

# Cranial Nerve Examination (Upper CN – 1-4, 6)

## UNILATERAL NERVE PALSIES

- Infection (HZV, CMV, syphilis, TB)
- Ischaemia – infarction
- Raised ICP
- Trauma
- Vascular (aneurysm)

GI

- **Today I have been asked to check your cranial nerves. These are the nerves that supply your face and neck**
- **Responsiveness + Orientated** ["tell me how you got here today?"]
- **Ptosis** (drooping one/both eyelids = old age, 7<sup>th</sup> nerve palsy, Horner's (ptosis + anhidrosis, myosis, anophthalmos)
- **Proptosis / strabismus** (misalignment/deviation of one/both eye)
- **Facial asymmetry** & facial drooping (salivation)
- Obvious **muscle wasting** (Temporal)

CN I

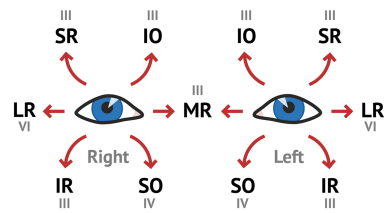
- **Alcohol wipe smell** (test each nostril separately)
  - "Close eyes + cover one nose" "Describe to me what you smell"
  - **DDx (anosmia):** Kallman URTI, smoking, ethmoid tumours, basal skull/frontal fracture, post pituitary surgery, congenital (eg. Kallmans syndrome), meningioma of olfactory groove, infectious (meningitis)

Acuity  
[snellan chart]

- **ENSURE YOU POSITION PATIENT AT EYE LEVEL!!**
- Cover one eye and read the smallest line you can
  - If unable: → **"How many fingers"** [CFI] → **Hand movement** [HM] → **Perception of Light** [PL] → **NPL**

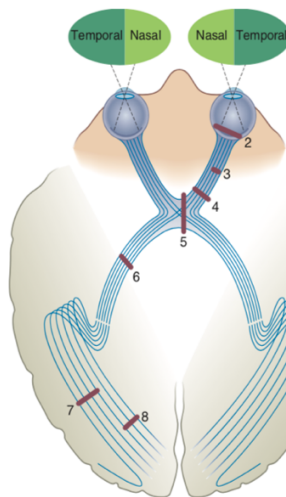
Visual  
Fields  
(repeat other  
eye)

- **"Cover your own eye with one hand and then the other!"**
- Cover your **left eye with your left hand** → "look into my eye and say 'yes' when you see **my finger moving**"
- Repeat with **coloured object** (NARROWER visual field – cones located centrally in macula, rods peripheral)



Visual field testing: 'Tell me when you first see the red pin come into view'

The visual fields and optic pathways.



1. **TUNNEL VISION**  
Concentric diminution, e.g. glaucoma, papilloedema, syphilis
2. **ENLARGED BLIND SPOT**  
Optic nerve head enlargement
3. **CENTRAL SCOTOMATA**  
Optic nerve head to chiasmal lesion, e.g. demyelination, toxic, vascular, nutritional
4. **UNILATERAL FIELD LOSS**  
Optic nerve lesion, e.g. vascular, tumour
5. **BITEMPORAL HEMIANOPIA**  
Optic chiasm lesion, e.g. pituitary tumour, sella meningioma
6. **HOMONYMOUS HEMIANOPIA**  
Optic tract to occipital cortex, e.g. vascular, tumour (NB: incomplete lesion results in macular (central) vision sparing)
7. **UPPER QUADRANT HOMONYMOUS HEMIANOPIA**  
Temporal lobe lesion, e.g. vascular, tumour
8. **LOWER QUADRANT HOMONYMOUS HEMIANOPIA**  
Parietal lobe lesion

CN 2  
AFRO  
CAP

Colour vision

Ishihara Plates:

- **optic neuritis** (**loss of red**, central scotoma, RAFL, unilateral vision loss + painful eye movements)
  - **DDx: MS, SLE, DM, sarcoidosis, Measles, mumps, syphilis, lyme disease**
- Colour blindness: vit A deficiency / X-linked chromosome loss

Accommodation

- "Stare at point on the wall behind me → now look at the red ball"
  - Should see convergence of eyes

Pupil light reflex  
(PEARL)  
[Check size,  
shape of pupil]

- **"Stare at a point behind me" → Pen light from side and into eye slowly**
- Check pupil size
- Repeat x2 (see constriction in blinded eye (direct) and then the other (consensual))
- **Swing torch test**
  - If light shone on damaged eye (NO consensual response)
  - If light shone on bad eye → good eye → bad eye (appears to dilate)
  - **Bad eye = Marcus Gunn pupil** is a **relative afferent pupillary defect** indicating a decreased **pupillary response** to light in the affected eye

Pathology

- **Failure of accommodation ONLY** → midbrain lesion or with cortical blindness.
- **Absent light reflex ONLY** → midbrain lesion (e.g. Argyll Robertson pupil of syphilis – accommodates but does not react), a ciliary ganglion lesion (e.g. Adie's pupil)
- **Amsler grid** → AMD

Optic Disc  
(Fundoscopy)  
"Say would do"

Papilloedema

Definition

Distribution

vision

Light reflex

Optic neuritis

Inflamed or infarcted optic nerve head

Unilateral

Scotoma → blindness

Reduced

CN 3

Eye movements  
[Draw large H]

- Do you have any **double vision (diplopia)**?
- **Pursuit Movements** (tracking) → smooth conjugate movement
- **Saccades** "Look left then right" "up and down"
  - **hypometric OR hypermetric/overshoot saccades**
- **Horizontal Nystagmus** (MS or vascular lesion)
  - **Vestibular lesion = nystagmus away from side of lesion**
  - **Cerebellar lesion = nystagmus to side of lesion**
- **Vertical Nystagmus**
  - Midbrain lesion, floor of 4<sup>th</sup> ventricle
  - ETOH, phenytoin

**Conjugate Gaze Palsy**

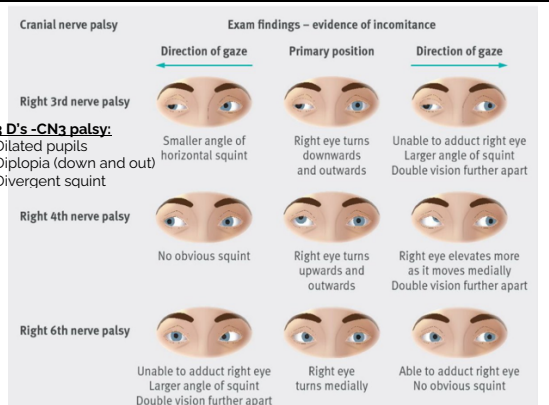
- **Supranuclear palsies** – bilateral vertical and horizontal gaze palsy BUT reflex movement intact
- **PSP = Loss of vertical → then horizontal gaze** → bilateral fixed unequal eyes but reflex eye movements intact
- **Parinaud's syndrome** (Pseudo-Argyll-Robert) = Involuntary upward dev of eyes + **loss of vertical gaze = pinealoma, MS, vascular**
- **One and a half syndrome** = horizontal gaze palsy + impaired adduction

CN 4

Reflex types:  
1) pursuit  
2) saccades  
3) convergence  
4) VOR

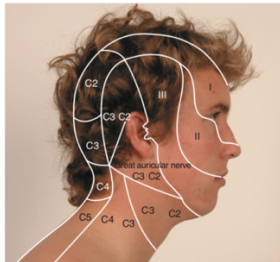
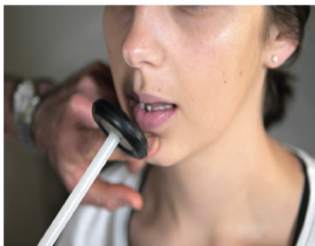
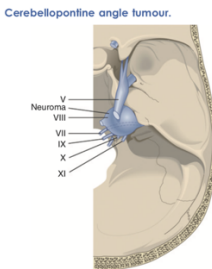
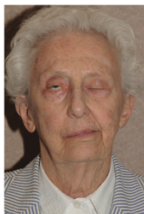
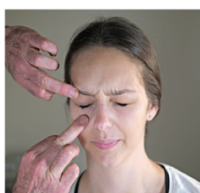
CN 6

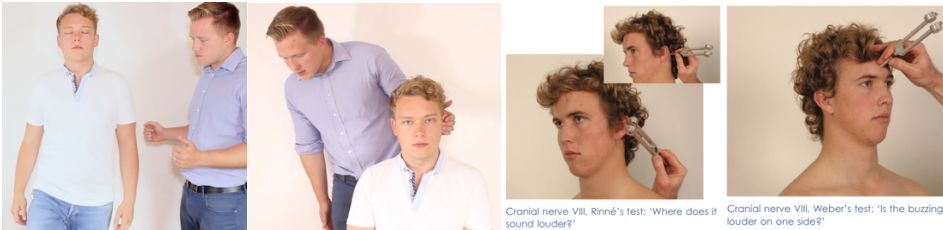
LR6 = abduction  
SO4 = depressor  
in eye adduction  
(head tilt away  
from lesion)



To **exclude a CNIV lesion** in context of 3<sup>rd</sup> nerve palsy, tilt head to **same side** as the lesion → the affected eye will **intort** if CNIV **intact**

# Cranial Nerve Examination (Lower CN – 5, 7-12)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
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| CN 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Sensory division of trigeminal<br>V1 = ophthalmic (sup. orbital)<br>V2 = mandibular (foramen rotundum)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Examine facial sensation<br>[close patients' eyes]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>"This is what the cotton wool/pin feels like" [Both sides of Head → cheek → jaw]</b> <ul style="list-style-type: none"><li>Is it cold/hot or sharp/dull <u>AND</u></li><li>did it feel the same on both sides of the face?</li></ul> <div><p>Dermatomes of the head and neck</p></div> <div><p>Facial sensation V, test all three divisions on each side</p></div> <div><p>Herpes zoster distribution of the maxillary nerve</p></div> |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | *Corneal reflex [Not done]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Lightly touch cornea ( <i>not</i> the conjunctiva) with cottonwool brought to the eye from side <ul style="list-style-type: none"><li>No sensation = corneal ulceration / ACOUSTIC NERUOMA ( <b>NO CN7 TO BLINK</b>)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Motor division of trigeminal<br>V2 = maxillary (foramen ovale)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Muscles of mastication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"><li>(clench your teeth for me + relax): Feel for <b>temporalis</b> and <b>masseter</b> muscle wasting?</li><li>(ask patient to <b>bite down on wooden tongue depressor with molars</b>): <b>muscle strength</b></li><li>(open your mouth – don't let me close it): <b>pterygoid</b> muscle<ul style="list-style-type: none"><li><b>Jaw deviates to affected side</b></li></ul></li></ul>                                                                                                                                                                                                                                                                      |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Jaw Jerk Or Masseter Reflex                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"><li>"Relax your jaw down slightly for me → just going to tap tip of your chin/jaw lightly"<ul style="list-style-type: none"><li>→ exaggerated jaw jerk = <b>UMN lesion above pons</b> [pseudobulbar palsy]</li></ul></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| <div><p>Cranial nerve V (motor): 'Clench your jaw'— feel the masseter muscles</p></div> <div><p>Cranial nerve V: the jaw jerk</p></div> <div><p>Cerebellopontine angle tumour.</p></div> <div><p><b>Practise point:</b></p><p>The tongue and jaw never lie → always point to side of lesion!</p></div> <p><b>NB:</b> schwannoma from CNVIII can compress adjacent CNV and CNVII nerves, brainstem and cerebellum</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
| CN 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Facial movements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"><li><b>Frontalis (temporal)</b> = "Raise your eyebrows and don't me push them down "→ NO wrinkle (<b>UMN lesion – FOREHEAD SPARING</b>)</li><li><b>OBICULARIS OCULI (ZYGOMATIC)</b> "Close eyes <b>TIGHTLY</b> as you can and don't let me open them" → <b>Bell's LMN palsy</b>: upward movement of the eyeball and incomplete closure of the eyelid</li><li><b>BUCCINATOR (BUCCAL)</b> "Puff cheeks and don't let me push them in" → asymmetry (<b>LMN lesion</b>)</li><li><b>ZYGOMATIC MUSCLE (ZYG + BUCCAL)</b> "Smile and show me your teeth" → facial paralysis (<b>cortical lesion</b>)</li><li><b>CERVICAL</b> Platysma + occipitalis</li></ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Q "Any change in taste"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"><li><b>CNVII (chorda tympani)</b> has sensory fibres for <b>taste</b> from anterior 2/3 of tongue → fibres reach brain via <b>CNV</b></li><li><b>Unilateral loss of taste</b>: middle-ear lesions involving the chorda tympani (CN7) or lingual nerve (CNV)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Q "Any change in hearing"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"><li><b>Stapedius</b> supplied by VII → controls stapes → hyperacusis when damaged</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <div><p>Bell's palsy on the right side</p></div> <div><p>Cranial nerve VII: 'Puff out your cheeks' (normal)</p></div> <div><p>Cranial nerve VII: 'Look up to wrinkle your forehead' (normal)</p></div> <div><p>Cranial nerve VII: 'Shut your eyes tight and stop me opening them' (normal)</p></div> <div><p><b>Central causes</b> (pons, medulla, upper cervical cord) = <b>FOREHEAD SPARING</b></p><ul style="list-style-type: none"><li>vascular lesion,</li><li>tumour,</li><li>syringobulbia.</li></ul><p><b>Peripheral causes</b></p><ul style="list-style-type: none"><li>aneurysm, tumour,</li><li>chronic meningitis.</li><li>Trigeminal ganglion causes include trigeminal neuroma, meningioma fracture</li></ul></div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |

| CN 8<br>(512Hz)                                        | Inspect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"><li>Hearing aids</li><li>Herpes zoster lesions (external acoustic meatus)</li></ul>                                                                                                                              |                                                   |  |                       |        |                                |                     |                                                        |                                         |                                                                           |                                         |                                              |                                                                |                                                      |                                                   |     |   |                                                                                                                                                                                                           |
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|                                                        | "whisper" test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"><li>"Close your eyes and tell me if you hear a sound" → Scrunch fingers to test ear<ul style="list-style-type: none"><li>Mask opposite ear rubbing the <u>tragus</u> while testing other ear</li></ul></li></ul> |                                                   |  |                       |        |                                |                     |                                                        |                                         |                                                                           |                                         |                                              |                                                                |                                                      |                                                   |     |   |                                                                                                                                                                                                           |
|                                                        | Vestibular Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"><li>Stand up → march on spot [pathological = patient turns to side of lesion]</li></ul>                                                                                                                          |                                                   |  |                       |        |                                |                     |                                                        |                                         |                                                                           |                                         |                                              |                                                                |                                                      |                                                   |     |   |                                                                                                                                                                                                           |
|                                                        | <div><div><p>Cranial nerve VIII, Rinne's test: 'Where does it sound louder?'</p><p>Cranial nerve VIII, Weber's test: 'Is the buzzing louder on one side?'</p></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                    |                                                   |  |                       |        |                                |                     |                                                        |                                         |                                                                           |                                         |                                              |                                                                |                                                      |                                                   |     |   |                                                                                                                                                                                                           |
|                                                        | <table><tr><th>Special Tests (512Hz)</th><th>Normal</th><th>Sensorineural hearing deafness</th><th>Conductive deafness</th></tr><tr><td><b>Rinne test</b><br/>[mastoid process, behind the ear]</td><td><b>Air conduction</b> &gt; Bone conduction</td><td><b>Air conduction</b> &gt; Bone conduction (both conduction reduced equally)</td><td><b>Bone conduction</b> &gt; Air conduction</td></tr><tr><td><b>Weber's test</b><br/>[test lateralisation]</td><td>Sound heard <u>equally</u> in both ears<br/>[No lateralisation]</td><td>Sound louder on side of <b>intact/unaffected ear</b></td><td>Sound heard louder on side of <b>affected ear</b></td></tr><tr><td>DDx</td><td>-</td><td><b>Unilateral</b> = schwannoma, trauma (# of petrous part of temporal bone), internal auditory artery rupture<br/><b>Bilateral</b> = Infection (TORCH), Ménière's disease, Ab (aminoglycosides), diuretics</td><td>Wax, otitis media<br/>Paget's</td></tr></table> |                                                                                                                                                                                                                                                    |                                                   |  | Special Tests (512Hz) | Normal | Sensorineural hearing deafness | Conductive deafness | <b>Rinne test</b><br>[mastoid process, behind the ear] | <b>Air conduction</b> > Bone conduction | <b>Air conduction</b> > Bone conduction (both conduction reduced equally) | <b>Bone conduction</b> > Air conduction | <b>Weber's test</b><br>[test lateralisation] | Sound heard <u>equally</u> in both ears<br>[No lateralisation] | Sound louder on side of <b>intact/unaffected ear</b> | Sound heard louder on side of <b>affected ear</b> | DDx | - | <b>Unilateral</b> = schwannoma, trauma (# of petrous part of temporal bone), internal auditory artery rupture<br><b>Bilateral</b> = Infection (TORCH), Ménière's disease, Ab (aminoglycosides), diuretics |
| Special Tests (512Hz)                                  | Normal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Sensorineural hearing deafness                                                                                                                                                                                                                     | Conductive deafness                               |  |                       |        |                                |                     |                                                        |                                         |                                                                           |                                         |                                              |                                                                |                                                      |                                                   |     |   |                                                                                                                                                                                                           |
| <b>Rinne test</b><br>[mastoid process, behind the ear] | <b>Air conduction</b> > Bone conduction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Air conduction</b> > Bone conduction (both conduction reduced equally)                                                                                                                                                                          | <b>Bone conduction</b> > Air conduction           |  |                       |        |                                |                     |                                                        |                                         |                                                                           |                                         |                                              |                                                                |                                                      |                                                   |     |   |                                                                                                                                                                                                           |
| <b>Weber's test</b><br>[test lateralisation]           | Sound heard <u>equally</u> in both ears<br>[No lateralisation]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Sound louder on side of <b>intact/unaffected ear</b>                                                                                                                                                                                               | Sound heard louder on side of <b>affected ear</b> |  |                       |        |                                |                     |                                                        |                                         |                                                                           |                                         |                                              |                                                                |                                                      |                                                   |     |   |                                                                                                                                                                                                           |
| DDx                                                    | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Unilateral</b> = schwannoma, trauma (# of petrous part of temporal bone), internal auditory artery rupture<br><b>Bilateral</b> = Infection (TORCH), Ménière's disease, Ab (aminoglycosides), diuretics                                          | Wax, otitis media<br>Paget's                      |  |                       |        |                                |                     |                                                        |                                         |                                                                           |                                         |                                              |                                                                |                                                      |                                                   |     |   |                                                                                                                                                                                                           |

|                         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |
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| CN 9<br>"clean spatula" | Inspect             | symetry of soft palate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |
|                         | Voice               | <ul style="list-style-type: none"><li>Say "ahhhh" → Uvula should be raised upright</li><li><b>Pathology</b> = Uvula displaces <u>away</u> from side of lesion (<b>loss of innervation of levator palatini</b>)</li></ul>                                                                                                                                                                                                                                                                                                                                 |  |  |
|                         | Test cough (bovine) | <b>"Cough for me"</b><br>1. hoarseness OR bovine cough → <b>unilateral RLN lesion or vagal palsy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
|                         | Swallow test        | "Sip this glass of water when I tell you"<br>2. Dysphagia of dry foods → <b>CN9 nerve lesion</b><br>3. Dysphagia of solids and liquids + hoarseness → <b>Unilateral CNX paralysis</b>                                                                                                                                                                                                                                                                                                                                                                    |  |  |
|                         | Distribution        | <b>Discuss how IX carries sensory fibres for taste from the posterior one-third of the tongue</b><br>4. 9 <sup>th</sup> nerve → sensory fibres to <b>oropharynx</b> , the middle and inner ear and from the posterior 1/3 of the tongue (including taste fibres) <ul style="list-style-type: none"><li>secretory fibres to the parotid gland (PSNS)</li></ul> 5. 10 <sup>th</sup> nerve → sensory fibres to <b>laryngopharynx</b> <ul style="list-style-type: none"><li>Motor innervation to muscles of the pharynx, the larynx and the palate</li></ul> |  |  |

|                     |                                                                                                                                                                                                                    |  |  |
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| CN 10<br>"wanderer" | <ul style="list-style-type: none"><li><b>Gag reflex</b> (CN IX = sensory on soft palate and X = motor/vomiting component) → touch pharynx with spatula and observe reflex contraction of the soft palate</li></ul> |  |  |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|

|       |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                           |  |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| CN 11 | <ul style="list-style-type: none"><li><b>Trapezius</b>: "shrug your shoulders" → don't let me push them down</li><li><b>SCM</b>: "turn your head left and push against my hand" → and the other side (right SCM turns head left) → feel for SCM bulk</li></ul> <p>(Check for wasting of L) trapezius and winged scapula – serratus anterior)</p> | <div><p>(a) Cranial nerve XI: "Shrug your shoulders—push up hard". (b) Wasting of the left trapezius muscle</p></div> |  |
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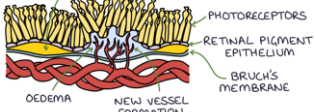
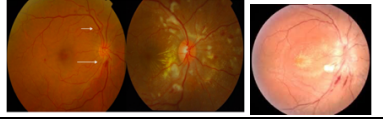
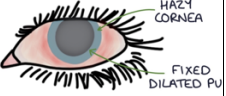
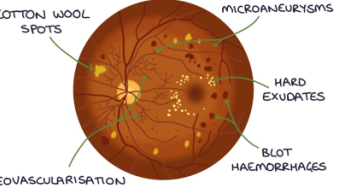
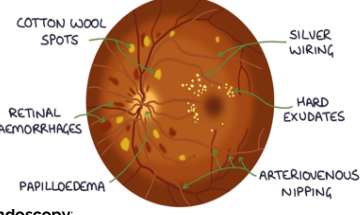
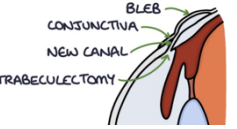
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                     |  |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| CN 12 | <b>"Stick your tongue out AND wiggle it around":</b> <ul style="list-style-type: none"><li>Protrusion = genioglossus muscle</li><li><b>Deviation to affected side</b> → <b>unilateral LMN lesion</b></li><li>cannot keep tongue protruded → <b>Huntington's chorea</b></li><li>coarse tremor of the tongue → <b>Parkinson's disease</b></li></ul> <b>"Press tongue into my fingers (on one side and the other)"</b> <ul style="list-style-type: none"><li>immobile tongue → <b>UMN lesion of CN XII</b></li></ul> <p>Innervates ALL intrinsic muscles of tongue EXCEPT palatoglossus</p> | <div><p>Fasciculations of the tongue in motor neurone disease</p><p>(a and b) Right hypoglossal (XII) nerve palsy—lower motor neurone lesion: "Stick out your tongue"</p></div> |  |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

| Feature  | Pseudobulbar<br>(bilateral <b>UMN</b> lesions of IX, X and XII)                  | Bulbar<br>(bilateral <b>LMN</b> lesions of IX, X, and XII)                                |
|----------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Gag      | Increased or normal                                                              | Absent                                                                                    |
| Tongue   | Spastic                                                                          | Wasted, fasciculations                                                                    |
| Jaw jerk | Increased                                                                        | Absent or normal                                                                          |
| Speech   | Spastic dysarthria                                                               | Nasal                                                                                     |
| Other    | Bilateral UMN (long tract) signs<br>Labile emotions                              | Signs of underlying disease – eg. Limb fasciculations, normal emotions                    |
| Causes   | Multiple sclerosis<br>MND<br>Brain trauma<br>Raised ICP<br>T2DM<br>Syringomyelia | MND<br>GBS<br>Poliomyelitis<br>Brainstem infarction<br>Myasthenia Gravis<br>Arnold Chiari |

#### UNILATERAL NERVE PALSIES

- Infection (HZV, CMV, syphilis, TB) (chronic meningitis)
- Ischaemia – infarction
- Raised ICP – tumour, hydrocephalus, abscess
- Trauma
- Vascular (aneurysm)
- Chiari malformation

# COMMON OPHTHALMOLOGY:DISORDERS

|              | Glaucoma                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Cataracts                                                                                                                                                                                                                                                                                                                                                                                                     | AMD                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Diabetic Retinopathy                                                                                                                                                                                                                                                                                                                                                                           | HTN Retinopathy                                                                                                                                                                                                                                                                                                                           |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Def</b>   | <ul style="list-style-type: none"> <li>Raised IOP causing optic nerve damage due to blockage of aqueous humour drainage</li> <li>Created by <b>resistance of flow</b> through trabecular meshwork into canal of Schlemm</li> <li><b>Normal intraocular pressure = 10-21 mmHg</b></li> <li><b>unrelated to:</b> HTN, diabetes or macular degeneration</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Cloudy and opaque lens</li> </ul> <p>Nb: cataracts may <b>hide</b> other ocular pathologies (e.g. AMD or Diabetic retinopathy) – only revealed once new intraocular lens inserted</p>                                                                                                                                                                                  | <p><b>Degeneration of macula</b></p>                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>Prolonged hyperglycemia exposure – gradual retinal BV deterioration</li> <li>Increased vasc. Permeability</li> </ul>                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Systemic HTN causes small BV damage</li> </ul> <p><b>Complications:</b></p> <ul style="list-style-type: none"> <li>Anterior ischaemic optic neuropathy -AION (painless vision loss)</li> </ul>                                                                                                     |
| <b>Types</b> | <ul style="list-style-type: none"> <li><b>Open-angle (chronic)</b> – gradual increase in resistance through trabecular network (slow pressure build up)</li> <li><b>Closed angle (acute)</b>- iris bulges forward to obstruct trabecular network and outflow = ophthal emergency</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li><b>Dry AMD (90%)</b> - druzens</li> <li><b>Wet AMD (10%)</b> – worse prognosis</li> </ul>                                                                                                                                                                                                                                                                                                                    | <p><b>Non-proliferative DR</b></p> <ul style="list-style-type: none"> <li>Microaneurysms, exudates</li> </ul> <p><b>Proliferative DR</b></p> <ul style="list-style-type: none"> <li>Neovasc + vitreous haem</li> </ul>                                                                                                                                                                         | <p><b>Keith-Wagener Classification</b></p> <ul style="list-style-type: none"> <li>Stage 1: Mild narrowing of the arterioles</li> <li>Stage 2: Focal constriction of BV and AV nicking</li> <li>Stage 3: Cotton-wool patches, exudates and haemorrhages</li> <li>Stage 4: Papilloedema</li> </ul>                                          |
| <b>RF</b>    | <ul style="list-style-type: none"> <li><b>Old age</b></li> <li><b>Females &gt; males</b></li> <li><b>FHx</b></li> <li><b>Black ethnic origin</b> OR Chinese and East-Asian</li> <li><b>Myopia</b> (nearsightedness)</li> </ul> <p><b>Medication triggers:</b></p> <ol style="list-style-type: none"> <li>Adrenergics (noradrenal)</li> <li>Anti-chol (e.g. oxybutynin and solifenacin)</li> <li>TCA – (e.g. amitriptyline) w/ anti-chol effects</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>Congenital</li> <li>Advanced age</li> <li>Smoking</li> <li>Alcohol</li> <li>Diabetes</li> <li>Steroids</li> <li>hypoCa</li> </ul>                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>Advanced age</li> <li>Smoking</li> <li>White or Chinese ethnic</li> <li>FHx</li> <li>CVD</li> </ul>                                                                                                                                                                                                                                                                                                          | <p>Poor diabetic control</p> <p><b>Complications:</b></p> <ul style="list-style-type: none"> <li>Retinal detachment</li> <li>Vitreous haemorrhage</li> <li>Rebeosis iridis (new BV in iris)</li> <li>Optic neuropathy</li> <li>Cataracts</li> </ul>                                                                                                                                            | <p><b>Uncontrolled HTN</b></p>                                                                                                                                                                                                                         |
| <b>Sx</b>    | <p><b>General:</b></p> <ul style="list-style-type: none"> <li>Raised optic cupping &gt; 0.5</li> <li><b>Bilateral Loss of peripheral vision</b> (tunnel vision)</li> <li>Gradual onset of fluctuating pain, headaches, blurred vision</li> <li>Halos around lights (night)</li> </ul> <p><b>Specific Sx:</b></p> <ul style="list-style-type: none"> <li><b>Open-angle (chronic)</b> = asymptomatic (diagnosed on screening)</li> <li><b>Closed angle (acute)</b> = acutely (1) <b>painful</b> eye, (2) <b>headache</b>, N/V + (3) <b>mydriasis</b></li> </ul>  <p><b>Red flags:</b></p> <ul style="list-style-type: none"> <li>Red eye</li> <li>Hazy cornea</li> <li>Mydriasis</li> <li>Fixed pupil size</li> <li>Firm eyeball</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                             | <p><b>Asymmetrical presentation</b></p> <ul style="list-style-type: none"> <li>Slow Reduced visual acuity</li> <li>Progressive blurry vision</li> <li>Altered colour vision (more <b>brown</b> and <b>yellow</b>)</li> <li>"Starbursts" – around lights (night time)</li> </ul> <p><b>Exam:</b></p> <ul style="list-style-type: none"> <li><b>Loss of red reflex (grey/white)</b></li> </ul>                  | <p><b>Key findings:</b></p> <ul style="list-style-type: none"> <li>Worsening Central vision loss</li> <li>Reduced visual acuity</li> <li>Crooked/wavy appearance to straight lines</li> </ul> <p><b>Special tests:</b></p> <ul style="list-style-type: none"> <li>Snellen chart – reduced acuity</li> <li>Amsler grid test – distorted straight lines</li> <li>Scotoma – central patch of vision loss</li> </ul>                                    | <p><b>PROLIFERATIVE DIABETIC RETINOPATHY</b></p>                                                                                                                                                                                                                                                            | <p><b>HYPERTENSIVE RETINOPATHY</b></p>                                                                                                                                                                                                                 |
| <b>Ix</b>    | <ul style="list-style-type: none"> <li>Non-contact tonometry (measure intraocular pressure) – shoots puff of air</li> <li><b>Visual field assessment</b> – peripheral vision loss <ul style="list-style-type: none"> <li><b>Humphrey visual field (formal assessment by ophthal)</b></li> <li><b>Need &gt; 110° to legally drive</b></li> </ul> </li> <li><b>Goldmann applanation tonometry</b> (gold standard) – direct pressure for more accurate measurement</li> <li><b>Fundoscopy</b> – optic disc cupping</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                               | <p><b>Fundoscopy:</b></p> <ul style="list-style-type: none"> <li>Druzens (dry AMD)</li> </ul> <p><b>Optical coherence tomography:</b></p> <ul style="list-style-type: none"> <li>Diagnose wet AMD – atrophy of retinal pigment epithelium</li> <li>Degeneration of photoreceptors</li> </ul> <p><b>Fluorescein angiography</b></p> <ul style="list-style-type: none"> <li>Oedema + neovascularisation</li> <li>Helps to diagnose wet AMD</li> </ul> | <p><b>Fundoscopy</b></p> <ul style="list-style-type: none"> <li><b>Mild</b> - Microaneurysms → venous beading</li> <li><b>Mod</b> - PLUS Hard exudates (lipids) &amp; Cotton wool spots (nerve damage)</li> <li><b>Severe</b> = blot haemorrhages</li> <li><b>Proliferative DR</b> <ul style="list-style-type: none"> <li>NEOangiogenesis</li> <li>Vitreous haemorrhage</li> </ul> </li> </ul> | <p><b>Fundoscopy:</b></p> <ul style="list-style-type: none"> <li>Copper → silver wiring (thickened and sclerosed arterioles)</li> <li>AV nicking (arterioles compress veins they cross)</li> <li>Cotton wool spots (ischaemia and infarcted nerve fibres)</li> <li>Hard exudates</li> <li>Papilloedema (ischaemic optic nerve)</li> </ul> |
| <b>Mx</b>    | <p><b>Open-angle glaucoma</b></p> <ol style="list-style-type: none"> <li><b>Prostaglandin eye drop</b> (e.g. latanoprost) – increases uveoscleral outflow</li> <li><b>0.5% BB (timolol) or CA inhibitor</b> (dorzolamide) -reduce aqueous humour production by ciliary body</li> <li><b>SNS mimics (brimonidine)</b> – reduce aqueous humour production and increase uveoscleral outflow</li> <li><b>Surgery (trabeculectomy)</b> – create 'bleb' or new channel from anterior chamber through sclera and under conjunctiva to drain aq. humour</li> </ol>  <p><b>Closed -angle glaucoma:</b></p> <ol style="list-style-type: none"> <li>Lie fully supine</li> <li><b>5% timolol / 2% Pilocarpine eye drops</b> – miotic agent (constrict pupil and ciliary muscle)</li> <li><b>Acetazolamide 500mg PO – CA inhibitor</b></li> <li><b>+/- hyperosmotic agents</b> (glycerol or mannitol – increase osmo gradient)</li> <li>Analgesia and anti-emetic</li> <li><b>Long-term Mx – follow open angle glaucoma</b></li> <li><b>Laser iridotomy</b> (definitive Rx) – hole in iris to drain aqueous humour from anterior to posterior chamber</li> </ol> | <p><b>Conservative</b></p> <ul style="list-style-type: none"> <li>Watch and wait (if asymptomatic)</li> </ul> <p><b>Intraocular lens insertion</b> (under local anaesthetic)</p> <p><b>Complications of cataract surgery:</b></p> <ul style="list-style-type: none"> <li>Endophthalmitis - inflamed inner eye</li> <li>Vision loss and loss of eye</li> <li>Rx: intravitreal ABx injected into eye</li> </ul> | <p><b>MUST:</b></p> <ul style="list-style-type: none"> <li>Refer to ophthalmologist</li> </ul> <p><b>Dry AMD = Lifestyle advice</b></p> <ul style="list-style-type: none"> <li>Avoid smoking</li> <li>Control BP</li> </ul> <p><b>Wet AMD</b></p> <ul style="list-style-type: none"> <li>Injected Anti-VEGF (E.g. ranibizumab, bevacizumab) – minimise angiogenesis</li> <li>Must be started within 3/12 to be effective</li> </ul>                 | <p><b>INTERVENTIONS</b></p> <ul style="list-style-type: none"> <li><b>Injected Anti-VEGF</b> (E.g. ranibizumab, bevacizumab) –</li> <li><b>Laser photocoagulation</b></li> <li><b>Vitreoretinal surgery</b> (keyhole surgery on eye) – if severe</li> </ul>                                                                                                                                    | <p><b>LIFESTYLE</b></p> <ul style="list-style-type: none"> <li><b>BP control</b> - ACEi, CaB, thiazides</li> <li><b>HC control</b> → statins?</li> <li><b>STOP smoking</b></li> </ul>                                                                                                                                                     |

PUPIL DISORDERS

| <ul style="list-style-type: none"><li>PSNS (ACH)- pupil constriction</li><li>SNS (adrenaline) = Pupil dilatation</li></ul>                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Abnormal shape                                                                                                                                                                                                                                                                                                                                                   | Miosis                                                                                                                                                                                                                                                                            | Mydriasis                                                                                                                                                                                                                                                                                                                                                     |
| <ul style="list-style-type: none"><li>Sphincter muscle trauma (post-cataract op)</li><li>Anterior uveitis causes adhesions in iris</li><li>Acute angle closure glaucoma</li><li>Rubeosis iridis (neovasc. Distorts iris and pupil)</li><li>Coloboma (congenital malformation of hole in iris)</li><li>Tadpole pupil (iris spasm – assoc. w/ migraines)</li></ul> | <ul style="list-style-type: none"><li>Horner's (ptosis, miosis, anhidrosis, enophthalmos)</li><li>Argyll-Robertson 'prostitute's pupil' (neurosyphilis) (accommodates but does not react)</li><li>Opiates</li><li>Nicotine</li><li>Pilocarpine</li><li>Cluster headache</li></ul> | <ul style="list-style-type: none"><li>3<sup>rd</sup> nerve palsy<ul style="list-style-type: none"><li>Holmes-Adie syndrome (unilateral undilated pupil sluggish to react to light + absent ankle and knee reflexes)</li></ul></li><li>Raised ICP (AM headache)</li><li>Congenital</li><li>Trauma</li><li>Stimulants (e.g. cocaine)</li><li>Antichol</li></ul> |

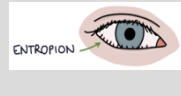
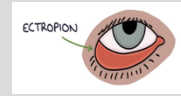
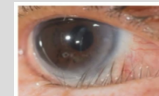
- 3<sup>rd</sup> nerve palsy: (2 types)
- Ptosis – levator palpebrae palsy (upper eyelid)
    - DDx: myasthenia gravis, Horner's
  - Fixed mydriasis – PSNS of sphincter muscle on iris
  - divergent strabismus (squint) → "down-out" position

|                                  |                                                                                                                                                                                                           |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sparing pupil                    | <b>Microvascular</b> cause as <b>PSNS</b> spared <ul style="list-style-type: none"><li>Diabetes, HTN, ischaemia</li></ul>                                                                                 |
| Full 3 <sup>rd</sup> nerve palsy | <b>Nerve compression "surgical 3<sup>rd</sup>"</b> <ul style="list-style-type: none"><li>Idiopathic</li><li>Tumour</li><li>PcomA aneurysm</li><li>Cavernous sinus thrombosis</li><li>Raised ICP</li></ul> |

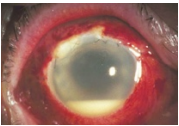
- Horner's syndrome
- ptosis, miosis, anhidrosis, enophthalmos
    - DDx: myasthenia gravis, 3<sup>rd</sup> nerve palsy
  - congenital horner's → assoc. with heterochromia (different iris colour)
  - Cocaine eye drops → tests for Horner → no pupil reaction when should actually cause dilation

|            | Central (4 S's)                                                                                                                   | Pre-ganglionic (4 T's)                                                                                                                                               | Post-ganglionic (4 C's)                                                                                                                                        |
|------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Anhidrosis | Arm / trunk / face                                                                                                                | Face                                                                                                                                                                 | None                                                                                                                                                           |
| Cause      | <ul style="list-style-type: none"><li>Stroke</li><li>MS -NMO</li><li>Swelling (tumours)</li><li>Syringomyelia (SC cyst)</li></ul> | <ul style="list-style-type: none"><li>Tumour (Pancoast)</li><li>Trauma</li><li>Thyroidectomy</li><li>Top rib (cervical rib grows above 1<sup>st</sup> rib)</li></ul> | <ul style="list-style-type: none"><li>Carotid aneurysm</li><li>Carotid artery dissection</li><li>Cavernous sinus thrombosis</li><li>Cluster headache</li></ul> |

EYELID DISORDERS

|      | Blepharitis                                                                                                                                                                       | Stye (hordeolum)                                                                                                                                                                                                                                 | Cholazion                                                                                                                                      | Entropion                                                                                                                                                                      | Ectropion                                                                                                            | Trichiasis                                                                                                                    | Cellulitis                                                                                                                                                                                                                                                                                               |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Def  | <ul style="list-style-type: none"><li>Inflammation of eyelid margins</li><li>Dysfn Meibomian glands</li></ul>                                                                     | Bacterial infected oil gland or follicle <ul style="list-style-type: none"><li><b>Hordeolum externum</b> (infected glands near base of eyelashes)</li><li><b>Hordeolum Internum</b> → Infected Meibomian glands - deeper, more painful</li></ul> | <b>Blocked Moll (sweat) or Zeis (sebaceous) gland</b> → swells up                                                                              | Entropion – eyelid turns <u>inwards</u>                                                                                                                                        | Ectropion – eyelid turns <b>outwards</b> → dries eye out clearly                                                     | Inward growth of eyelashes                                                                                                    | <ul style="list-style-type: none"><li><b>Periorbital</b> - infection around eyeball <b>in front</b> of orbital septum</li><li><b>Orbital</b> – infection around eyeball <b>behind</b> orbital septum</li><li><b>Ddx:</b> orbital blowout #</li></ul>                                                     |
| Comp | <ul style="list-style-type: none"><li>Style</li><li>Cholazion</li></ul>                                                                                                           |                                                                                                                                                                                                                                                  |                                                                                                                                                | <ul style="list-style-type: none"><li>Corneal damage</li><li>Ulceration</li></ul>                                                                                              | <ul style="list-style-type: none"><li>Exposure keratopathy</li></ul>                                                 | <ul style="list-style-type: none"><li>Corneal damage</li><li>Ulceration</li></ul>                                             | <ul style="list-style-type: none"><li><b>Periorbital</b> → <b>orbital</b></li><li><b>Orbital</b> – CN2 damage, hearing loss, meningitis</li></ul>                                                                                                                                                        |
| Sx   | <ul style="list-style-type: none"><li>Gritty, itchy dry eyes</li><li>Crusting of lid margin</li></ul> RF:<br><b>ROSACEA (20-42%)</b><br><b>DRY EYES</b><br><b>SEBORRHEIC DERM</b> | <div><div></div><div><div>1. Painful</div><div>2. Fluctuant</div><div>3. Near eyelash follicle</div></div></div>                                                                                                                                 | <u>Key ddx</u> <ol style="list-style-type: none"><li>Non-painful</li><li>Firm</li><li>Upper Eyelid swelling (<b>above</b> eyelashes)</li></ol> |                                                                                                                                                                                |                                                                                                                      |                                                                                                                               | <ul style="list-style-type: none"><li>Any proptosis or</li><li>painful tender eye with reduced visual acuity and Ophthalmoplegia</li><li>+/- headaches</li></ul> <b>is treated as orbital cellulitis until proven otherwise</b> <ul style="list-style-type: none"><li>Previous Hx of sinusitis</li></ul> |
| Mx   | <ul style="list-style-type: none"><li>Warm compress</li><li>Gentle cleaning with sterilised water</li><li>Lubricating eye drops (e.g. Hypromellose)</li></ul>                     | <ul style="list-style-type: none"><li>Warm compress</li><li>Analgesia</li><li>Topical Abx (chloramphen) if conjunctivitis present</li></ul>                                                                                                      | Same as stye <ul style="list-style-type: none"><li>Surgical drainage if conservative Mx fails</li></ul>                                        | <ul style="list-style-type: none"><li>Tape eyelid down → add lubricating eyedrops</li><li>Surgery (definitive mx)</li><li>Same-day ophthal referral if risk of sight</li></ul> | <ul style="list-style-type: none"><li>Regular lubricant</li><li>Same-day ophthal referral if risk of sight</li></ul> | <ul style="list-style-type: none"><li>Epilation (remove eyelash)</li><li>Same-day ophthal referral if risk of sight</li></ul> | <b>CT scan to differentiate</b> <ul style="list-style-type: none"><li>➢ <b>Admit + 2x Systemic Abx (IV flucloxac = MSSA cover) (IV cef + gram -ve pseudo + ESCAPPM coverage)</b></li><li>➢ Surgical drainage if abscess forms</li><li>➢ NO nose blowing if orbital blowout #</li></ul>                   |
|      |                                                                                                  |                                                                             |                                                             |                                                                                             |                                   |                                            |                                                                                                                                                                                                                                                                                                          |

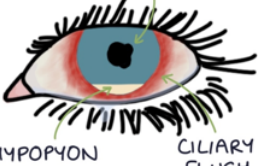
|                        | PAINFUL                                                                                                                                                                                                                                                                                                                                                                                  | PAINLESS                                                                                                                                                                                                                                                                              |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UNILATERAL VISION LOSS | <ul style="list-style-type: none"><li>Orbital cellulitis</li><li>Corneal abrasion</li><li>Acute angle closure glaucoma (peripheral)</li><li>Inflammation – iritis, uveitis</li><li>MS – optic neuritis (central scotoma)</li><li>Cavernous sinus thrombosis</li><li>Infection (HZV)</li><li>Temporal arteritis</li><li>Retro-orbital haematoma / trauma (basal skull fracture)</li></ul> | <ul style="list-style-type: none"><li>MULTIPLE SCLEROSIS</li><li>Retinal detachment</li><li>Vitreous haemorrhage</li><li>Bilaterally retinal vein or artery occlusion</li><li>Dislocated lens (e.g. Marfan's -up, Homocystinuria – down)</li><li>Ischaemic optic neuropathy</li></ul> |
| BILATERAL VISION LOSS  | <ul style="list-style-type: none"><li>Keratitis (HSV)</li><li>Optic chiasm impingement (e.g. pituitary tumour)</li><li>Caustic exposure</li><li>Trauma</li></ul>                                                                                                                                                                                                                         | <ul style="list-style-type: none"><li>Stroke (amaurosis fugax - TIA)</li><li>Med A/E (E.g. anti-cholinergics, steroids)</li><li>Keratitis</li><li>Psychogenic</li></ul>                                                                                                               |
| RED EYE                | <ul style="list-style-type: none"><li>Any of the above</li></ul>                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"><li>Conjunctivitis</li><li>Episcleritis</li><li>Subconjunctival haemorrhage (post-op, COPD cough, Mallory-weiss)</li></ul>                                                                                                                          |
| Proptosis              |                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"><li>Hyperthyroidism</li><li>Malignancy (e.g. rhabdomyosarcoma)</li><li>Inflammatory disorders</li><li>Tolosa Hunt (CN3, 4 and 6 palsy)</li><li>Orbital cellulitis</li><li>Carotid cavernous fistula</li></ul>                                       |



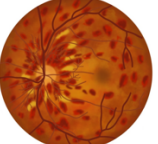
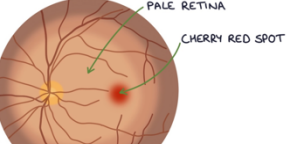
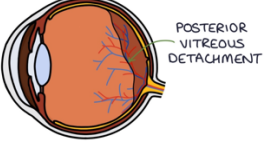
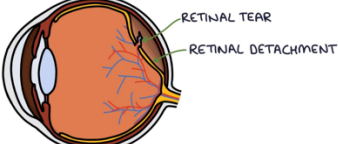
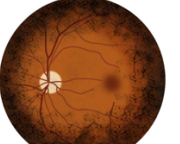
Hypopyon = white fluid level = severe infection = ED

|                   | Presentation                                                                                                                                                                 | Rx                                                                                                     |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| HIV / IVDU        | <ul style="list-style-type: none"><li>Retinitis</li><li>Toxoplasmosis / CMV retinitis</li></ul>                                                                              | <ul style="list-style-type: none"><li></li></ul>                                                       |
| TB                | <ul style="list-style-type: none"><li>retinal vasculitis / choroiditis</li></ul>                                                                                             | <ul style="list-style-type: none"><li></li></ul>                                                       |
| Mucor-mycosis     | <ul style="list-style-type: none"><li>Fungal sinus infection (retro-orbital inflammation &amp; swelling)</li></ul>                                                           | <ul style="list-style-type: none"><li>ABCDE → DKA / neutropenia / immunosuppressed</li></ul>           |
| Klebsiella pneumo | <ul style="list-style-type: none"><li>liver abscesses?</li><li>Assoc. w/ endogenous endophthalmitis – 5-10% cases <b>hypopyon</b> and vision loss as initial signs</li></ul> | <ul style="list-style-type: none"><li>urgent systemic therapy</li><li>High risk of blindness</li></ul> |

# INFLAMMATORY EYE CONDITIONS

|       | CONJUNCTIVITIS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ANTERIOR UVEITIS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EPISCLERITIS                                                                                                                                                                                                                                                                                                                                                     | SCLERITIS                                                                                                                                                                                                                                                                                                                                    | KERATITIS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CORNEAL ABRASIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Def   | Inflammation of conjunctiva (thin tissue layer covering inside of eyelids and sclera)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>Inflamed anterior part of uvea (iris, ciliary body and choroid)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                         | Inflamed episcleral (outermost layer of sclera beneath conjunctiva)                                                                                                                                                                                                                                                                                              | Inflammation of full-thickness of sclera                                                                                                                                                                                                                                                                                                     | Inflammation of cornea<br>Nb: HSV keratitis affects ONLY epithelial layer of cornea                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Scratches/damage to cornea                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Cause | <ul style="list-style-type: none"> <li><b>Bacterial</b> <ul style="list-style-type: none"> <li>trachoma – trachomitis in ATSI children) → This <b>strain NOT transmissible via sex</b></li> <li>gonococcal conjunctivitis (1<sup>st</sup> week of life)</li> <li>chlamydial conjunctivitis (after 1<sup>st</sup> week of life)</li> </ul> </li> <li><b>Viral (COMMON)</b></li> <li><b>Allergic</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                     | <b>Acute anterior uveitis</b> → HLA-B27 assoc. <ul style="list-style-type: none"> <li>Ankylosing spondylitis</li> <li>IBD</li> <li>Reactive arthritis</li> </ul> <b>Chronic anterior uveitis assoc.</b> <ul style="list-style-type: none"> <li>Sarcoidosis</li> <li>Syphilis</li> <li>Lyme disease</li> <li>TB</li> <li>Herpes virus</li> </ul>                                                                                                                                                                           | <b>Risk factors:</b> <ul style="list-style-type: none"> <li>Young-middle aged</li> <li>RA</li> <li>IBD</li> </ul>                                                                                                                                                                                                                                                | Assoc: <ul style="list-style-type: none"> <li>RA</li> <li>SLE</li> <li>IBD</li> <li>Sarcoidosis</li> <li>Wegener's</li> </ul>                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li><b>Viral</b> – Herpes simplex virus<br/><b>MOST COMMON – infects V1 branch of trigeminals</b></li> <li><b>Bacterial</b> – pseudomonas, staph</li> <li><b>Fungal</b> – candida, aspergillus</li> <li><b>Exposure</b> – Eyelid ectropion (inadequate eye coverage)</li> <li><b>Contact lens acute red eye (CLARE)</b></li> </ul>                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Contact lens</li> <li>Fingernails</li> <li>Eyelashes</li> <li>Foreign bodies</li> <li>Entropion</li> <li>Chemical</li> </ul> <p><u>DDx:</u> herpes keratitis (antivirals)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Comp  | <ul style="list-style-type: none"> <li>Loss of sight (esp. w/ gonococcal)</li> <li>Pneumonia</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>Loss of sight</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | None                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li><b>Necrotising scleritis</b> (visual impairment but no pain)</li> <li><b>Sclera perforation</b></li> </ul>                                                                                                                                                                                            | If inflammation occurs in stromal layer (between epithelium and endothelium) = stromal keratitis leading to: <ul style="list-style-type: none"> <li><b>Stromal necrosis + vascularisation</b></li> <li><b>Corneal scarring → blindness</b></li> </ul>                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>If contact lens – consider <b>pseudomonas</b></li> <li><b>Chemical abrasions</b> (acid) → urgent ED → irrigation within 20-30mins</li> <li><b>Ulcer → abscess → endophthalmitis</b> (infection within eye)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Sx    | <ul style="list-style-type: none"> <li>Unilateral then spreads → bilateral</li> <li>Red eyes – bloodshot</li> <li>Itchy or gritty sensation</li> <li><b>Bacterial</b> – purulent discharge + inflamed conjunctiva (worse in AM)</li> <li><b>Viral (COMMON)</b> – clear discharge + tender preauricular LN (in front of ears)</li> <li><b>Allergic</b> – contact w/ allergens, swollen eyelid and conjunctival sac + itchy watery eyes</li> </ul>                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li><b>Painful red eye with painful eye movements</b></li> <li><b>Miosis</b></li> <li><b>Floaters and flashes</b></li> <li><b>Ciliary flush</b> (ring of red spreading from cornea outwards)</li> <li><b>Photophobia</b> (ciliary muscle spasm)</li> <li><b>Lacrimation</b></li> <li><b>Hypopyon</b> (collection of WBC in anterior chamber)</li> </ul>                                                                                                                                | <ul style="list-style-type: none"> <li><b>Non-painful red eye</b></li> <li><b>NO vision loss</b></li> <li>FB sensation</li> <li>Watery eye (NO discharge)</li> </ul> <p><u>How to ddx from conjunctivitis?</u></p> <ul style="list-style-type: none"> <li>Give phenylephrine drops – relieves redness unlike conjunctivitis</li> <li>Blanches vessels</li> </ul> | <ul style="list-style-type: none"> <li><b>Painful (severe) red eye + movement</b></li> <li><b>Vision or acuity loss</b></li> <li>Photophobia</li> <li>Eye watering</li> <li>Tender on palpation</li> </ul>                                                                                                                                   | <ul style="list-style-type: none"> <li>Painful red eye</li> <li>Photophobia</li> <li>Vesicles around eye</li> <li>FB sensation</li> <li>Watery eye</li> <li>Loss in visual acuity</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Hx of contact lens + FB</li> <li>Painful red eye</li> <li>Photophobia</li> <li>FB sensation</li> <li>Watery eye</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Ix    | <ul style="list-style-type: none"> <li>Clinical + swab M/C/S</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>Clinical</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>Clinical</li> </ul>                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>Clinical</li> </ul>                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>SLIT-LAMP + fluorescein dye</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>SLIT-LAMP + fluorescein dye</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Mx    | <b>Bacterial / viral</b> <ul style="list-style-type: none"> <li>Hand hygiene (avoid eye rubbing + wash hands)</li> <li>Avoid contact lenses</li> <li>Clear eyes w/ cool boiled water</li> <li><b>PO Azithromycin</b> → for trachomitis AND other bacterial</li> <li><b>PO acyclovir</b> → if viral suspected</li> </ul> <b>Allergic:</b> <ul style="list-style-type: none"> <li>Avoid allergens</li> <li>Antihistamines (oral or topical)</li> <li>Topical mast cell stabilisers (use for several weeks for benefits) → indicated in those w/ chronic seasonal symptoms</li> </ul> <p><u>When is urgent ophthalmology r/v needed?</u></p> <ul style="list-style-type: none"> <li>Any visual acuity loss</li> <li>Neonatal conjunctivitis</li> <li>Gonococcal infection</li> </ul> | <b>General Mx:</b> <ol style="list-style-type: none"> <li>Ophthal referral</li> <li>Steroids (oral, topical or IV)</li> <li>Cycloplegic-mydratic meds (e.g. atropine) → blocks action of iris sphincter and ciliar body → dilate pupil and reduce pain</li> </ol> <ul style="list-style-type: none"> <li>Immunosupp – (DMARDs and Anti-TNF)</li> </ul> <b>Last resort</b> <ul style="list-style-type: none"> <li>Laser, cryo or surgery (vitrectomy)</li> </ul> <p><b>ABNORMAL SHAPED PUPIL (POSTERIOR SYNECHIAE)</b></p> | <b>SELF-LIMITING within 1-4 weeks</b> <ul style="list-style-type: none"> <li>Simple analgesia</li> <li>Cold compress</li> <li>2.5% phenylephrine (a1 agonist) eye drops</li> <li>Safety net advice</li> </ul> <b>If severe / concerns:</b> <ul style="list-style-type: none"> <li>Ophthal referral</li> <li>NSAIDs</li> <li>Topical steroid eye drops</li> </ul> | <b>General</b> <ul style="list-style-type: none"> <li><b>NSAID</b> (topical/systemic)</li> <li><b>Steroids</b> (topical/systemic)</li> <li><b>Immunosuppression</b> appropriate to underlying systemic condition (E.g. MTX in RA)</li> </ul> <b>If severe / concerns:</b> <ul style="list-style-type: none"> <li>Ophthal referral</li> </ul> | <b>Initial Ix:</b> <ul style="list-style-type: none"> <li>Slit-lamp exam</li> <li>Fluorescein dye = dendritic corneal ulcer</li> <li>Corneal swabs or scrapings (isolate virus for PCR)</li> </ul> <b>If severe / concerns:</b> <ul style="list-style-type: none"> <li><b>1<sup>ST</sup> LINE</b> = Ophthal referral</li> <li><b>2<sup>nd</sup> line</b> (if in pain) = analgesia + chloramphenicol eye drops prophylactic</li> <li><b>3<sup>rd</sup> line</b> = topical steroids (for stromal keratitis)</li> <li><b>4<sup>th</sup> line</b> = corneal transplant (if corneal scarring)</li> </ul> | <b>Initial Ix:</b> <ul style="list-style-type: none"> <li>Slit-lamp exam</li> <li>Fluorescein dye = <b>yellow-orange HIGHLIGHTS</b> of abrasion</li> </ul> <p><b>Uncomplicated corneal abrasions</b></p> <ul style="list-style-type: none"> <li>1<sup>st</sup> line = remove reversible cause (e.g. FB, contact lens)</li> <li>2<sup>nd</sup> line (if in pain) = analgesia + chloramphenicol eye drops prophylactic</li> <li>Review in 1 weeks time – heals within 2-3 days</li> </ul> <p><b>Specific Mx:</b></p> <ul style="list-style-type: none"> <li>Abx eye drops (e.g. chloramphenicol) +/- intra-vitreous injection of ABx</li> <li>Chemical abrasions → urgent ophthal referral (within 20-30mins) for irrigation</li> <li>Review in 1 weeks time</li> </ul> |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## VASCULAR EYE CONDITIONS

|              | SUBCONJUNCTIVAL HAEM                                                                                                                                                                                                                                                                                                | RETINAL VEIN OCCLUSION                                                                                                                                                                                                                                                                                                                                                                                                     | CENTRAL RETINAL ARTERY OCCLUSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | POSTERIOR VITREOUS DETACHMENT                                                                                                                                                                                     | RETINAL DETACHMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RETINITIS PIGMENTOSA                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Def</b>   | When small BVs in conjunctiva ruptures and release blood into space between sclera and conjunctiva                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>Blood clot (thrombus) within retinal veins</li> <li>4 branches veins anastomose to larger central vein (blockage in any one can cause symptoms)</li> </ul>                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>Blockage of central retinal artery</li> <li>ICA → ophthalmic → central retinal artery</li> </ul>                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>Vitreous body = collagen + water gel that keeps retina pressed on choroid</li> <li>Vitreous body comes away from retina as unable to maintain firmness with age</li> </ul> | Retina separates from choroid underneath <ul style="list-style-type: none"> <li>Secondary to retinal tear</li> </ul>                                                                                                                                                                                                                                                                                                                                                                     | <b>CONGENITAL</b> degeneration of rods and cones in retina <ul style="list-style-type: none"> <li>Could also be sporadic mutation</li> </ul>                                                                                                                                                                                                                                                                                            |
| <b>Cause</b> | <b>Most idiopathic BUT consider</b> <ul style="list-style-type: none"> <li>XS strain (e.g. heavy cough, weight lift, constipation)</li> <li>Trauma</li> <li>HTN</li> <li>Bleeding disorders (e.g. thrombocytopenia)</li> <li>Whooping cough</li> <li>Drugs (warfarin, DOAC, anti-platelets)</li> <li>NAI</li> </ul> | <b>Vascular risk factors</b> <ul style="list-style-type: none"> <li>HTN</li> <li>HC</li> <li>T2DM</li> <li>Smoking</li> <li>Glaucoma</li> <li>Systemic inflammation (SLE)</li> </ul>                                                                                                                                                                                                                                       | <b>Vascular risk factors:</b> <ul style="list-style-type: none"> <li>Advanced age</li> <li>FHx</li> <li>Smoking + EtOH</li> <li>HTN</li> <li>T2DM</li> <li>Poor diet, Inactive &amp; OBESE</li> </ul> <b>Strongly associated w/:</b> <ul style="list-style-type: none"> <li><b>Temporal arteritis</b> (females w/ PMR) → causes <b>AION</b></li> </ul>                                                                                                                                                              | <ul style="list-style-type: none"> <li>Advanced age</li> </ul>                                                                                                                                                    | <ul style="list-style-type: none"> <li>Posterior vitreous detachment</li> <li><b>Diabetic retinopathy</b></li> <li>Eye trauma</li> <li>Retinal malignancy</li> <li>Older age</li> <li>FHx</li> </ul> <b>DDx:</b> <ul style="list-style-type: none"> <li>Stroke</li> <li>Amaurosis fugax (TIA of ophthalmic artery)</li> </ul>                                                                                                                                                            | <ul style="list-style-type: none"> <li>FHx</li> </ul> Assoc. with systemic disease: <ul style="list-style-type: none"> <li><b>Usher's syndrome</b> – hearing loss + retinitis pigmentosa</li> <li><b>Refsum's disease</b> – metabolic disorder of phytanic acid causing hearing, skin and neuro issue + retinitis pigmentosa</li> <li><b>Bassen-Kornzweig Syndrome</b> – fat malabsorption + neuro sx + retinitis pigmentosa</li> </ul> |
| <b>Comp.</b> | None                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>Retinal damage</li> <li>Vision loss</li> <li>Neovascularisation (VEGF release)</li> </ul>                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>Retinal damage</li> <li>Vision loss</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Retinal tears and retinal detachment</li> </ul>                                                                                                                            | <b>Permanent vision loss</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Sx</b>    | Asymptomatic <ul style="list-style-type: none"> <li>Hx of strenuous activity (TRIGGER Event)</li> </ul>                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li><b>Sudden painless vision loss</b></li> </ul>                                                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li><b>Sudden painless vision loss</b></li> <li><b>RAPD</b> – affected eye constrict more when light shone in other eye</li> </ul>                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li><b>Sudden painless vision loss (SPOTS)</b></li> <li><b>Floaters</b></li> <li><b>Flashing lights</b></li> </ul>                                                             | <ul style="list-style-type: none"> <li><b>(1) PRODROME:</b> Flashed and floaters</li> <li><b>(2) Painless peripheral vision loss (sudden) + (curtain falling down)</b></li> <li>Blurred/distorted vision</li> </ul>                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li><b>NIGHT blindness</b> (rods degenerate more than cones)</li> <li><b>Peripheral vision lost BEFORE central vision</b></li> </ul>                                                                                                                                                                                                                                                                 |
| <b>Ix</b>    | Clinical Exam                                                                                                                                                                                                                                                                                                       | <b>Check other co-morbidities:</b> <ul style="list-style-type: none"> <li>BP (HTN)</li> <li>FBC (leukemia)</li> <li>ESR (inflammatory disorders)</li> <li>Fasting BSL and HbA1C (T2DM)</li> </ul> <b>Fundoscopy</b> <ul style="list-style-type: none"> <li>Flame and blot haemorrhages (<b>snowstorm appearance</b>)</li> <li>Optic disc oedema</li> <li>Macular oedema</li> <li>Retinal haemorrhages</li> </ul>           | <b>Check other co-morbidities:</b> <ul style="list-style-type: none"> <li>BP (HTN)</li> <li>FBC (leukemia)</li> <li>ESR (check for GCA)</li> </ul> <b>Fundoscopy</b> <ul style="list-style-type: none"> <li>Cherry red spot macula on pale retina (hypoperfusion of retina)</li> </ul>                                                                                                                                                                                                                              | <b>Fundoscopy</b>                                                                                                                                                                                                 | <b>Fundoscopy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Fundoscopy</b> <ul style="list-style-type: none"> <li>Pigmented retina "bone spicule"</li> </ul>                                                                                                                                                                                                                                                                                                                                     |
| <b>Mx</b>    | <b>Self-limiting (within 2 weeks)</b> <ul style="list-style-type: none"> <li>Lubricating eye drops for FB sensation</li> </ul>                                                                                                                                                                                      | <ul style="list-style-type: none"> <li><b>Urgent ophthal referral</b></li> </ul> <b>Secondary care:</b> <ul style="list-style-type: none"> <li>Treat <b>macular oedema</b></li> <li><b>Prevent neovascularisation through:</b> <ul style="list-style-type: none"> <li>Anti-VEGF injections</li> <li>Laser photocoagulation</li> <li>Intravitreal steroids (e.g. dexamethasone intravitreal implant)</li> </ul> </li> </ul> | <b>Immediate mx:</b> <ul style="list-style-type: none"> <li><b>Urgent ophthal referral</b></li> <li><b>?Ocular massage</b></li> <li><b>Remove fluid from anterior chamber to reduce IOP</b></li> <li><b>?SL Isosorbide dinitrate to dilate artery</b></li> <li>Consider ESR and temporal artery biopsy</li> <li><b>(begin high-dose steroids e.g. 60mg prednisolone)</b></li> </ul> <b>Long-term Mx:</b> <ul style="list-style-type: none"> <li>Manage risk factors</li> <li>Secondary prevention of CVD</li> </ul> | None<br><br>Referral to optometrist or ophthalmologist to assess retina                                                                                                                                           | <b>For retinal tears:</b> <ul style="list-style-type: none"> <li>Laser therapy</li> <li>Cryotherapy</li> </ul> <b>For retinal detachment (reattach retina and repair retinal tear – as above)</b> <ul style="list-style-type: none"> <li>Vitrectomy (remove vitreous body + replace it with oil or gas)</li> <li>Scleral buckling – silicon "buckle" to put pressure on outside of eye to bring choroid inwards in contact with detached retina</li> <li>Pneumatic retinopexy</li> </ul> | <ol style="list-style-type: none"> <li><b>Ophthal Referral</b> (do Mx + Dx)</li> <li><b>Genetic counselling</b></li> <li><b>Vision aids</b></li> <li><b>Sunglasses</b> to protect the retina from accelerated damage</li> <li><b>Driving limitations and informing the DVLA</b></li> <li><b>Regular FU</b> - assess vision and OTHER reversible eye conditions (e.g. cataracts)</li> <li>?gene therapy in the future</li> </ol>         |
|              |                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                    |

