulated to use.

7. OCCLUSIVE CONTACT LENSES

Here, occlusive contact lenses is prescribed to the sound eye, thus amblyopic eye will be stimulated and bounded to use. According to several studies, it is proved that in 92% of the cases, improvement upto 1 line of Snellen Chart is observed.

Another methods like Bilateral Light Occlusin, Levodopa Treatment and Pleoptics method are used for the treatment of Amblyopia. But it has been proved that clinically these procedures are less significant as compared to occlusion/patching therapy.

8. CONCLUSION

Amblyopia is a condition where visual acuity is being deteriorated without improvement with a pinhole. Amblyopia may be reversible that is amblyopia ex-anopsia or irreversible that is organic amblyopia. It mainly occurs due to improper stimulation goes to brain form the retina. It occurs primarily in critical and

plasticity period. During this type, brain development is highest, so due to inadequate stimulation, Amblyopia is created. Critical and plasticity period is the ultimate time to treat the Amblyopia.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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