AMSER Case of the Month August 2024

A 46 y/o F presents with a history of worsening chronic headaches

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Patient Presentation

- A 46-year-old African American female with a PMH of chronic headaches (for 20+ years following a car accident), hypertension, and tobacco use presented to outpatient neurology clinic with recent headaches worsening in frequency, duration, and severity. Her headache frequency increased to near daily occurrence and occasionally lasted for multiple days at a time. She also began to experience episodes of blurry vision with visual field defects, as well as light and sound sensitivity. Family history was significant for a cousin who died from subarachnoid hemorrhage due to a ruptured intracranial aneurysm.
- Vital signs WNL
- On exam, patient exhibited nonspecific visual field attenuation with no focal neurologic signs

What Imaging Should We Order?

ACR Appropriateness Criteria

This imaging modality was ordered by the neurologist

Variant 7: **Headache with one or more of the following "red flags": increasing frequency or severity, fever or neurologic deficit, history of cancer or immunocompromise, older age (>50 years) of onset, or posttraumatic onset. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
MRI head without and with IV contrast	Usually Appropriate	O
MRI head without IV contrast	Usually Appropriate	O
CT head without IV contrast	Usually Appropriate	☢☢☢
Arteriography cervicocerebral	Usually Not Appropriate	☢☢☢
MRA head with IV contrast	Usually Not Appropriate	O
MRA head without and with IV contrast	Usually Not Appropriate	O
MRA head without IV contrast	Usually Not Appropriate	O
MRI head with IV contrast	Usually Not Appropriate	O
MRV head with IV contrast	Usually Not Appropriate	O
MRV head without and with IV contrast	Usually Not Appropriate	O
MRV head without IV contrast	Usually Not Appropriate	O
CT head with IV contrast	Usually Not Appropriate	☢☢☢
CT head without and with IV contrast	Usually Not Appropriate	☢☢☢
CTA head with IV contrast	Usually Not Appropriate	☢☢☢
CTV head with IV contrast	Usually Not Appropriate	☢☢☢

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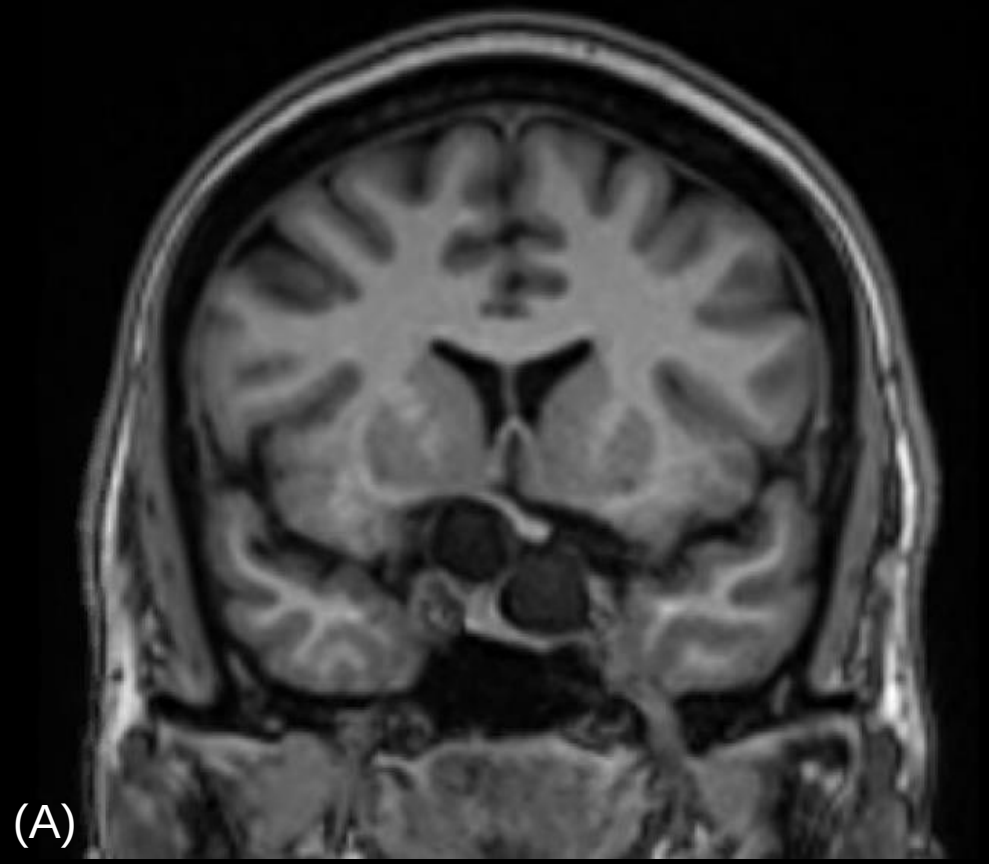
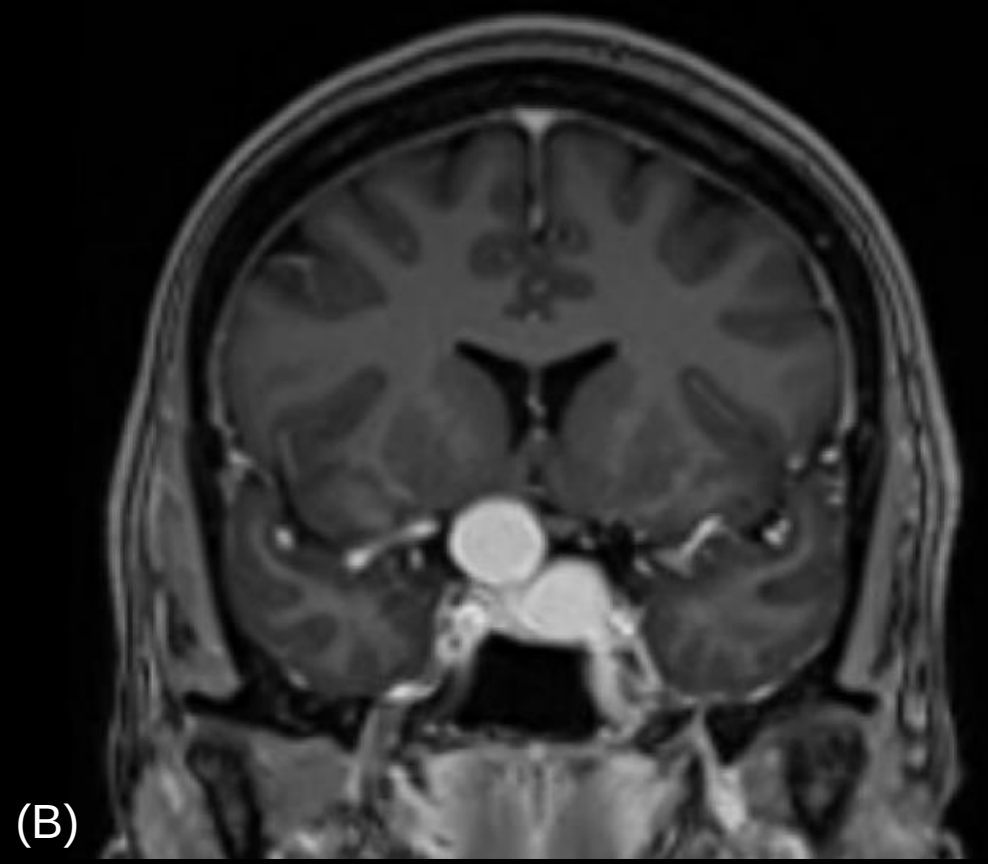
Findings

MRI: Coronal T1 without contrast (A) and T1 post contrast (B)



(A)



(B)

Findings

MRI: Post Contrast Sagittal T1 images demonstrating R enhancing mass (A) and L enhancing mass (B)

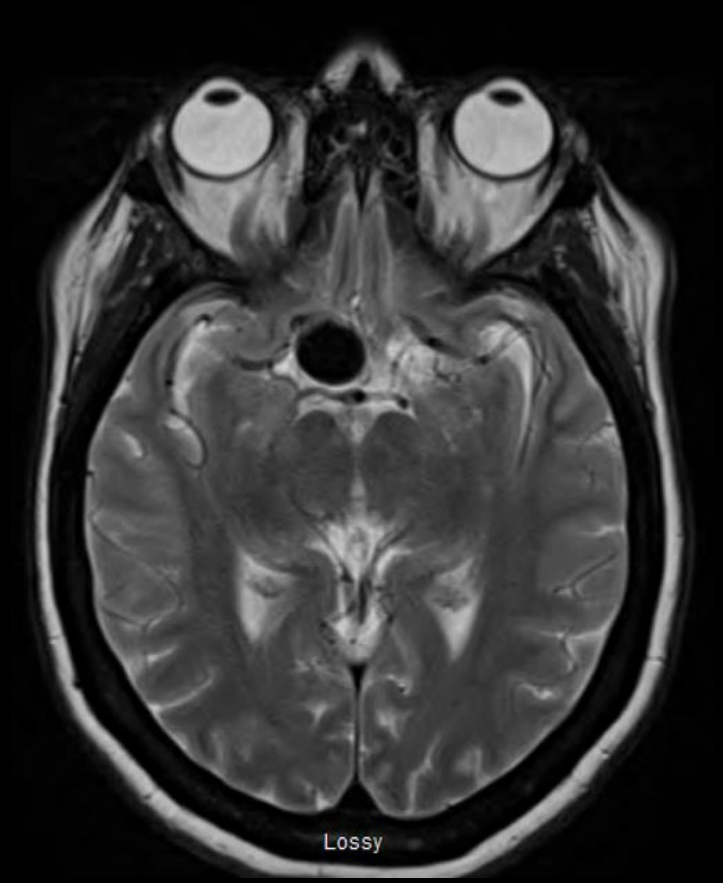
(A)

(B)

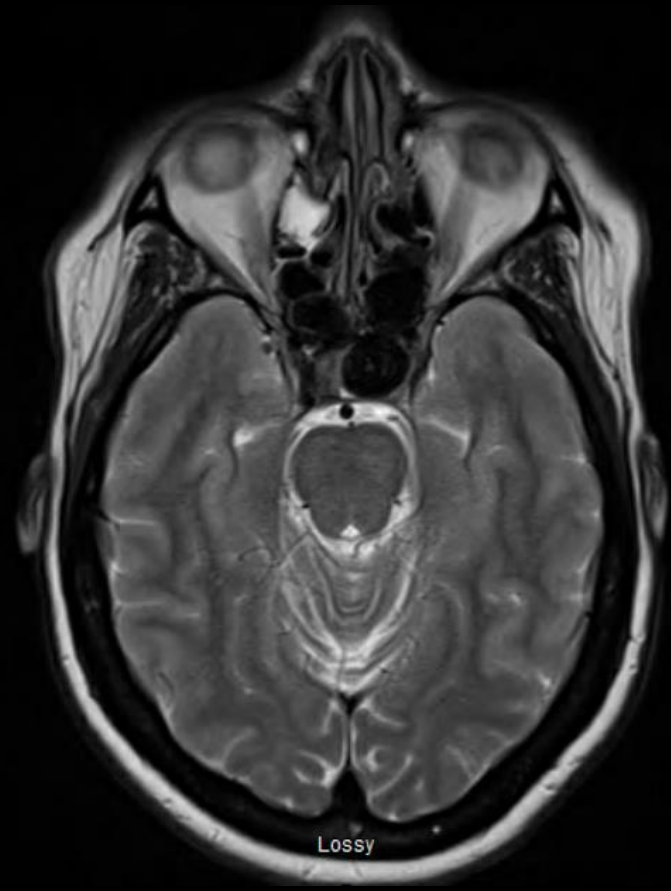
Findings

MRI: Axial T2 TSE signal voids on R (A) and L (B)

(A)

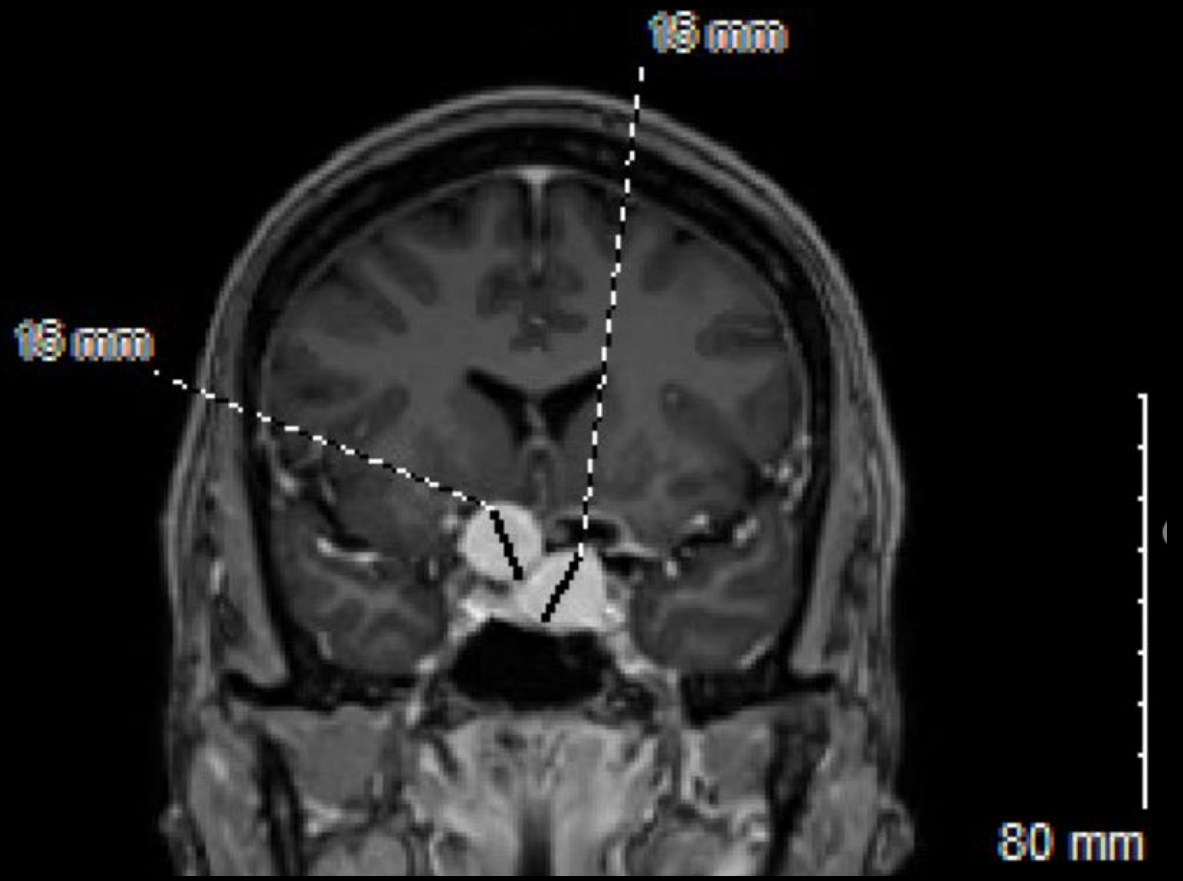


(B)



Findings (labeled)

MRI: Coronal T1 post contrast



Bilateral 15 mm
round enhancing lesions within the sellar and suprasellar region, consistent with bilateral cerebral aneurysms

What Follow-Up Imaging Should We Order?

ACR Appropriateness Criteria

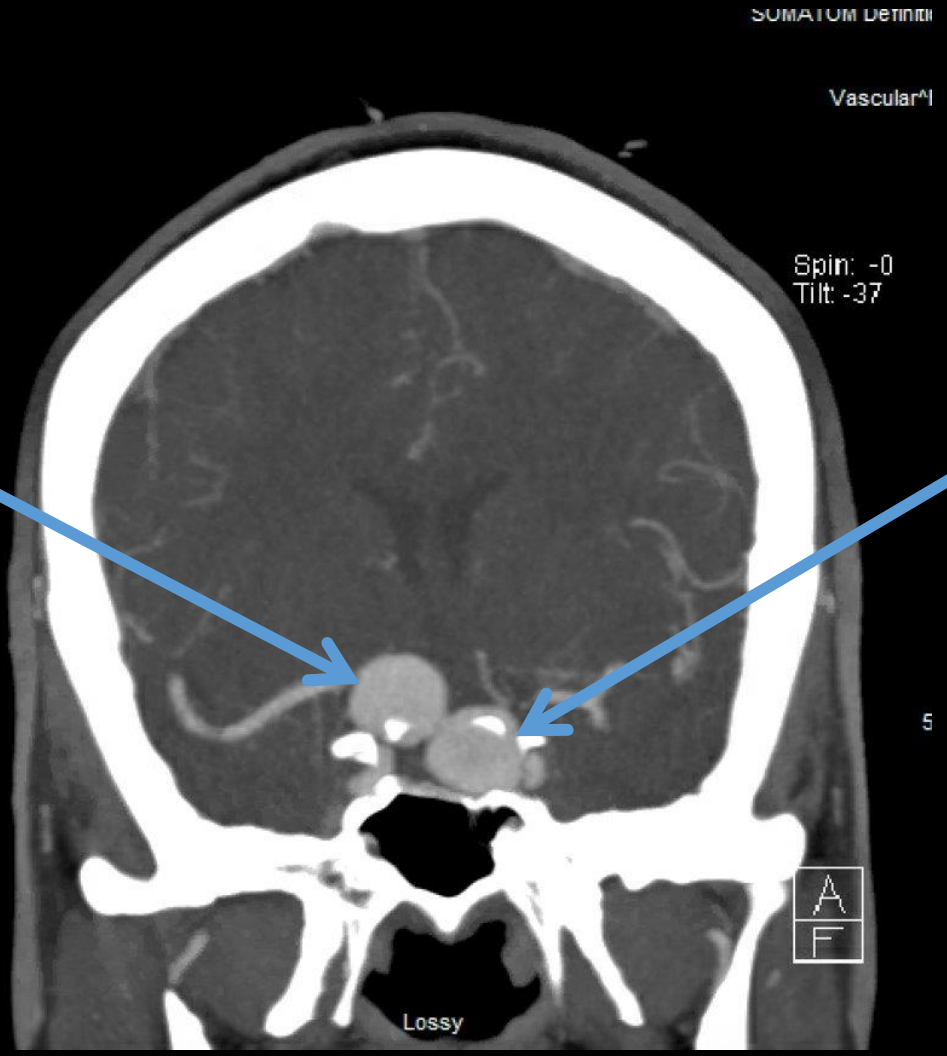
This follow-up imaging modality was ordered by the neurologist

Variant 3: **Known cerebral aneurysm; untreated. Surveillance monitoring.**

Procedure	Appropriateness Category	Relative Radiation Level
MRA head without IV contrast	Usually Appropriate	O
CTA head with IV contrast	Usually Appropriate	☢☢☢
Arteriography cervicocerebral	May Be Appropriate	☢☢☢
MRA head with IV contrast	May Be Appropriate (Disagreement)	O
MRA head without and with IV contrast	May Be Appropriate	O
US duplex Doppler carotid artery	Usually Not Appropriate	O
US duplex Doppler transcranial	Usually Not Appropriate	O
MRA neck with IV contrast	Usually Not Appropriate	O
MRA neck without and with IV contrast	Usually Not Appropriate	O
MRA neck without IV contrast	Usually Not Appropriate	O
MRI head perfusion with IV contrast	Usually Not Appropriate	O
MRI head with IV contrast	Usually Not Appropriate	O
MRI head without and with IV contrast	Usually Not Appropriate	O
MRI head without IV contrast	Usually Not Appropriate	O
MRV head with IV contrast	Usually Not Appropriate	O
MRV head without and with IV contrast	Usually Not Appropriate	O
MRV head without IV contrast	Usually Not Appropriate	O
CT head perfusion with IV contrast	Usually Not Appropriate	☢☢☢
CT head with IV contrast	Usually Not Appropriate	☢☢☢
CT head without and with IV contrast	Usually Not Appropriate	☢☢☢
CT head without IV contrast	Usually Not Appropriate	☢☢☢
CTA neck with IV contrast	Usually Not Appropriate	☢☢☢
CTV head with IV contrast	Usually Not Appropriate	☢☢☢

Findings (labeled)

CTA Head with Contrast



Aneurysm of the Right supraclinoid internal carotid artery measuring up to 16 mm

Aneurysm of the Left supraclinoid internal carotid artery measuring 18 mm

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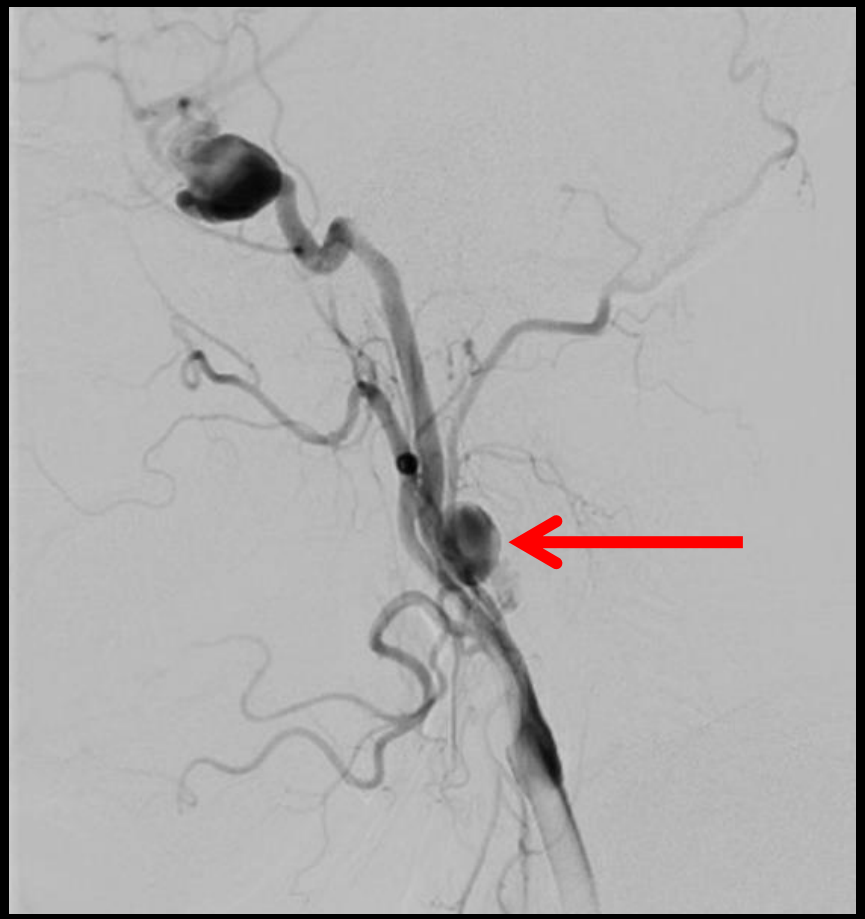
Final Diagnosis:

Bilateral Supraclinoid Internal Carotid Artery Aneurysms

Further Characterization with Digital Subtraction Angiography

Redemonstration of aneurysm of the clinoid segment of the Right ICA

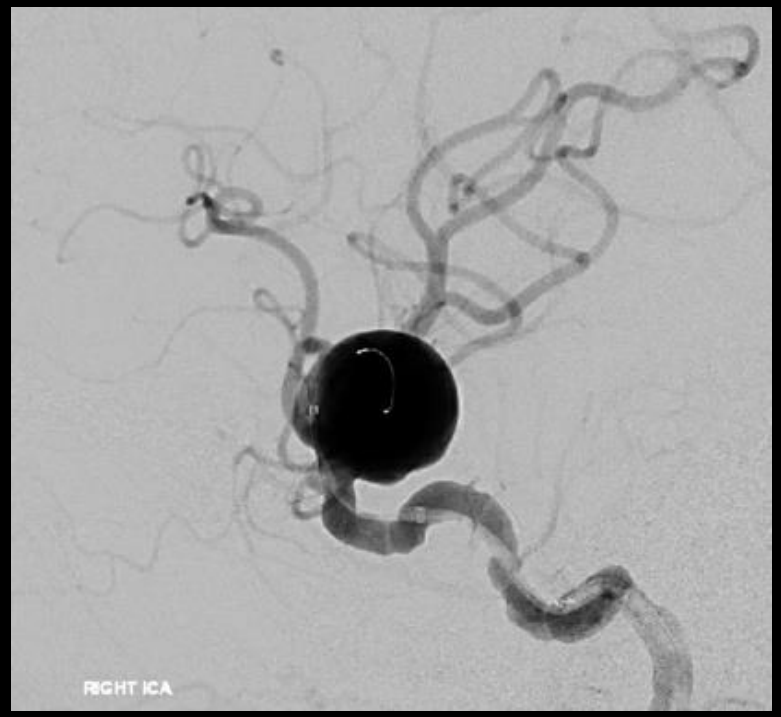
Redemonstration of aneurysm of the clinoid segment of the Left ICA, and one additional extradural aneurysm of the proximal cervical segment of the Left ICA.



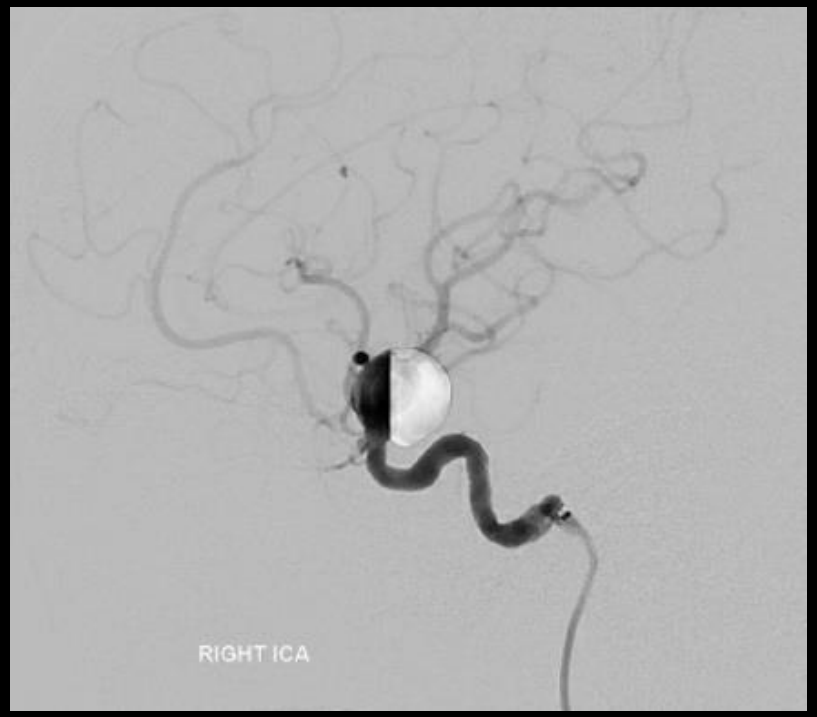
Treatment

Flex Embolization of Right ICA Aneurysm: During coil embolization (A) & (B) and post embolization (C)

(A)



(B)



(C)

Case Discussion

- The differential diagnosis for round, enhancing lesions within the sellar and suprasellar region that abut the optic chiasm include a functional ACTH-producing pituitary adenoma, considering the patient's associated history of hypertension, in addition to a non-functioning pituitary adenoma, craniopharyngioma, and meningioma.
- Given brisk enhancement on the arterial phase makes aneurysm the most likely consideration on the initial MRI
- There are several pertinent risk factors for arterial aneurysm in this patient, including a history of smoking, hypertension, and African American race.
- For treatment, the right ICA aneurysm was successfully treated with the flex embolization technique, followed by treatment of the left intracranial ICA aneurysm at a later date.

Case Discussion

- Due to the presence of three aneurysms, a workup for Autosomal Dominant Polycystic Kidney Disease, Ehlers-Danlos syndrome, Fibromuscular Dysplasia, collagen vascular disease, and other connective tissue diseases is indicated for this patient.
- The prevalence of bilateral sellar/suprasellar aneurysms is unknown.
- The prevalence of extracranial aneurysms in the setting of a known intracranial aneurysm is estimated to be between 1.9% and 4.6%.[5,8]
- In conclusion, it is important to consider the diagnosis of a sellar/suprasellar aneurysm (or other mass effect lesions) in a patient with worsening headaches and/or visual disturbances with a positive family history.

References:

1. Eddleman CS, Hurley MC, Bendok BR, Batjer HH. Cavernous carotid aneurysms: to treat or not to treat? Neurosurg Focus. 2009 May;26(5):E4. doi: 10.3171/2009.2.FOCUS0920. PMID: 19409005. https://pubmed.ncbi.nlm.nih.gov/19409005/

2. Gagliardi D, Faravelli I, Villa L, et al. Bilateral Cavernous Carotid Aneurysms: Atypical Presentation of a Rare Cause of Mass Effect. A Case Report and a Review of the Literature. Front Neurol. 2018;9:619. Published 2018 Aug 2. doi:10.3389/fneur.2018.00619. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6084507/

3. Hanak BW, Zada G, Nayar VV, Thiex R, Du R, Day AL, Laws ER. Cerebral aneurysms with intrasellar extension: a systematic review of clinical, anatomical, and treatment characteristics. J Neurosurg. 2012 Jan;116(1):164-78. doi: 10.3171/2011.9.JNS11380. Epub 2011 Nov 4. PMID: 22054212. https://pubmed.ncbi.nlm.nih.gov/22054212/

4. Hashmi HZ, Inkollu S, Jain D, Tummala R, Araki T, Harindhanavudhi T. Internal Carotid Artery Aneurysm Mimicking a Pituitary Adenoma: A Case Report and Review of the Literature. AACE Clin Case Rep. 2023 Feb 5;9(2):39-43. doi: 10.1016/j.aace.2023.02.001. PMID: 37056416; PMCID: PMC10086597. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10086597/

5. Pourier VEC, van Laarhoven CJHCM, Vergouwen MDI, Rinkel GJE, de Borst GJ. Prevalence of extracranial carotid artery aneurysms in patients with an intracranial aneurysm. PLoS One. 2017 Nov 13;12(11):e0187479. doi: 10.1371/journal.pone.0187479. PMID: 29131823; PMCID: PMC5683613. https://pubmed.ncbi.nlm.nih.gov/29131823/

6. Rosi Junior J, Welling LC, Yeng LT, Caldas JG, Schafranski M, Teixeira MJ, Figueiredo EG. Cavernous carotid artery aneurysms: epidemiology, natural history, diagnostic and treatment. An experience of a single institution. Clin Neurol Neurosurg. 2014 Oct;125:32-5. doi: 10.1016/j.clineuro.2014.07.015. Epub 2014 Jul 20. PMID: 25083803. https://pubmed.ncbi.nlm.nih.gov/25083803/

7. Torres A, Dammers R, Krisht AF. Bilateral internal carotid artery aneurysm simulating pituitary apoplexy: case report. Neurosurgery. 2009 Dec;65(6):E1202; discussion E1202. doi: 10.1227/01.NEU.0000360127.88741.E3. PMID: 19934939. https://pubmed.ncbi.nlm.nih.gov/19934939/

8. Van Laarhoven CJHCM, Pourier VEC, Lindgren AE, Vergouwen MDI, Jääskeläinen JE, Rinkel GJE, de Kleijn DPV, de Borst GJ. Co-prevalence of extracranial carotid aneurysms differs between European intracranial aneurysm cohorts. PLoS One. 2020 Jan 23;15(1):e0228041. doi: 10.1371/journal.pone.0228041. PMID: 31971973; PMCID: PMC6977743. https://pubmed.ncbi.nlm.nih.gov/31971973/

9. Wijethunga WMUA, Dissanayake HA, Perera S, Katulanda P. Intra cavernous aneurysm of internal carotid artery masquerading as a pituitary adenoma: a case report. BMC Res Notes. 2018 Apr 10;11(1):237. doi: 10.1186/s13104-018-3329-2. PMID: 29636087; PMCID: PMC5894197. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5894197/

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