

AMSER Case of the Month

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57 year old female with generalized weakness

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Patient Presentation

HPI: 57-year-old female with Grave's disease controlled on Methimazole presents to outside ED with a 4-day history of progressively worsening non-bloody diarrhea, nausea, and non-bilious/non-bloody emesis. She has had **increasing lethargy** in this time and reduced appetite. GI symptoms are somewhat improved with loperamide. She denies lightheadedness, vision changes, fever, or chest pain. She also notes she slipped and fell down 4-5 stairs on the day of admission, but reports no loss of consciousness or head trauma. Of note, outside ED comments that patient **appeared confused** prior to transfer to VCU

Patient Presentation (Continued)

- Past Medical History: Grave's disease, glaucoma
- Past Surgical History: Endometrial ablation
- Social history: Occasional alcohol use; no tobacco or illicit drug use
- Daily Medications: Methimazole, Latanoprost
- Vitals: Stable, unremarkable
- Pertinent Labs: Na 105 (L), K 3.1 (L), Mg 1.6 (L), Cl 77 (L), T4 0.5 (L)

Physical Exam

General: Not in acute distress

Pupils: **Unequal with R>L** (4 mm vs 3 mm); reactive to light bilaterally; amblyopia noted on exam, evidence of **right abducens palsy**

Abdominal: Soft, no distention, no tenderness to palpation, no guarding

Mental status: Alert and oriented to person, place, time, and event

Remainder of physical exam within normal limits

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 1: **Adult. Altered mental status. Suspected intracranial pathology or focal neurologic deficit. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT head without IV contrast	Usually Appropriate	☼☼☼
MRI head without and with IV contrast	May Be Appropriate	○
MRI head without IV contrast	May Be Appropriate	○
MRI head with IV contrast	Usually Not Appropriate	○
CT head with IV contrast	Usually Not Appropriate	☼☼☼
CT head without and with IV contrast	Usually Not Appropriate	☼☼☼

Ordered by Attending Physician in MRICU to rule out hemorrhage

Findings (unlabeled)



CT Head non-contrast, axial view

Findings (labeled)



Large sellar mass
(orange) with
expansion of the
right lateral sellar
boundary (green)

What Imaging Should We Order Next?

Select the applicable ACR Appropriateness Criteria

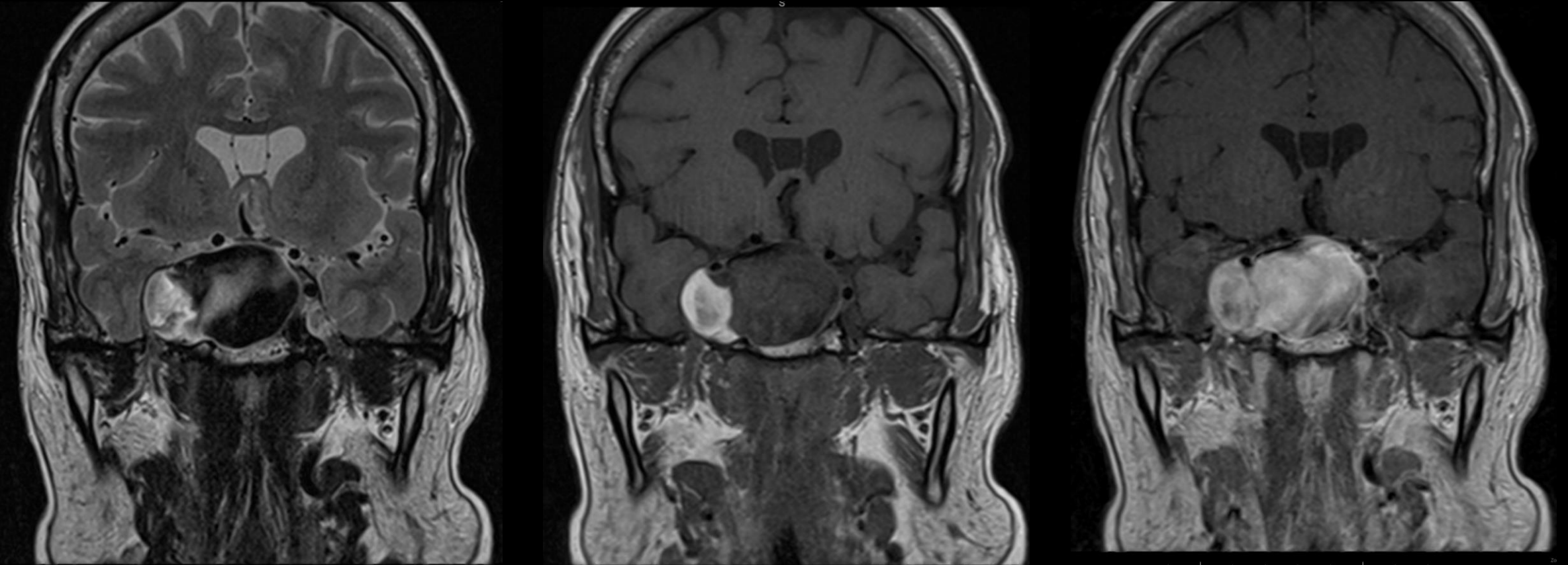
Variant 1: Adult. Suspected or known hypofunctioning pituitary gland (hypopituitarism, growth hormone deficiency, growth deceleration, panhypopituitarism, hypogonadotropic hypogonadism). Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
MRI sella without and with IV contrast	Usually Appropriate	○
MRI sella without IV contrast	Usually Appropriate	○
CT sella with IV contrast	May Be Appropriate	⊗⊗⊗
MRI sella with IV contrast	May Be Appropriate	○
CT sella without IV contrast	Usually Not Appropriate	⊗⊗⊗
CTA head with IV contrast	Usually Not Appropriate	⊗⊗⊗
MRA head without IV contrast	Usually Not Appropriate	○
MRA head with IV contrast	Usually Not Appropriate	○
MRA head without and with IV contrast	Usually Not Appropriate	○
CT sella without and with IV contrast	Usually Not Appropriate	⊗⊗⊗
Radiography sella	Usually Not Appropriate	⊗
Venous sampling petrosal sinus	Usually Not Appropriate	Varies

Ordered by Attending Physician in MRICU after CT findings

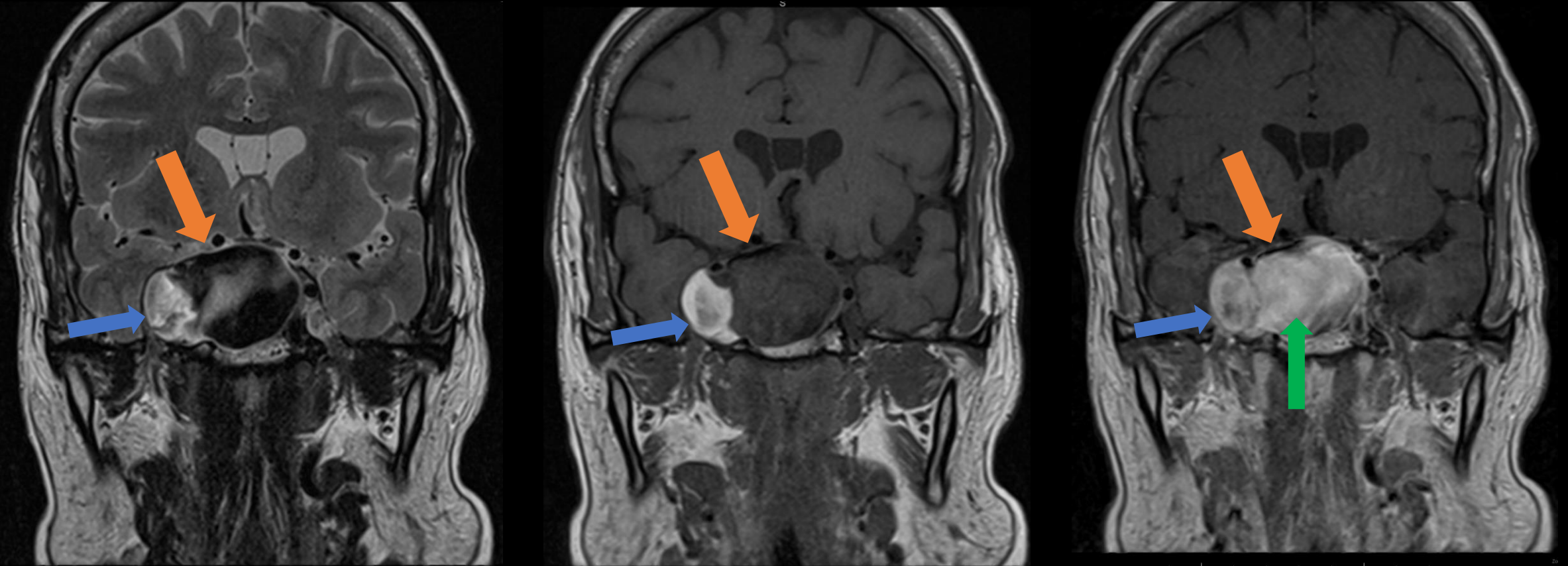


Findings: (unlabeled)



MRI Sella w/wo IV contrast; coronal T2 (left), coronal T1 (middle), coronal T1 post-contrast (right)

Findings: (unlabeled)



Redemonstrated sellar mass (orange) with right lateral hyperintensity (blue) and diffuse contrast uptake (green)

What Imaging Should We Order Next?

Select the applicable ACR Appropriateness Criteria

Variant 2: Suspected cerebral vasospasm. Initial imaging.		
Procedure	Appropriateness Category	Relative Radiation Level
Arteriography, cervicocerebral	Usually Appropriate	⊕⊕⊕
CTA head with IV contrast	Usually Appropriate	⊕⊕⊕
US duplex Doppler transcranial	May Be Appropriate	○
MRI head perfusion with IV contrast	May Be Appropriate	○
MRI head without IV contrast	May Be Appropriate	○
CT head perfusion with IV contrast	May Be Appropriate	⊕⊕⊕
CT head without IV contrast	May Be Appropriate	⊕⊕⊕

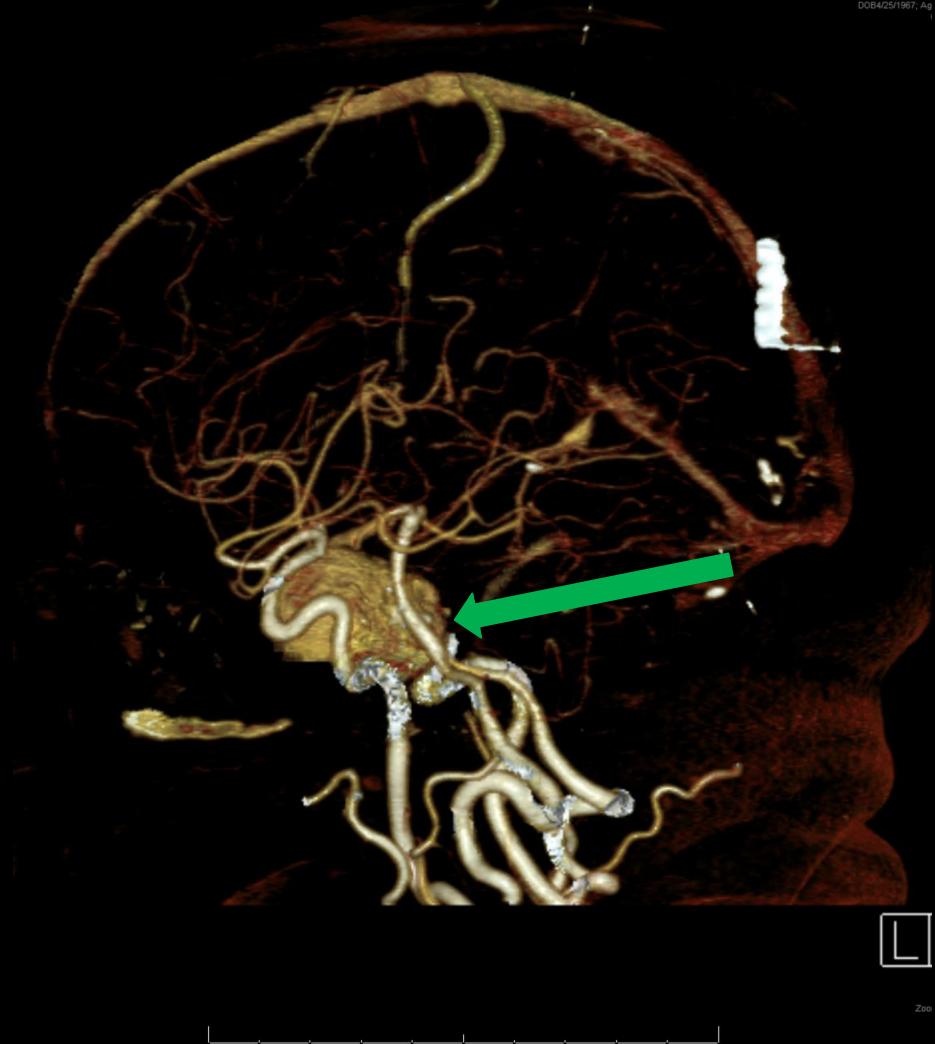
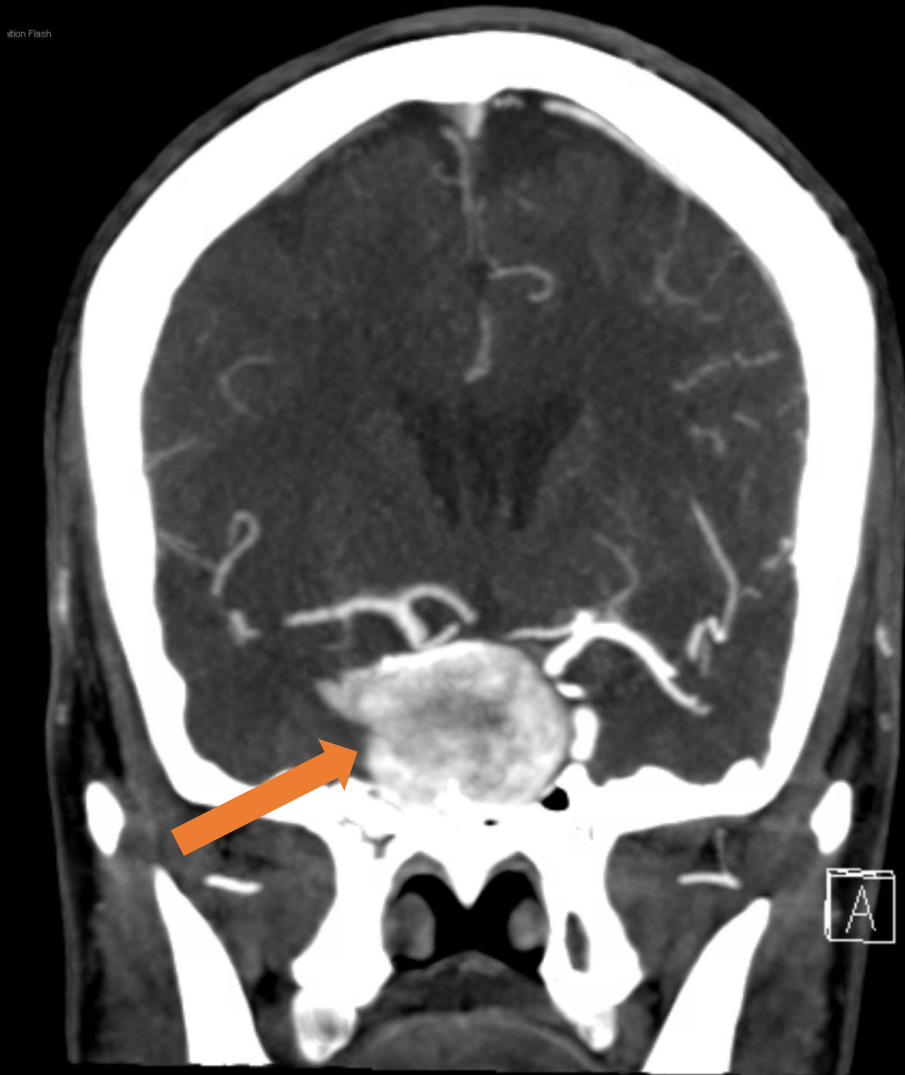
Ordered by Neurosurgery Team, concern for vascular abnormality on MRI

Findings: (unlabeled)



CTA Head coronal (left) and 3D reconstruction (right)

Findings: (unlabeled)



Redemonstrated sellar mass with heterogeneous contrast uptake (orange) and invasion into the right cavernous sinus, apparent origin off right ICA (green)

Follow-up/Surgical Findings

- Patient underwent diagnostic cerebral angiogram with neurosurgical service to confirm diagnosis of **right ICA aneurysm**; procedure confirmed original diagnosis and found an additional small left ICA aneurysm
 - Plan is to follow-up in 4-6 weeks for surgical planning, delayed given current hospitalization
- Hyponatremia slowly corrected during hospitalization to 124 with precautions in place for overcorrection; presumed to be due to **SIADH**
- Additionally found to have low AM cortisol presumably due to **central adrenal insufficiency** in setting of mass effect from aneurysm; started on moderate dose hydrocortisone

Final Dx:

Right Internal Carotid Artery Aneurysm with
Expansion into Right Cavernous Sinus

Case Discussion

- Cerebral aneurysms are dilations or outpouching of cerebral vessels, most commonly the anterior communicating artery in the Circle of Willis, that involves all layers and can lead to thrombus formation or expansion and rupture.
- Differential diagnosis of sellar/suprasellar masses includes sellar adenoma, sarcoidosis, teratoma, tuberculosis, hypothalamic glioma, aneurysm, craniopharyngioma, hamartoma, meningioma, optic nerve glioma, Rathke cleft cyst, and metastatic disease
- Diagnosis: History and Physical Exam
 - Aneurysms are **generally asymptomatic** until rupture, with symptoms of rupture including thunderclap headache and decline of mental status.
 - However, larger aneurysms (as in this case) may cause symptoms due to mass effect on nearby structures such as the **pituitary gland or cranial nerves**.
 - Physical examination may reveal cranial nerve deficits such as the abducens palsy displayed in this case.

Case Discussion

- Imaging
 - Aneurysms are most commonly imaged using CT angiography, MR angiography, or digital subtraction imaging.
 - on **CT angiography**, aneurysms will enhance uniformly on delayed phase with possible calcifications and may include a non-enhancing rim indicating thrombus
 - on **MR angiography**, heterogeneous intensity on T1 and usually hypointense on T2
 - **DSA** is the most accurate but most invasive test

Case Discussion

- Treatment options consist of vascular intervention or open surgical approach
 - In the case of **vascular intervention**, certain portions of feeding arteries may be embolized to prevent further flow into the aneurysm; alternatively, thrombogenic coils may be placed into the body of the aneurysm to stop turbulent flow within the aneurysm.
 - The goal of an **open surgical approach** is to place a clip across the aneurysm base and block further blood flow, effectively stabilizing the aneurysm and reducing risk of future expansion and subsequent rupture.

Case Discussion

- Major Takeaways:
 - The **differential for sellar masses** is extensive and should be thoroughly explored to avoid missing any major findings that necessitate prompt treatment, such as with the aneurysm in this case.
 - Note that the mnemonic “SATCHMO” is used to remember the extensive list presented on slide 19
 - Large aneurysms can have a **heterogeneous contrast uptake on CTA** due to slow filling in comparison to the feeding arteries or because they have developed a **central thrombosed area** that is resistant to contrast uptake.
 - In these cases, delayed phase imaging may better characterize the suspected aneurysm.
 - On post-contrast MRI in our case, there was a **phase-encoding artifact indicating arterial flow** and pointing away from a macroadenoma, which led the original differential

References:

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Brown A, Jolliff H, Poe D, Weinstock M. Intracavernous Internal Carotid Artery Aneurysm Presenting as Acute Diplopia: A Case Report. *Clinical Practice and Cases in Emergency Medicine*. 2020;4(3):362-365. doi:10.5811/cpcem.2020.3.45266

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