

SUMMARY OF AMBLYOPIA- EASY TO UNDERSTAND

ABSTRACT:

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

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:

A. Pattern Distortion

B. Cortical Distortion

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 :

A. Strabismic Amblyopia

B. Monocular Pattern Distortion Amblyopia

C. Binocular Pattern Distortion Amblyopia

31 A. Strabismic Amblyopia:

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

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

40 B. Monocular Pattern Distortion Amblyopia:

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

44 Examples :

- 45 a) If Right Eye is Plano and ortho with visual acuity 6/6 and Left Eye is
46 having esotropia of 40 prism diopters with the visual acuity of 6/60
- 47 b) If Right Eye has +1.00 D sph with visual acuity of 6/6 and Left Eye is
48 having +6.00 D with visual acuity of 6/18
- 49 c) If Right Eye is having -1.00 D sph with visual acuity of 6/6 and Left
50 Eye is having -8.00 Dsph with visual acuity of 6/18
- 51 d) If Right Eye has +2.00 Dcyl *180 with visual acuity of 6/6^P and Left
52 Eye is having +6.00Dcyl *180 with visual acuity of 6/18^P
- 53 e) If Right Eye is having -2.00Dcyl*90 with visual acuity of 6/6^P and
54 Left Eye is having -8.00Dcyl*90 with visual acuity of 6/18^P

55 C. Binocular Pattern Distortion Amblyopia:

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

58 Examples :

- 59 a) 40 Prism diopter of esotropia with visual acuity of 6/36 in both the
60 eyes.
- 61 b) +7.00 Dsph refractive error with visual acuity of 6/18 in both the eyes.
- 62 c) -10.00 Dsph refractive error with visual acuity of 6/18 in both the eyes

- 63 d) -8.00 Dcyl *180 refractive error with visual acuity of 6/24 in both the
64 eyes
65 e) +6.00 Dcyl*180 refractive error with visual acuity of 6/24 in both the
66 eyes.

67 Amblyopia can be classified as uniocular amblyopia as well as binocular
68 amblyopia

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

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

77 **Characteristics :**

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

81

- 82 A. Eccentric fixation

83 When amblyopic patient is trying to see an object , at that time images of an
84 object is falling on the para foveal region. During ophthalmoscopy, patient is
85 instructed to look at the ophthalmoscopic light, so that the light falls on the
86 foveal region. But in case of amblyopia, light will fall on the para foveal
87 region. This is an inherent characteristic of amblyopia. Eccentric fixation
88 indicates the severity of Amblyopia. It should be noted that, Abnormal
89 Retinal Correspondence (ARC) and Amblyopia is not same. ARC is always
90 associated with binocular phenomenon while Amblyopia can be monocular
91 or binocular phenomenon.

- 92 B. Crowding phenomenon

93 Here patient's visual acuity with single optotypes is better as compared to
94 multiple optotypes in a row. There will be a difference of 1 to 2 Snellen lines
95 when asked to read with single optotypes and multiple optotypes in a row.

96 Crowding bars are used sometimes around the single optotype to test
97 crowding phenomenon in Amblyopia.

98 C. Neutral Density Filter

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

104 **DIAGNOSIS:**

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

110 2. Visuoscope :

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

113 3. Vertical Prism Test

114 If visual acuity of Right Eye is 6/60 which is not improving with pinhole and
115 visual acuity of Left Eye is 6/6, then Right Eye will be amblyopic.

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

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

121 **4.Fixation Testing**

122 It is divided into 2 groups: Monocular Fixation Testing and Binocular
123 Fixation Testing. Central fixation is achieved within 2-3 months of age in
124 normal patients. Here, patient is instructed to look at the target. The target
125 should be moved slowly back and forth in front of the child and the eye is
126 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.

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.

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.

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.

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.

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.

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.

Ethical approval and consent: NA

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