Radiological Evaluation of Orbital Masses

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Our Patient’s Clinical History

• HPI: 78 y/o F with excessive tearing, redness, and swelling of left eye, worsened on treatment with steroids and then antibiotics. S/p lacrimal sac drainage for presumed dacryocystitis. Now, visual blurriness and light sensitivity.

• PMH: 5 years ago, scleral banding for retinal detachment

• Allergy: Iodinated contrast
Menu of Tests

- **Ophthalmologist (generally inside the globe)**
  - Fundus photographs
  - Angiography- fluorescein, ICG
  - Ultrasound- usually 1D
  - Optical Coherence Tomography (OCT)- retinal nerve fiber layer thickness, imaging of macula

- **Radiologist (generally outside the globe)**
  - MRI orbit – best for soft tissue, contraindicated if suspect ferromagnetic foreign body. Fat suppression helpful.
  - Ultrasound – usually 2D. Best for retinal detachments.
  - FDG-PET/Gallium scan – as part of cancer workup
Our Patient - Orbital Anatomy

Our Patient - Orbital Anatomy

- Medial rectus
- Optic nerve
- Lacrimal gland
- Orbital Fat
- Lateral rectus
- Anterior chamber
- Posterior chamber
- Scleral buckle

Axial CT
Our Patient - Orbital Anatomy

Coronal CT

PACS, BIDMC
Our Patient - Orbital Anatomy

T1 axial

T1 coronal

PACS, BIDMC
Ocular Spaces

Companion Patient 1 with orbital mass in three compartments

Ocular Spaces

Companion Patient 1 with orbital mass in three compartments

Pre-septal

Extraconal

(Intracranial)

Intraconal

In the left orbit, there is soft tissue density mass with ill defined borders, surrounding optic nerve and extending medially into the extraconal and preseptal spaces. Scleral buckle is in place.
Our Patient

Axial T1 – lesion isointense to muscle

PACS, BIDMC
Our Patient

T1

T1 FS post-contrast

PACS, BIDMC
Our Patient

Axial T2

PACS, BIDMC
Our patient - FDG-PET

“low signal intensity in the left orbit—no evidence of FDG-avid disease”
Frequency of Orbital Lesions

- 47% Thyroid orbitopathy
- 8% Cystic lesions
- 8% Inflammatory lesions
- 5% Vascular lesions
- 4% Lacrimal lesions
- 4% Lymphoproliferative lesions
- 4% Secondary tumors
- 3% Myxomatous and adipose lesions
- 2% Mesenchymal lesions
- 2% Metastatic tumors
- 1%: Optic nerve tumors, fibrous and connective tissue lesions, Osseous and fibroosseous lesions, histiocytic lesions
- 17% Other and unclassified

Companion Patient 2
Grave’s Ophthalmopathy

Companion Patient 3

Inflammatory Psuedotumor

Is not associated with local or systemic disease.

Presents with proptosis, ptosis, conjunctival injection, and pain.
Companion Patient 4
Orbital Cellulitis

Fat stranding
Extension into orbit

Companion Patient 5
Cavernous Hemangioma

Smoothly marginated, high density, round contrast enhancing intraconal mass of the left orbit displacing the left globe anteriorly.

Orbital lymphoma displacing the globe laterally and anteriorly.

Companion Patient 7
Meningioma- “Tram-track” sign

Companion Patient 8
Optic Neuritis

http://www.amershamhealth.com/medcyclopaedia/medical/volume%20VI%201/OPTIC%20NEURITIS.ASP
Orbital mass in a 78 y/o: Differential Diagnosis

- Lymphoma
- Pseudotumor
- Mucocele
- Metastatic carcinoma
- Leukemia
- Melanoma
Orbital mass in a 70 y/o:
Radiographic Differential Diagnosis

- **Periosteal reaction:** pseudotumor
- **Diffuse radiodensity blending with normal structures:** pseudotumor
- **Discrete mass:** melanoma, lymphoma, leukemia, metastatic carcinoma, mucocele
- **Extraocular muscle enlargement:** pseudotumor, metastatic carcinoma, mucocele
- **Calcific densities:** mucocele
- **Enlargement of superior orbital fissure:** metastatic carcinoma
- **Erosion of optic canal / sinuses:** melanoma, mucocele
Our Patient - Pathological Diagnosis:
Atypical Lymphoid Infiltrate, a “low-grade lymphoma”
Orbital lymphoid neoplasms

• Spectrum of disease from benign to malignant
  – Inflammatory pseudotumor & reactive lymphoid hyperplasia (benign), atypical lymphocytic infiltrate (can be malignant), lymphoma (malignant)

• Lymphomas are “soft”.
  – Mold to orbital structures. Rarely invade bone.

• Most common orbital lymphoid neoplasm: Non-hodgkin’s lymphoma- MALToma. Arises within orbit (vs. leukemia – spread)
Summary

• Menu of tests: inside vs. outside globe
  – Inside the eye: fundus photographs, angiography (fluorescein, ICG), OCT
  – Outside the eye: Specify “orbit” CT, MRI, U/S.
• Most common orbital lesion: Grave’s disease: muscle thickening sparing lateral rectus
• Lymphomas are “soft”: mold around tissue, invasion rare
• In contrast to lymphomas, cellulitis and pseudotumor present with pain and show radiographic signs of inflammation.
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