GUIDE LINE TO SOLVE EYE SCENARIOS

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RMC

I have tried my best to right them accurately, kindly do point out if you find any mistake

PART 1

TOPICS= RETINA, VITREOUS, OPTIC NERVE

Normal retina

PART 1 = SYMPTOMS
Most of the scenarios, we come across have the words LOSS OF VISION

Now see the onset, is it SUDDEN or GRADUAL

If its **SUDDEN** then the causes can be

- **PAINFUL** = TRACK (temporal arteritis, retrobulbar neuritis, Acute congestive glaucoma, corneal Hydrops in Keratoconus, keratitis)
- **PAINLESS**= any artery/venous occlusion at retina(CRAO/BRAO/CRVO/BRVO), Retinal detachment, vitreous hemorrhage

Similarly **GRADUAL** will be having

- **PAINFUL**: Any inflammation in anterior part of eye like cornea (KERATITIS), Sclera (SCLERITIS), uveal (chronic IRIDO CYCLITIS)
- **PAINLESS**: DR-COCK= diabetic retinopathy, refractive error, cataract, optic atrophy, chronic open angle glaucoma, Keratoconus

Now a third category is **TRANSIENT LOSS OF VISION** (vision returns to normal within 24 hrs, usually in 1 hr)

This is seen with either ischemia or any arterial condition

- **Ventrobasilar insufficiency**
• Migraine (remember vasodilation of vessels leading to throbbing headache)
• Prodromal phase of CRAO
• Amaurosis fugax
• Giant cell arteritis

Now the next thing is

NIGHT BLINDNESS

It can occur in

• Vit A deficiency
• Congenital
• Retinitis pigmentosa
• Peripheral cortical cataract
• Advanced PAOG

DAY BLINDNESS

It occurs with any type of **CENTRAL OPACITY** or RARELY absence of cones.

• Nuclear cataract
• Central corneal opacity
• Central vitreous opacity
• Congenital deficiency of cones
Now

FLOATERS

They are spots moving in front of eye, remember they are in chambers and chambers contain fluid so your patient will see them floating in front of eyes

- Vitreous hemorrhage
- Vitreous degeneration
- Posterior vitreous detachment
- Intermediate uveitis
- Choroiditis (exudates in vitreous)
- Retinal break (bcz its related to vitreous detachment)
- MIGRAINE

PHOTOPSIA

It is the light flashing in front of eyes

It is seen in MIGRAINE as well as vitreous/retinal conditions

- Posterior vitreous detachment
- Retinal detachment
- Migraine

AFFERENT PUPILLARY DEFECT

It is also called MARCUS GUNN PUPIL
When there is **UNILATERAL** damage to anterior visual pathway, conduction defects arise, they are called **RELATIVE AFFERENT PUPILLARY DEFECTS**

There are 2 conditions

- The optic nerve of **ONE** side is damaged (**OPTIC NEURITIS, OPTIC NEUROPATHY**)  
- The retina has extensive damage like in **CRVO**

**U will never find them in BILATERAL SYMETRICAL OPTIC NERVE OR LESION & also in opacities of ocular media ( corneal scar, cataract, vitreous hemorrhage)**  

**DIAGNOSIS by SWINGING FLASH LIGHT TEST**

**CHERRY RED SPOT**

Occurs in 2 conditions

1. **CRAO**  
2. **Storage diseases (nieman pick, tay sach’s)**

**RETINAL HEMORRHAGES**

They depend on which layer of retina is involved.
1. If nerve fibre layer is involved, they will arise from large superficial pre-capillary arterioles. The architecture of nerve fibres is such that they will be **FLAMED SHAPED**

2. If hemorrhage is in **middle layer of retina** then there are 2 conditions
   - Hemorrhage from **venous end** of capillaries (intraretinal hemorrhage) = **DOT/ BLOT shaped**
   - Hemorrhagic infarcts = deeper dark round hemorrhages (**DARK/BLOT shaped**)

Now hemorrhages occurs in following condition
   - Diabetic retinopathy
   - Hypertensive retinopathy
   - CRVO/BRVO
   - Age related macular degeneration (wet type)
   - Sickle cell anemia

**COTTON WOOL SPOTS**
   - Diabetic retinopathy
   - Hypertensive retinopathy
   - CRVO

**HARD EXUDATES**

They are caused by chronic localized retinal edema. They are composed of lipoprotein & lipid filled macrophages
• Diabetic retinopathy
• Hypertensive retinopathy
• CRVO
• PAPILLOEDEMA

TUBULAR VISION

Acquired conditions of night blindness may have tubular vision

• Retinitis pigmentosa
• Advanced Glaucoma
• PRP (panretinal photocoagulation)

CENTRAL SCOTOMA

TOM-Cat

• Tobacco amblyopia
• Optic neuritis/ occipital cortex lesion
• Macular hole
• Compressive optic neuropathy

PART 2 : DISEASES
1. **Optic neuritis**

- Acute/subacute visual loss = unilateral or bilateral (viral)
- Pain on extraocular movements
- Reduced VA + impaired color vision (red, green) + RAPD + tenderness of globe + deep orbital pain/ brow pain
- Fundoscopy = swollen disc with inflammatory cells in viterous (papillitis)
- Swollen disc with inflammatory cells in viterous + macular star (neuroretinitis)

**MACULAR STAR**

- Perimetry = central/ centrocaecal scotoma
- Visual evoked potential = abnormal
2. Papillitis
- Blurred disc margin
- Hyperaemic disc
- Engorged vessels
3. Papilloedema
Headache + nausea/vomiting + deterioration of consciousness + unilat/bilateral greying out/blacking out of vision many times a day for 10-15 sec + diplopia.
Normal VA + normal pupillary reactions + hyperemic disc with elevated blurry margins + obscured blood vessels as they cross disc margin, tortuous veins + absent venous pulsation + hard exudates + cotton wool spots + hemorrhage + macular star (Deposits of hard exudates material, mainly lipids, in Henle's fibre layer radiating out in a star-like pattern) + retained central cup + paton’s lines
Papilloedema
• Champagne cork appearance in longstanding papilloedema, Dec VA & Blind spot enlarged
4. **Optic atrophy**

- VA reduced + altered color vision + reduced contrast sensitivity + **Afferent pupillary defect** + visual field defect
- PRIMARY OPTIC ATROPHY= Chalky white optic disc with clear margins + **No sheathing** of vessels
PRIMARY OPTIC ATROPHY

- Chalky white optic disc with clear margins
- LC more visible
- No sheathing of vessels

SECONDARY OPTIC ATROPHY = Grey / dirty white optic disc with blurred margins + sheathing of vessels
VITREOUS

1. VITREOUS LIQUEFACTION

Floaters (black moving spots) + loss of fibrillar structure + pockets of fluid with coarse aggregate materials that moves freely in vitreous
2. **POSTERIOR VITREOUS DETACHMENT**

Above 60 yr + flashes of light + floaters + a ring like opacity
3. **MUSCAE VOLITANTES**

Physiological opacities represent residue of hyaloids vasculature + black spots like small mosquitoes
4. **ASTEROID HYALOSIS**

Small white round bodies + Ca containing lipids + history of DM, Hypercholesteremia + unilateral + old age + asymptomatic
5. **SYNCYSIS SCINTILLANS**

Small white angular & refractile bodies + made of **cholesterol** + affects already damaged eyes + **golden shower appearance** + symptomatic but untreatable
6. **INFLAMMATORY OPACITIES**

Pouring of inflammatory exudates in vitreous sec to iridocyclitis, post uveitis, endophthalmitis.

7. **AMYLOID DEGENERATION**

Rare + bilateral + deposition of amyloid in vitreous

8. **PERSISTENT HYPERPLASTIC PRIMARY VITREOUS**

Cataracts Associated with Persistent Fetal Vasculature
9. VITREOUS HEMORRHAGE

Can change into

- Absorption
- Organization forming yellow white debris
- Retinal detachment
- **Ghost cell glaucoma** (Following a vitreous hemorrhage episode, blood breakdown products may accumulate in the trabecular meshwork. Hemolyzed erythrocytes may obstruct aqueous outflow and lead to a secondary open-angle glaucoma known as ghost cell glaucoma.)

**Small hemorrhage**

Sudden development of floaters + black shadow in red glow (distant direct ophthalmoscopy)
See black shadows in red glow

**Large hemorrhage**

Sudden painless loss of vision + no red glow (distant direct ophthalmoscopy)
No red glow
1. DIABETIC RETINOPATHY

Background Diabetic retinopathy

- Microaneurysms
- Haemorrhages (flame-shaped = superficial, dot:blot=deep)
- Hard exudates (plasma proteins + lipids + have yellow waxy appearance with relatively distinct margins)
- Retinal edema= gives cystoid appearance to macula
Background Diabetic retinopathy

Fig. 14.7
Background diabetic retinopathy:
(a) clinical features;
(b) location of lesions
(Courtesy of Wilmer Institute)
Preproliferative DR

- VASCULAR CHANGES (venous= beading, looping, sausage like segmentation) (arterioles= narrow)
- COTTON WOOL SPOTS = whitish grey areas with indistinct margins
- DARK: BLOT HEMORRHAGES (hemorrhagic renal infarcts)
- INTRARETINAL MICROVASCULAR ABNORMALITIES : arteriovenous shunts
Proliferative diabetic retinopathy

- NEOVASCULARIZATION (new vessel at disc (NVD), new vessels elsewhere (NVE) along course of internal temporal vascular arcades or else where.
- VITREOUS DETACHMENT
- HEMORRHAGE
- PRERETINAL HEMORRHAGE (retrohyaloid space)
- VITREOUS HEMORRHAGE
Proliferative diabetic retinopathy

Fig. 14.27
Proliferative diabetic retinopathy. (a) Clinical features; (b) location of neovascularization (Courtesy of Wilmer Institute)
ADVANCED/COMPLICATED STAGE

- Persistent viterous hemorrhage
- Retinal detachment

2. HYPERTENSIVE RETINOPATHY

GRADING IN OLD INDIVIDUALS by keith wegenar & barker

Grade 1
• Generalized arteriolar constriction + broadening of arteriolar light reflex + concealment of vein by arteriole

**Grade 2**

- Grade 1 + focal arteriolar constriction + deflection of vein at arteriovenous crossing (Salu’s sign)

**Grade 3**

- Grade 2 + retinal edema + hard exudates + cotton wool spots + hemorrhage
- Copper wire appearance of arterioles
- Banking of veins distal to AV crossing (Bonnet’s sign)
- Tapering of veins on either side of crossing (Gunn’s sign) and right angled deflection of vein
Grade 4

- Grade 3 + disc edema + silver wire appearance of arterioles
Hypertensive Retinopathy - Grade 4

- Flame haemorrhage
- Hard Exudates
- Papilloedema
- Cotton Wool Spot
MALIGNANT HTN = bilateral papilloedema

Toxemia of pregnancy

- Raised BP + proteinuria + edema in pregnancy (usually last trimester)
- STAGE OF ANGIOSPASM (narrowing of nasal arteries followed by generalized narrowing)
- STAGE OF HYPOXIC RETINOPATHY (retinal edema + hard exudates + cotton wool spots + hemorrhage + macular
star/ flat macular detachment + exudative retinal detachment

• COMPLICATION = loss of life of mother/fetus, loss of vision

3. CENTRAL RETINAL VEIN OCCLUSION

Ischemic CRVO

• Sudden onset of severe visual loss
• VA = usually counting fingers or worse
• Marked Afferent pupillary defect
• Raised IOP

**FUNDOSCOPY=** dilated engorged retinal veins + Dot:blot & flame shaped hemorrhages present in all 4 quadrants and post pole (**tomato splashed appearance**)

• cotton wool spots + severe optic disc & macular edema
Ischemic CRVO
Non ischemic CRVO

- Most common
- Sudden onset of unilateral painless deterioration of vision
- VA= moderate to severe visual loss
- Mild/absent Afferent pupillary defect
- Raised IOP
- FUNDOSCOPY= absence of spontaneous venous pulsation + dilated engorged retinal veins + Dot:blot & flame shaped
hemorrhages present in all 4 quadrants and most numerous in periphery + cotton wool spots + mild optic disc & macular edema

4. **BRANCH RETINAL VEIN OCCLUSION**
   - Edema & hemorrhages **limited to retinal area drained by affected vein**
   - Vision affected only when macular area involved
   - Cotton wool spots
   - Sec glaucoma rarely
5. **CENTRAL RETINAL ATERY OCCLUSION**

- **Amaurosis fugax** = monocular repeated transient episodes of decreased vision /blindness that may occur before visual loss
- Sudden painless severe loss of vision
- **VA** = profound loss of vision even up to no perception of light
- **Pupil** = direct pupillary light reflex is absent (total afferent pupillary conduction defect)
- **FUNDUS** = whitish (opaque) retina + extremely thin retinal arteries + almost normal veins + blood column in veins may be segmented (cattle tracking sign) + cloudy retina + cherry red spot + after few weeks edema subsides, arteries thread like, optic atrophy
6. **BRANCH RETINAL ARTERY OCCLUSION**
   - Retina distal to occlusion becomes edematous with narrow arterioles
   - Later involved area atrophied= permanent **sectorial visual defect**
7. AGE-RELATED MACULAR DEGENERATION

ATROPHIC ARMD = gradual impairment of central vision (month – yrs) + affects both eyes asymmetrically + focal hyperpigmentation / atrophy of RPE & drusen at macula + sharply circumscribed areas of RPE atrophy + loss of choriocapillaries + geographical atrophy of RPE atrophic area increases and coalesce -> preexisting drusen disappears & choroidal vessels become visible
EXUDATIVE ARMD = sudden deterioration of central vision + metamorphosia + sharply circumscribed dome-shaped elevation due to detachment of RPE by fluid at posterior pole + exudates & hemorrhage in macular area leading to fibrous disciform scar at macula.
Exudative ARMD
8. CENTRAL SEROUS RETINOPATHY

Usually unilateral + male (20-40 years) + sudden onset of unilateral painless blurred vision associated with positive scotoma + metamorphosia (wavy distortion of images) + micropsia + decreased visual acuity (correctable with weak + lens), hypermetropia on retinoscopy + oval/round elevation of sensory retina of macular area demarcated by circular ring reflex + absent/ distorted foveal reflex + amsler gird test to confirm metamorphosis + FFA (ink: spot/expansile dot pattern or smoke-stack pattern or mushroom/umbrella like pattern or multiple leak pattern)
Central serous chorioretinopathy (CSCR)

Fundus Fluorescein Angiogram Showing Central Serous Retinopathy OS

9. RETINOPATHY OF PREMATURITY
I- **Demarcation line** between normally vascular & peripheral non-vascular area

II- **elevated pink ridge** representing mesenchymal shunt joining venules & arterioles

III- **ridge + extra-retinal fibrovascular proliferation** + neovessels leading to retinal hemorrhage

IV- regression, cicatrition

V- total retinal detachment
10. **RETINITIS PIGMENTOSA**

Hereditary + initially rods affected eventually all rods & cones destroyed + photoreceptor dystrophy occurs starts at equatorial region leading to ring scotoma + tubular vision ultimately leading to blindness + reduced VA + normal color vision + RETINA shows thread like vessels + pigmentary bone corpuscles/ bone spicules + pale wax appearance of optic disc + maculopathy + vit A & E can delay the onset of blindness
11. **RETINOBLASTOMA**

Most common intraocular tumor of childhood + gene on 13q14 + leukocoria + strabismus + defective vision + secondary
glaucoma + pseudohypopyon + proptosis (advanced stage) +

FUNDOSCOPY=

• **ENDOPHYTIC TYPE** = pale pink or white mass with newly formed vessels on its surface
• **EXOPHYTIC TYPE** = appearance of exudative retinal detachment + subretinal mutilobulated white mass
• Pearly white surface of tumor & chalky white inside

**Retinoblastoma**

**ENDOPHYTIC RETINOBLASTOMA**
12. **RETINAL DETACHMENT**

[Image of retinal detachment]
RHEGMETOGENOUS = floaters + flashing light (photopsia) + sudden painless fall of vision + field defects (dark curtain) + decreased V.A + RAPD in case of total detachment + decreased IOP by 5 mmHg + mild anterior uveitis + shaffer’s sign (anterior vitreous shows tobacco dust like opacities) + RETINA shows grey/translucent appearance + loss of normal choroidal pattern + bullous/corrugated appearance + tortuous dark blood vessels + arteries & veins appear to have blood of same color
• **TRACTIONAL** = viterioretinal band + decreased retinal mobility + increased elevation of retina at site of traction

• **EXUDATIVE/SEROUS** = smooth, convex appearance + change in position of detached area with gravity.
PART 3: SOLVED SCENARIOS

SPECIAL THANKS TO
AFTAB ARIF (CMH)

1) A 20 year old boy presents with c/o difficulty seeing in dim light, his elder brother has similar condition. o/e media clear but multiple black spots seen on fundus= RETINITIS PIGMENTOSA
2) A 65yr old with h/o gradual painless deterioration of vision in his both eyes during last several months, D/D
   - Age related macular degeneration
   - glaucoma
   - Senile cataract
   - Optic atrophy

3) 65 yr old pseudophakic woman has developed sudden painless loss of vision in lower half of field of vision in right eye. Which part of retina is affected.
   **ANTERIOR ISCHEMIC OPTIC NEUROPATHY (NON-ARTERITIC)** occlusion of short posterior ciliary artery leads to infarction of optic nerve head.

4) A 55yr old diabetic presented with sudden painless loss of vision in his right eye, o/e V.A R=HM, L=6/12 with glasses, ant segment of both eyes is normal, right fundus is not visible & left fundus shows PDR= chronic incomplete Posterior vitreous detachment leading to **TRACTINAL RETINAL DETACHMENT**

5) 25 yr old myopic with c/o sudden painless loss of vision in L eye. h/o flashes. followed by feeling of
curtain falling in front of eye = RHEGMETOGENOUS RETINAL DETACHMENT

6) A 1 yr old baby with h/o premature birth & 20 days stay in incubator is brought with c/o white reflex in eye, 3 most imp causes of leucokoria in him
   - Retinoblastoma
   - Retrolental fibroplasias
   - Congenital cataract

7) 68 yr old DIABETIC, h/o cataract surgery with IOL 2 yr ago. c/o sudden blurring of vision. o/e fundal glow appears dull. B-Scan reveals echogenic vitreous.

   VITREOUS HEMORRHAGE (LARGE)

8) 50 yr old hypertensive. c/o sudden loss of vision in right eye. RAPD +, fundoscopy reveals scattered hemorrhages in upper quadrants.

   BRACH RETINAL VENOUS OCCLUSION

9) 55 yr old lady with marked blurring her right eye. VA 6/60, RAPD +, optic disc shows sectorial pallor. = OPTIC ATROPHY
10) 2 yr old is brought with white pupil in eye & squint. on fundus exam multiple polyploid masses are seen.

**RETINOBLASTOMA**

11) 69 yr old male with sudden painless loss of vision in right eye. retina shows attenuated vessels & cherry red spot.

**CRAO**

12) 5 d/d of unilateral optic disc swelling

**CAT-000**

- CRVO
- Anterior ischemic optic neuropathy
- Thyroid eye disease
- Optic papillitis
- Optic glioma
- Orbital cellulitis

13) A young man has a 10 DS myopia. he noticed floaters in right eye with painless sudden decrease in vision.

= **RHEGMETOGENOUS RD**

14) 20 yr old high myopic male presents with c/o flashes & floaters. RAPD + in right eye.
RHEGMETOGENOUS RD involving MACULA