

# AMBLYOPIA

## Definition & General Information

1. Abnormal vision (generally affecting one eye) not corrected by refraction, without abnormality in visual pathway
2. Condition reversible during “critical period” of vision maturation (age 1-7)<sup>1</sup>

## Pathophysiology

1. May occur early in the first weeks of life with abnormal maturity of visual pathways to brain
2. Conditions that prevent development of visual perception may lead to amblyopia: strabismus, refractive errors, cataracts<sup>2</sup>

## Incidence, Prevalence

1. 2-5% of children depending on population and diagnostic criteria<sup>1</sup>

## Risk Factors

1. Family history of amblyopia or strabismus, childhood cataract or glaucoma, and delayed visual or neurologic maturation of unclear etiology<sup>3</sup>
2. Prematurity - Modest degrees of low birth weight and prematurity may be associated with increased ophthalmic morbidity at age 6 years<sup>4</sup>

## Morbidity / Mortality

1. Treatment outcomes dependent on compliance
2. Possible untoward outcomes - Permanent vision loss; loss of stereoscopic vision; damage to healthy eye<sup>2</sup>

## Diagnostics

1. **Screening:**
  - Appropriate for children age 3 to late school age
  - No standardized protocol or personnel to carry out testing (MD/DO/PA/NP, optometrist, RN or school based)
  - Programs rely on reduced, condition-associated visual acuity as marker for disease. (high sensitivity, low specificity)
  - Components of screening tests:
    - monocular visual acuity with an age-appropriate testing
    - assessment of extra-ocular muscle function
    - binocular status
    - color vision assessment
  - Protocols vary with regard to vision and binocular function test used, threshold for referral and age at which children screened
  - USPSTF
    - Recommends vision screening for all children at least once between ages of 3 and 5 years, to detect presence of **amblyopia** or its risk factors. **Grade B recommendation**

- Insufficient to assess balance of benefits and harms of vision screening for children <3 years of age. **I statement** (Insufficient evidence for or against)<sup>5</sup>
  - No optimal screening interval
- 2. **Benefits of screening:**
  - Prevention or reversal of vision impairment
  - improvement of visual acuity
  - correction of strabismus
  - maintaining alignment of eyes
  - reducing need for repeat surgery<sup>3</sup>
- 3. **Potential Harms of screening**
  - Risk of developing strabismus or occlusion **amblyopia** in the better eye
  - Risks of wearing patch: skin irritation, accidents, psychological effects<sup>5</sup>
  - Risks of atropine use: systemic side effects, possibility of blur-induced **amblyopia**, development of strabismus<sup>3</sup>
  - Risk of false-positive screening: unnecessary use of corrective lenses
  - USPSTF found inadequate evidence for harms from screening and treatment for children <3 years of age<sup>5</sup>
- 4. **History**
  - Patients (or caregivers) may complain of vision loss or show signs of strabismus or ptosis
  - Commonly no presenting symptoms or signs
  - Often goes unnoticed by parents or caregivers<sup>6</sup>
  - Prematurity, perinatal history (e.g., alcohol, tobacco, and drug use during pregnancy); past hospitalizations and operations; and general health and development<sup>3</sup>
- 5. **Physical examination**
  - Four main steps in diagnosis of amblyopia:<sup>3</sup>
    - Monocular visual acuity assessment using an age-appropriate vision test;
    - Refraction: retinoscopy recommended
      - In young children, cyclopentolate hydrochloride or similar topical (cycloplegic) agent required to paralyze accommodation, as most young children unable to maintain distance fixation during testing;
    - Fundus and media examination to exclude pathology;
    - Rechecking visual acuity with corrective lenses in place
      - During critical period, some improvement in visual acuity expected after wearing appropriate corrective lenses (approximately six - twelve weeks common)
      - Diagnosis made if visual acuity deficit persists after refractive error corrected for appropriate period<sup>1</sup>
- 6. **Diagnostic “Criteria” for Amblyopia (If indicated)**
  - Classification by cause:
    - Strabismic (caused by misalignment of eyes);
    - Stimulus deprivation (reduced vision occurring secondary to obstacle in anterior visual pathway);
    - Refractive:

- Anisometropic (difference in refractive (focusing) error of both eyes);
- Ametropic (significant refractive error of both eyes);
- Meridional (astigmatism of both eyes)<sup>3</sup>
- Classification based on severity:
  - Mild (worse than 20/25, but <20/200)
  - Severe (legal blindness, 20/200 or worse.)<sup>2</sup>

### **Key Differential Diagnoses**

1. Refractive error
2. Anisometropia

### **Extensive Differential Diagnoses**

1. Organic diseases,
2. Congenital cataracts,
3. Retinoblastoma

### **Therapeutics**

#### **Acute Treatment:**

1. Refractive amblyopia:
  - Optical correction (glasses) first line (SOR:A)<sup>1</sup>
  - No evidence to support adding occlusion therapy for this sub-type of amblyopia
2. Strabismic amblyopia:
  - Glasses plus occlusion (SOR:A)<sup>1</sup>
    - Two types of occlusions include:
      - Patching: 2-6 hrs/day (SOR:A)<sup>1</sup>
        - Severe amblyopia: patching for 6 hrs/day equal to full time occlusion
        - Moderate amblyopia: patching for 2 hrs/day equal to 6 hrs/day
      - Penalization (vision blurring) with topical ophthalmic atropine equal to patching
        - Consider atropine in children who cannot comply with patching
        - Atropine sulfate 1%. 1 drop in unaffected eye daily, 2-7 days/week (SOR:A)<sup>2, 6</sup>
3. Visual deprivation amblyopia (cataracts, vitreous hemorrhage, corneal scar/opacity)
  - surgical repair can be considered in these cases (SOR:B)<sup>3</sup>

#### **Further Management:**

1. Referral to ophthalmology recommended
2. Treatment and follow-up until maximal visual acuity obtained and/or until age 9-10
3. Long term treatment includes patient/parent education on use of eye protection during activities

#### **Follow-Up**

1. Depends on type, severity and age of patient
2. Generally, younger patients require closer follow-up (Amblyopia CPG)<sup>3</sup>

### **Prognosis**

1. 75% of amblyopic children younger than 7 years have significant improvement in amblyopic eye (to 20/30 or better) after treatment. (SOR:A)<sup>3</sup>

### **Prevention**

1. Periodic eye and vision screening to detect pediatric eye disorders.
2. Reduction or prevention of risk factors:
  - premature birth and detrimental prenatal environmental,
  - influences such as substance abuse and smoking

### **Patient Education**

1. <http://www.aafp.org/afp/2007/0201/p368.html>
2. <http://familydoctor.org/460.xml>
3. <http://www.aapos.org>

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