Topic: Proptosis Basics

Learning objectives: Discuss the clinical features, investigations and management of proptosis in children and adults

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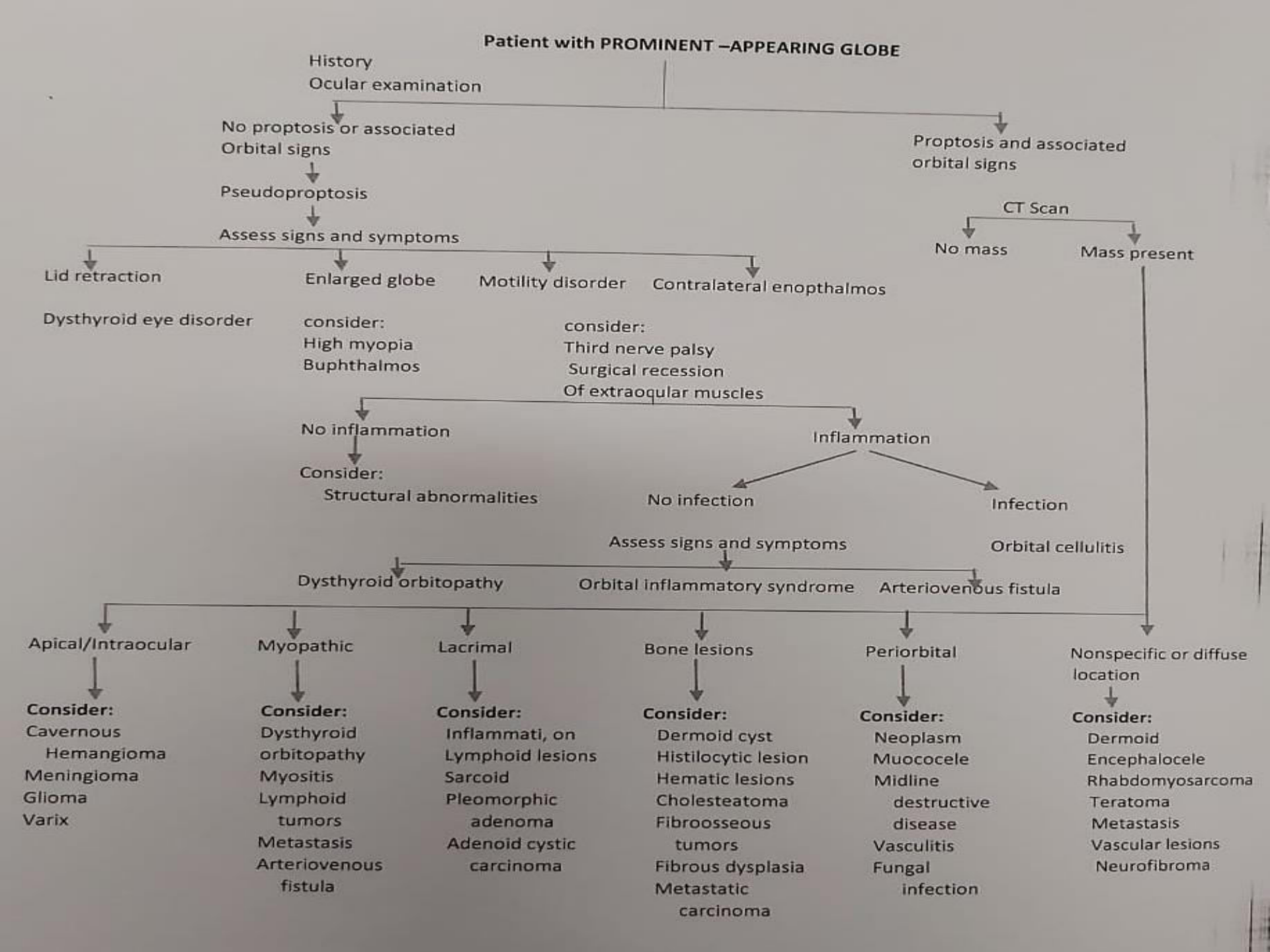

Patient with PROMINENT –APPEARING GLOBE
History
Ocular examination
No proptosis or associated Orbital signs
Proptosis and associated orbital signs
Pseudoproptosis
CT Scan
Assess signs and symptoms
No mass
Mass present
Lid retraction
Enlarged globe
Motility disorder
Contralateral enopthalmos
Dysthyroid eye disorder
consider:
High myopia
Buphthalmos
consider:
Third nerve palsy
Surgical recession
Of extraoqular muscles
No inflammation
Inflammation
Consider:
Structural abnormalities
No infection
Infection
Orbital cellulitis
Assess signs and symptoms
Dysthyroid orbitopathy
Orbital inflammatory syndrome
Arteriovenous fistula
Apical/Intraocular
Myopathic
Lacrimal
Bone lesions
Periorbital
Nonspecific or diffuse location
Consider:
Cavernous Hemangioma
Meningioma
Glioma
Varix
Consider:
Dysthyroid orbitopathy
Myositis
Lymphoid tumors
Metastasis
Arteriovenous fistula
Consider:
Inflammati, on
Lymphoid lesions
Sarcoid
Pleomorphic adenoma
Adenoid cystic carcinoma
Consider:
Dermoid cyst
Histilocytic lesion
Hematic lesions
Cholesteatoma
Fibroosseous tumors
Fibrous dysplasia
Metastatic carcinoma
Consider:
Neoplasm
Muococele
Midline destructive disease
Vasculitis
Fungal infection
Consider:
Dermoid
Encephalocele
Rhabdomyosarcoma
Teratoma
Metastasis
Vascular lesions
Neurofibroma

Clinical features of orbital disease

Symptoms:

- Eyelid and conjunctival swelling
- Redness, watering, pain
- Ocular prominence, displacement or a sunken impression of the eye
- Double vision, blurring
- Pulsating sensation or audible bruit.

a) Soft tissue involvement:

- Eyelid and periocular oedema
- Skin discoloration, ptosis
- Chemosis, which may involve plica and caruncle
- Epibulbar injection

Causes:

Thyroid eye disease, orbital inflammatory disease and obstruction to venous drainage.

b) Proptosis:

- Abnormal protrusion of an organ
- Caused by retrobulbar lesions or a shallow orbit.
- The intra orbital portion of the optic nerve is longer than the distance between the back of globe and optic canal.
- Allows for significant forward displacement of the globe without excessive stretching of the nerve.

Asymmetrical proptosis:

Detected by looking down at the patient from above and behind.

Left proptosis visualized from above

The direction of proptosis:

- Indicate the likely pathology
- e.g space occupying lesions within muscle cone such as a cavernous haemangioma or optic nerve tumours cause axial proptosis.
- External lesions give rise to combined proptosis and dystopia.

Dystopia:

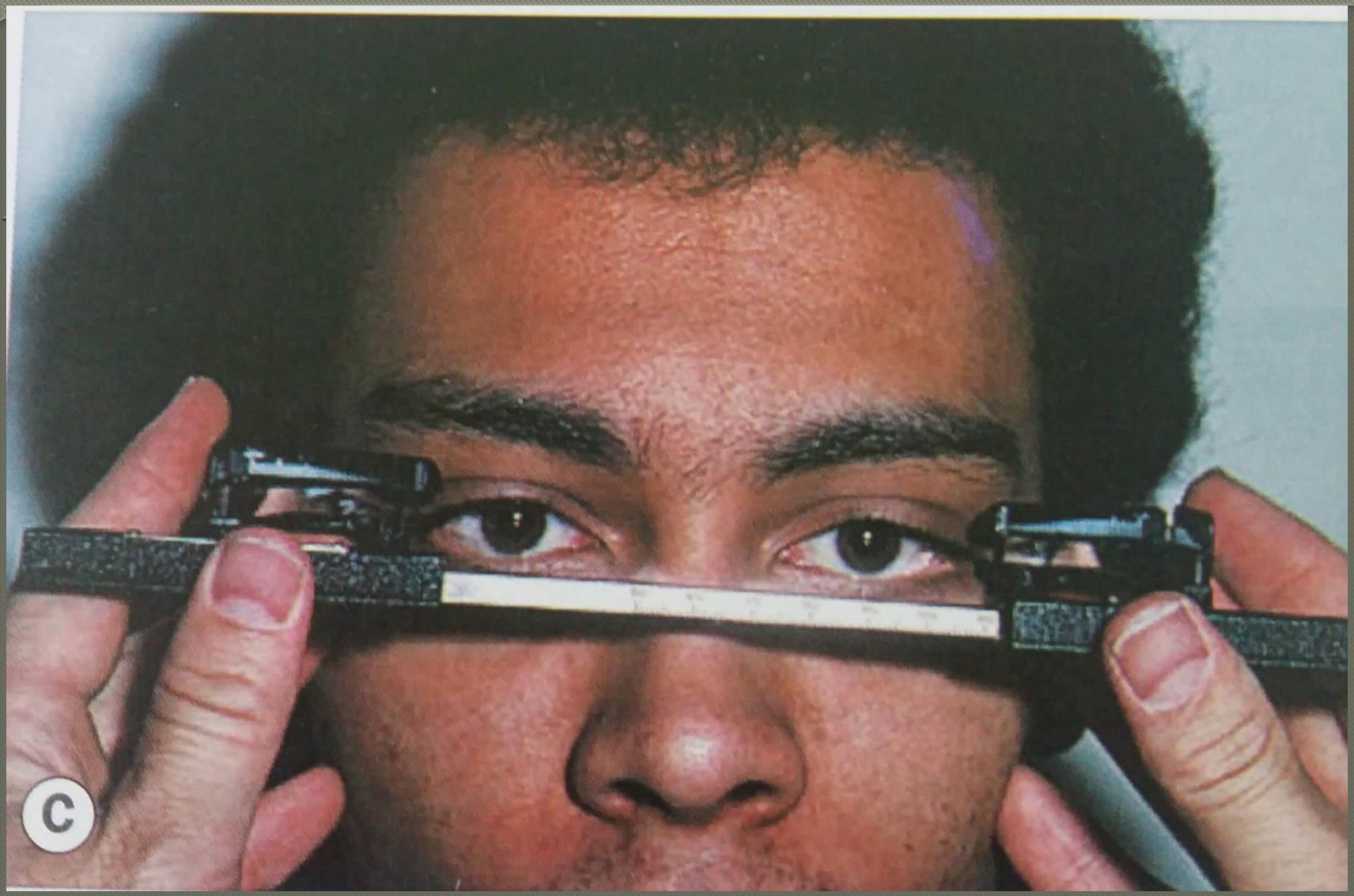
Displacement of globe in coronal plane

- Usually due to extraconal orbital mass such as a lacrimal gland tumour.
- Horizontal displacement is measured from the midline (nose) to centre of pupil.
- Vertical displacement is read on a vertical scale perpendicular to a horizontal rule placed over bridge of the nose.

Right inferior dystopia

Severity of proptosis:

- ✓ Measured by plastic rule resting on the lateral orbital margin.
- ✓ A binocular exophthalmometer e.g Hertel is employed for this purpose.



Measurement of proptosis with an exophthalmometer

- ✓ Reading greater than 20 mm indicative of proptosis.
- ✓ Difference of 2 – 3 mm or more between two eyes is suspicious.

Pseudoproptosis:

- ✓ False impression of proptosis
- ✓ Due to facial asymmetry
- ✓ Enlargement of globe e.g high myopia or buphthalmos
- ✓ Lid retraction
- ✓ Contralateral enophthalmos.

c) Enophthalmos:

- Implies recession of the globe within the orbit
- Causes include congenital/traumatic orbital wall abnormalities.
  - Atrophy of orbital contents
    e.g radiotherapy
    Scleroderma
    Sclerosis(e.g metastatic scirrhous carcinoma)

- Psuedoenophthalmos
  - Small or shrunken eye (microphthalmos phthsis bulbi)
- Ptosis
  - Contralated proptosis
  - Pseudoproptosis

d) Ophthalmoplegia:

- Defective ocular motility
- Causes – orbital mass
  Restricted myopathy (e.g TED)
  Orbital myositis
  Ocular motor nerve involvement associated with lesions in cavernous sinus, orbital fissures or posterior orbit (e.g CCF, THS)

Restrictive myopathy and bilateral lid retraction and proptosis in thyroid eye disease – nine positions of gaze

- Tests to differentiate a restrictive from neurological motility defect:

i) *Forced duction test (FDT):*

- Under topical anaesthesia, insertion of muscle in an involved eye is grasped with forceps.

- Globe is rotated in the direction of reduced mobility
- Checked movement of globe – indicate restrictive problem
- No resistance encountered with a neurological lesion.

ii) Differential IOP test:

- Involves less discomfort than FDT.
- An objective rather than subjective end point.
- IOP measured in primary position of gaze and then with patient attempting to look in direction of limited mobility.
- An increase of 6 mm or more denotes resistance transmitted to the globe by muscle restriction.

iii) Saccadic eye movements:

- In neurological lesions are reduced in velocity.
- In restrictive defects manifest normal saccadic velocity with sudden halting of ocular movements.

e) Dynamic properties:

Increasing venous pressure

By dependent head position – the valsalva manoeuvre or jugular compression may induce or exacerbate proptosis in patients with orbital venous anomalies or infants with orbital capillary haemangioma.

Pulsation:

Caused either by

- Arteriovenous communication or
- Defect in orbital roof

In arteriovenous communication

- Pulsation associated with a bruit depending on size of communication

In orbital roof defect

- Pulsation transmitted from brain by CSF. There is no associated bruit.

A bruit:

Sign found with a larger carotid cavernous fistula.

Best heard with bell of stethoscope.

Bruit Lessened or abolished by gently compressing ipsilateral carotid artery in neck.

f) Fundus changes:

Optic disc swelling

Initial feature of compressive optic neuropathy.

Disc swelling

Optic atrophy

Preceded by swelling

Feature of severe compressive optic neuropathy, TED and optic nerve tumours.

Optic atrophy

Opticociliary collaterals

Consist of enlarged pre-existing peripapillary capillaries.

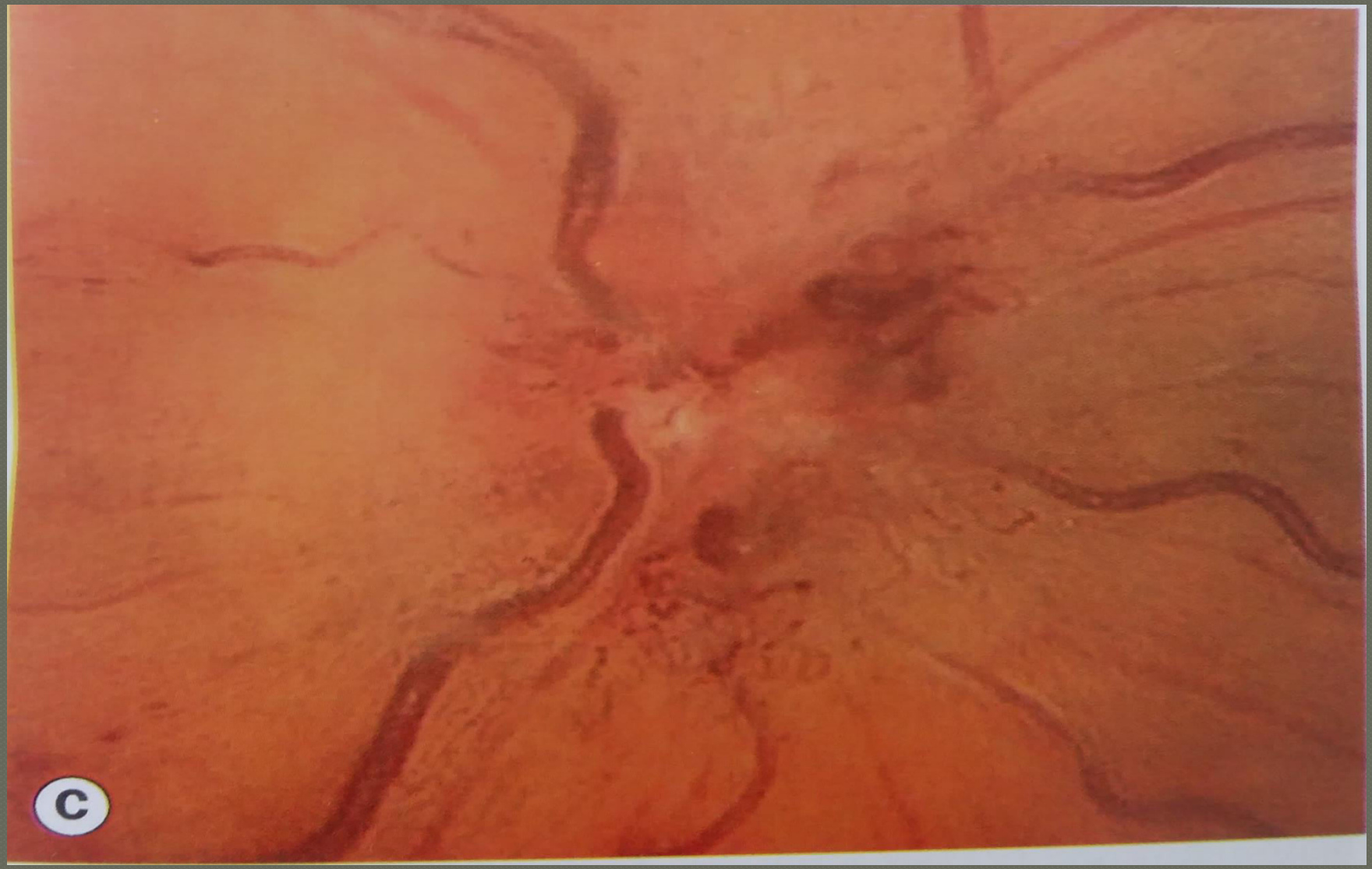
Divert blood from central retinal venous circulation to peripapillary choroidal circulation when there is obstruction of normal drainage channels.

On Ophthalmoscopy:

Vessels appear as large tortuous channels

Most frequent location temporally.

Disappear at disc margin.



Opticociliary vessels on a chronically swollen disc

Collaterals:

Associated with any orbital or optic nerve tumour.

Compresses intra orbital optic nerve and impairs blood flow through central - retinal vein.

Most common tumour associated with shunts is an optic nerve sheath meningioma.

Other causes – optic nerve glioma
CRVO
Idiopathic intracranial - hypertension
Glaucoma

Choroidal folds

Are parallel grooves or striae involving inner choroid, Bruch membrane, RPE and retina.

Causes include:

- Idiopathic
- Papilloedemia
- Orbital disease e.g retrobulbar tumours and thyroid ophthalmopathy.
- Ocular disease such as choriodal tumours, inflammation such as posterior scleritis and hypotony.

Choroidal folds

Investigations

1) Computed tomography (CT):

- Useful for depicting bony structures and location and size of space occupying lesions.
- Particular value in patients with orbital trauma.
- It can detect small fractures, foreign bodies, blood, herniation of extraocular muscle and emphysema

2) Magnetic resonance imaging (MRI):

- Demonstrate orbital apex lesions and intracranial extension of orbital tumours.
- Useful for imaging orbital inflammatory disease.

3)Plain X – rays:

- Little useful
- Rarely used for the initial diagnosis of traumatic bony injury.

4) Ultrasonography:

- Provide useful information
- Helpful for posterior segment and orbital lesions.
- High grade apparatus and operator is required.

5) Fine needle biopsy:

- Sometimes performed
- Helpful in suspected neoplastic disease.
- Complications include haemorrhage and ocular penetration.

Management

- Depends on underlying cause

Medical

- Artificial tears
- Antibiotics for oribtal cellulitis
- Medical treatments for underlying conditions such as medications for hyper thyroidism
- IV medication teprotumumab for thyroid eye disease

Other non surgical treatments

- Double vision treatments
- Immuno suppressive drugs
- Corticosteroids

Surgery (orbitotomy or biopsy)

Indicated for

- Remove a tumor
- Create more space behind the eye in the eye socket
- To perfect cornea

Prevention

- Keeping thyroid levels in check
- Quitting smoking

Thanks