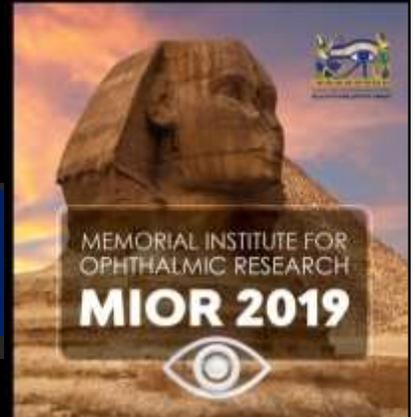


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Posterior ischaemic optic neuropathy (PION)

BY

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The blood supply of the optic nerve

The ON head

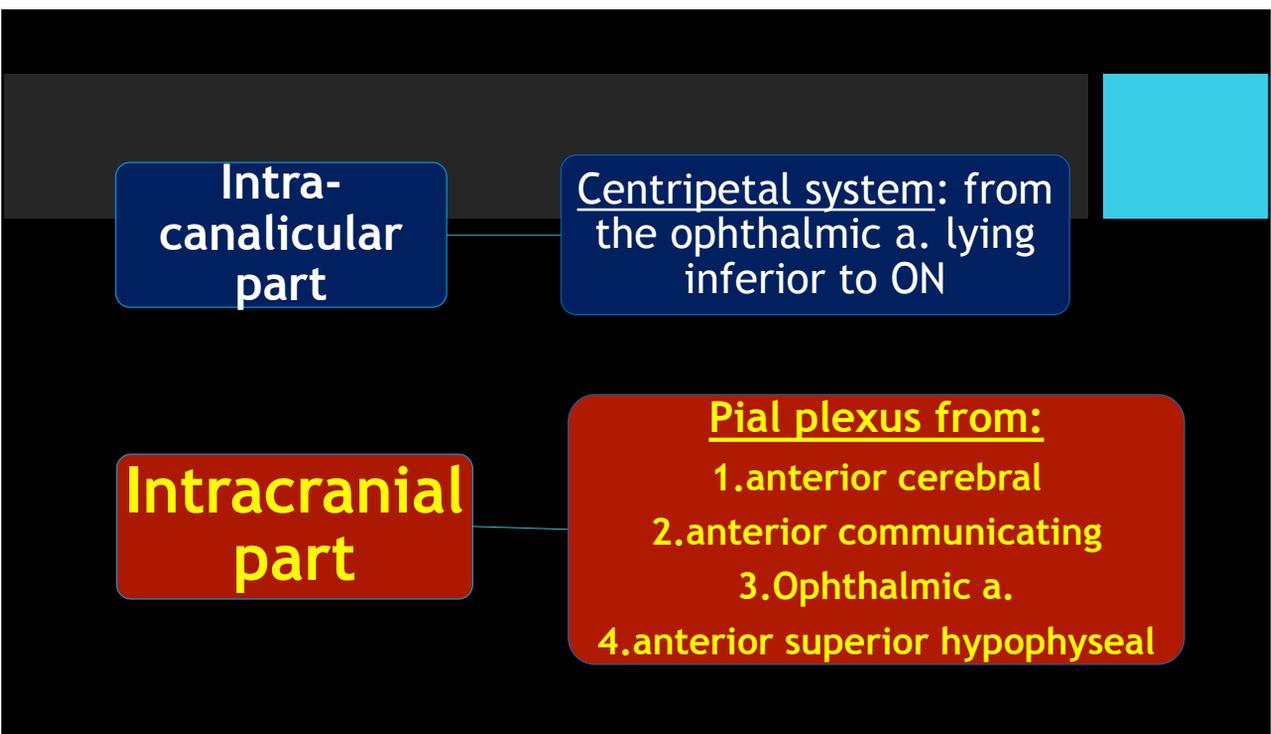
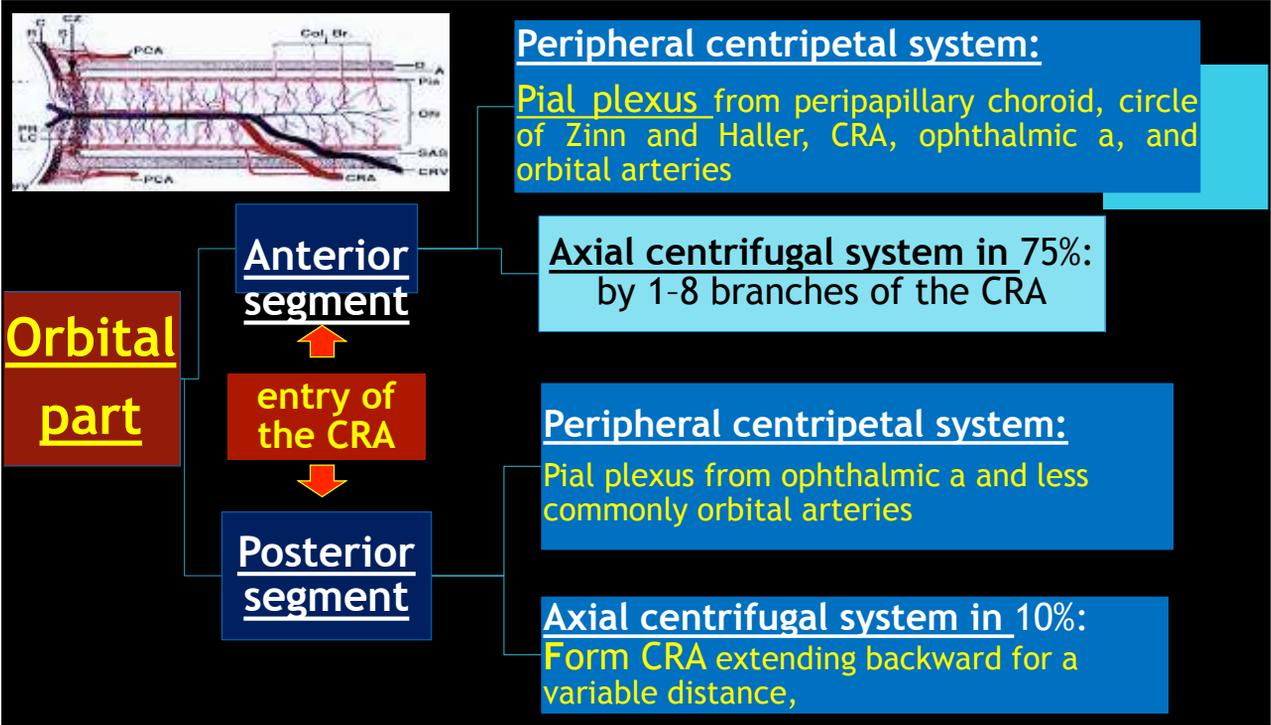
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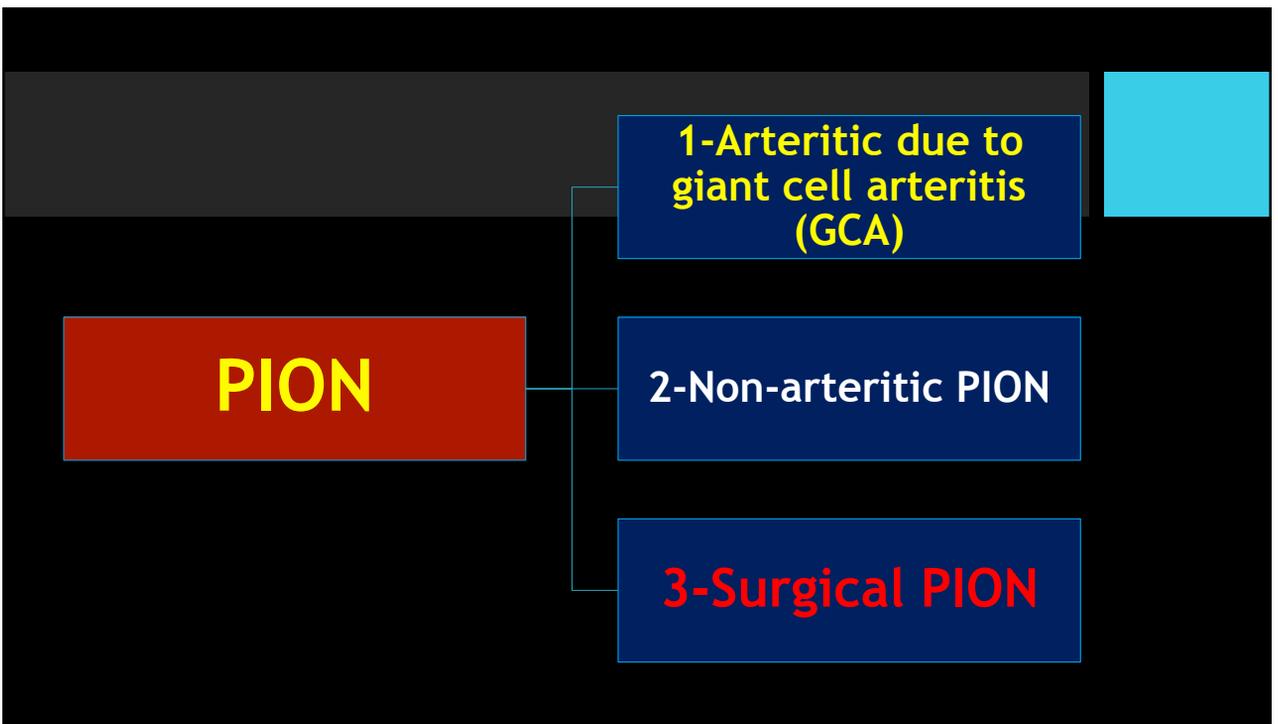
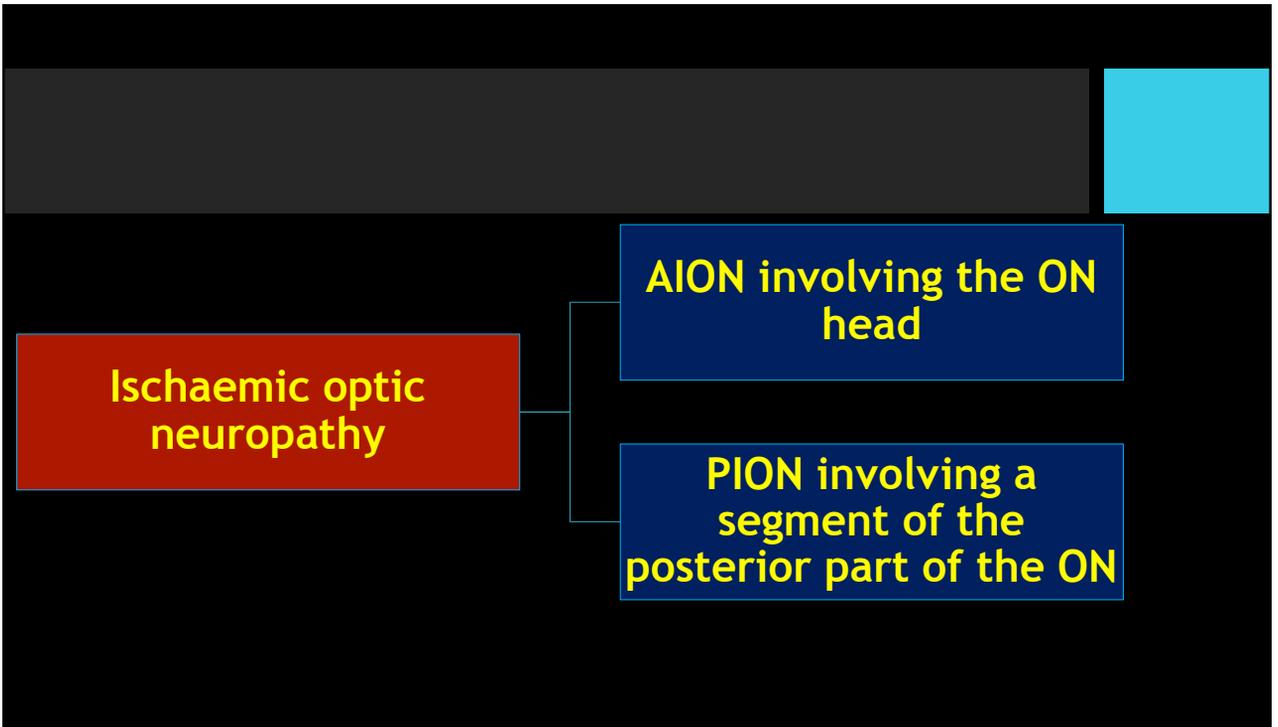
the posterior ciliary arteries

The rest of the ON

BY

multiple sources





Non-arteritic PION

may be associated with long list of systemic diseases:

- | | | |
|------------------------------------|-------------------------|--|
| 1. DM | 8. pulseless disease | 12. Head injury |
| 2. Hypertension | 9. Emboli | 13. Extradural haematoma |
| 3. Severe hypotension | 10. aplastic anemia | 14. Rupture of anterior cerebral artery aneurysm |
| 4. Atherosclerosis | 11. sickle cell disease | 15. Aspergillus infection |
| 5. Migraine | | |
| 6. Haemodialysis | | |
| 7. carotid stenosis, or dissection | | |

Arteritic PION: GCA

- GCA mostly affects PCAs → arteritic AION
- GCA can sometimes involve other orbital arteries.
- Arteritic PION is much less common than arteritic AION.

Other causes of Arteritic ION

1. herpes zoster
2. Behçet's disease
3. relapsing polychondritis
4. polyarteritis nodosa
5. rheumatoid arthritis
6. Wegener's vasculitis
7. Crohn's disease
8. Takayasu's arteritis
9. systemic lupus
10. infections by *Rickettsia conorii*

Surgical PION

Also called postoperative or perioperative

Associated with prolonged systemic surgical procedures:

1. Spinal and orthopaedic and Hip surgery
2. Coronary artery bypass
3. Radical neck dissection
4. venous graft in extremities
5. Cataract surgery
6. Strabismus surgery
7. Orbital surgery
8. Nasal surgery
9. Thoracotomy for haemothorax
10. Penetrating thoracoabdominal injury

Pathogenesis of Surgical PION

Multifactorial:

1. Severe & prolonged arterial hypotension (prolonged general anaesthesia, surgical trauma, massive blood loss)
2. Haemodilution: large amount of IV fluids
3. Anaemia
4. Orbital and periorbital edema or orbital compression by prone position

Histopathology

- Infarction may involve the entire nerve thickness or only the central part or the peripheral part, depending upon blood supply pattern.

AGE

- Mostly middle-aged and elderly, however no age is immune.
- The age incidences of arteritic and nonarteritic PION is similar to that of arteritic and nonarteritic AION

Symptoms

Acute, painless visual loss in one or both eyes, sometimes discovered upon waking up in the morning.

Surgical PION:

- Visual loss after a prolonged, major surgery
- Discovered as soon as patient is alert (may be several days after surgery).
- Bilateral massive permanent visual loss or complete blindness (great medicolegal importance).

Examination

- Visual acuity from near normal to NPL
- RAPD in unilateral cases
- Unlike AION, the disc does not have small or absent cup.

Examination

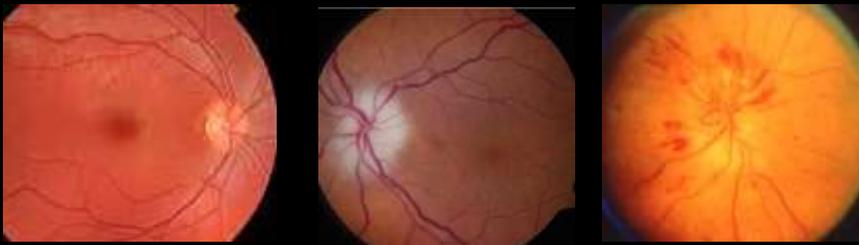
- Initially normal optic disc on ophthalmoscopy and F/A
- Within 6-8 weeks disc pallor develops (usually > temporally).
- Rarely the optic disc develops cupping in nonarteritic PION

Visual field defect

- **Central VF defect is the most common** as the axial region in the posterior ON is a watershed zone → more susceptible to ischemia
- Conversely, in 10% of the nerves have intraneural branch of the CRA → preservation of a **tunnel-like central field** with loss of peripheral field

Arteritic versus nonarteritic PION

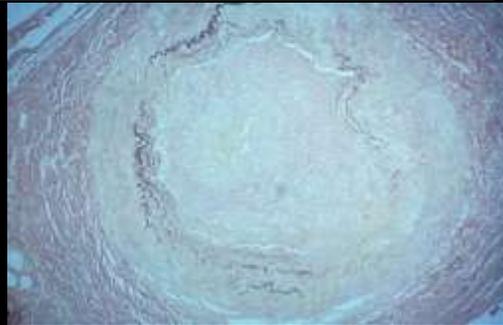
- The same as arteritic versus nonarteritic AION
- However the disc is initially normal in both types in PION whereas disc changes are present in AION



Diagnosis

- Difficult (especially non-arteritic) = diagnosis of exclusion.
- Other DD should be ruled out (retro-bulbar neuritis, compressive and other optic neuropathy, neurological lesions, hysteria, malingering).

Diagnosis



- Diagnosis of surgical PION is relatively straight forward.

Why is PION much less common than AION?

1-Different nature of the blood supply

2-The blood flow in the ONH depends upon IOP which is much higher than the orbital pressure.

Management of Non-Arteritic PION

- Aggressive systemic steroid therapy during the very early stages may have a beneficial effect.
- However, spontaneous improvement in VA and VF may also occur in some eyes without steroid therapy.

Management of Arteritic PION

- **Rapid, aggressive systemic steroid therapy to prevent further visual loss.**

Surgical PION

- **Prophylactic measures** as once the visual loss occurs, it is usually bilateral, severe, and irreversible with no effective treatment improve vision.
 1. **Avoid arterial hypotension**
 2. **Avoid excessive fluid replacement and haemodilution**
 3. **Use colloid and crystalloid fluids**
 4. **Periodic Check of hematocrit**

Surgical PION

5. Shorten the surgery (consider staging the operations)
6. Avoid dependent position of the head
7. Avoid pressure on the eyeball and orbit. Visualization of the eyes can be done using a mirrored head holder



Visual prognosis

- Non-arteritic PION early treated with high-dose steroid has better visual improvement than untreated cases.
- Arteritic PION, if treated urgently and aggressively with high-dose steroid → no change in vision but it prevented further visual loss.
- Surgical PION → severe, irreversible bilateral visual loss and do not respond to steroid therapy.

Thank You

Further readings:

- Hayreh S: Posterior ischaemic optic neuropathy: clinical features, pathogenesis, and management. *Eye* (2004) 18, 1188-1206
- Larson P and Jaffe R: Preventing Ischemic Optic Neuropathy during Posterior Spine Surgery in *Practical Anesthetic Management 2016*, pp 113-120
- Anthony A: **Ischemic Optic Neuropathy The Evolving Profile, 1966-2015.** *Journal of Neuro-Ophthalmology* 2016