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DON´T CRY FOR ME ARGENTINA!

LACRIMAL GLAND LESIONS

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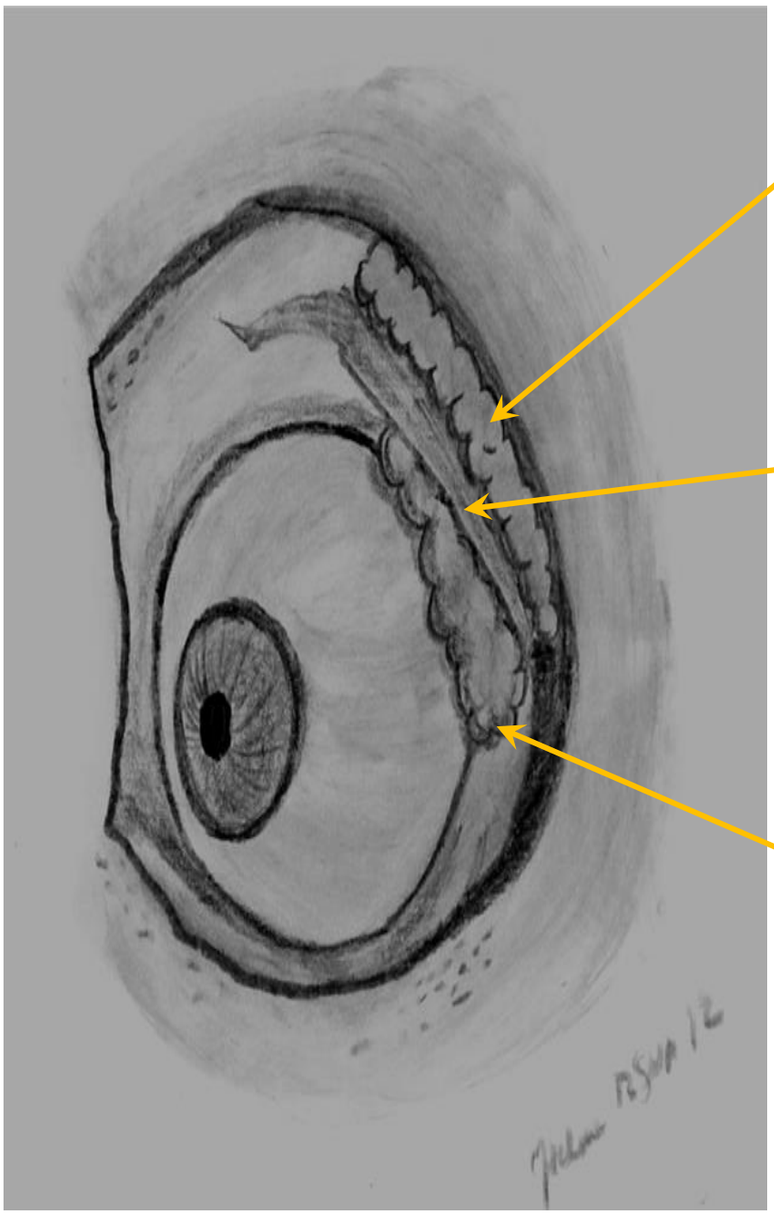
Disclosures: None

INFLAMMATORY AND INFECTIONS DISEASES OF THE ORBIT

- First of all, we'll have a brief anatomical explanation about the lacrimal gland structures
  - After that we'll see the pathological and clinical basis of the most common lacrimal glands
    - Last but not least, let's talk about imaging findings that allow us to narrow the differential diagnoses

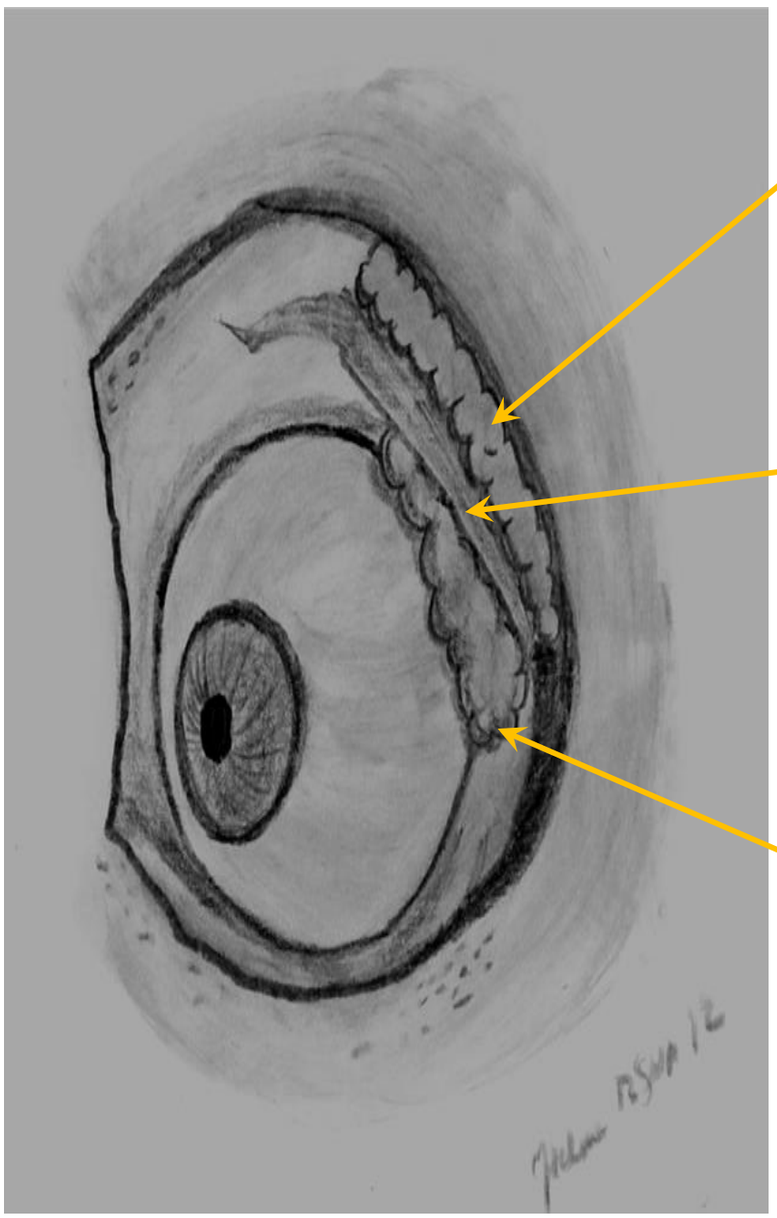
Don’t cry just yet and enjoy the journey!

Lacrimal gland



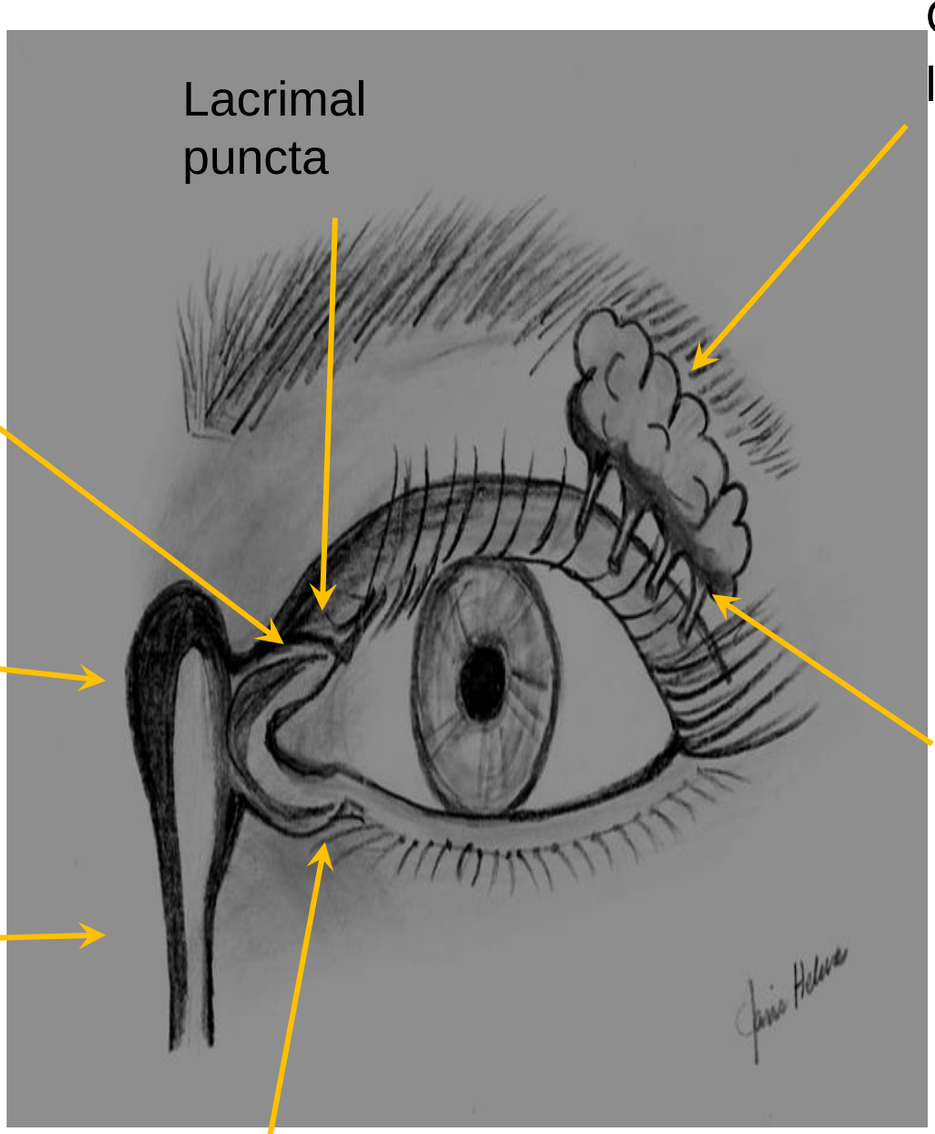
The lacrimal gland is an exocrine gland, unequally divided by the transversal fascia of the *levator* muscle into two lobes. The largest one is the orbital lobe, an almond-shaped structure situated in the anterior, upper, and outer portion of the orbit, in the lacrimal fossa of the frontal bone. The smaller palpebral lobe lies close to the eye, along the inner surface of the upper eyelid and is visually accessible by its eversion.

Lacrimal gland



Both lobes are made up of many lobules separated by connective tissue, and each lobule contains many acini. Each acinus consists of a grape-like mass of serous cells with their apices pointed towards the central lumen of the interlobular duct. The interlobular ducts unite to form 3 - 5 main excretory ducts in the orbital lobe that join 5 – 7 similar ducts from the palpebral lobe. All of them emerge and open into the angle formed by the upper eyelid with the eyeball, an area called the upper fornix.

Lacrimal apparatus



Secreted tears are collected in the fornix conjunctiva of the upper lid, and after passing over the eye surface are driven to the lacrimal puncta, two small holes located at the inner corner of the eyelids. These holes pass the tears on to the lacrimal sac, through the superior and inferior canaliculus, and then to the nasolacrimal duct, which dumps them out into the nose.

Lacrimal Gland Tumors

- Lacrimal gland tumors represent almost 10% of the space-occupying orbital lesions. Of these, 20% are epithelial lesions

- Inflammatory and lymphatic lesions represent the remaining 80%

- Among the epithelial lesions, 55% are benign and 45% are malignant

- The most common benign lesion is pleomorphic adenoma, whereas among the malignant lesions adenoid cystic carcinoma is most common

MIXED BENIGN TUMOR

Pathology	Clinical findings
Pleomorphic adenoma Common benign epithelial lesion of the lacrimal gland 4^{th}-5^{th} decade Can degenerate into malignant lesions	Painless mass Proptosis Progressive slow grow Complete surgical excision with intact capsule recommended Avoid biopsy (recurrence or malignant transformation)

PLEOMORPHIC ADENOMA

Imaging:
Most of the time, neither CT nor MRI can precisely define the limits of an epithelial lesion, benign or malignant. Calcification can occur in both, benign and malignant tumors

CT: Intraglandular mass, well defined, round or oval, remodelling bone and sporadic calcification

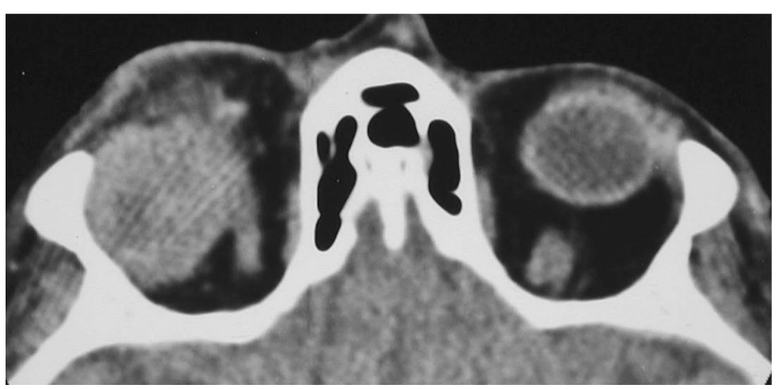
MRI:
Used to best define the limits of the lesions, with variable signal, most frequently isointense to muscle in T1, heterogenous in T2 and contrast-enhancement

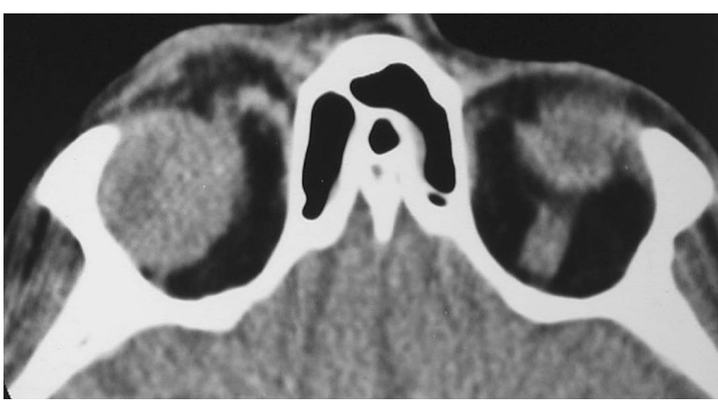
(Pleomorphic Adenoma):

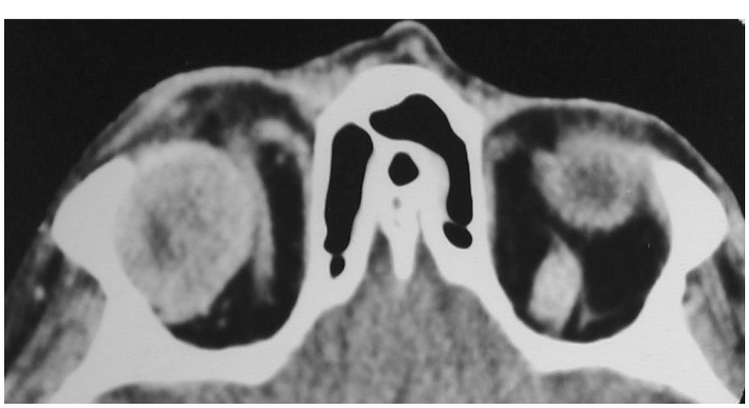
Male, 50 years old

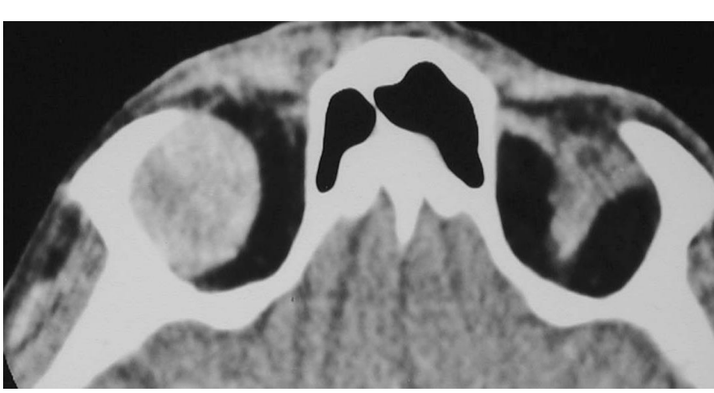
Ten years of right eye proptosis

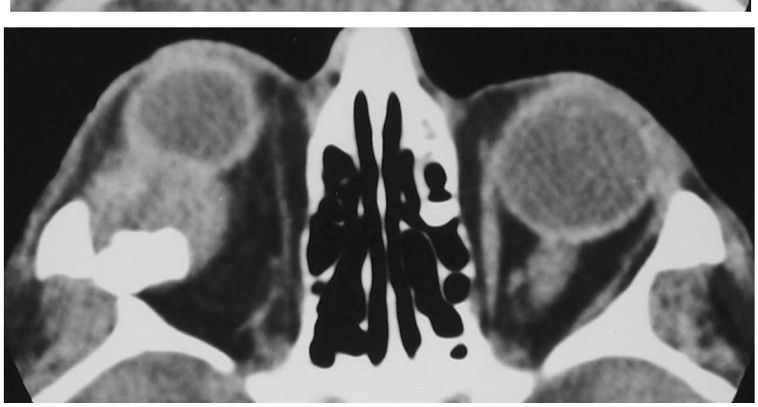
CT with IV contrast shows an intraglandular partially calcified mass that enhances a little less than the rest of the gland

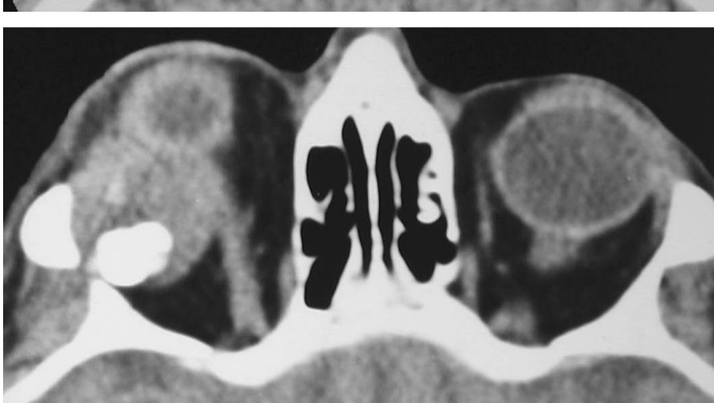










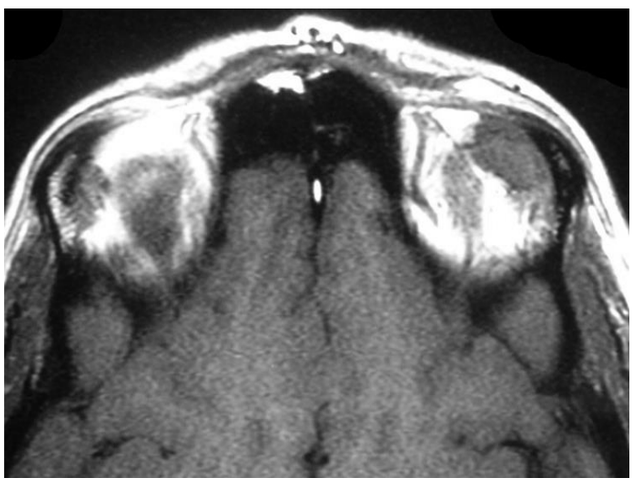


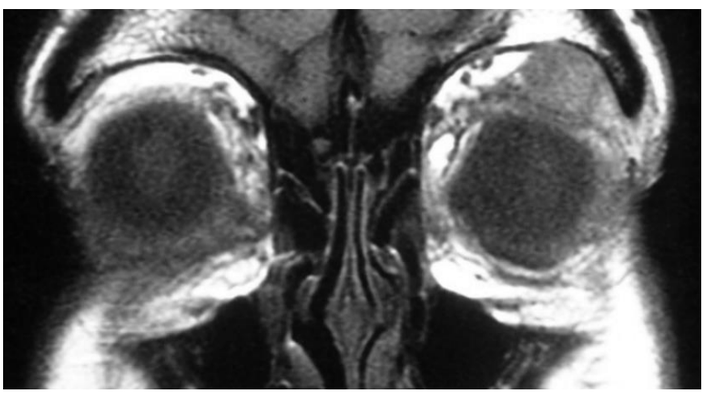
(Pleomorphic Adenoma):

Female, 57 years old

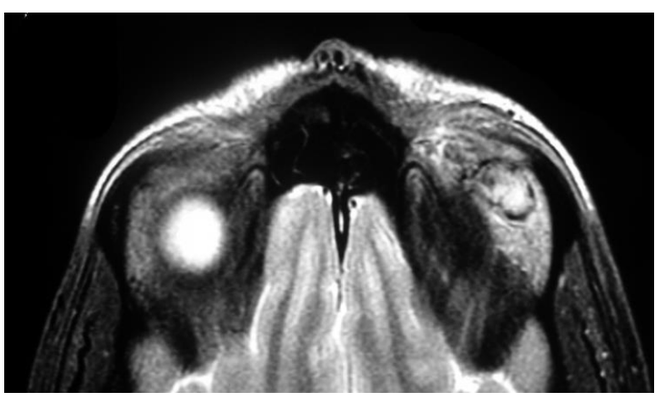
Long history of proptosis without other complaints

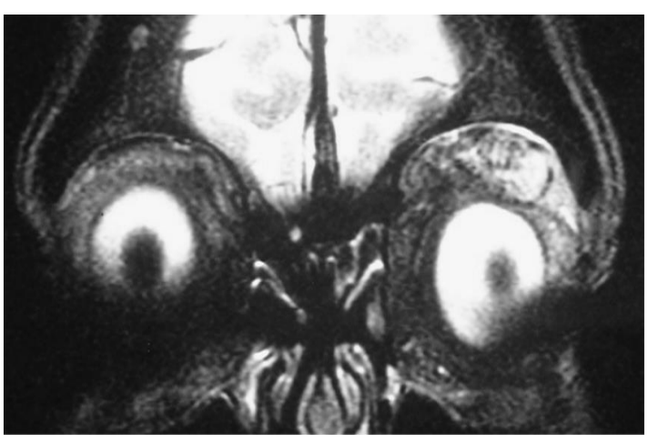
T1WI





T2WI





T1WI shows an isointense/hyperintense intraglandular lesion. On the T2WI we can see its contours better delineated by the deposition of paramagnetic material. Adjacent bone is hypointense and slightly remodeled

Malignant epithelial tumors

The most common malignant lesion is the adenoid cystic carcinoma (ACC) (66%); followed by carcinoma ex pleomorphic adenoma (12%), primary adenocarcinoma (9%), and mucoepidermoid carcinoma (3%)

Adenoid cystic carcinomas may arise from the accessory lacrimal gland and atopic lacrimal gland tissue

Carcinoma ex pleomorphic adenoma (Ca ex PA), also called malignant mixed tumor, or pleomorphic carcinoma, represents 12% of the lacrimal gland malignant neoplasms

The prognosis is bad because of the great dissemination and metastasizing potential of these lesions

ADENOID CYSTIC CARCINOMA

Pathology	Clinical findings
Most frequent malignant epithelial tumor 29% of epithelial tumors Usually fourth decade Can be a benign neoplasm degeneration Symptoms duration last for less than one year	Globe dystopia Proptosis S-shaped ptosis Pain and frontotemporal hypoesthesia (in aggressive behavior) Treatment includes surgical resection, radiotherapy, and extended cranio-orbital resection

ADENOID CYSTIC CARCINOMA

Imaging:

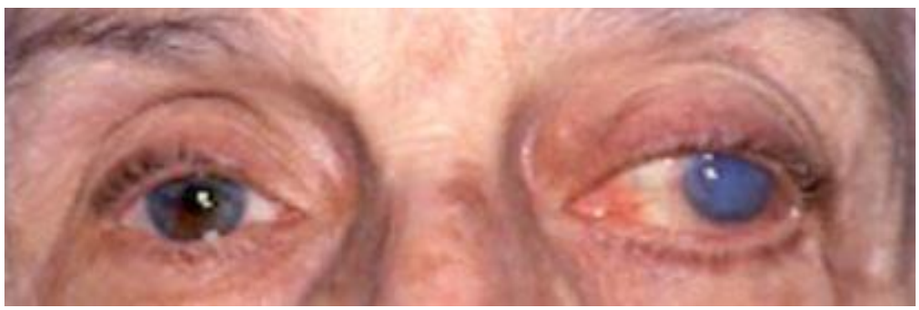
Non characteristic, ranging from delimited lesion to ill defined infiltrative masses with extension to other structures eroding bone

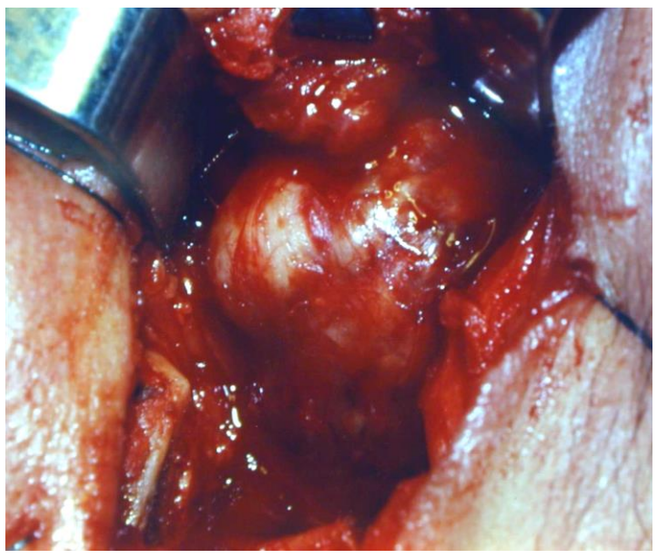
Bone erosion occurs early in the margins of the lesion, which may appear irregular. Focal calcification within the lesion may be seen

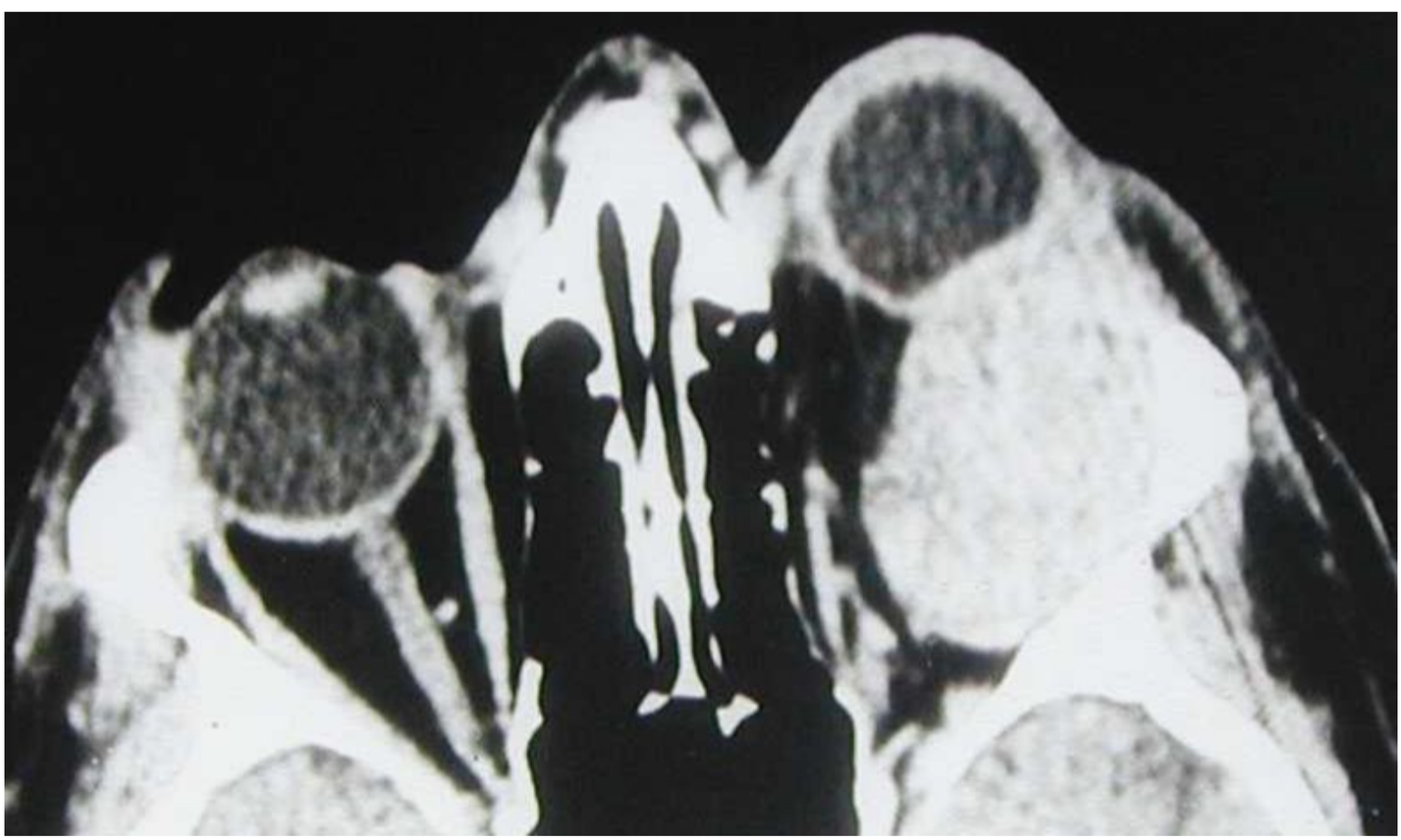
(Adenoid Cystic Carcinoma):

Female, 76 years old

Left eye proptosis, amaurosis, and opacification of the anterior chamber





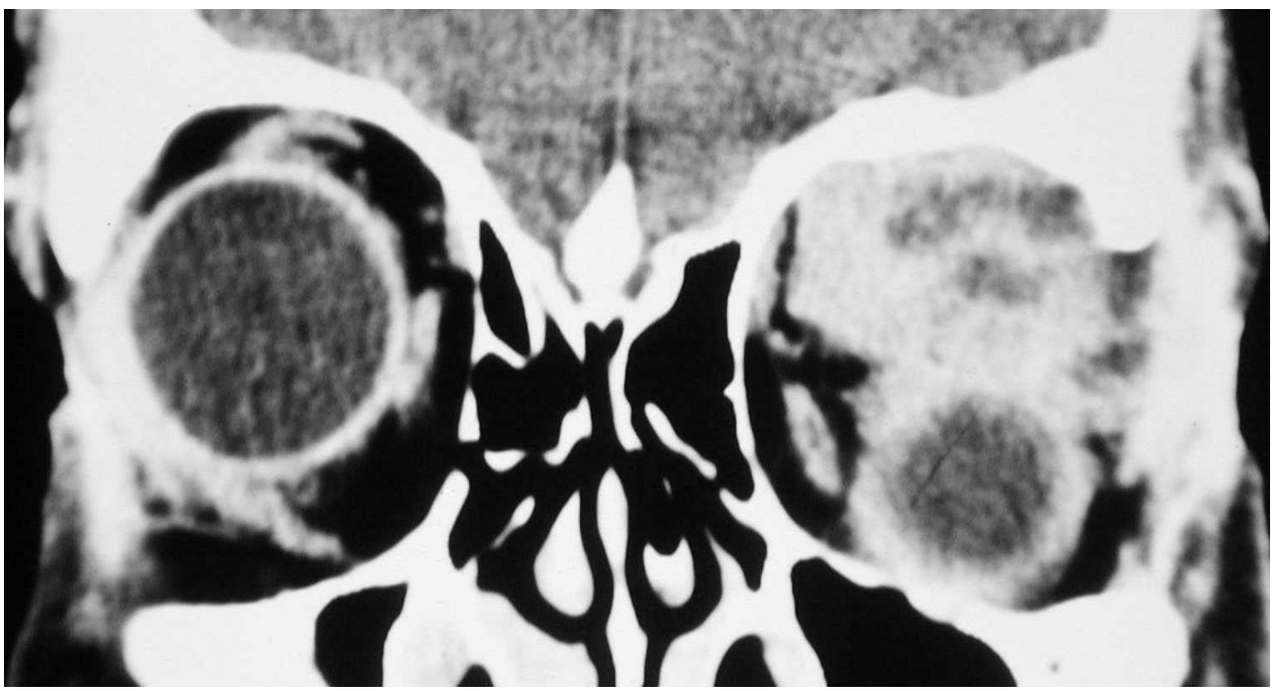


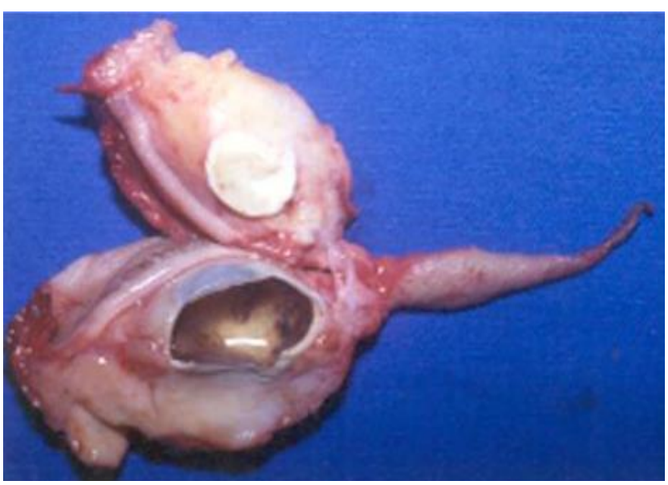
Enhanced CT shows a solid mass, with rounded contours and bone remodeling. There is proptosis and invasion of the left ocular globe

(Adenoid Cystic Carcinoma):

Female, 58 years old

Painless proptosis for 11 months, which became painful 2 months before the CT exam





Coronal enhanced CT shows a solid heterogeneously enhancing extraconal mass in the upper temporal orbit, displacing anteriorly the left temporal globe. There are signs of bone invasion (not shown)

DACRYOADENITIS

Pathology	Clinical findings
Acute infection (viral or bacterial) Child and young adults Can be related to prior trauma	Gland oedema Erythema Can be associated with purulent secretion Cervical lymphadenopathy May be part of idiopathic inflammatory syndrome

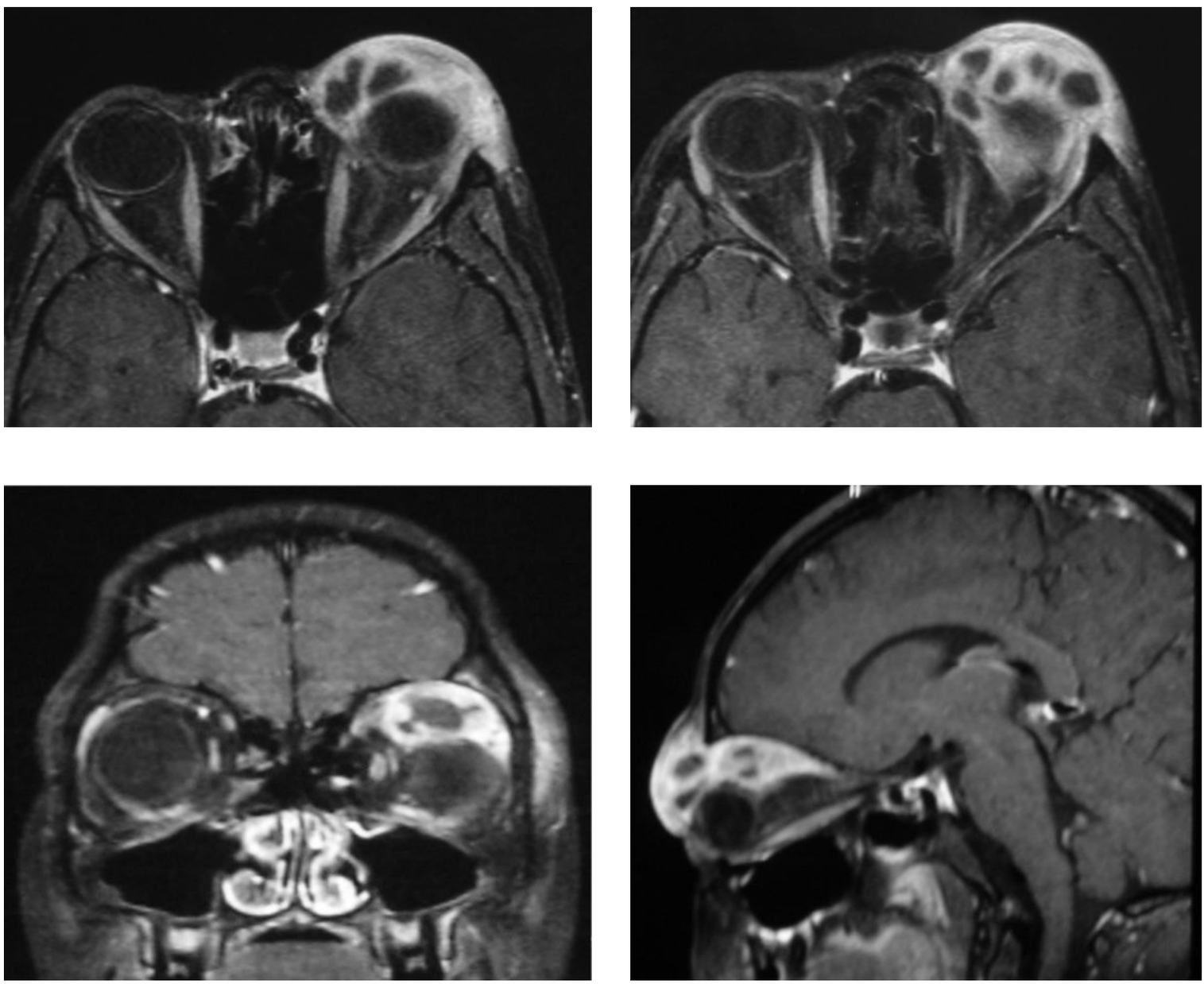
DACRYOADENITIS

Imaging: non characteristic findings, diffuse enlargement of the gland with postcontrast enhancement in both CT and MRI

DDX: inflammatory process from other causes, granulomatosis with polyangiitis, idiopathic inflammatory syndrome, endocrine thyroidopathy and acute infection

MRI: diffuse enlargement of the gland, low/intermediate T1 and T2 and enhancement postcontrast

(Dacryoadenitis):
Male, 7 years old
Palpebral swelling, downward proptosis and fever



Three orthogonal planes of T1WI post Gd showing diffuse enlargement of the gland by a multiloculated palpebral and orbital lobes abscess due to *S. aureus*

INFLAMMATORY IDIOPATHIC ORBITAL SYNDROME

Pathology	Clinical findings
Lacrimal gland involvement in 15% idiopathic inflammatory syndrome (isolated is rare) No local or systemic cause Polymorphous chronic inflammation and fibrosis Exclusion diagnosis, no sex predilection Many times the diagnosis is only made by histopathological findings	Gland oedema Pain Erythema Usually unilateral

IDIOPATHIC INFLAMMATORY ORBITAL SYNDROME

IMAGING:
Mass-like enhancing soft tissue

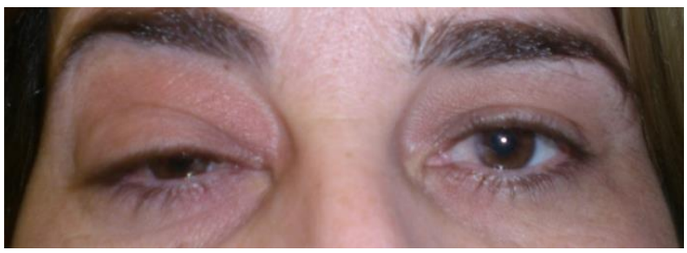
CT:
Focal ill defined masses with postcontrast enhancement

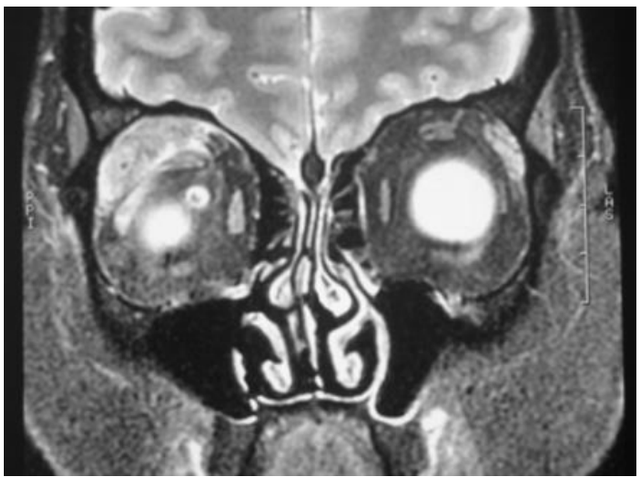
MRI:
Hypointense on T1, iso/hypointense on FATSAT/STIR, enhancement of affected structures

(Idiopathic inflammatory orbital syndrome):

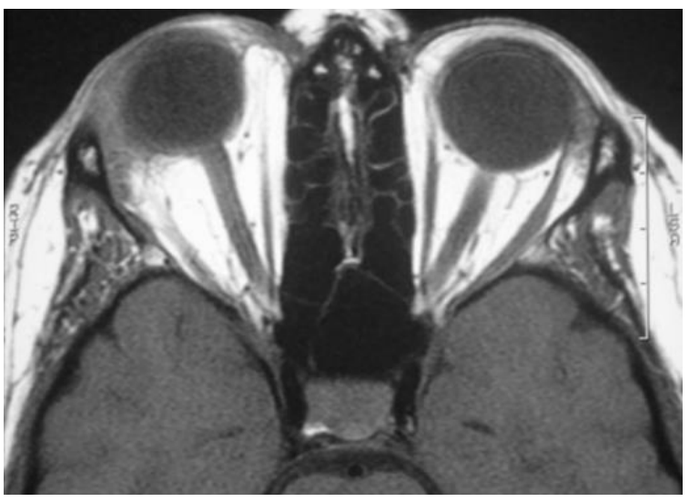
Female, 28 years old

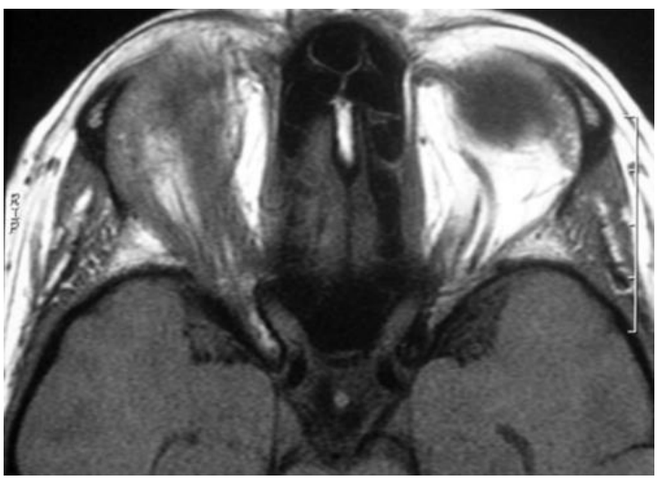
Palpebral swelling, downward proptosis, and redness of the conjunctiva





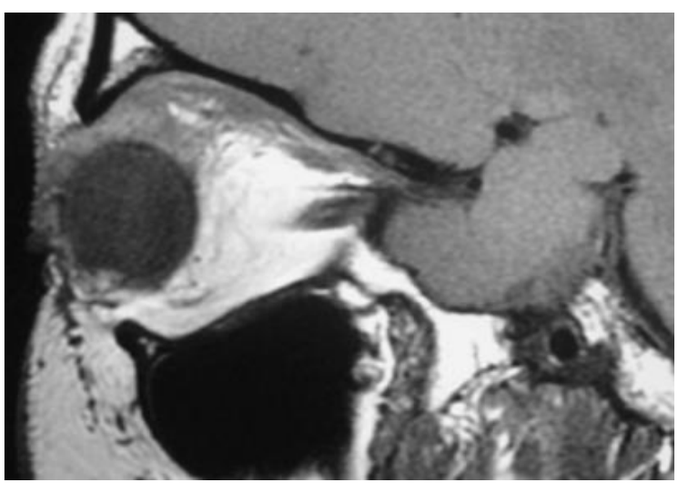
T2WI

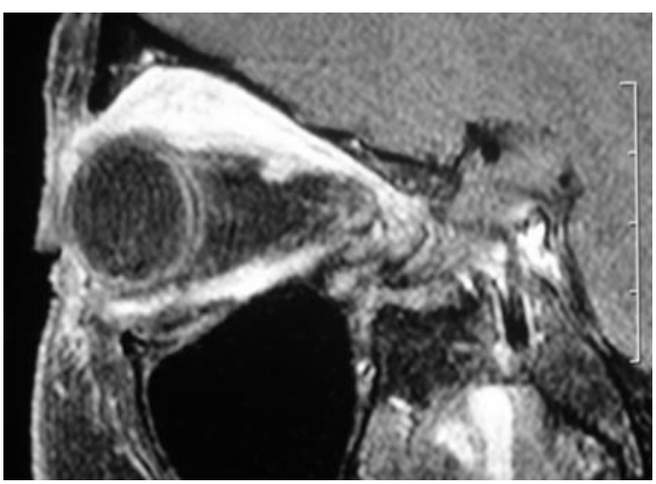




T1WI

T1WI





T1WI with IV contrast

Diffuse involvement of the lacrimal gland and of the levator-superior rectus muscles complex. Signal isointense to the extrinsic muscles. Homogeneous enhancement

GRANULOMATOSIS WITH POLYANGIITIS

Pathology	Clinical findings
Wegener's granulomatosis Unknown etiology 40% with orbital involvement Intraconal / Extraconal / lacrimal gland	Gland oedema Pain Erythema Sinusitis is commonly seen (100% in chronic cases)

GRANULOMATOSIS WITH POLYANGIITIS

Imaging: Look for other Wegener´s hallmarks (nasal and paranasal sinus, lung and kidney disease)

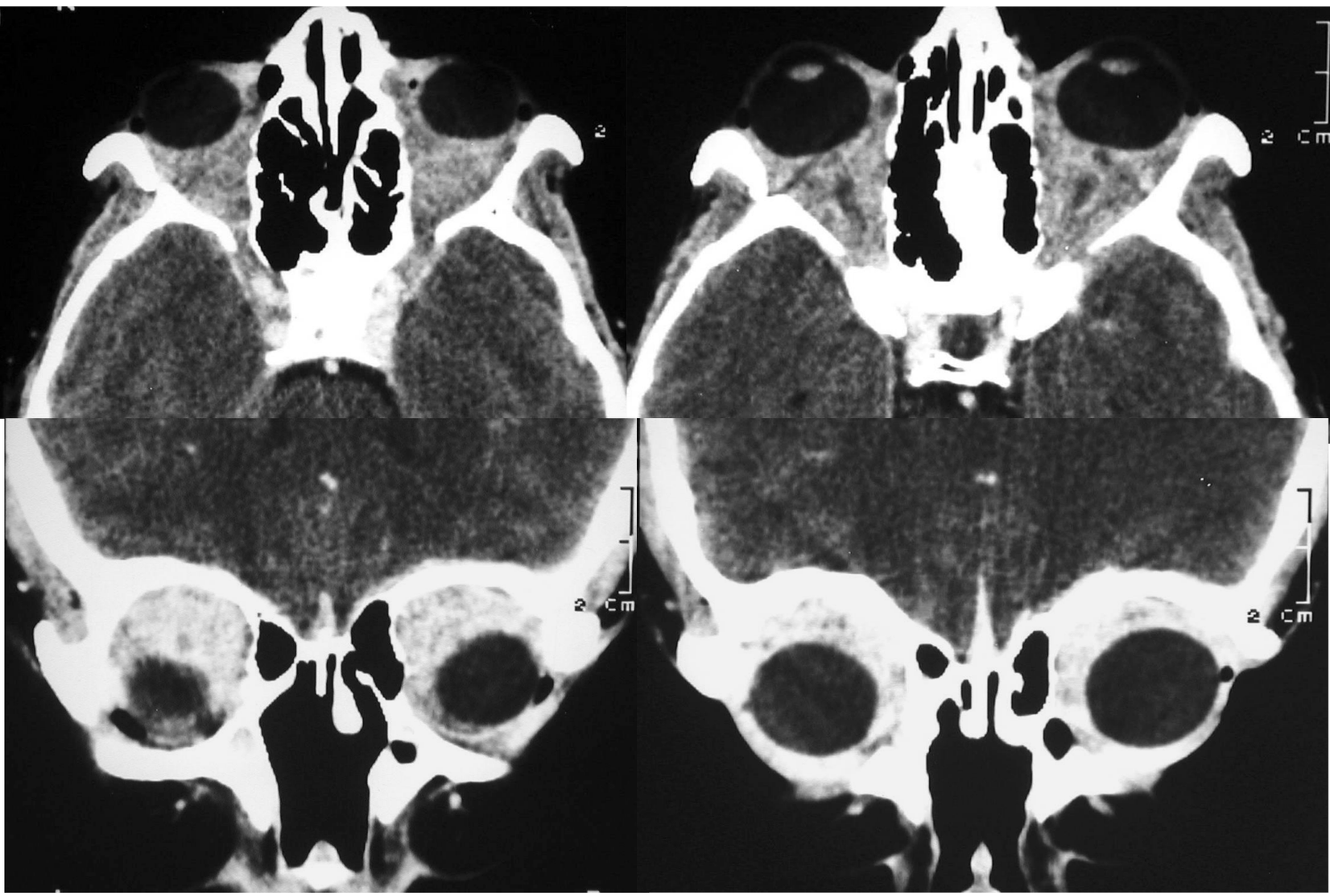
CT:

Diffuse and homogeneous enlargement of the lacrimal gland, postcontrast enhancement

MRI:

Hyposignal on T1, hypersignal on T2 and postcontrast enhancement

(Granulomatosis with polyangiitis):
Female, 32 years old
Palpebral swelling, proptosis, pain and erythema



Axial and coronal postcontrast CT showing diffuse nonspecific orbital involvement. The diagnosis is based on clinical and laboratorial grounds, therapeutic tests and eventually biopsy

LYMPHOMA

Pathology	Clinical findings
Second most common lacrimal gland tumor (only after epithelial tumors) Adults above 50 years 75% will develop systemic lymphoma	Diffuse lacrimal gland enlargement Expansive mass No pain Salmon flesh conjunctiva Radiotherapy in orbital disease alone, chemoterapy in systemic disease

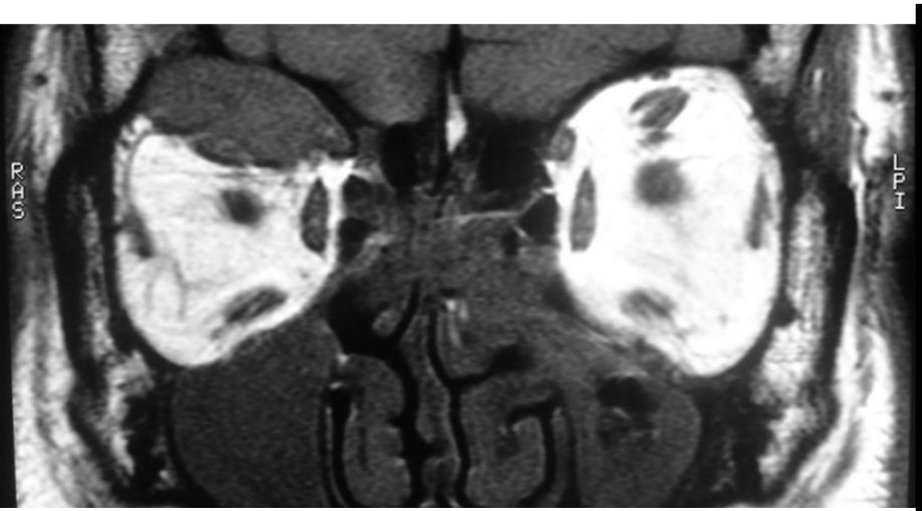
LYMPHOMA

CT: Diffuse lacrimal gland enlargement, usually bilateral and symmetrical, postcontrast enhancement

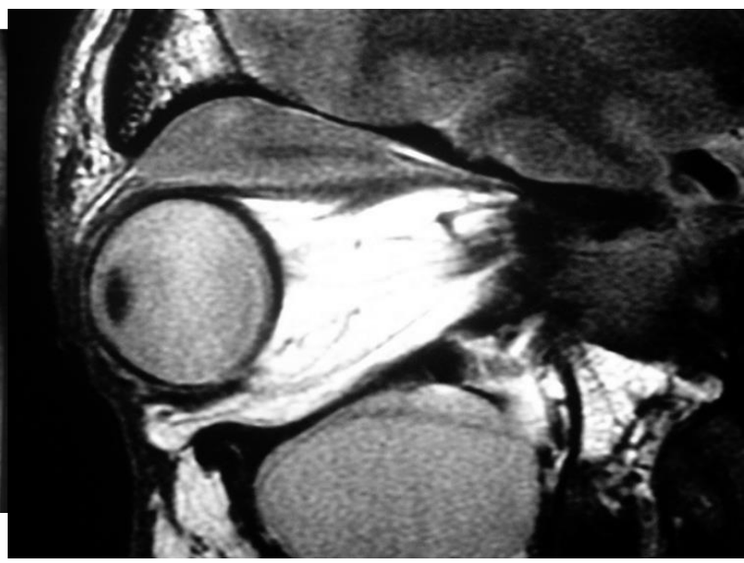
MRI:
Diffuse lacrimal gland enlargement, usually bilateral and symmetrical
Isointense to muscle on T1
Heterogeneous or hyposignal in T2
Postcontrast enhancement
* DWI restriction can be useful*

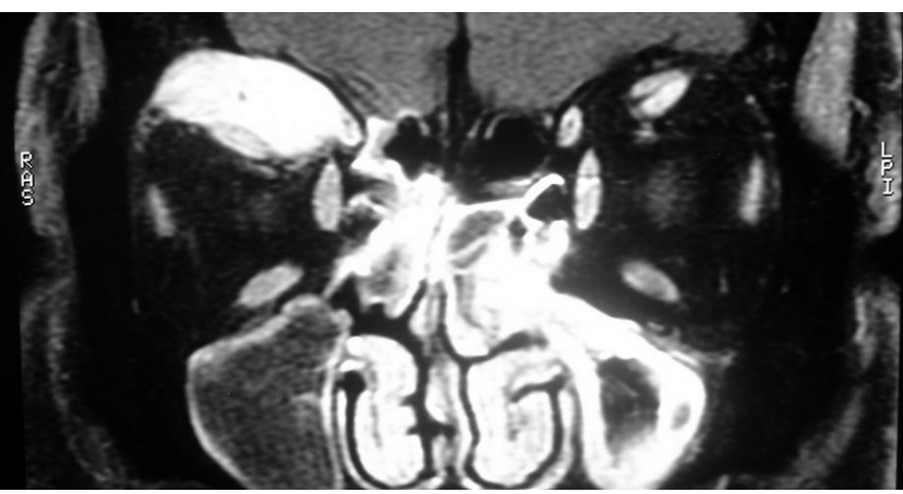
(Lymphoma - B cell non Hodgkin):
Male, 4 years old
Two month painless progressive proptosis

T1WI

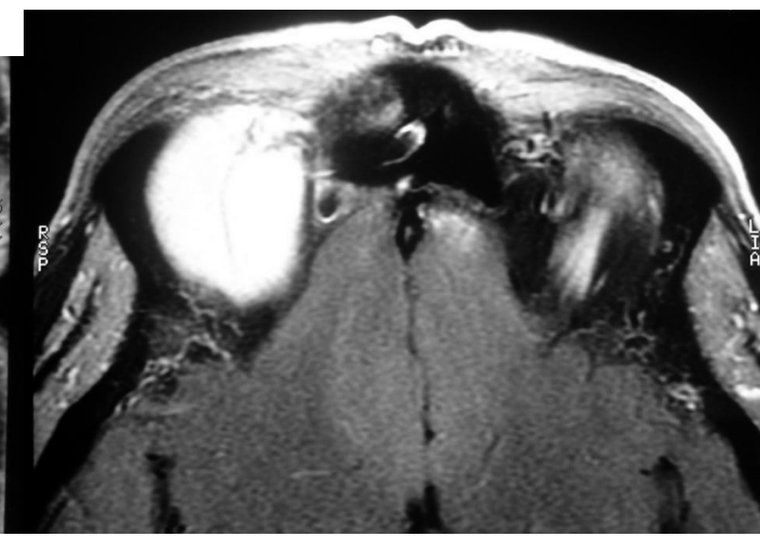


T2WI





T1WI with IV contrast



T1WI with IV contrast

Diffuse and homogeneous involvement of the right lacrimal gland that presents isointensity to the extrinsic muscles on T1WI, hypointensity on T2WI and homogeneous enhancement by the gadolinium chelate. Incidental finding: maxillar and ethmoidal sinusitis

Conclusions

- Mass-occupying lesions of the lacrimal glands include inflammatory and neoplastic conditions

- Epithelial tumors can often be diagnosed in advance by imaging studies, avoiding the need for biopsy

- All other affections, if not diagnosed by clinical, imaging, and therapeutic tests, must be biopsied

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