433 Teams

OPHTHALMOLOGY

7

Strabismus, Amblyopia & Leukocoria

Color index:

432 Team – Important – 433 Notes – Not important

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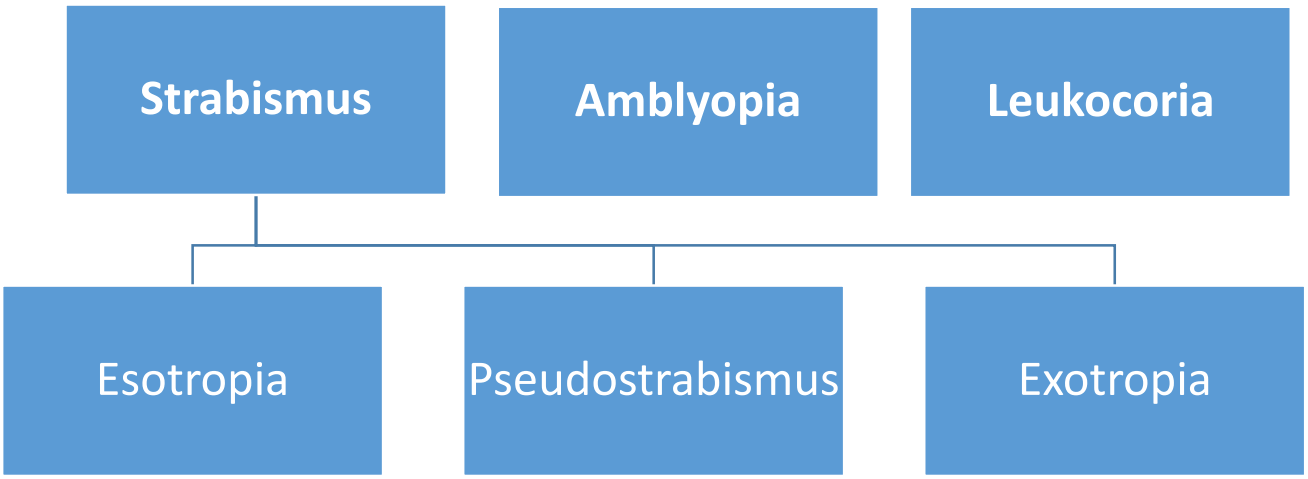
Objectives

(Weren't provided)



Strabismus

Definition: Abnormal alignment of the eyes; the condition of having a squint. (Oxford dictionary)

Fig. 1 Large-angle infantile-onset esotropia.

Epidemiology: 2%-3% of children and young adults. Prevalence in males=females

Causes:

- Inherited pattern. Most patients fall under this category, so it is important to ask about family history.
- Idiopathic.
- Neurological conditions (Cerebral palsy, brain tumors).
- Down syndrome.
- Congenital cataract, Eyes Tumor.

Binocular Single Vision can be:

-Normal – Binocular Single vision can be classified as normal when it is bifoveal and there is no manifest deviation.

-Anomalous - Binocular Single vision is anomalous when the images of the fixated object are projected from the fovea of one eye and an extrafoveal area of the other eye i.e. when the visual direction of the retinal elements has changed. A small manifest strabismus is therefore always present in anomalous Binocular Single vision.

Why we are concerned about strabismus?

1. Double vision. Mainly in adults. because infants have a suppression feature which is not found in adults
2. Cosmetic.
3. Binocular single vision.

Consequences

- Amblyopia (lazy eye). In children
- Double vision. Usually in adults but you may see it in children. E.g: if they have a tumor and they present with sudden esotropia and diplopia

Tests for deviation:

1. Hirschberg test: 1mm from pupil center=15PD (prism diopter) or 7°. also known as corneal light reflex →→ you shine the light at one arm length into both eyes and see the corneal reflex. It should be in the center.
2. Krimsky: place prism on fixating eye until control reflex in deviated eye. same as Hirschberg test but you add prism tool (to measure the exact deviation).
3. Cover test. cover one eye and look for deviation.
4. Prism cover test. Same as cover test but with a prism.

Notes:

-in Hirschberg test: roughly we can say if the corneal reflex at the pupil edge =30 pd (15°), midway between pupil and the limbus its 60 pd (30°) and at the limbus 90 pd (45°).

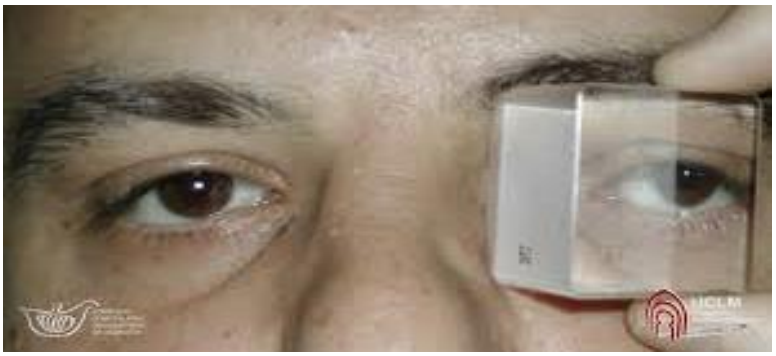
Hirschberg test: corneal reflex is in the center we call it orthoptic and its normal . if the light is shifted temporally or laterally we call it esotropia (inward deviation) . If it is nasally shifted we call it exotropia (outward deviation).

Hirschberg test:

https://www.youtube.com/watch?v=j57G7N1CnOE

Right eye is easotropic.

Note: A tropia is a misalignment of the two eyes when a patient is looking with both eyes uncovered. A phoria (or latent deviation) only appears when binocular viewing is broken and the two eyes are no longer looking at the same object.



Krimsky test

You place the prism in the fixating eye till you reach the power needed to make the light reflex at the cente . in this case the apex is out so this is a case of exotropia

https://www.youtube.com/watch?v=PRa7mPx2XVs

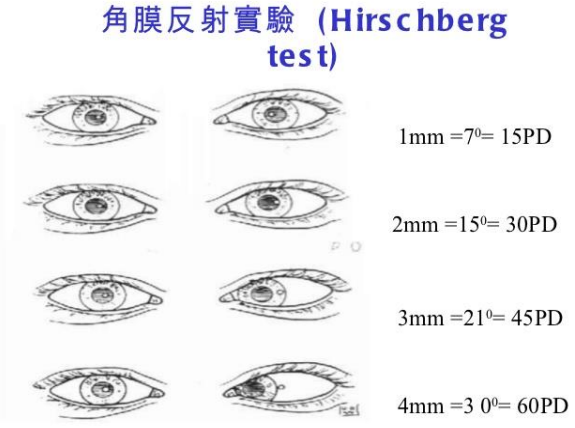
Tests for deviation,E.g: Hirschberg test. tropia vs phoria

Also called Alternate Cover test. Move the occluder from one eye to the other eye. If it's normal: the covered eye shouldn't move when the occluder removed. It is abnormal when you cover one eye and remove it you see the movement under the cover.

Cover uncover test detects TROPIA

Cross cover detects tropia and phoria. It is the more accurate

This patient has exotropia because the apex is out and base of the prism is at 40 pd (prism diopter)



ET: esotropia

XT: exotropia

Types of Strabismus: Two classifications

First:

1. Comitant: XT or ET Almost same angle in any direction of gaze.
2. Non-Comitant: XT or ET angle change with direction of gaze(Paretic, restrictive)

Second:

1. Esotropia (ET). Also called cross eyed
2. Exotropia (XT).Also called wall eyed
3. Hypertropia (HT).
4. Hypotropia(HPO).

Commitant strabismus

ET20

ET 25 ET30 ET25

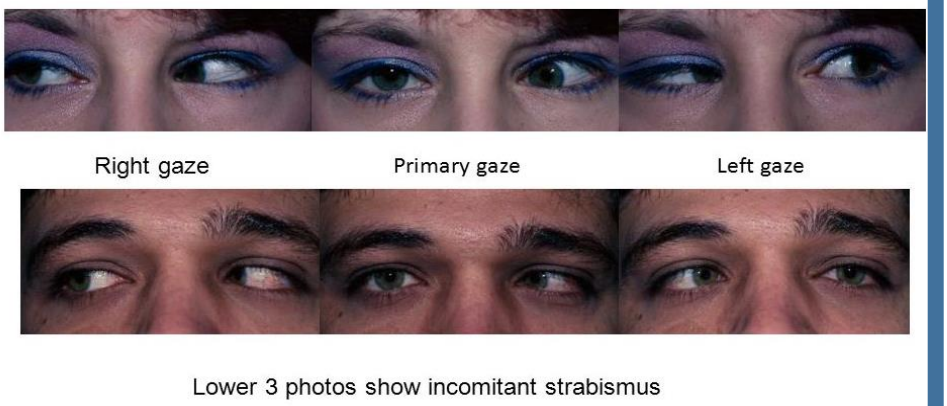
ET30

Non-commitant

ET 20

ET 10 ET 12 ET40

ET18

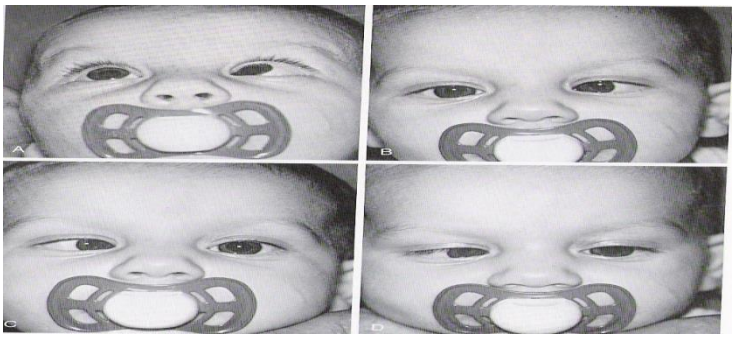


Comitant: the size of the deviation does not vary with direction of gaze.

incomitant, where the direction of gaze affects the size

Esotropia (ET):

1. Infantile (congintal) ET.
2. Accomodative ET:
   A. hypermetropic(refractive)
   B. high AC/A ratio.
   C. partially accommodative ET.
3. Aquired non acommodative ET(DIVERGENCE paralysis).
4. Sensory ET.
5. Cyclic ET.



1. Infantile (congintal) ET.

- Large Angle.
- Small hypermetropia .
- Before age of 6 months .
- Cross fixation (turning the face to fixate the eye contralateral to the target).

Ocular association of infantile ET:

- DVD (dissociate vertical deviation).
- IOOA (inferior oblique oval overaction)
- Latent nystagmus.
- Smooth pursuit asymmetry (slow lagging temporally directed on OKN (Optokinetic nystagmus)).
- DHD (dissociate horizontal deviation)

Treatment of infantile ET:

- Surgically by weakening the medial rectus muscles at age of 10-11months. Goal is to achieve monofixation syndrome. (by disinserting the muscle from the original position and move it backward according to the degree of deviation i.e. if it was 30 you see in the table how many mm you have to move it back and place the insertion in the sclera)

  Monofixation syndrome is a form of subnormal binocular vision without bifixation. It is often the desired result of strabismus surgery.
- Prognosis: gross stereopsis. (Stereopsis: the visual perception of depth, or the ability to see three dimensionally)

Clinical example:

A 4 month old healthy child presents with a history of eyes turning in most of the time, since he was 8 weeks of age.

Examination: ET for both distance and near 60 PD. Extra Ocular Movement is full. Cycloplegic retinoscopy is +1.25 D. Fundus: normal. Always measure the near and distant deviation

2. Accomodative ET: most common

A. hypermetropic(refractive)

- >+2.00 hypermetropia.
- age>6mo-7years (average 4years).
- High risk of amblyopia.
- Intermittent at onset then constant.
- Corrected totally (<10PD residual N+D) with glasses. N+D= near and distance vision.

Accomodative ET due to hypermetropia corrected with glasses

B. high AC/A ratio:

- The accommodative convergence/accommodation (AC/A) ratio gives the relationship between the amount of convergence (in-turning of the eyes) that is generated by a given amount of accommodation (focusing effort).
- Esotropia with high AC/A ratio (also termed non-refractive accommodative esotropia).
- Treatment is bifocal glasses, not surgical.

C. Partially accommodative ET.

- >10 PD (prism diopter) residual for distance and near vision with full hypermetropic correction.
- Treatment: Surgery for the residual deviation.

Scenario: a patient was given glasses. two months later he comes with residual 10PD or more for Distance+Near with full hypermetropic correction. You need to refract him again to see if there is any hidden hypermetropia. If esotropia >10 PD persist after full hypermetropic correction you go for surgery. Unlike the fully accommodative type mentioned earlier which requires only glasses.

3. Divergence paralysis (Aquired non acommodative ET):

- ET at Distance>Near .
- MRI : arnold chiari, pontine tumor
- First treat the underlying cause then treat the esotropia with surgery

4. **Sensory ET.**
   - ET due to unilatral blindness. A patient with such a problem could have both ways: inward and outward deviation
   - Treatment: Surgical. Usually for cosmetic purposes
5. **Cyclic ET.**
   - Very rare.
   - Acquired (2-6years).
   - Cycle between straight and ET.
   - Treatment: if hypermetropia give glasses. If not hypermetropia you need to do surgery.

Pseudostrabismus:

Pseudoesotropia is a condition in which alignment of the eyes is straight (also known as orthotropic); however, they appear to be crossed.

Due to :

- A flat nasal bridge
- Prominent epicanthal folds.

A careful ocular examination (eg, Hirschberg light reflex, cover test) reveals that the eyes are straight.

Exodeviation (Exotropia)

Definition: A horizontal form of strabismus characterized by visual axes those form a divergent angle.

Types:

1. **Intermittent exotropia X(T).**
   - Acquired, early childhood.
   - Intermittently controlled by fusional convergence.
   - Close one eye in the bright light. Parents notice that. This happens due to the outward drifting of the eye which created a double vision.

Treatment

- Surgical treatment. Which involves lateral rectus muscle
- Non-surgical: alternate patching, Over-minus lenses.

Indications of surgery

1. Poor control.
2. The deviation occurs more than 50%of time.
3. Loss of distance stereopsis.

2. Congenital XT.

- Very rare.
- Constant large angle ↠between the two eyes which is assessed by the prism
- Poor fusion prognosis
- High risk of amblyopia
- Associated with craniofacial abnormalities, albinism, Cerebral Palsy.
- Tx: BLR (bilateral lateral rectus muscle) Weakening.

Exotropia

3. **Sensory XT.**
    - Blind in one eye so it drifts outward.
    - Tx: Surgery.

4. **Convergence insufficiency.**
    - Inability to maintain the convergence on objects approaching from Distance to Near.
    - **Symptoms:** asthenopia(frontal headache), diplopia
    - Exophoria (X) or Exotropia (XT) at Near, Stright at Distance.
    - Remote near point of convergence (normal 5-6cm).
    - Tx: orthoptic exercise.

Amblyopia (lazy eye)

Definition: Amblyopia refers to reduced vision, uncorrectable with glasses or contact lenses, due to failure or incomplete development of the visual cortex of the brain. Eye itself is normal but brain can't translate the image.

- Visual acuity (VA) is <20/40 or worse or 2 lines below the good eye.
- 2 ~4%.
- Almost during visual immaturity till the 9th BirthDay.
- Unilateral or bilateral.

Classification:

- Strabismus Amblypoia
- Refractive Amblypoia
- Occlusive:organic ,cataract
- Idiopathic ,2ry to nystagmus

Diagnosis:

- VA<20/40 OU or in one eye.
- Family history (FHx).
- History of visual deprivation during infancy. like cataract

Amblyopia is diagnosed when the following criteria are met and a cause is identified.

Unilateral:

- Asymmetric objection to occlusion of 1 eye
- Unequal fixation preference behaviour
- Best corrected visual acuity difference between the 2 eyes of 2 or more lines.

Bilateral:

- Best corrected visual acuity less than 20/40 in either eye in a child age 4 and older
- Best corrected visual acuity less than 20/50 in either eye in a child age 3 and younger.

Treatment

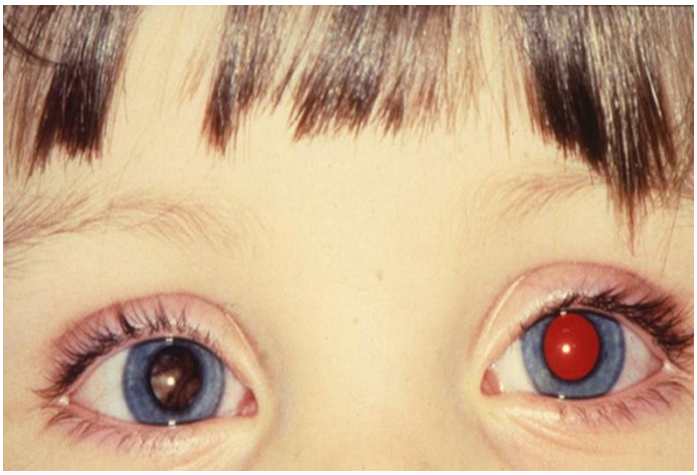
- Optical correction.
- PTO (part-time occlusion) patching as a treatment option, you patch the healthy eye and let the patient use only the diseased one. not during sleep
- Defocusing (penalization). We can use it if the patient refused patching. Penalization is a therapeutic technique performed by optically defocusing the eye having better vision by using cycloplegia (pharmacological penalization) or by altering the eyeglass lens (optical penalization) to cause decreased vision in the non-amblyopic eye. If pharmacological penalization is used it should be used for a short period as atropine has side effects.

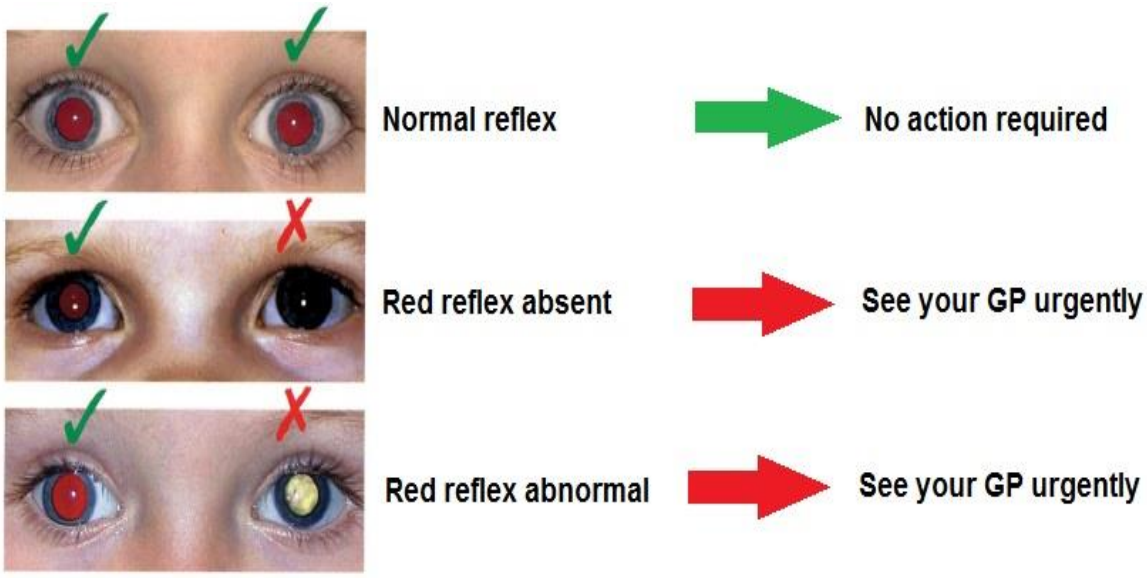
Leukocoria

Definition : white pupil and no red reflex

Differential diagnosis for leukocoria:

- Cataract.
- **Retinoblastoma:** eye tumor**, highly aggressive** and **needs immediate intervention. Treatment is enucleation** (removal of the eye).
  - Children less than 4 years average 18 months
  - It arises from the photoreceptors
  - It's the most common tumor to primary ocular in children
  - Due to random somatic mutation or several germ line inheritance pattern
  - Spreads by extension to the optic nerve toward the brain
  - **Ultrasound is used to rule it out.**
- PHPV: persistent hyperplastic primary vitreous
- COLOBOMA. (coloboma is a developmental defect of the eye occurring at embryonic stage.)
- RD. (retinal detachment)
- Astrocytoma
- Coat's disease, uveitis.




Normal reflex
No action required
Red reflex absent
See your GP urgently
Red reflex abnormal
See your GP urgently

Questions

1. A 3 months old child presented with this lesion:

- What is the diagnosis?

Capillary hemangioma of right eye

- What serious complication of this lesion?

Amblyopia

- What are the indications for surgery in intermittent exotropia?
    a. Poor control.
    b. The deviation occurs more than 50%of time.
    c. Loss of distance stereopsis.

- A child with leukocoria, what is the investigation of imaging you do?

Ultrasound

Done By:

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