Chronic visual loss

Ophthalmology Team

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Sources : notes during lecture

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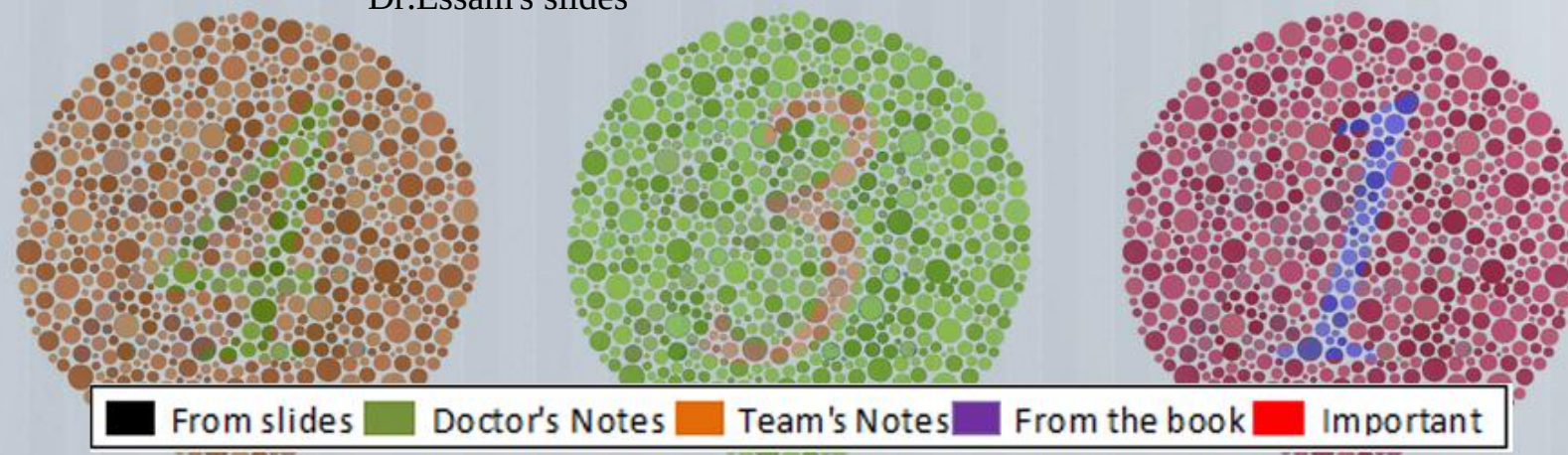
Lecture notes-11th edition

Dr.Essam's slides



- **Definition of chronic visual loss**: gradual decrease in visual acuity.
- **What questions would you ask a patient with chronic visual loss?**

1-Duration 2- onset 3- unilateral or bilateral

- **Possible causes of chronic visual loss:**

i. **Cornea**: Refractive errors, corneal dystrophy, scars
ii. **Lens**: Cataract, lens subluxation (same meridian), dislocation(forward and backward).
iii. **Anterior chamber**: Anterior uveitis.
iv. **Vitreous**: Vitreous hemorrhage, vitreous opacification
v. **Retina**: Diabetic retinopathy, retinal detachment, macular degeneration.
vi. **Optic nerve**: Glaucoma, MS, optic disk atrophy (use of ethambutol)
vii. **Optic chiasm**: Pituitary adenoma.

The Tx of full thickness corneal laceration is suturing.

1-Cataract:

Cataract is the name given to any light - scattering opacity within the lens wherever it is located. When it lies on the visual axis or is extensive, it gives rise to visual loss. Cataract is the commonest cause of reversible chronic visual loss in the world. The large majority of cataracts occur in older subjects**.** A smaller number are associated with specific ocular or systemic disease.

Possible ocular causes of cataract:

- Trauma.
- Uveitis.
- High myopia.
- Topical medication (particularly steroid eye drops).
- Intraocular tumor.

Possible systemic causes of cataract:

- Diabetes.
- Other metabolic disorders (including galactosaemia, hypocalcaemia, Fabry disease).
- Systemic drugs (particularly steroids, chlorpromazine).
- Infection (congenital rubella).
- Myotonic dystrophy.
- Atopic dermatitis.
- Systemic syndromes (Down ' s, Lowe ' s).
- Congenital, including inherited, cataract.
- X – radiation

Classification

1-morphologic
nuclear, sub-capsular, cortical
2-maturity
immature, mature, intumescent, hypermature
3-age of onset
Congenital, infantile, presenile. Senile

-Steroids use causes posterior subcapsular cataract.

-Senile cataract is an age-related.

Management:

Congenital: lens aspiration ±IOL
Aquired:
ICCE
ECCE
ECCE IOL
PHACO IOL

ICCE: Intracapsular Cataract Extraction
ECCE: Extracapsular Cataract Extraction
ECCE IOL: Extracapsular Cataract Extraction with Implantation of the Intraocular Lens.
PHACO IOL:
phacoemulsification With Intraocular Lens Implantation

2-Glaucoma:

Glaucoma is an acquired or congenital chronic optic neuropathy characterized by optic disk cupping and visual field loss. It is usually associated with increased IOP. We only control the IOP.

Often asymptomatic in early stages (because only peripheral vision is affected).
One of the Most common causes of irreversible chronic visual loss.

Pathophysiology:

The intraocular pressure level is determined by a balance between production and removal of aqueous humour. Aqueous is actively secreted into the posterior chamber by the ciliary processes, by a combination of active transport(NA/K ATPas and carbonic anhydrase) and passive (ultrafiltration). It then passes through the pupil into the anterior chamber and leaves the eye, predominantly, via the trabecular meshwork, Schlemm's canal and the episcleral veins to reach the bloodstream (the conventional pathway). A small but important proportion of the aqueous (4%) drains across the ciliary body into the supra-choroidal space and is absorbed into the venous circulation (the uveoscleral pathway).
Two theories have been advanced to explain how elevated intraocular pressure, acting at the nerve head, damages the optic nerve fibres:
1 Raised intraocular pressure causes mechanical damage to the axons.
2 Raised intraocular pressure causes ischaemia of the nerve axons by reducing blood flow at the nerve head.

Classification of Glaucoma:

1)Primary acute (Angle closure) Glaucoma (the iris covers the angle). Will be discussed in acute visual loss
2) Primary Chronic (Open angle) Glaucoma.

3) Congenital Glaucoma.
4)Secondary glaucoma: trauma, steroids.

Primary open angle glaucoma:

A special contact lens applied to the cornea (a gonioscopy lens) provides a view of the iridocorneal angle with the slit lamp. In open angle glaucoma the trabecular meshwork appears normal on gonioscopy but functionally, it offers an increased resistance to the outflow of aqueous. This results in an elevated ocular pressure. The causes of outflow obstruction include:

- thickening of the trabecular lamellae, which reduces pore size;
- reduction in the number of lining trabecular cells;
- increased extracellular material in the trabecular meshwork spaces.

A form of glaucoma also exists in which glaucomatous field loss and cupping of the optic disc occurs even though the intraocular pressure is not raised (normal tension or low tension glaucoma). It is thought that the optic nerve head in these patients is unusually susceptible to the intraocular pressure and/ or has an intrinsically low blood flow.

Symptoms:

- Raised intraocular pressure.
- Visual field defect (peripheral vision is affected.)
- Cupped optic disc.

2 out of 3 must be present.

Signs:

- Symptomless in its early stages.
- A white eye and clear cornea.

Treatment:

1 medical treatment; carbonic anhydrase inhibitors (**Acetazolamide)**
2 laser treatment;
3 surgical treatment.

In congenital glaucoma the definite treatment is surgery

There are 2 directions of fibers of retina:
Horizontal and vertical line. In glaucoma the horizontal raphe (MCQ) are damaged, Particularly the superior and inferior temporal fiber. The vertical midline is Involved in neurological diseases. --- Horizontal lines are weaker than vertical ones; this is why they get affected first by pressure. Papillomacular bundle is the strongest fiber bundle in the retina and it gives the best vision; it is between the fovea and the optic nerve.

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3-Macular degeneration:

Age related
Some degree of visual loss associated with drusen &atrophy of RPE
Sub-retinal neovascularization
Drusen are hyaline nodules (or colloid bodies) deposited in Bruch's membrane, which separates the inner choroidal vessels from the retinal pigment epithelium. Drusen

maybe small and discrete or larger, with irregular shapes and indistinct edges. Patients with drusen alone tend to have normal or near normal visual acuity ,with minimal metamorphopsia

Macular Anatomy:
The macula is an oval area situated about 2 disc diameters temporal to the optic disc. The macula is composed of both rods and cones and is the area responsible for detailed, fine central vision. The central macula is a vascular and appears darker than the surrounding retina. The fovea is an oval depression in the center of the macula. there is a high density of cones but no rods are present. The central depression of the fovea may act like a concave mirror during ophthalmoscopy, producing a light reflection (i.e., foveal reflex).

Relevance:

In the United States, age-related macular degeneration is the leading cause of irreversible central visual loss(20/200 or worse) among people aged 52 or older.

Because certain types of macular degeneration are treated effectively with laser, it is important to recognize this entity and to refer for appropriate care.

It is important to distinguish between the possible causes of visual loss, whether cataract (surgically correctable), glaucoma (medically or surgically treatable), or macular degeneration (potentially laser treatable).

As the most common cause of vision loss among people over the age of 60, macular degeneration impacts millions of older adults every year. The disease affects central vision and can sometimes make it difficult to read, drive or perform other activities requiring fine, detailed vision.

Symptoms:

metamorphopsia,(distorted vision)

micropsia (objects are perceived to be smaller than they actually are)

central scotoma (visual loss)

Types :
Dry (Non-−exudative): 90%, slow progressive, atrophy of RPE(Retinal pigmented epithelium) and photoreceptors
Wet type(exudative): 10%, RPE detachment and choroidal neovascularization.

Tests:
V/A
Pupillary light reaction
Color vision
Ophthalmoscopy
Amsler grid (a grid of horizontal and vertical lines used to monitor a person's central visual field)
Photosterss test
Laser inferometry
Flourescine angiography

Risk factors:

Non-−modifiable:
• Age • Race • Gender •Genetics
Modifiable:
• Smoking • High Blood Pressure • High Cholesterol • Poor Nutrition
• Unprotected Exposure to Sunlight • Ultraviolet (UV) light • Excessive Sugar Intake • Obesity • Sedentary Lifestyle

Treatment:
Dry type:
Observe
Low vision aids (magnifier, closed circuit television).
Anti---oxidants, green leafy vegetables.
Sunglasses,
visors.
Wet type:
Laser photocoagulation for neovascularization.
50% of choroidal neovascularization cannot be treated initially.
No definitive treatment for disciform scarring.
Photodynamic therapy with verteporfin
Intravitreal injection of anti-angiogenesis growth factor.

4-Diabetic retinopathy:

Pathophysiology: microvascular occlusion and leakage**.**

Occlusion	leakage
Thickened capillary basement membrane ⇩ Capillary endothelial cell damage ⇩ Changes in RBC ⇩ Retinal ischemia ⇩ AV SHUNT ⇩ NEOVASCULARIZATION + Presence of Cotton wool spots	Loss of pericyte cells between endothelial cells ⇩ Leakage of plasma constitute in the retina (exudate) + Presence of exudates and hemorrhage

Types
1. Non proliferative
2. Proliferative
3. Macular edema

Treatment:
1. Non proliferative: observation
2. Proliferative: pan retinal photocoagulation
3. Macular edema: focal ⇨ focal laser
   Diffuse ⇨ grid laser

Neovascularization > diabetic patient refuses to do laser > Secondary open angle Glaucoma develops > Leakage of the vessels > Fibrosis > Closed angle Glaucoma > Sudden increase in the IOP > Neovascular Glaucoma. --- If the angle Is closed > can't treat. --- If the angle is still open > we can treat with steroids (decreased edema) And Atropine (decreases ciliary body spasms and dilates The pupils). Causes of neovascular Glaucoma: --- Diabetic retinopathy. (Chronic visual loss) --- Central vein occlusion. (Acute visual loss)

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Summary:

- Chronic visual loss is a gradual decrease in visual acuity.
- Most common causes are:

  1-Cataracts: most common cause of reversible chronic visual loss

  2-Glaucoma: open angle glaucoma and long term steroids use are associated with chronic visual loss.

  Symptoms are : • Raised intraocular pressure.
  • Visual field defect (peripheral vision is affected.)
  • Cupped optic disc

  3- age-related macular degeneration: is the leading cause of irreversible central visual loss in the United States,

  Symptoms are : metamorphopsia, micropsia and central scotoma.

4- Diabetic retinopathy:is the commonest cause of irreversible chronic visual loss in our country