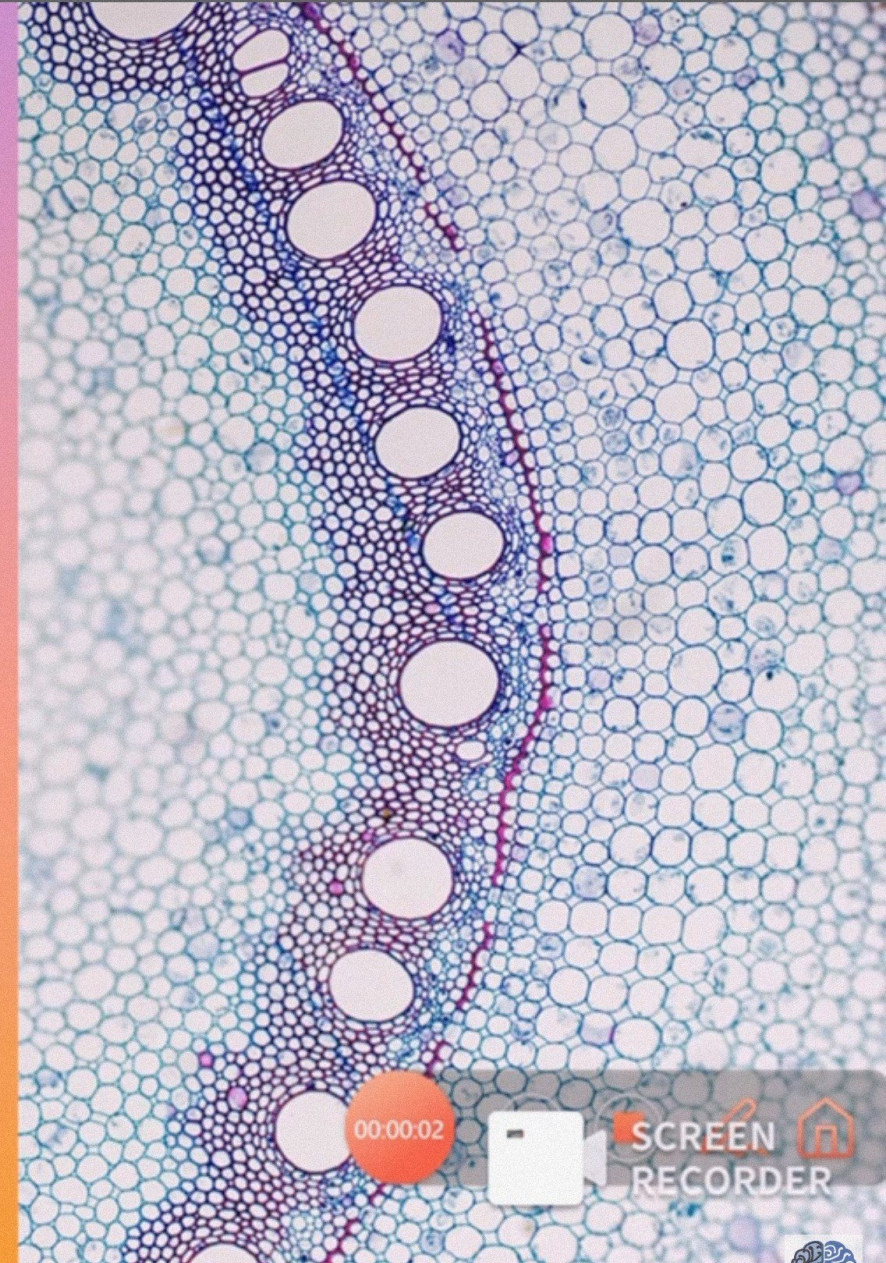


PAPILLOEDEMA

+

○



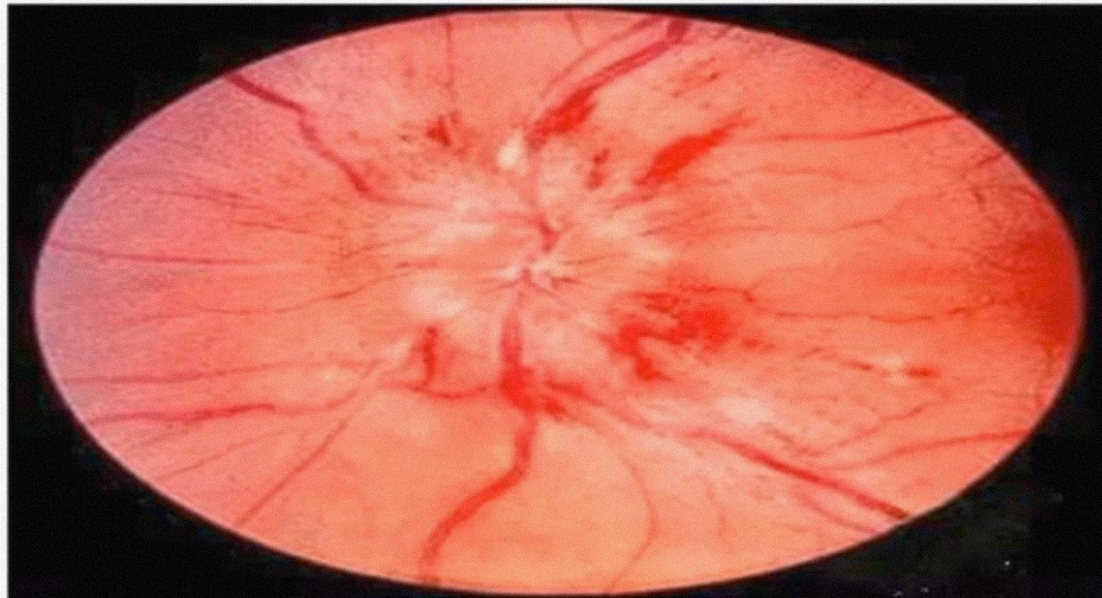
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- +
• Papilloedema is defined as oedema of the optic disc or nerve head due to raised intracranial pressure



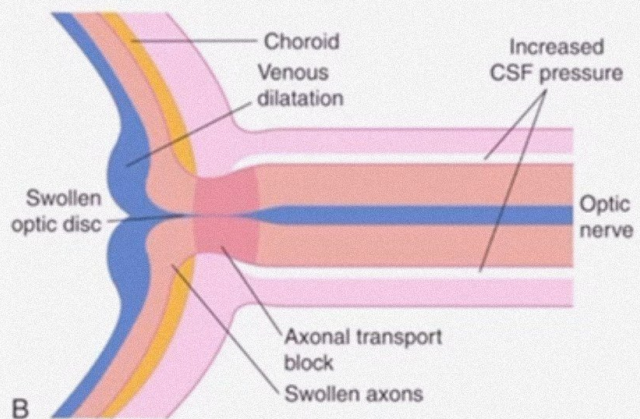
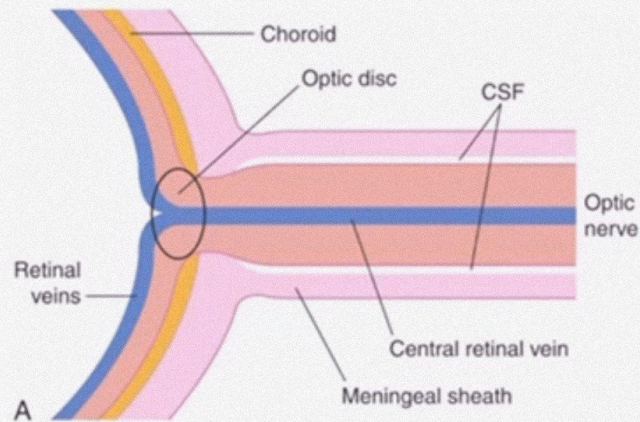


FIGURE 22.3 Mechanism of optic disc oedema (papilloedema). (A) Normal. (B) Disc oedema (e.g. due to cerebral tumour). (From Nicki Colledge, Brian Walker, Stuart Ralston. Davidson's Principles and Practice of Medicine. 21st ed. Edinburgh: Churchill-Livingstone; 2010)



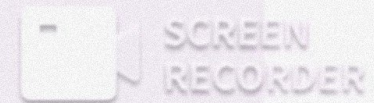
The subarachnoid and subdural spaces around the nerve are freely continuous with those around the brain.



Rise in ICT becomes evident around the nerve as the Subarachnoid space swells

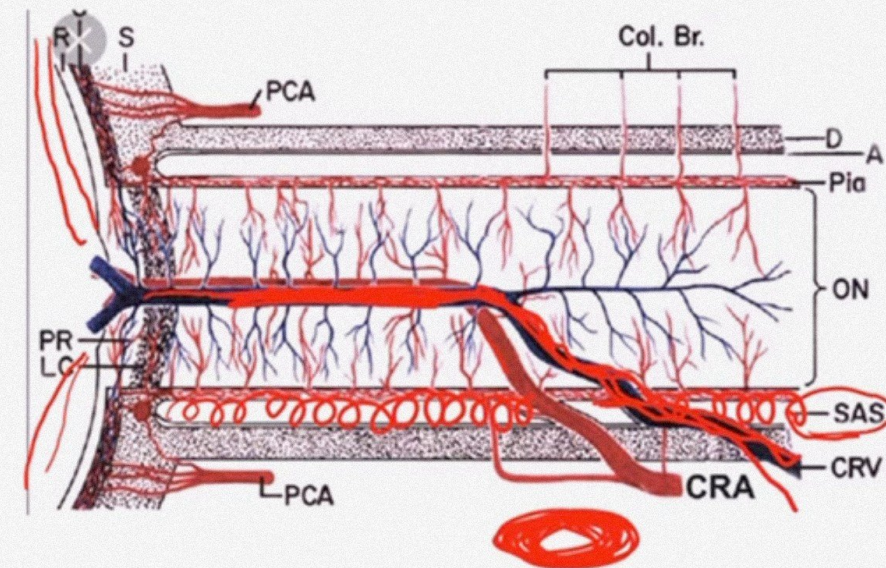


Purely hydrostatic, non-inflammatory phenomenon.



PATHOGENESIS.

- **Compression of the central retinal vein** as it crosses the subdural and subarachnoid spaces, causing its collapse, while the thicker-walled artery continued to transmit blood.
- **Blockage of axoplasmic transport.**
- Elevated cerebrospinal fluid (CSF) pressure produces axoplasmic stasis in the optic nerve head leading to swelling of the optic disc and secondary vascular changes at the disc surface.



00:01:08

SCREEN RECORDER



**COMPRESSION OF THE CENTRAL
RETINAL VEIN +**

**BLOCKAGE OF THE AXOPLASMIC
FLOW + ELEVATED CSF PRESSURE**

AXOPLASMIC STASIS

SWELLING OF THE OPTIC DISC

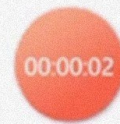
MECHANICAL CHANGES

00:00:01

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WHAT ARE THE CAUSES OF PAPILLEDEMA ?



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WHEN THE SKULL IS TOO SMALL (**CRANIOSYNOSTOSIS**)

WHEN BRAIN VOLUME INCREASES (**SPACE OCCUPYING LESIONS**)

WHEN THERE IS OBSTRUCTION OF THE CEREBROSPINAL FLOW (**COLLOID CYST , HYDROCEPHALOUS**)

INCREASED PRODUCTION OF CSF (**CHOROID PLEXUS PAPILOMA**)

REDUCED ABSORPTION OF CSF (**MENINGITIS, CEREBRAL VENOUS THROMBOSIS**)

00:00:05

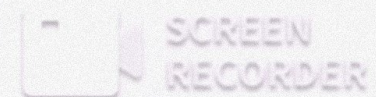
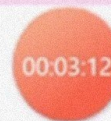
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Increased Intracranial pressure

- An intracranial tumor in any position, may induce it
- The highest percentage being found with tumours of the mid-brain, parieto-occipital region and cerebellum

- Internal hydrocephalus are most likely to cause papilledema.
- Brain abscess,
- Thrombosis of the cavernous sinus or other intracranial veins
- Aneurysm
- Subarachnoid hemorrhage
- Pseudotumor cerebri
- Malignant hypertension



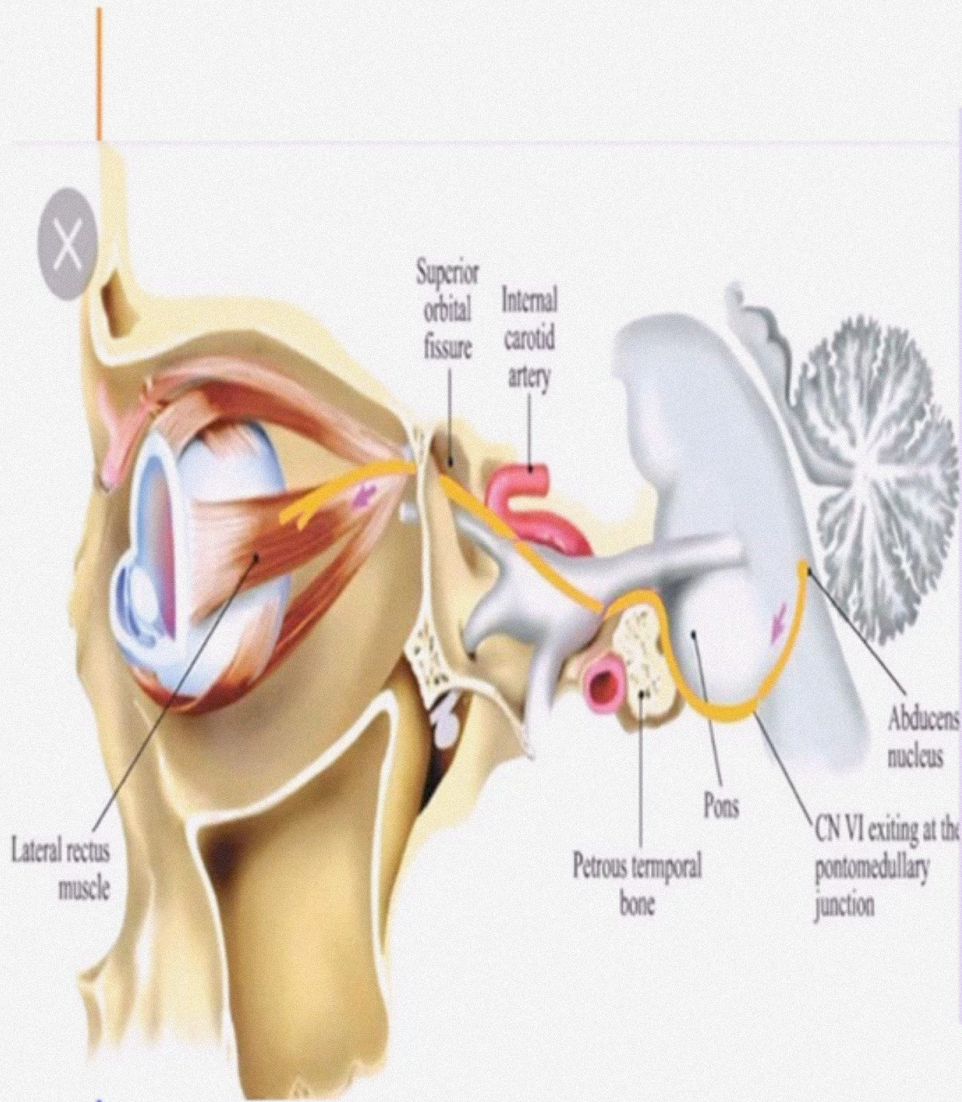
SYMPTOMS

Relative scotomata, first to green and red.

Headache, which becomes worse in a recumbent position or is worst in the early morning when the patient wakes up, but may improve during the day.

- Episodes of **transient** attacks of blurred vision.
- Bilateral or monocular '**black-outs**' lasting for a few seconds; precipitated by changes in posture, in the initial stages.
- **Enlargement of the blind spot** owing to separation of the retina around the disc by the oedema and a progressive contraction of the visual field due to atrophy of the nerve.





- Patients may complain of nausea and vomiting and **diplopia (double vision)** due to non-specific paresis of the sixth nerve caused by raised intracranial pressure.
- **PULSATILE TINNITUS**

00:00:32

SCREEN RECORDER



SIGNS

MECHANICAL/ DISC FINDINGS

- BLURRING OF THE DISC MARGINS
- HYPEREMIA AND EDEMA
- OBLITERATION OF THE CUP
- ELEVATION OF DISC (2-6 D

VASCULAR FINDINGS

- CONGESTION OF THE VEINS
- DIALATION AND TORTOUS VESSELS.
- ABSENT VENOUS PULSATATIONS
- RED STREAKS (ARTERIOLES

00:00:44



SCREEN RECORDER



- RETINAL FOLDS (**PATTON'S LINES**) → edema spread to surrounding retina

- LOSS OF REDDISH HUE
- OPACIFICATION OF RETINA

- Ischemia, infarct and direct pressure induced axonal damage.

- Secondary optic atrophy/ post papilledema atrophy.

- Reactionary organization or gliosis

↓
Replaced by glial tissue
↳ Astrocytes

↓
whitish in color

↓
Opacification of Retina

- Haemorrhages (punctate and flame shape) ↳ around disc
↳ indicate acute phase

- MACULAR STAR (INCOMPLETE and fan towards disc

- Cotton wool spots (retinal microinfarcts.

00:02:19



SCREEN RECORDER



- RETINAL FOLDS (PATTON'S LINES) → edema spread to surrounding retina

- LOSS OF REDDISH HUE

- OPACIFICATION OF RETINA
↳ Chronic Stage

- Ischemia, infarct and direct pressure induced axonal damage.

- Secondary optic atrophy/ post papilledema atrophy.

- Reactionary organization or gliosis

- Haemorrhages (punctate and flame shape) ↳ around disc
↳ indicate acute phase

- MACULAR STAR (INCOMPLETE and fan towards disc

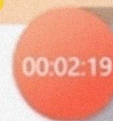
- Cotton wool spots (retinal microinfarcts.

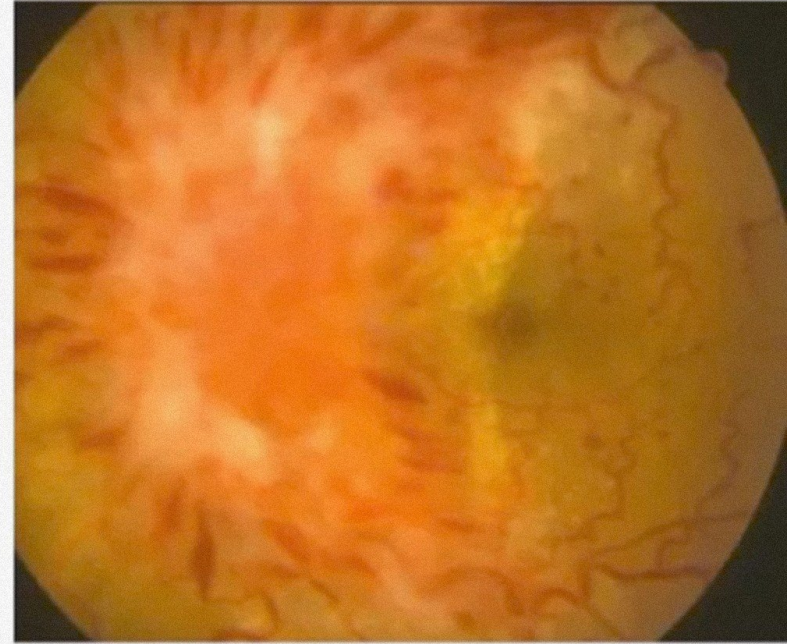
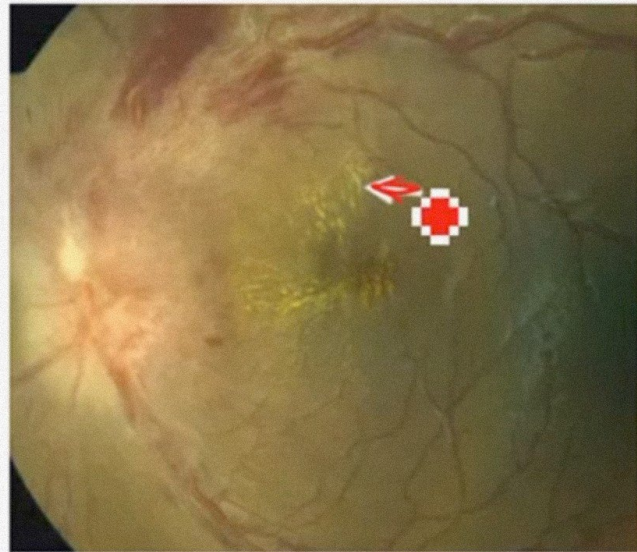
↓
Replaced by glial tissue
↳ Astrocytes

↓
whitish in color

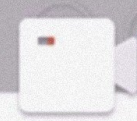
↓
Opacification of Retina

↳ Gliosis
seen in stage of Optic Atrophy



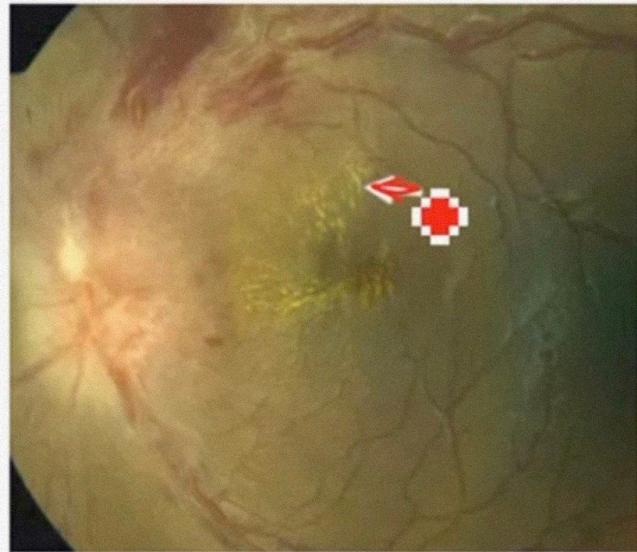


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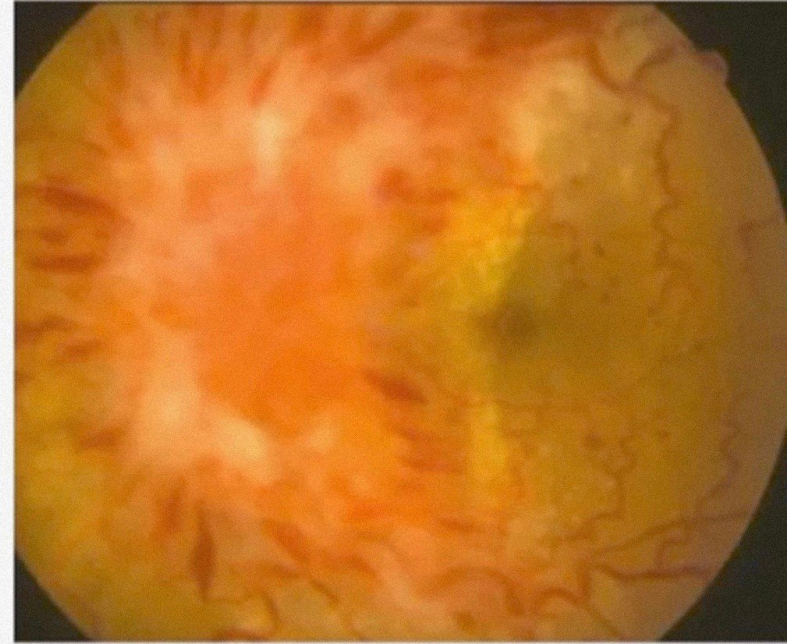


SCREEN RECORDER





Incomplete
← Macular Star



00:07:03

SCREEN RECORDER



Papilledema Grading System (Frisen Scale)^[5]

Stage 0 - Normal Optic Disc Blurring of nasal, superior and inferior poles in inverse proportion to disc diameter. Radial nerve fibre layer (NFL) without NFL tortuosity. Rare obscuration of a major blood vessel, usually on the upper pole.

Stage 1 -Very Early Papilledema Obscuration of the nasal border of the disc. No elevation of the disc borders. Disruption of the normal radial NFL arrangement with greyish opacity accentuating nerve fibre layer bundles. Normal temporal disc margin. Subtle greyish halo with temporal gap (best seen with indirect ophthalmoscopy).
Concentric or radial retro choroidal folds.

Stage 2 - Early Papilledema Obscuration of all borders. Elevation of the nasal border. Complete peripapillary halo.

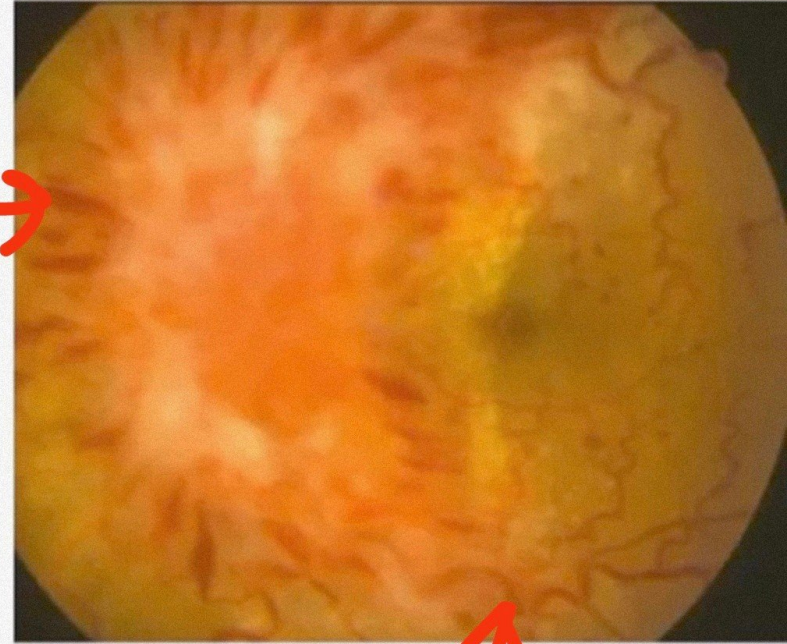
Stage 3 - Moderate Papilledema Obscuration of all borders. Increased diameter of optic nerve head. Obscuration of one or more segments of major blood vessels leaving the disc. Peripapillary halo-irregular outer fringe with finger-like extensions.

Stage 4 - Marked Papilledema Elevation of the entire nerve head. Obscuration of all borders. Peripapillary halo. Total obscuration on the disc of a segment of a major blood vessel.

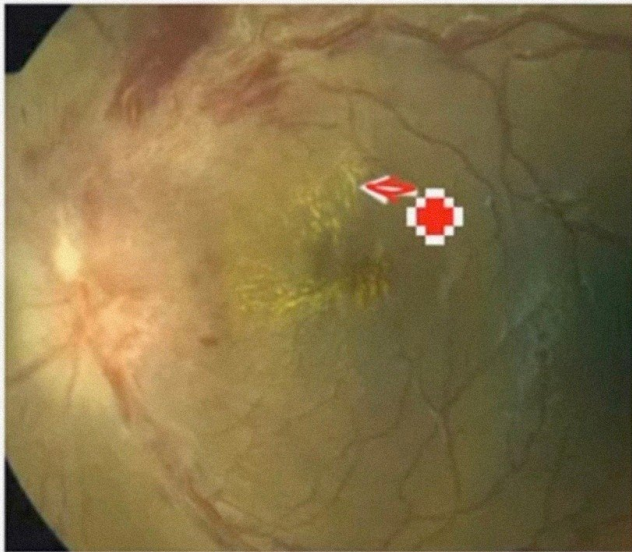
Stage 5 - Severe Papilledema Dome-shaped protrusions representing anterior expansion of the optic nerve head. Peripapillary halo is narrow and smoothly demarcated. Total obscuration of a segment of a major blood vessel may or may not be present. Obliteration of the



Hemorrhages →



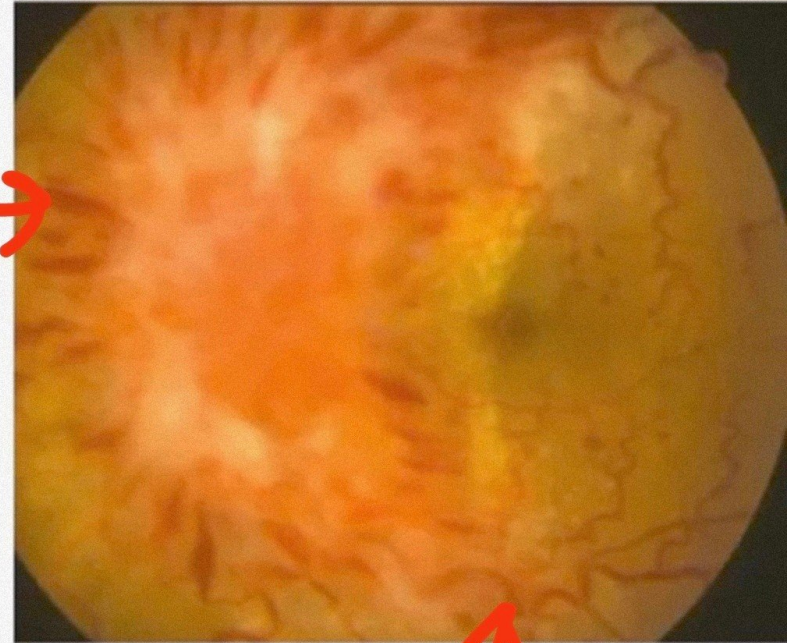
↑
Tortuous
vessels



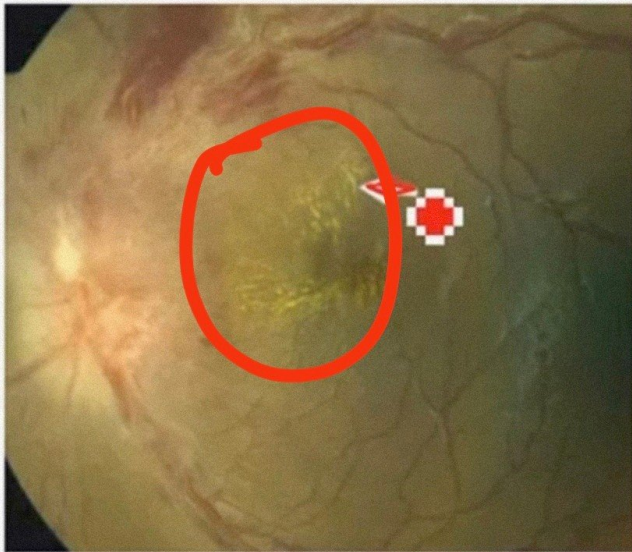
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Macular Star



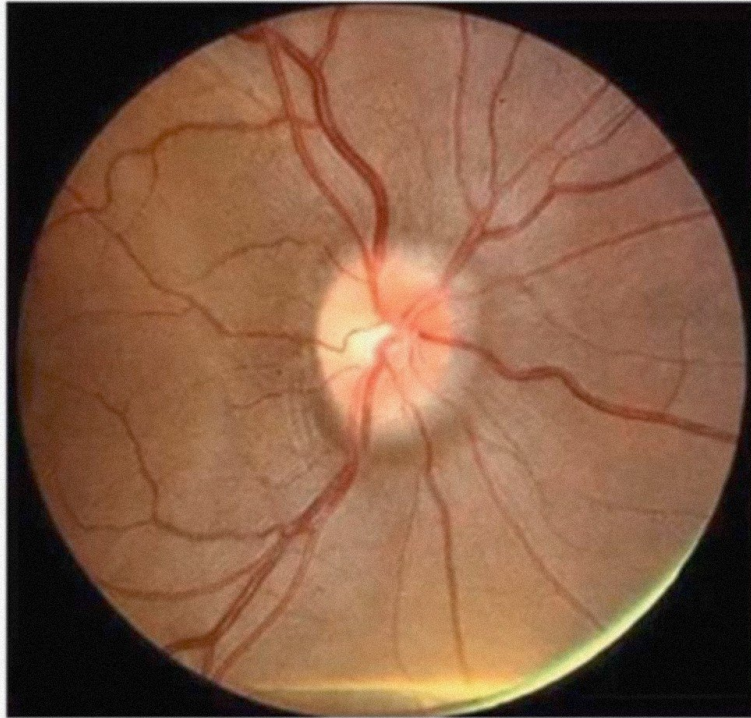
Hemorrhages →



↑
Tortuous
vessels

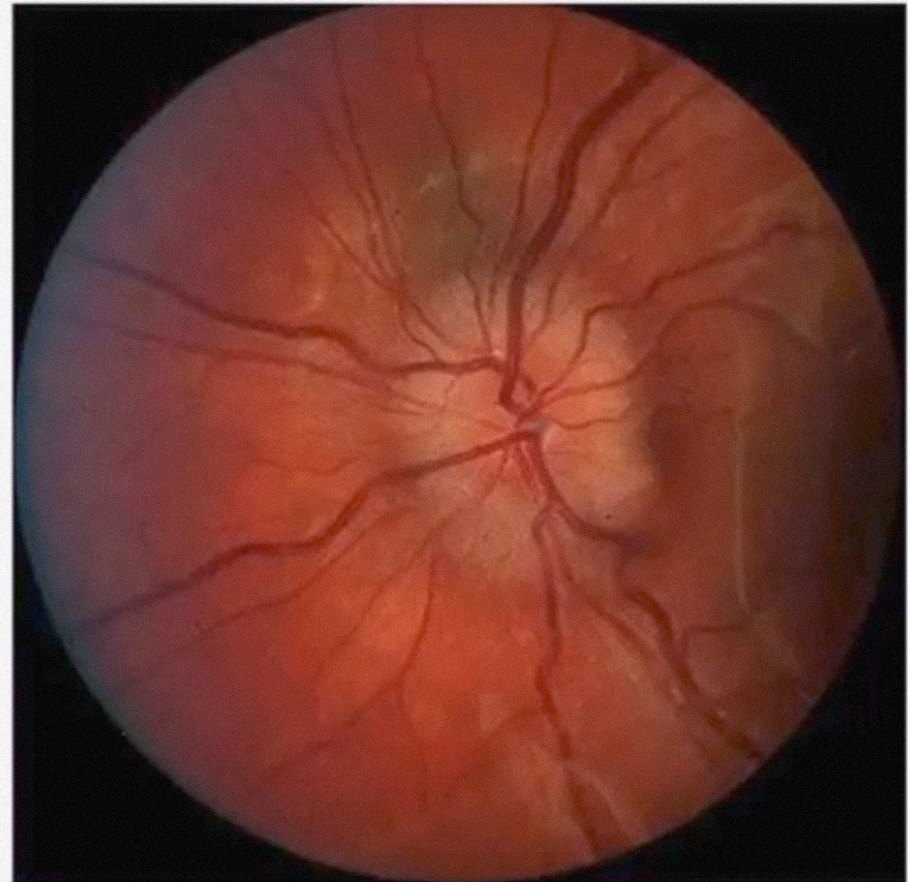


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Macular Star



C-shaped halo with a temporal gap

With **Grade II** papilledema, the halo becomes circumferential



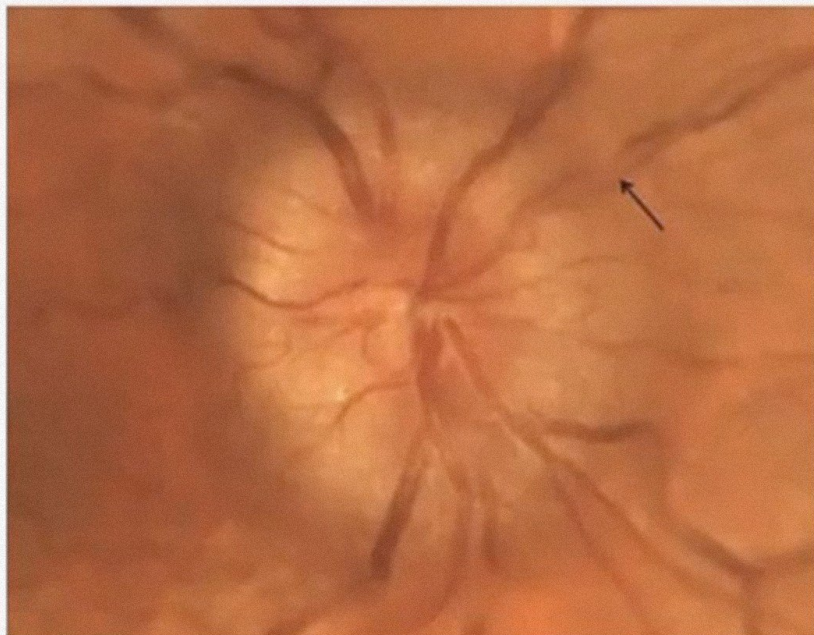
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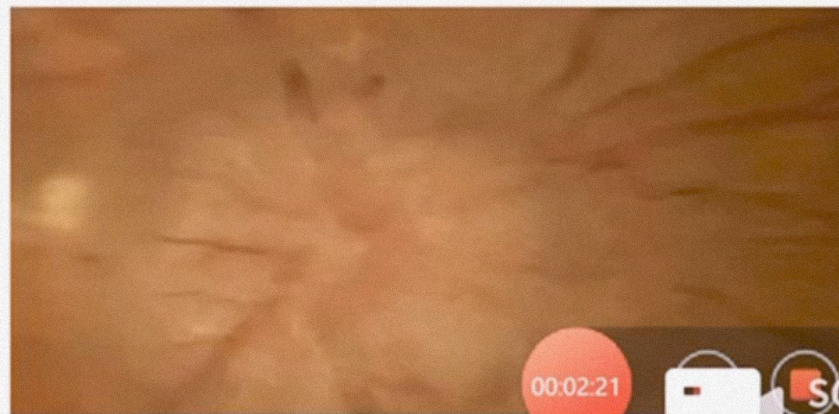
Grade III papilledema is characterized by loss of major vessels AS THEY LEAVE the disc (arrow)



Grade IV papilledema is characterized by loss of major vessels ON THE DISC.



Grade V papilledema has the criteria of grade IV plus partial or total obscuration of all vessels of the disc.



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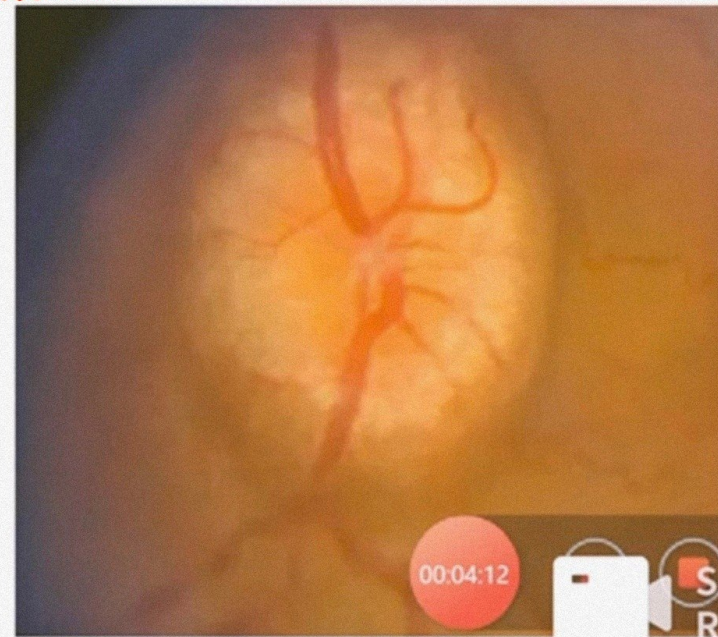
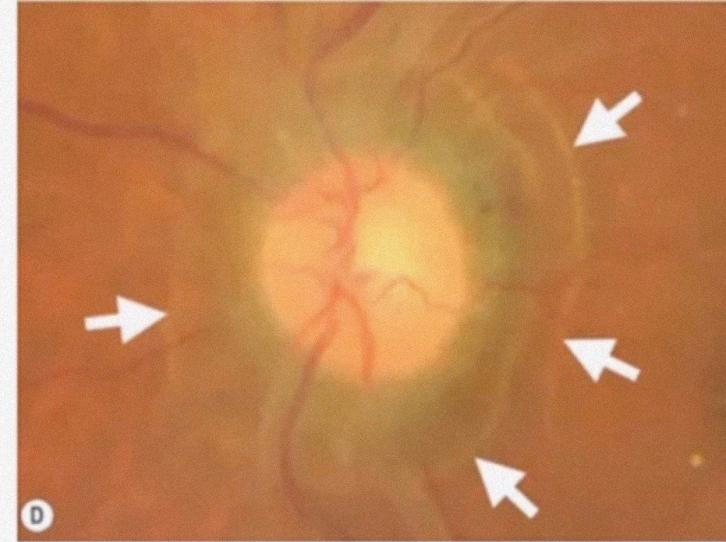


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CHRONIC PAPILLEDEMA

- Disc appears PALE
- Persistent Water marks
- Optociliary shunts *→ Anastomoses develop bw ciliary circulation and retinal circulation*
- **“CHAMPAGNE CORK APPEARANCE”**



FOSTER KENNEDY SYNDROME

- Papilledema is bilateral, although asymmetrical.
- Amount of swelling may be of localizing significance.
- Frontal tumors and middle ear disease, however, the swelling is usually greater on the side of the lesion.
- Unilateral **papilledema**, with **optic** atrophy on the other side, suggests a tumor of the **opposite** olfactory groove or orbital surface of the frontal lobe or of the pituitary body (the Foster-Kennedy syndrome).

00:06:20



SCREEN
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DIAGNOSTIC INVESTIGATIONS

**OPHTHALMIC
INVESTIGATIONS**

NEUROIMAGING

LUMBAR PUNCTURE



DIAGNOSTIC INVESTIGATIONS

**OPHTHALMIC
INVESTIGATIONS**

NEUROIMAGING

LUMBAR PUNCTURE

Fundus Examination

**BP → to rule out
malignant HTN*



DIAGNOSTIC INVESTIGATIONS

OPHTHALMIC INVESTIGATIONS

- Spectral Domain OCT (RNFL and MACULAR SCAN)
- Disc Images
- Automated perimetry
- Fluorescein angiography

DIAGNOSTIC INVESTIGATIONS

NEUROIMAGING

- CT scan → to rule out space occupying lesions
- CT venogram → cerebral vein thrombosis
- MRI
- MRV (MR VENOGRAPHY)

meningitis {

DIAGNOSTIC INVESTIGATIONS

LUMBAR PUNCTURE

- Should be done after NEUROIMAGING
- Always rule out tonsillar ectopia in neuroimaging
- *LP is done to check :*
 - Opening pressure
 - CSF composition.

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MANAGEMENT

- treat underlying cause
- save vision
- symptomatic relief

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- If malignant hypertension was found, then the patient must be sent to the emergency department for further management. Even with malignant hypertension cases, the patient with papilledema should still proceed with neuro-imaging
- If a mass is present, primary therapy should be directed towards that lesion (e.g., surgery)
- If acute cerebral venous thrombosis was seen, the patient must be sent to the thrombosis team immediately. It is best to avoid acetazolamide in cerebral venous thrombosis as it can precipitate the condition, however it can later be added on when the patient has started on anti-coagulation
- Medications (tetracyclines, vitamin A analogues, etc.) are felt to be causative so they should be discontinued.
- If the final diagnosis was IIH

TREATMENT OF PAPILEDEMA

- Decompression. → *considered in vision threatening conditions*
- OPTIC NERVE FENESTRATION
- DURAL VENOUS SHUNTING
- The recovery of vision may be faster than the subsidence of the papilloedema. On the other hand, vision may deteriorate after operation, probably because of progressive sclerosis especially if surgical intervention has been delayed

00:00:19

SCREEN
RECORD



- visual fields should be carefully watched and decompression urged from the ophthalmological point of view before peripheral constriction becomes evident.
- Surgical options for pseudotumour cerebri include a lumbar–peritoneal shunt by a neurosurgeon, or local decompression by making multiple slits or cutting a window in the optic nerve sheaths (dura and arachnoid) in the orbit.