

AMSER Case of the Month: January 2020

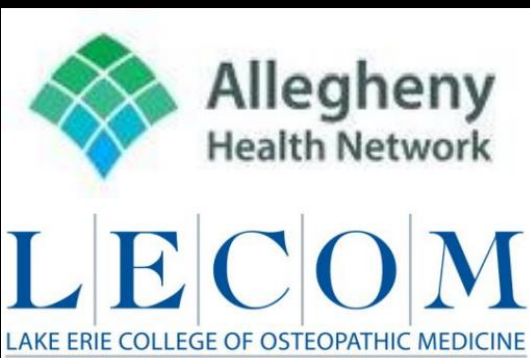
57 year old female presents with right sided visual disturbances following cataract surgery

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Patient Presentation

- **HPI:** 57-year-old female presents with right-sided blurred vision following cataract surgery on her right eye 5 days ago. Over the past 5-6 years, she has had intermittent blurred vision and diplopia. Her left eyesight is clear. She denies headache, focal neurologic deficits, or signs of increased intracranial pressure. She also denies fever, chills, night sweats, or weight loss.
- **PMHx:** Irritable bowel syndrome, hypertension, type 2 diabetes, morbid obesity
- **PSHx:** cholecystectomy, lens implantation (5 days ago)
- **Family Hx:** non-contributory
- **Social Hx:** non-contributory

Physical Exam and Labs

- Abnormal labs
 - Prolactin >4700 ng/mL
 - HbA1c: 6.3%
 - BUN: 23 mg/dL
 - Chloride: 97 mEq/L
- Abnormal physical exam findings
 - Partial left homonymous hemianopia
 - Left eye has brownish discoloration
 - Increased ocular pressure bilaterally

What Imaging Should We Order?

ACR Appropriateness Criteria

Variant 7: Nonischemic visual loss. Chiasm or post-chiasm symptoms. Initial imaging.

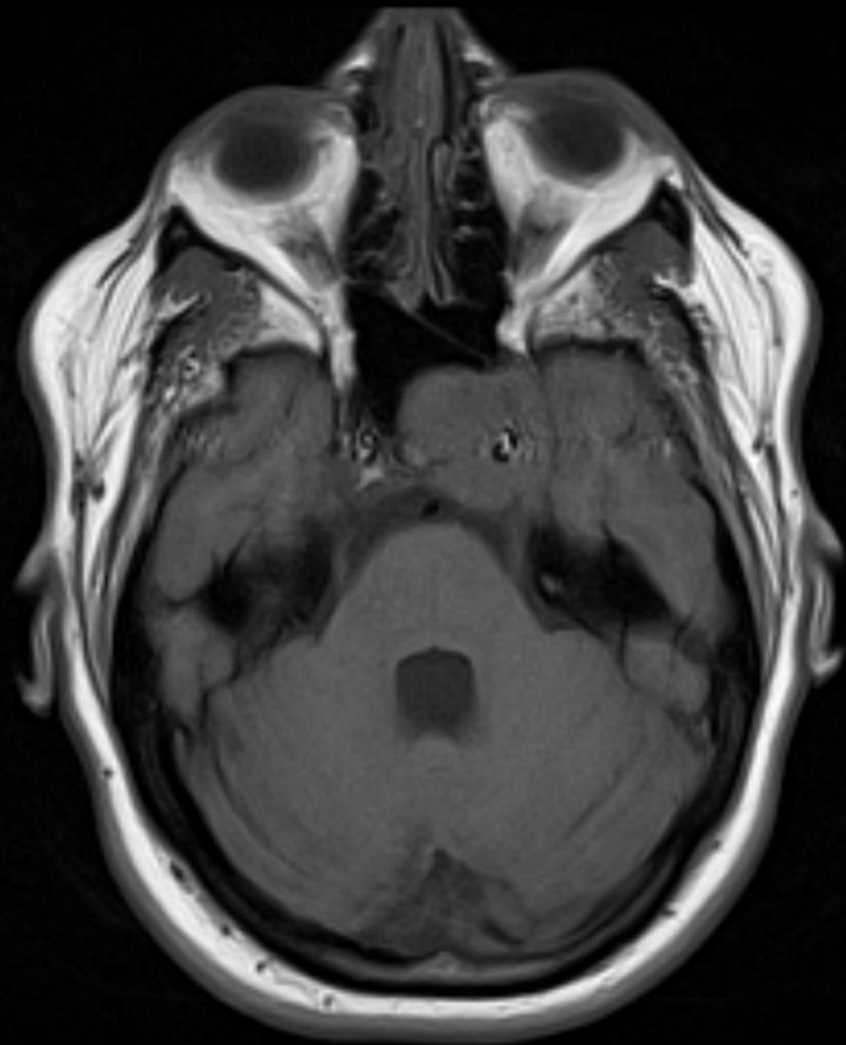
Procedure	Appropriateness Category	RRL
MRI head without and with IV contrast	Usually Appropriate	○
MRI head without IV contrast	Usually Appropriate	○
CT head with IV contrast	May Be Appropriate	⊗ ⊗ ⊗
CT head without and with IV contrast	May Be Appropriate	⊗ ⊗ ⊗
CT head without IV contrast	May Be Appropriate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



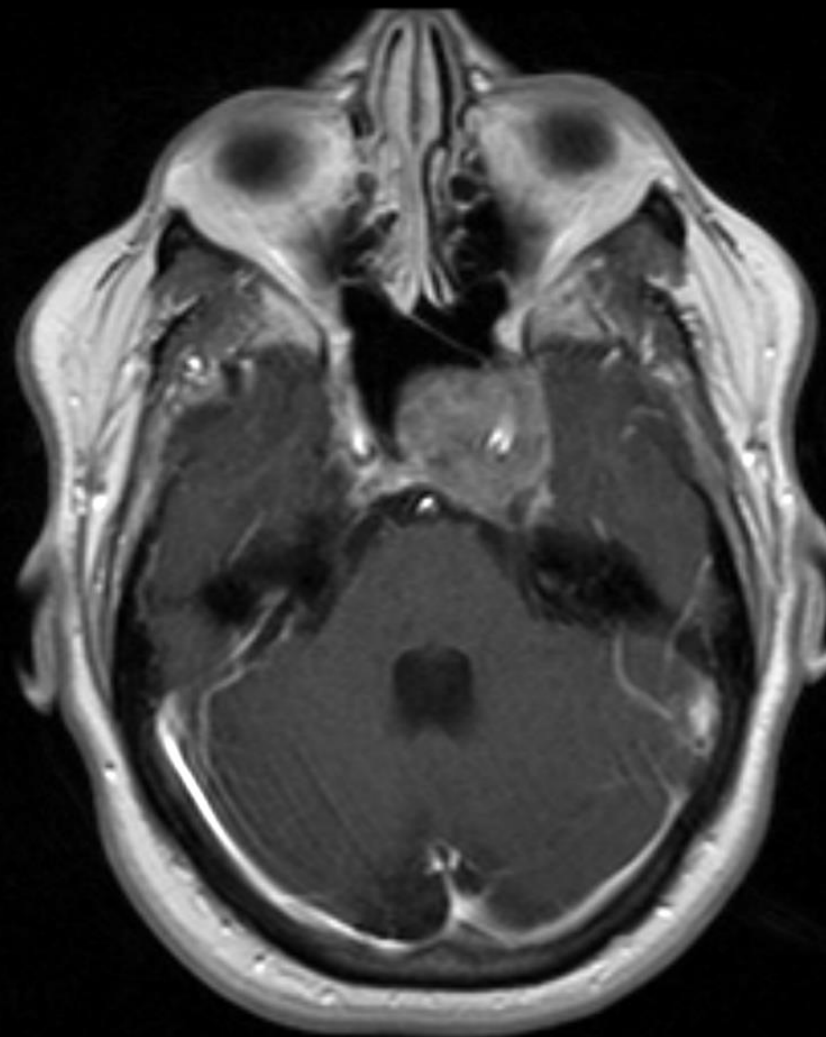
This imaging modality was ordered by the ER physician

Findings (unlabeled)

T1 Pre-Contrast

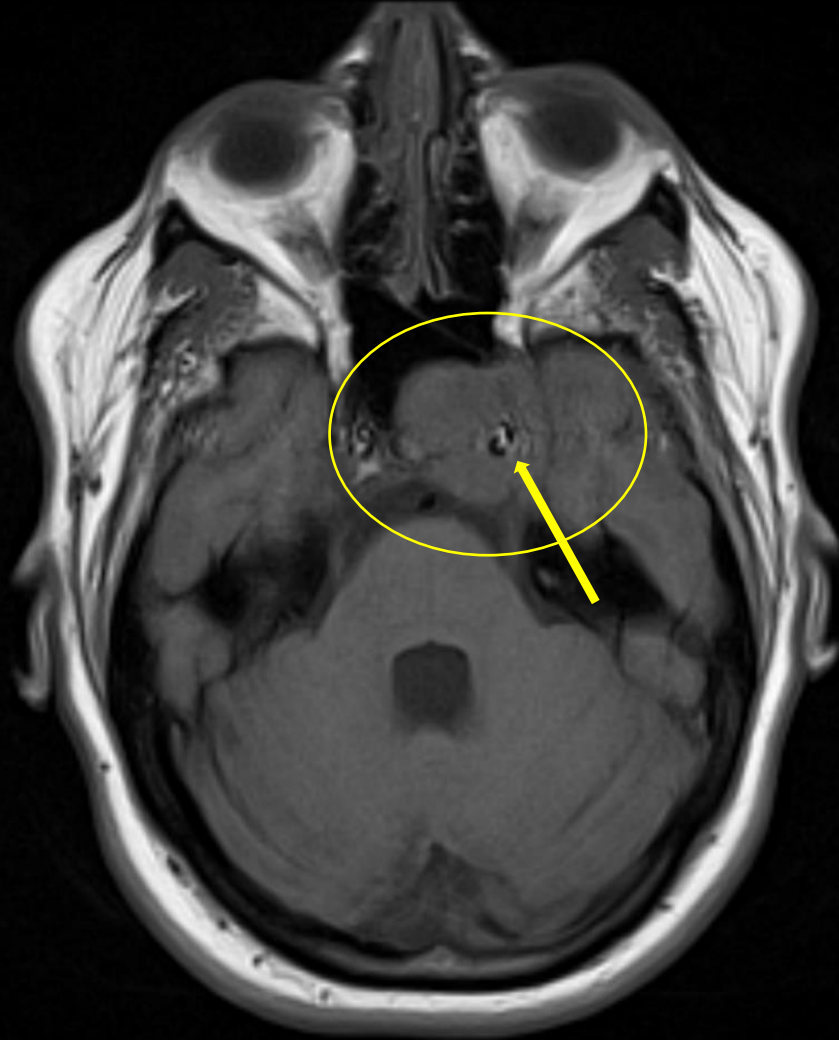


T1 Post-Contrast

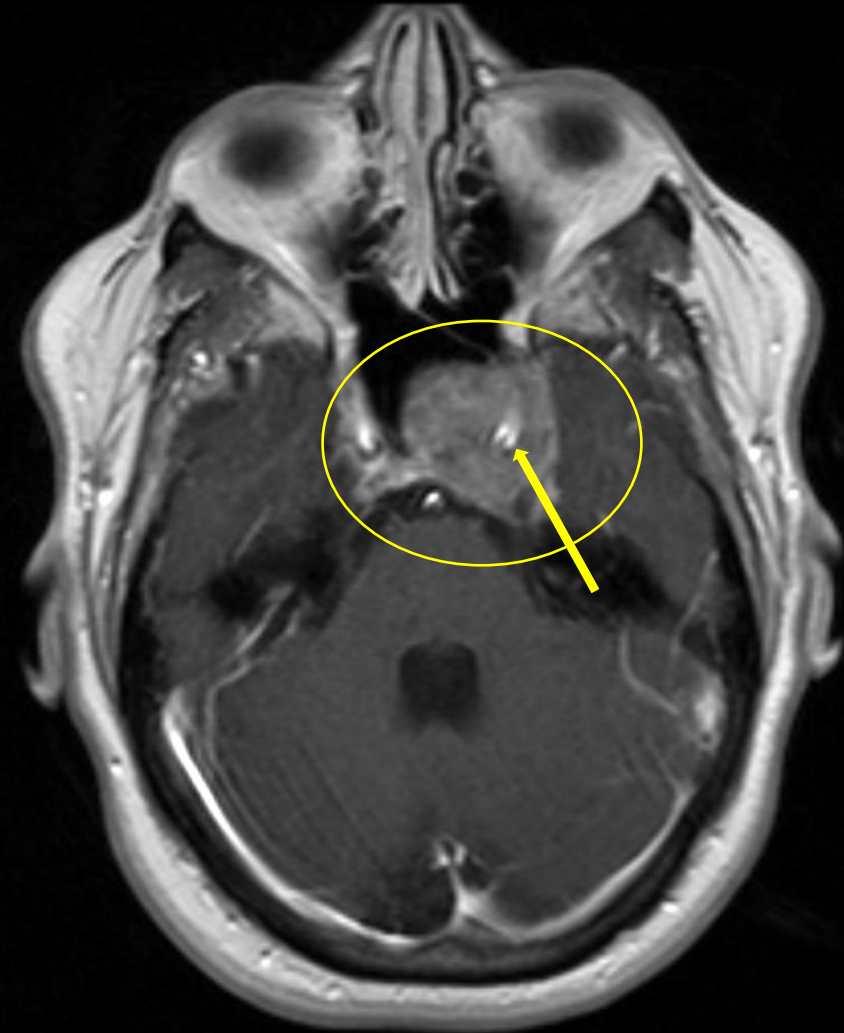


Findings (labeled)

T1 Pre-Contrast



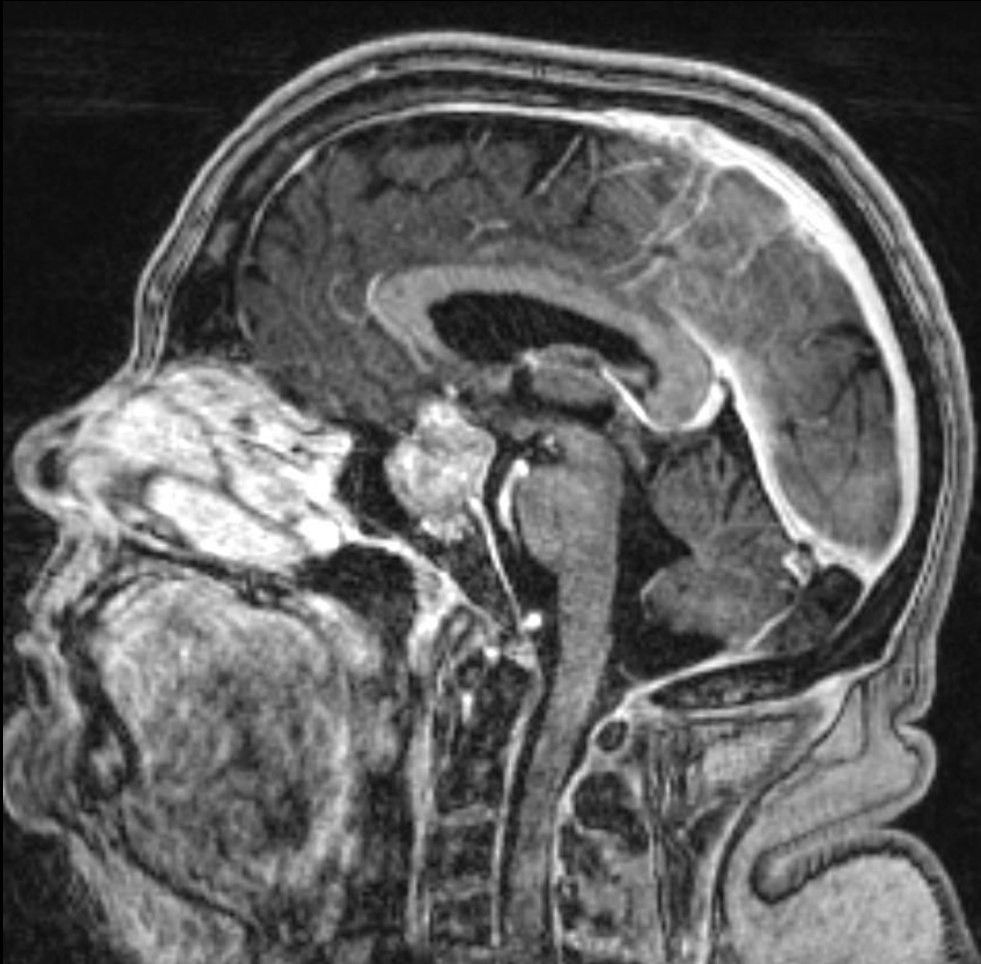
T1 Post-Contrast



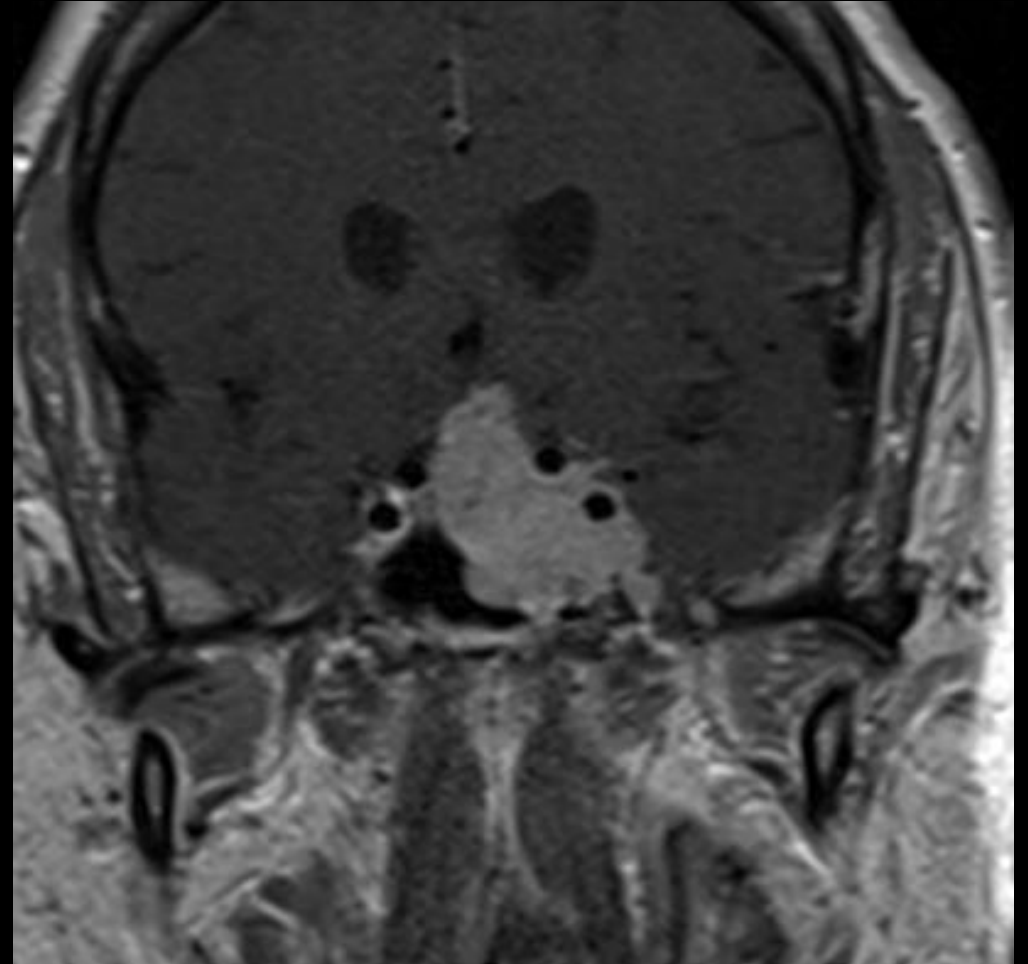
Suprasellar mass extending into the left cavernous sinus with encasement of the left internal carotid artery (arrow)

Findings (unlabeled)

T1 post-contrast



T1 post-contrast



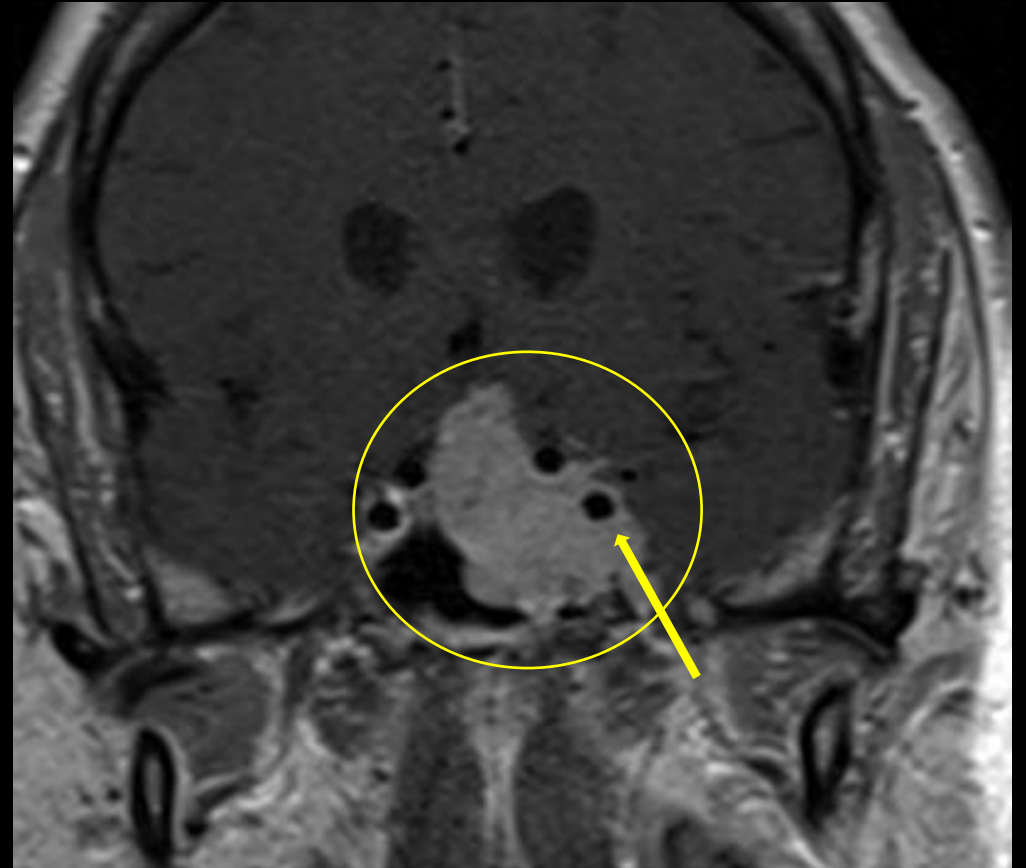
Findings (labeled)

T1 post-contrast



Suprasellar mass superiorly displacing the optic chiasm (approximate region labeled with arrow)

T1 post-contrast



Suprasellar mass extending into the left cavernous sinus with encasement of the left internal carotid artery (arrow)

Differential diagnosis: Pituitary region mass

- **SATCHMO** Mnemonic

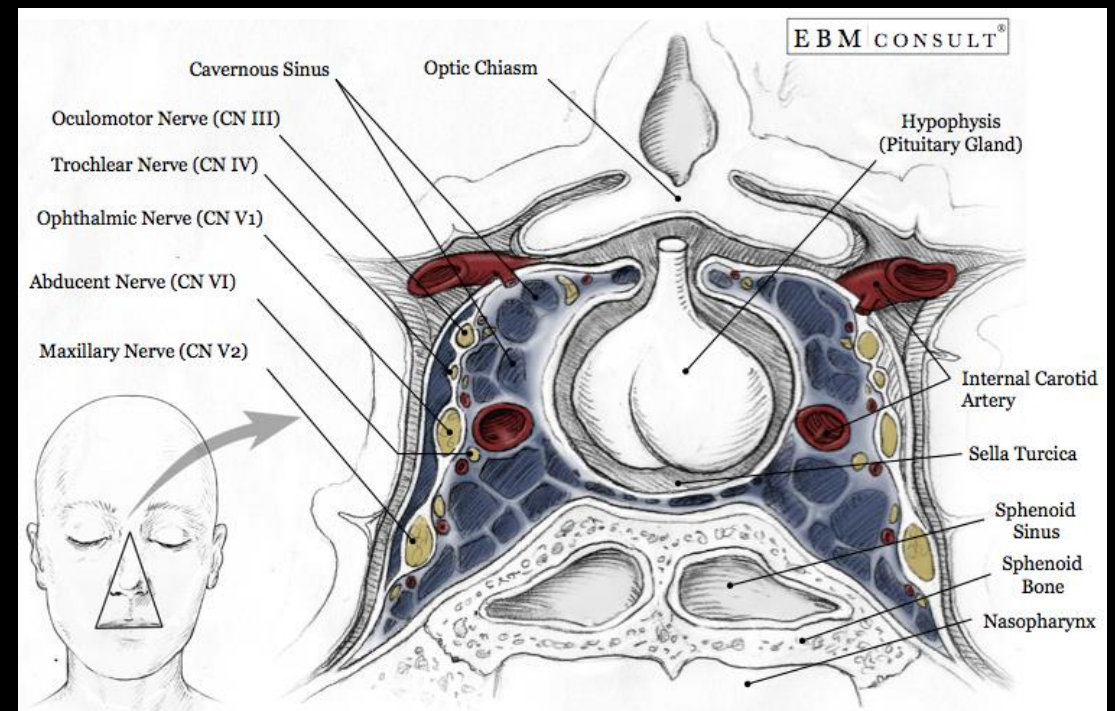
- Sarcoid
- Aneurysm, Adenoma
- Teratoma, Tuberculosis
- Craniopharyngioma, Rathke's Cleft cyst
- Hypothalamic glioma, Hamartoma of tuber cinereum, Histiocytosis
- Meningioma, Metastasis
- Optic nerve glioma

Final Dx:

Prolactin secreting pituitary macroadenoma

Anatomy: Cavernous Sinus

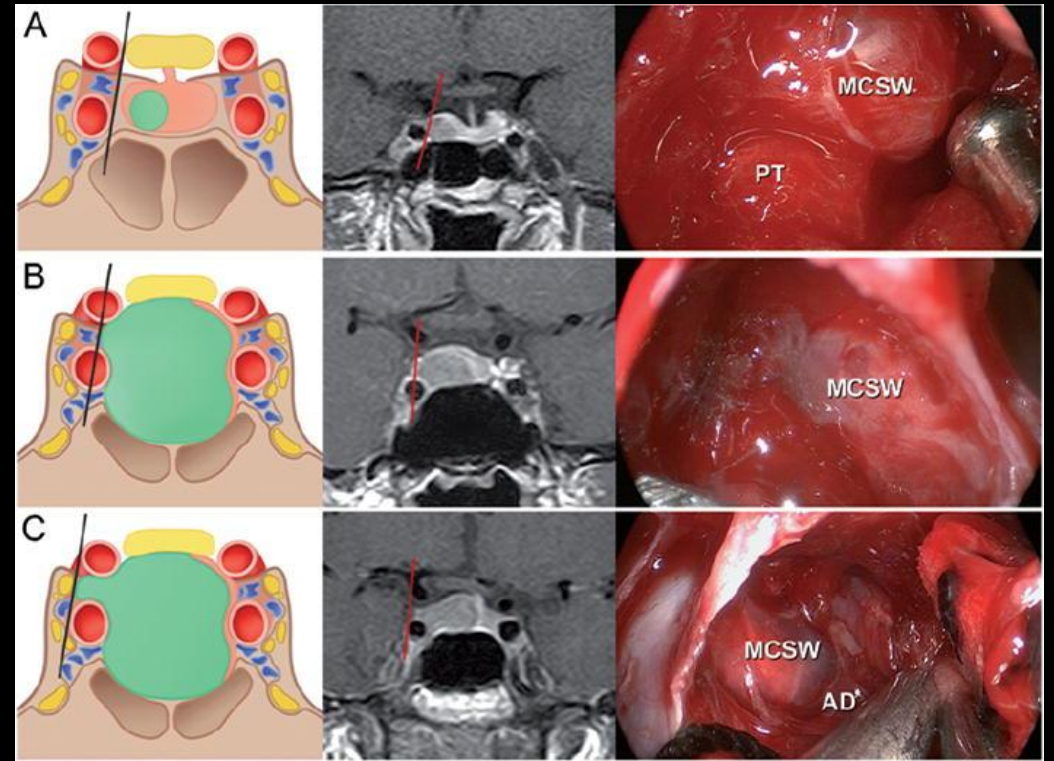
- The pituitary gland lies within the **sella turcica** and is surrounded by the **cavernous sinus**
- The cavernous sinus contains:
 - **Cranial nerves**
 - Oculomotor nerve (CN III)
 - Trochlear n. (CN IV)
 - Ophthalmic n. (CN V1)
 - Maxillary n. (CN V2)
 - Abducens n. (CN VI)
 - **Internal carotid artery**
 - **Carotid plexus of sympathetic n.**
- Lies adjacent to the **optic chiasm**.



<https://www.ebmconsult.com/articles/anatomy-cavernous-sinus>

Grading: Cavernous sinus invasion by a pituitary macroadenoma

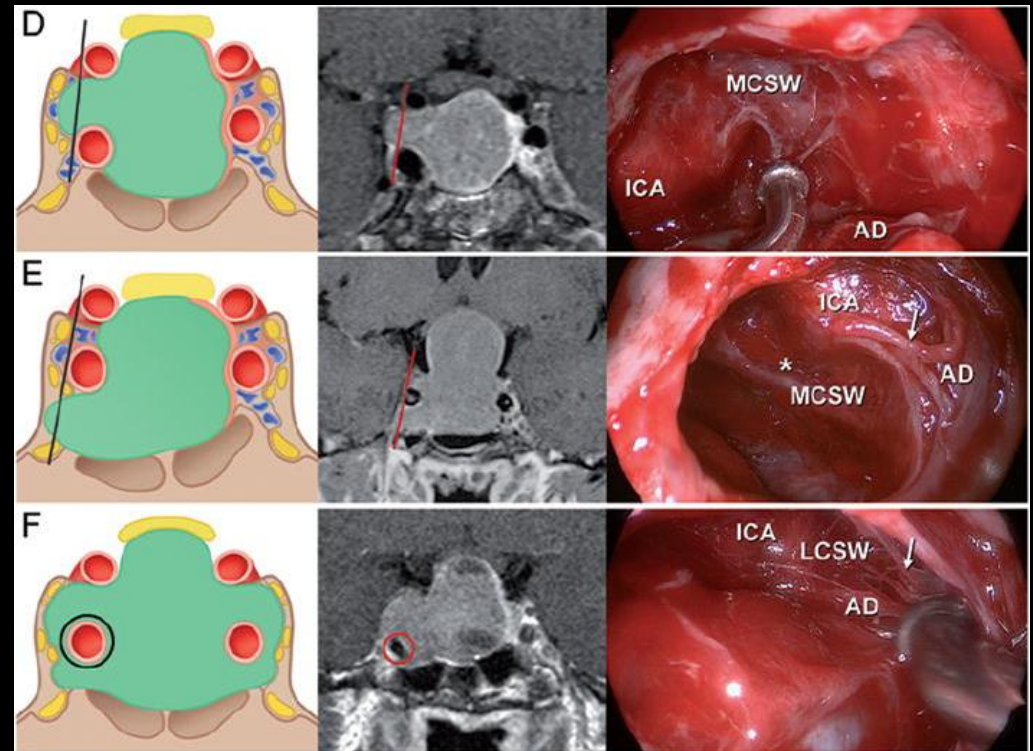
- **grade 0:** does not extend to the medial carotid line (figure 1.A)
- **grade 1:** extends past the medial line, but does not extend beyond the median line (figure 1.B)
- **grade 2:** extends past the median line, but does not extend beyond the lateral line (figure 1.C)



Micko (2015)

Grading: Cavernous sinus invasion by a pituitary macroadenoma

- **grade 3A:** extends past the lateral line of the ICAs and into the superior cavernous sinus compartment, (figure 1.D)
- **grade 3B:** extends past the lateral line of the ICAs and into the inferior cavernous sinus compartment, (figure 1.E)
- **grade 4:** encases the intracavernous ICA completely (figure 1.F)

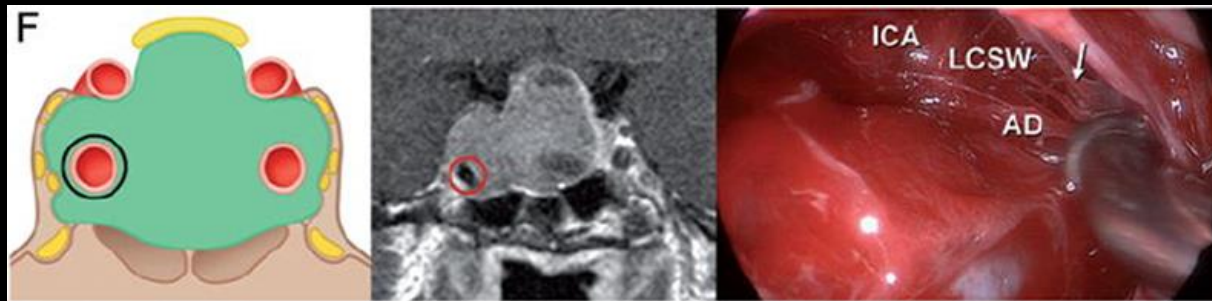
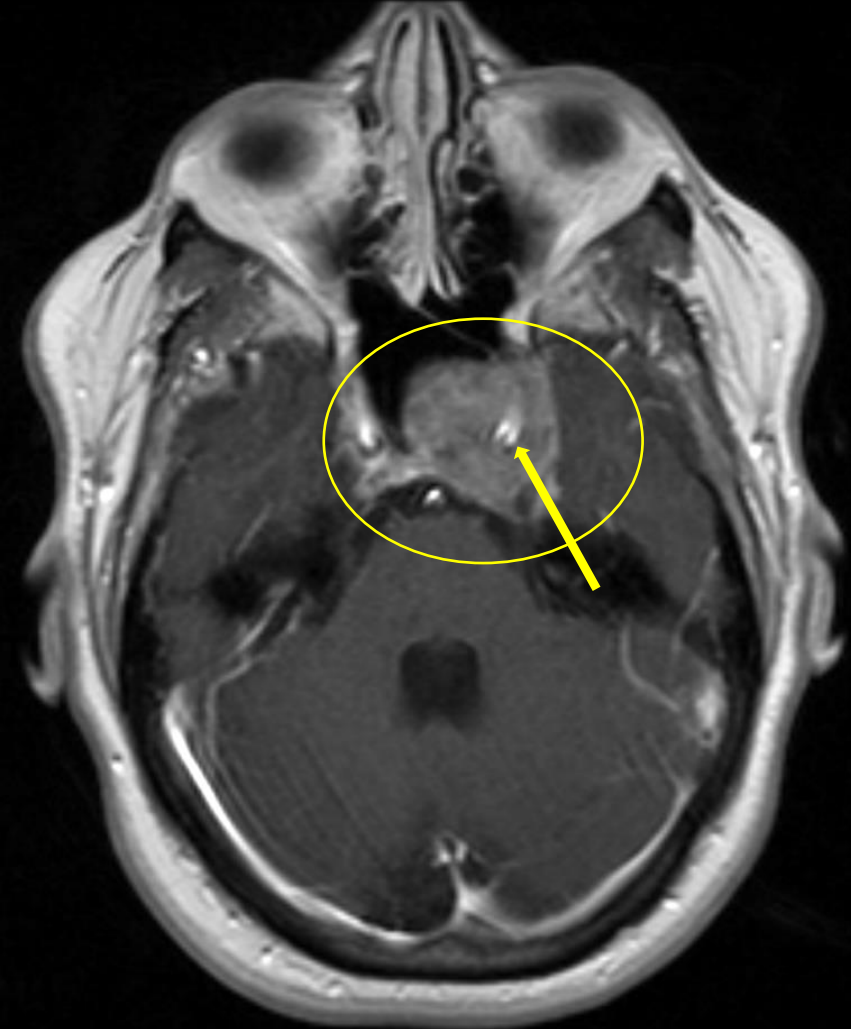


Micko (2015)

Our Patient

- Due to encasement of the entire internal carotid artery, this patient was diagnosed with a **grade 4** pituitary macroadenoma

T1 Post-Contrast



Micko (2015)

Treatment Options

- Surgical removal
 - The **transphenoidal approach** is the treatment of choice for pituitary adenomas
 - Our patient with a **grade 4** pituitary macroadenoma would not be a surgical candidate at the time of diagnosis

Grade	Parasellar Invasiveness (%)	GTR (%)	ER (%)	MIB-1 (%)
1	1.5	83	88	2.5
2	9.9	71	60	2.8
3A	26.5	85	67	2.5
3B	70.6	64	0	2.3
4	100	0	0	4.1

GTR: Gross-total resection rate; ER: Endocrinological remission; MIB-1 was used as a marker of cellular proliferation (antibody against Ki-67) (Micko 2015)

Treatment options

- Medication therapy
 - **Prolactin** secreting pituitary adenomas may be treated with **dopamine agonists**
 - Dopamine inhibits prolactin secretion from lactotroph cells, thus inhibiting lactotroph growth
 - Surgery can be reconsidered in tumors that fail to respond to medication
- Radiation therapy
 - Alternative approach that uses high-dose focused radiation to kill tumor cells

Our Patient

- The adenoma was prolactin secreting, so treatment with cabergoline 0.5 mg twice per week was begun to reduce tumor size
- 5 months later, her prolactin level was measured to be 680 ng/mL with a significant improvement in hemianopia
- The patient will continue to be monitored for tumor regression
- If additional treatment is needed, a repeat MRI may be performed to determine if she is considered a surgical candidate

References:

1. Pituitary Adenomas (Tumors) Description and Treatment Options. Aans.org. <https://www.aans.org/en/Patients/Neurosurgical-Conditions-and-Treatments/Pituitary-Gland-and-Pituitary-Tumors>. Published 2019.
2. Micko, A. S. G., Wöhrer, A., Wolfsberger, S., & Knosp, E. (2015). Invasion of the cavernous sinus space in pituitary adenomas: endoscopic verification and its correlation with an MRI-based classification. *Journal of Neurosurgery*, 122(4), 803–811.
3. Busti A, DeAugustinis K. Cavernous Sinus Anatomy. Ebmconsult.com. <https://www.ebmconsult.com/articles/anatomy-cavernous-sinus>. Published 2009.
4. ACR Appropriateness Criteria®. Acr.org. <https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria>. Published 2016.
5. Osborn, A. G., Hedlund, G. L., & Salzman, K. L. (2018). *Osborns brain: imaging, pathology, and anatomy*. Philadelphia, PA: Elsevier.