

AMSER Case of the Month

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59-year-old female with headache and eye pain

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Patient Presentation

- 59-year-old woman with history of Afib, HTN, Heart Failure with reduced Ejection Fraction and Graves' Disease presents to the ED with a 6-month history of unilateral headache and eye pain.
- Vitals: BP 170/83, HR 103, Temp 36.6, RR 19, SpO2 97% on room air
- Physical Exam: PERRL, EOMI, mild bilateral ptosis, slight left sided supraorbital swelling without erythema, rash or bruising. No focal neurological deficits.
- Labs: CBC, BMP within normal limits, AST 53, ALT 33, AlkPhos 206, TSH <0.01, Free T4 1.69

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 2:

Nontraumatic orbital asymmetry, exophthalmos, or enophthalmos. Initial imaging.

Procedure	Appropriateness Category	RRL
MRI orbits without and with IV contrast	Usually Appropriate	O
CT orbits with IV contrast	Usually Appropriate	⊗ ⊗ ⊗
CT orbits without IV contrast	May Be Appropriate	⊗ ⊗ ⊗
CTA head and neck with IV contrast	May Be Appropriate	⊗ ⊗ ⊗
MRA head and neck without and with IV contrast	May Be Appropriate	O
MRI head without and with IV contrast	May Be Appropriate	O
MRI orbits without IV contrast	May Be Appropriate	O
MRA head and neck without IV contrast	May Be Appropriate (Disagreement)	O
MRI head without IV contrast	May Be Appropriate	O
Arteriography cervicocerebral	May Be Appropriate	⊗ ⊗ ⊗
CT head with IV contrast	May Be Appropriate	⊗ ⊗ ⊗
CT head without IV contrast	May Be Appropriate	⊗ ⊗ ⊗
CT head without and with IV contrast	Usually Not Appropriate	⊗ ⊗ ⊗
CT orbits without and with IV contrast	Usually Not Appropriate	⊗ ⊗ ⊗
X-ray orbit	Usually Not Appropriate	⊗

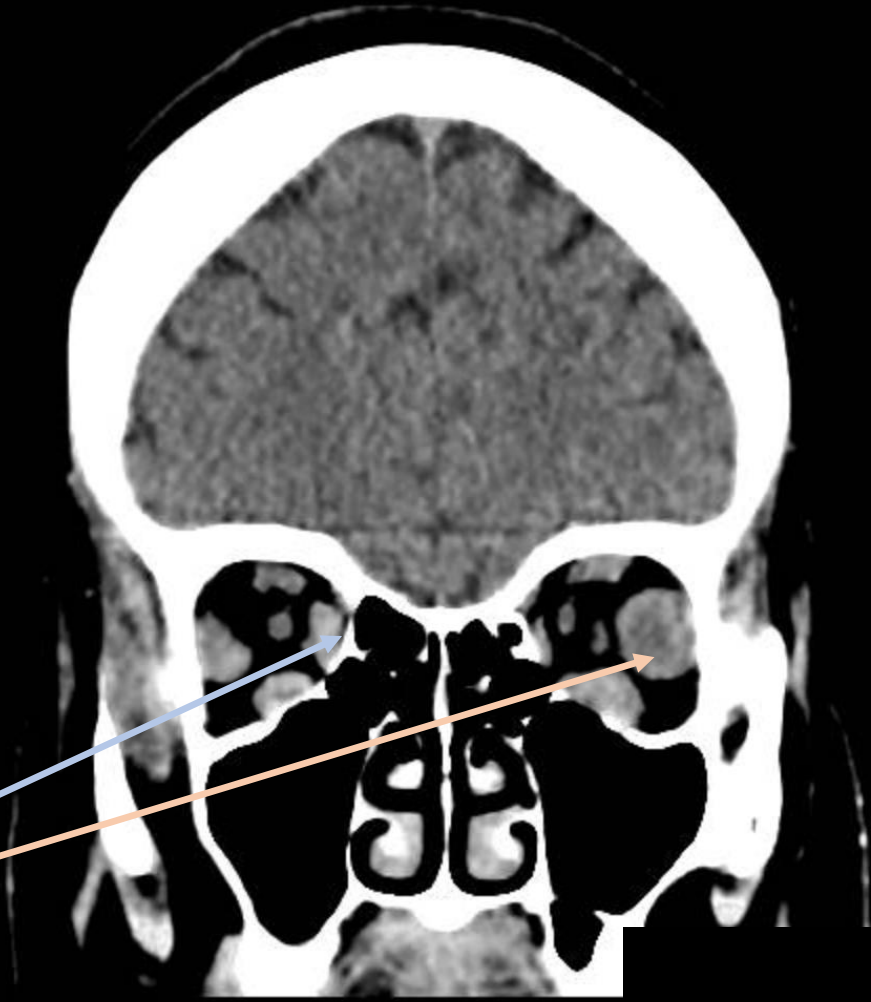
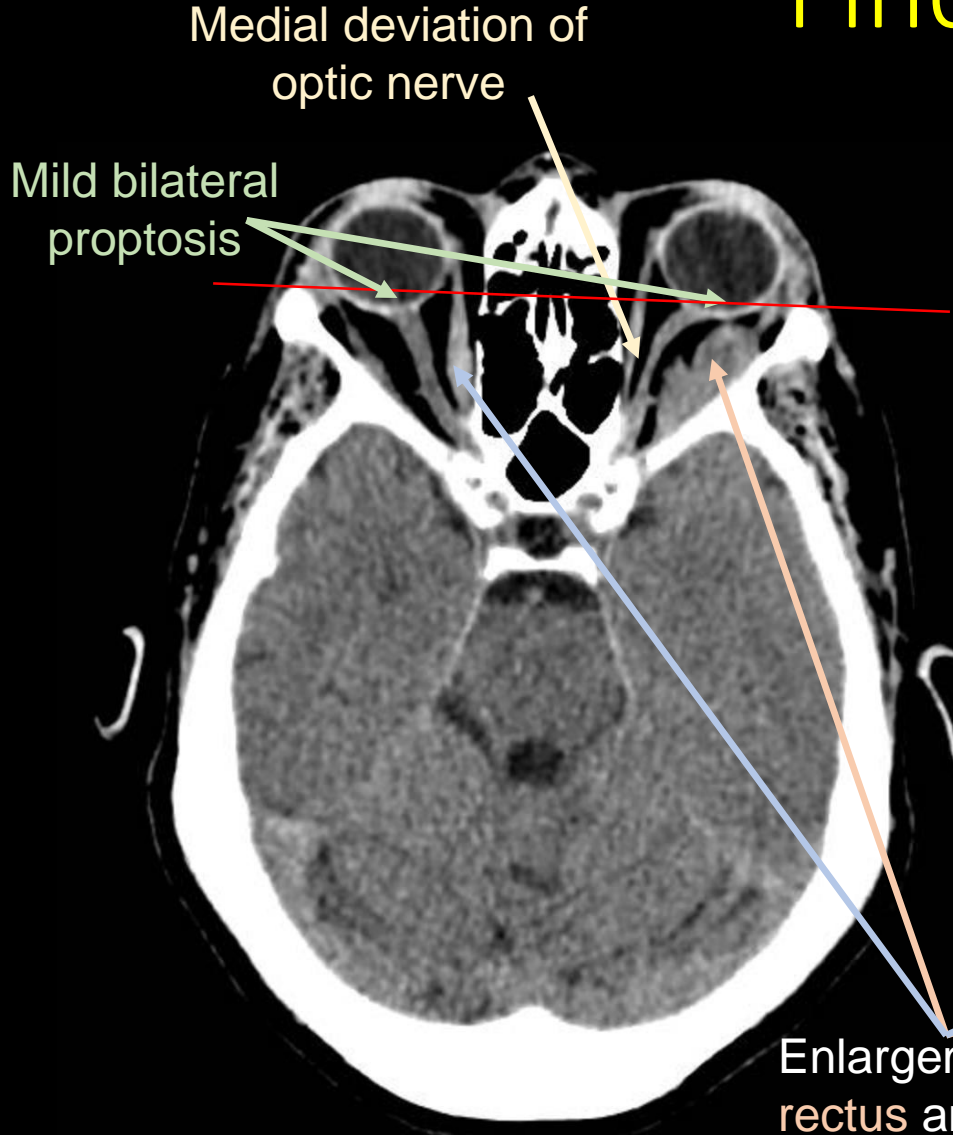
This imaging modality was ordered by the ER physician



Findings (unlabeled)



Findings (labeled)



Final Dx:

Grave's Ophthalmopathy

Case Discussion

- Differential Diagnosis¹
 - Orbital Malignancy
 - Primary vs metastatic vs lymphoma
 - Orbital pseudotumor
 - Orbital myositis
 - Commonly secondary to sarcoidosis
 - Amyloidosis
 - Carotid cavernous fistula
 - Histiocytosis/Erdheim-Chester Disease

Case Discussion

- Epidemiology²
 - Ophthalmopathy is highly prevalent among patients with Graves' hyperthyroidism
 - Nearly half of Graves' hyperthyroidism patients report ocular symptoms
 - 70% of patients with Graves' hyperthyroidism have radiological evidence of ophthalmopathy (including subclinical)
- Pathophysiology^{2,3}
 - anti-TSH receptor antibodies bind TSH receptor expressed on adipocytes and fibroblasts, inducing increased synthesis of glycosaminoglycans leading to fluid accumulation/edema
 - Activated T-cells and macrophages further stimulate orbital fibroblasts and adipocytes, inducing adipogenesis and proliferation
 - Combination of edema, fibroblast proliferation and adipogenesis causes expansion of tissue within orbit and increases intraorbital pressure, thereby compressing extraocular muscles/orbital nerve and driving proptosis

Case Discussion

- Typical radiological findings⁴
 - Extraocular muscle thickening
 - Muscle involvement in order from most prevalent to least prevalent by mnemonic: IM SLOW⁵
 - Inferior rectus
 - Medial rectus
 - Superior rectus/Levator palpebrae superioris
 - Lateral rectus
 - Oblique
 - Proptosis
 - Increased in orbital fibroadipose tissue
 - Optic Nerve compression/deviation
- Clinical Pearl⁶
 - Patients with Graves' often (47%) present with at least one liver enzyme abnormality
 - Liver enzyme abnormalities may be attributable to Graves' rather than concurrent liver pathology
 - Most often abnormality in GGT (74.0%), followed by ALT (56.5%), AlkPhos (39.1%) and finally AST (29.0%)

References:

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4. Luccas R, Riguetto CM, Alves M, Zantut-Wittmann DE, Reis F. Computed tomography and magnetic resonance imaging approaches to Graves' ophthalmopathy: a narrative review. *Front Endocrinol (Lausanne).* 2024;14:1277961. Published 2024 Jan 8. doi:10.3389/fendo.2023.1277961
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6. Hsieh A, Adelstein S, McLennan SV, Williams PF, Chua EL, Twigg SM. Liver enzyme profile and progression in association with thyroid autoimmunity in Graves' disease. *Endocrinol Diabetes Metab.* 2019;2(4):e00086. Published 2019 Jul 15. doi:10.1002/edm2.86