Amblyopia

Dr Amani Badawi

ASSISTANT PROFESSOR

OPHTHALMOLOGY

Amani Badawi 8/30/2015
Amblyopia
Definition

• Decrease of vision, either unilaterally or bilaterally, for which no cause can be found by **physical examination** of the eye.

• Types of amblyopia:- anisometropic
  - strabismic
  - combined
Amblyopia

• Decrease in visual acuity of one or both eyes without the presence of an organic cause that explains that decrease in visual acuity.

• Cortical ignorance of one eye.

• Lazy eye.
Amblyopia

- 2-4% of the general population.
- The most common cause of visual loss under 20 years of life.
Amblyopia

**Basic Information:**

- Newborns have **poor vision** at birth
- Visual acuity reaches **normal adult level by age of three years**
- Vision remains **plastic until the age of 12 years**
• 2 dichoptic stimuli (half images with similar features but not exactly the same).
What if images were totally different or grossly different?

- Diplopia.
- Confusion.
- Suppression.
Why fusion may fail?

- significant anisometropia.
- significant aniseikonia.
- Strabismus.
- Higher cortical problems (e.g: head trauma, alcohol intake, drugs, … etc).
amblyopia is believed to result from **disuse inadequate** foveal or peripheral retinal stimulation and/or abnormal binocular interaction that causes different visual input from the foveae

- **No retinal changes - ERG OK**
- **Afferent pupil response has been reported but not common**
- **Lateral geniculate layers subserving amblyopic eyes atrophic**
- **Cortical ocular dominance columns representing less responsive to stimulus and show changes microscopically**
Amblyopia

Three critical periods of human visual acuity development have been determined. During these time periods, vision can be affected by the various mechanisms to cause or reverse amblyopia. These periods are as follows:

- The development of visual acuity from the 20/200 (6/60) range to 20/20 (6/6), which occurs from birth to age 3-5 years.

- The period of the highest risk of deprivation amblyopia, from a few months to 7 or 8 years.

- The period during which recovery from amblyopia can be obtained, from the time of deprivation up to the teenage years.
Causes of Amblyopia

1. Anisometropia

- The abnormal binocular interaction caused by one defocused image and one focused image.
- This type of amblyopia is more common in patients with anisohypermetropia than anisomyopia. Small amounts of hyperopic anisometropia, such as 1-2 diopters, can induce amblyopia. In myopia, mild myopic anisometropia up to -3.00 diopters usually does not cause amblyopia.
Causes of Amblyopia

Ametropic Amblyopia

Uncorrected high hyperopia is an example of this bilateral amblyopia.
Causes of Amblyopia

Strabismus

- The patient favors **fixation strongly with one eye** and does not alternate fixation. This leads to **inhibition of visual input to the retinocortical pathways.**
- Incidence of amblyopia is greater in **esotropic** patients than in **exotropic** patients.

Alternation with alternate suppression avoids amblyopia
Strabismic
Causes of Amblyopia

Visual deprivation

Amblyopia results from disuse or understimulation of the retina. This condition may be unilateral or bilateral. Examples include cataract, corneal opacities, ptosis, and surgical lid closure.
Deprivation amblyopia
Changes in amblyopia

• Different **visual functions** have different **critical periods**.
• Most of them are developed by the age of **9-10 years**.
• Photopic and scotopic sensitivity--- **0-1 yr**
• Pattern vision and biocular vision--- **1-2 yr**
• Contrast sensitivity--- **2-8 yr**
Changes in amblyopia

- Light sense --- normal
- Color vision --- Normal
- Contrast sensitivity --- reduced
- Visual acuity --- reduced
- Structure of the eye --- should be normal. (how ???)
Amblyopia is a Silent Disease
Amblyopia

• **Diagnosis** of amblyopia usually requires a 2-line difference of visual acuity between the eyes

• **Crowding phenomenon:** A common characteristic of amblyopic eyes is difficulty in distinguishing optotypes that are close together. Visual acuity often is better when the patient is presented with single letters rather than a line of letters
Acuity levels for diagnosis

- a 2-line of difference on an acuity chart
- Classification:
  - mild: VA > 0,3=6/12
  - moderate: VA= 0,1- 0,3
  - severe: VA< 0,1=6/60
Principles of treatment

• Ophthalmic examination
• Appropriate glasses prescription as initial treatment
• Patching according to a plan
• Careful follow-up
• Treatment of strabismus
Treatment

- Patching  **Occlusion Therapy**
- Penalization
  - optical: blur good eye with out of focus lens
  - pharmacologic: atropin
- New Techniques
Treatment

• **1** - The clinician must first rule out an organic cause and treat any obstacle to vision (eg, cataract, occlusion of the eye from other etiologies).
• Remove cataracts in the first 2 months of life, and aphakic correction must occur quickly
• Treatment of anisometropia and refractive errors must occur next
• The next step is forcing the use of the amblyopic eye by **2-occlusion therapy**
Occlusion therapy

Fig. 2 Patching the dominant eye allows the weaker eye to get stronger.
Early Amblyopia Treatment

- Total to form and light
- Total to form
- Partial to form
- Timing
Amblyopia Treatment
Amblyopia Treatment
Amblyopia Treatment
Amblyopia Treatment

- Then: visual stimulation
Amblyopia Treatment duration
(Occlusion Therapy)

- On face
- Adhesives vary
- 1 week/year life

...5 y.o. = 5 wks
...1 y.o. = 1 wk
The goal is 20/25

• Maintain until 9 years of age
Amblyopia Treatment

- Atropine
Contact Lenses

• used when the differences very high between two eyes
• after 9 years of age, when don’t want to wear glasses for one eye
• Consider refractive surgery
• e.g. Lasik and others
<table>
<thead>
<tr>
<th>Fixation pattern</th>
<th>Amount of occlusion</th>
<th>Review time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternating squint or Holding</td>
<td>No occlusion indicated</td>
<td>Review 6 – 12 weeks</td>
</tr>
<tr>
<td>fixation}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking up fixation quickly</td>
<td>Observe</td>
<td>Review 6-12 weeks</td>
</tr>
<tr>
<td>Taking up fixation slowly</td>
<td>Consider 2 hours occlusion daily</td>
<td>Review 4-6 weeks</td>
</tr>
<tr>
<td>Not taking up fixation</td>
<td>Consider inverse occlusion</td>
<td>See separate guidelines (section 10.3)</td>
</tr>
</tbody>
</table>

**Age group: 2 ½ years to 5 ½ years of age:**

<table>
<thead>
<tr>
<th>VA</th>
<th>Amount of occlusion</th>
<th>Review time</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA better than 0.6 LogMAR</td>
<td>2-4 hours</td>
<td>Review 6-8 weeks</td>
</tr>
<tr>
<td>VA less than 0.6 LogMAR</td>
<td>4-6 hours</td>
<td>Review 4-6 weeks</td>
</tr>
</tbody>
</table>

**Age group: 5 ½ years of age and upwards:**

<table>
<thead>
<tr>
<th>VA</th>
<th>Amount of occlusion</th>
<th>Review time</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA better than 0.6 LogMAR</td>
<td>2-4 hours</td>
<td>Review 6 weeks</td>
</tr>
<tr>
<td>VA less than 0.6 LogMAR</td>
<td>Consider up to 6 hours occlusion per day dependant on other clinical considerations i.e. density of suppression, area of fixation, behaviour of child, parental views etc</td>
<td>Review 2 weeks</td>
</tr>
</tbody>
</table>
2% - 5% of children should NOT be blind in one eye

• YOU CAN
• prevent this with a vision screen
What is Vision Screening?

• Vision Screening is strongly recommended by the American Academy of Pediatrics (AAP) to detect amblyopia early.

• Pediatricians check newborns for red reflex to find congenital cataracts. Infants are checked for the ability to fix and follow and whether they have strabismus.

• Toddlers can have their pupillary red reflexes tested with a direct ophthalmoscope (Brückner Test) or by photoscreening, or by remote autorefraction to identify refractive errors that can cause amblyopia.

• When children can consistently identify objects either by reading, or by matching, the acuity of each eye is screened to identify amblyopia.
Dilated Cycloplegic Retinoscopy

- Mydriacyl 1%
- Cyclogel 0.5%, 1%, (2%)
Thank you

Amani Badawi