

## Leukocoria

Absent of pigmentation in RPE lead to **ocular albinism**

**Red reflex** due to RPE, sometimes not red : yellow golden. seen by ophthalmoscope

If we don't have equal red reflex in both eyes we call it **Leukocoria**



Why?

**Leukocoria** : Can present a pathology in the eye and this pathology is a vision threatening pathology and it might be a life threatening pathology.

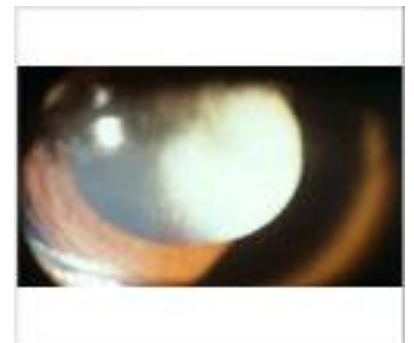
Causes of leukocoria:

- 1- The commonest cause of leukocoria in children :  
**Cataract** . can be **congenital or acquired**, usually causes blurred vision and glare . Acquired cause of cataract in children is **trauma** .
- 2- **Persistent hyperplastic primary vitreous**  
PHPV is a congenital condition caused by failure of the normal regression of the primary vitreous. It is usually associated with unilateral vision loss.

During embryology the blood vessels will come from the optic nerve to nourish the developing lens , this vessels should regress and disappear, if this process did not accomplish in a right way the blood vessels will persist and keep attached to the lens and the lens become pale, there will be an opacity in the lens and the eye become smaller.

(cataract ---> small eye ---> poor vision and leukocoria)

Treatment : remove the opacity in the lens and cut the blood vessels.



### 3- Organized vitreous hemorrhage

vitreous hemorrhage is usually secondary to a neovascular membrane or to a retinal tear. Patients may complain of a red haze, blurred vision, or floaters. When the blood starts to resolve the hemoglobin will give different colors like whitish or yellowish color some fibrous sheets may persist.

A B-scan (ultrasounds) is usually diagnostic and vitrectomy is usually required.

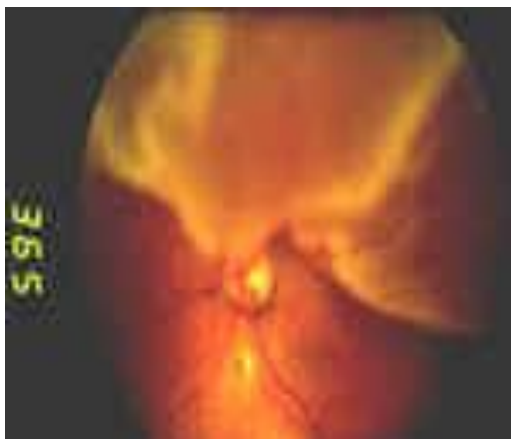


#### 4- Retinal detachment

Why retinal detachment cause leukocoria?

Neurosensory retina are transparent behind it is the retinal pigmented epithelium which give the color of the retina, if those two layers got separated then we will have white color ( leukocoria ). If it is big you will see leukocoria.

Causes of RD: high myopia and trauma.



## 5- Retinopathy of prematurity

During development, the blood vessels grow from the optic nerve and go continuously to the peripheral of the retina and keep going until the 37th week of gestation .

When the baby born prematurely before term (for example 25 week of gestation) the blood vessels only for example grow to mid periphery so they did not cover the peripheral area, so there will be areas which have no blood supply those areas will become ischemic, the body react to the ischemia by formation of new blood vessels but these blood vessels are fragile so they will bleed. The blood contains WBCs, macrophages and fibroblast all this will cause fibrosis and contraction of the retina so the retina will detached.

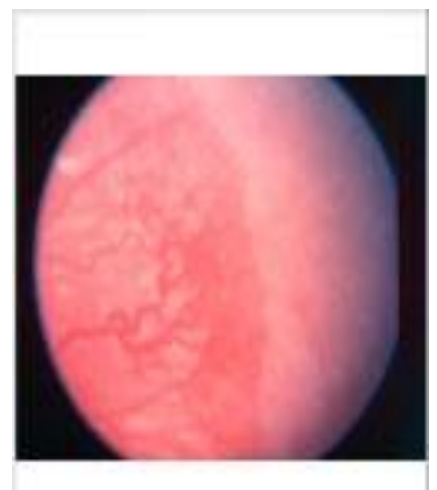
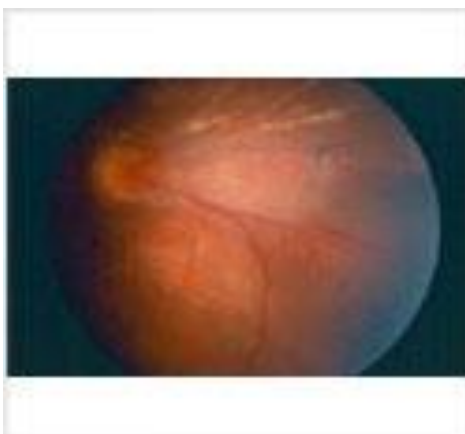
If we did not detect it and treat it, it will cause blindness.

Prematurity is a cause of blindness and leukocoria .

Treatment: by laser to kill the area and reduce the demand of blood.

Detection by screening .

who to screen? Gestational age of 28 weeks or less and Birth weight of 1500 g or less.



## 6- Coloboma

Congenital condition caused by incomplete closure of the fetal fissure. Degree of visual loss related to area affected (iris, retina, choroid, or optic nerve head)

- When it is involve the iris it will cause absence of the iris tissue ( the iris become incomplete) It will give : key hole OR cat eye appearance.



- When the coloboma extend backward to the retina and retinal pigmented epithelium so there will be no retina no retinal pigmented epithelium, there is only sclera ( whit area ) , if it is big it will give leukocoria.



- If the it is involve the macula it will cause poor vision.

## 7- Medullated nerve fibers

congenital anomaly caused by myelination of the retinal nerve fibers and usually asymptomatic.

When large areas are involved it can cause leukocoria.

There are 1.2 million nerve fibers and they should not be myelinated.

If the myelin involve the nerve fibers in the macula it cause poor vision .

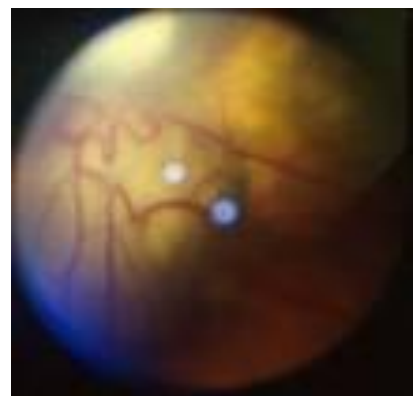
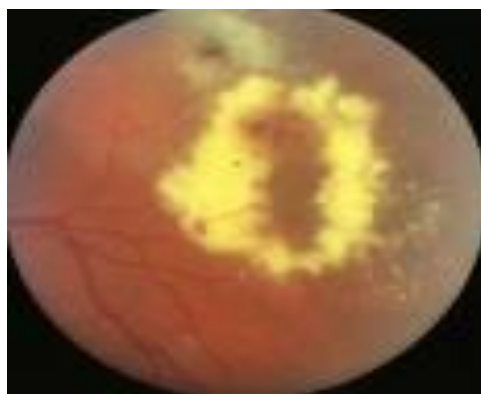
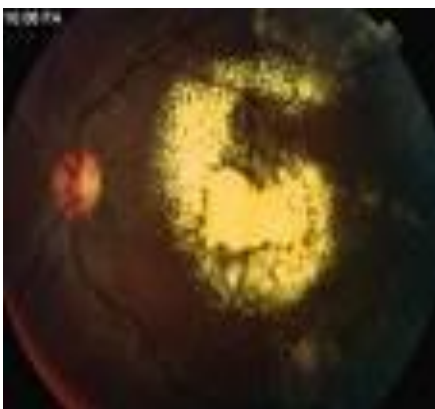


## 8- Coat's disease:

Typically a unilateral condition found in young boys. It is characterized by retinal telangiectasia and aneurysms that may cause exudative retinal detachments.

Telangiectasia of the blood vessels, the blood vessels will leak out lipid and cause exudates (exudates are lipid).

Treatment : by laser the leaking point.



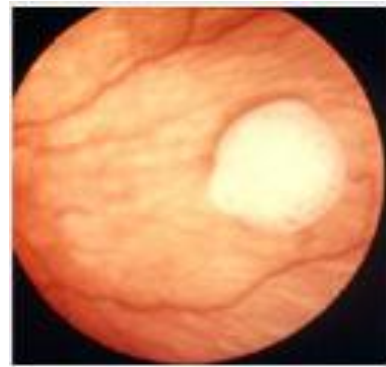


## 9- Retinoblastoma:

Life threatening , most common primary, malignant, intraocular tumor of childhood but still a rare tumor. Vast majority become apparent before age of 3yrs. It results from malignant transformation of primitive retinal cells before final differentiation. Presentation is most commonly(60%) with leukocoria and strabismus.

Treatment: by Chemotherapy, radiation or Enucleation of the eye ( removing of the eye ) depend on: the size of the tumor and the distance from the optic nerve.

If the tumor involves the optic nerve , it will go back to the brain and this what kill the patient.



## **Strabismus**

Definition: Any ocular misalignment or tendency toward misalignment.

We need two straight eyes to have : Binocular vision.

What is Binocular vision? Depth of the image , we have binocular vision to appreciate the depth of the image.

In order to have binocular vision we have to have :

- Two eyes.
- The image should fall on the fovea in both eyes.  
Then both eyes will send both images ( from the right and the left) to the cortex.  
The images which are sent from the retina are upside down , and when they reach to the cortex the brain will turn them up like what we see in the reality.

In order for the brain to unify the two images, the two images from both eyes should be similar in : size, shape and clarity.

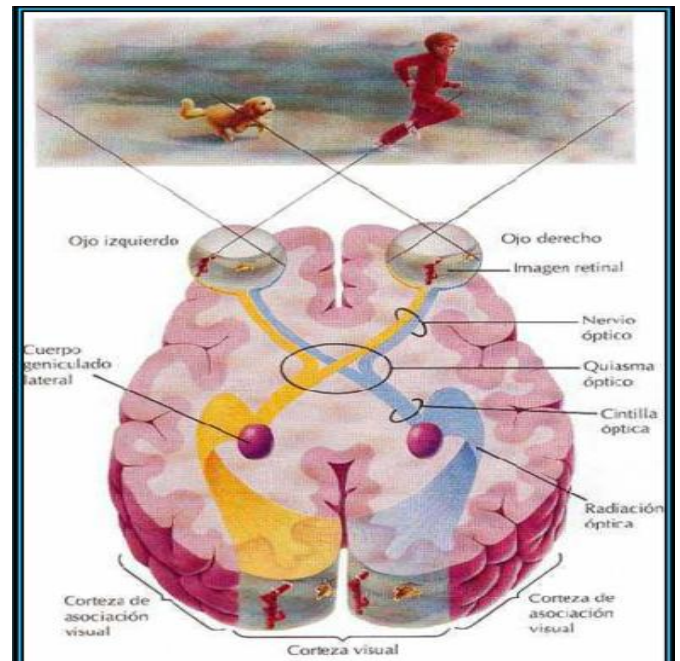
For example:

Clarity:

Child have cataract in the left eye, so the image that comes from the left eye is not clear as the image from the right eye,



when the brain comes to unify the two images the brain will find them different from each other in clarity, so the brain will take the clear and the good one and cancel the other image, if it is not treat it the brain will continue to cancel the image from the abnormal eye and this will lead to lazy eye or **Amblyopia**.



### Main 3 Causes of amblyopia:

- ❖ Strabismus
- ❖ Media clarity : congenital cataract, ptosis, vitreous hemorrhage , retinal mass and corneal opacity.
- ❖ Anisometropia (different in refractive error between two eyes : one eye -10 and the other 0) because the difference is big the image in one eye (-10) is smaller than the image in the other eye (0) so the brain cannot unify them so the brain will cancel one eye and become amblyopic.

But if the difference is small -2 or -3 the brain can unify them. Same thing in case of hyperopia if the difference is big between the eyes .

How do we detect children in the community with anisometropia? by screening

How much the difference between the eyes to call it Anisometropia?

- In case of myopia: -3 .... Ex. One eye -2 and the other -4 this is NOT anisometropia. If one eye -6 the other -2 in this case we can call it anisometropia.
- In case of hyperopia and astigmatism the difference should be 1.5 or more to call it anisometropia.

Child one eye +1 the other +3 , the image from +1 clearer than the image from +3 , the brain cannot unify them, so the brain will cancel the image from +3 which lead to amblyopia due to clarity.

Anisometropia cause amblyopia due to clarity but BIG anisometropia cause amblyopia due to the difference in size.

- shape: corneal problem

The common cause in our country is **keratoconus**.

The cornea send different shape of images and again the brain cannot unify them .

The image should focus on the foveal area in both eye in order to have binocular vision , so the eyes should move together, this is the function of Extraocular muscles.

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Strabismus :

Prevalence of strabismus in children : 4% in adult: 1%

The consequence of strabismus is amblyopia.

Why strabismus cause amblyopia?

the image in one eye will fall in the fovea but in the other eye the image will fall away from the fovea so there will be a difference in the clarity and this will lead to amblyopia.

How do we treat amblyopia in children?

We cover the eye.

Squint in children will not cause diplopia because the brain can suppress the eye but in adult the brain cannot suppress the eye and the visual system are mature so they do not have diplopia.

- Two type of strabismus:
- **Esotropia**: inward deviation of the eye. This is the commonest type of strabismus.



Types of esotropia:

Congenital or infantile : the child born with it , starts in the first 6 months of life. Treat him at 1 year old, surgery to Correct the muscle. Unknown cause.

**Accommodative**: the commonest type of esotropia.

Near reflex 3 things:

- 1- Accommodation.
- 2- Meiosis.
- 3- Convergence.

Hyperopic patients accommodate in order to increase the refraction power to make image fall on the retina.

In 2 years old child who have hyperopia he need accommodation and convergence if not treated it will lead to accommodative esotropia. But not all hyperopic patient will have esotropia.

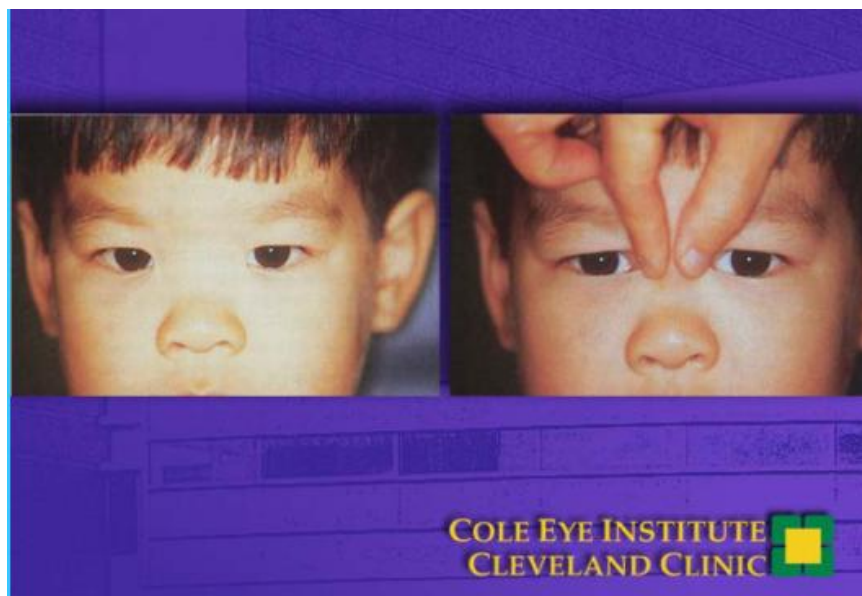
### Acquired non-accommodative:

Not common in children, the patient has esotropia but it is not congenital esotropia and does not have hyperopia.

Causes : Tumor in the brain or neurological cause.

### Pseudo-strabismus:

Cause: Wide epicanthal folds. Test: cover uncover test it is the definitive test and Hirshberg test (when we shine the light on the eyes , the light spot falls on the center of the pupil in both eye means it is normal ) .



**Alternating esotropia:** estropia moving from eye to the other , not fixed in one eye . It is good and it will not cause amblyopia.

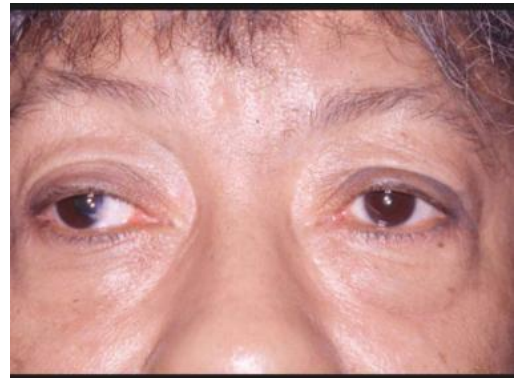


- **Exotropia:** Outward deviation. Commone in myopic patients.

**Intermittent.** So Exotropia is not associated with ambyopia like esotropia.

Types:

Congenital : very very rare.

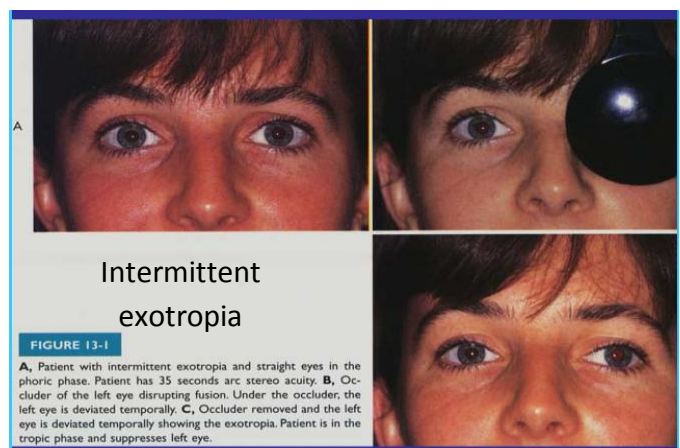


Intermittent : hirshberg test normal but cover uncover test shows mild exotropia.

**This is the commonest type of exotropia.**



Congenital exotropia



All the previous types of strabismus are horizontal strabismus.

We have vertical strabismus:

- acquired : in case of trauma there will be fracture in the floor of the orbit so the eye will not move , when the patient try to look u one eye will move but the other will not so he will have diplopia.



Other example of vertical strabismus : myasthenia graves, multiple sclerosis and thyroid eye disease.



Examples of acquired squint:

- 3<sup>rd</sup> nerve palsy: 3<sup>rd</sup> nerve supply all the muscles except superior oblique and lateral rectus muscle. When it is injured all the muscles will not work except the superior oblique and the lateral rectus so the child will have squint.

It is uncommon in children so we need to image the brain to discover the cause because it is neurological.



- 4<sup>th</sup> nerve palsy: when it happen in children they will have head tilt.



- 6<sup>th</sup> nerve palsy: the patient will have esotropia in the normal eye when he looks laterally.

When we look to the patient's eyes they will be straight , but we ask him to look to the left ( left gaze ) the affected eye will not move but the normal eye will move toward the midline so he will have esotropia .

The most common cause of 6<sup>th</sup> nerve palsy in our community is: **Diabetes** , we call it 6<sup>th</sup> nerve paresis , why? **Microvascular occlusion**.



Thyroid eye diseases can give any kind of strabismus.

# Done