AMSER Case of the Month December 2025

Chronic Headache

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Patient Presentation

- 67 year old female with a history of HTN, hypothyroidism, low-grade noninvasive papillary urothelial carcinoma (diagnosed in 2012) s/p resection without recurrence or adjuvant treatment
- Complaining of severe pain behind her right eye that developed 6 days ago
- History of migraines and ocular migraines with symptoms starting 2 months ago
- 1 month ago migraine episodes began to include vertigo and nausea
- Episode of confusion when she lost her way back home

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria[1]

Variant 2: **Chronic headache with new feature or neurologic deficit.**

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with contrast	8	See statement regarding contrast in text under "Anticipated Exceptions."	O
MRI head without contrast	7		O
CT head without contrast	7		☢☢☢
CT head without and with contrast	5		☢☢☢
MRA head without and with contrast	4	See statement regarding contrast in text under "Anticipated Exceptions."	O
MRA head without contrast	4	Perform this procedure in selected cases when vascular disease suspected.	O
CTA head with contrast	4		☢☢☢
CT head with contrast	3		☢☢☢
Arteriography cervicocerebral	2	This procedure is not used as a primary diagnostic tool.	☢☢☢

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level

This imaging modality was ordered by the ER physician

- The initial ordered study was a CT Angiogram head with contrast. As part of the institutional protocol, the acquisition in addition included a non-contrast head CT, post-contrast head CT, and CT Angiogram neck with contrast
- Further evaluation with contrast-enhanced MRI of the head was recommended

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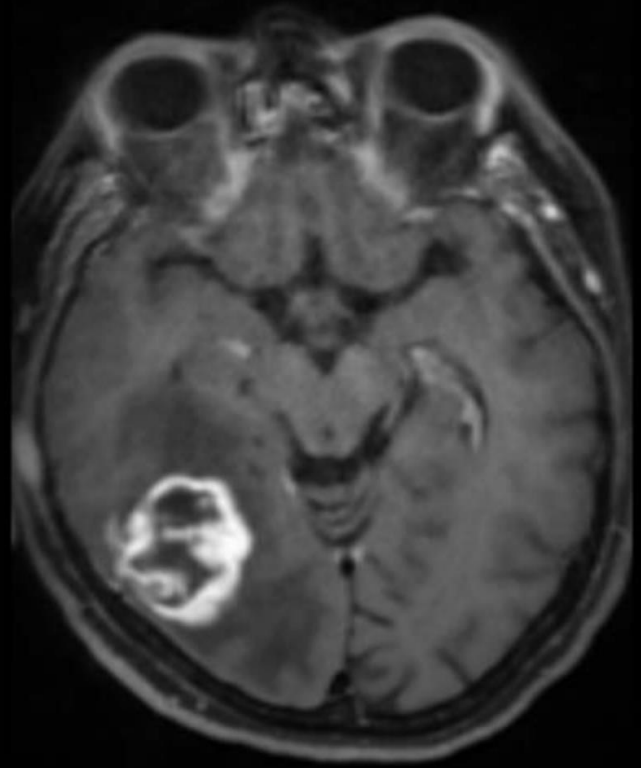
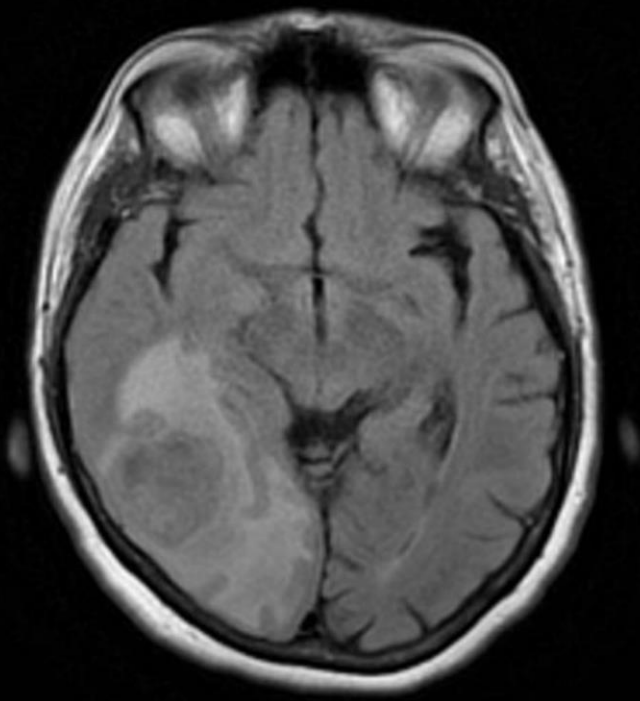
Findings unlabeled





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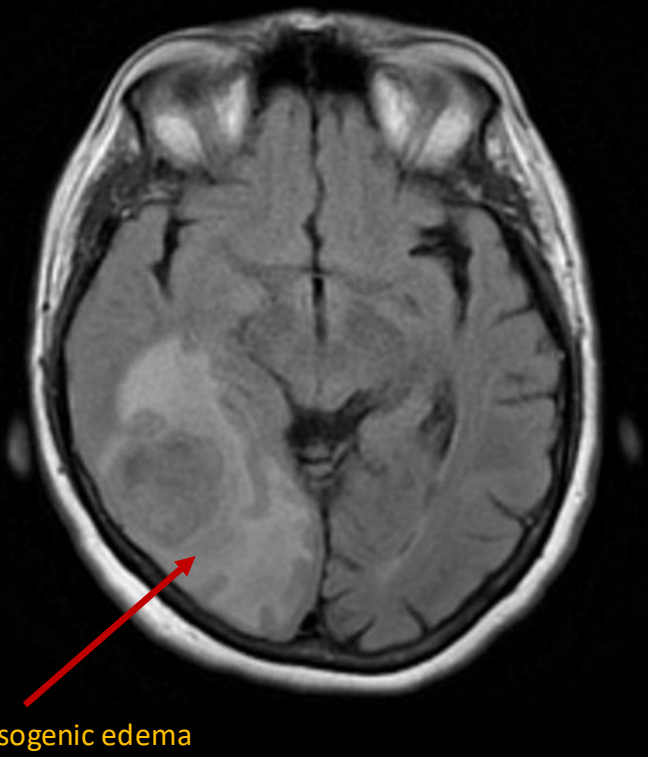
Findings labeled

CT Brain with Contrast

- Peripherally enhancing heterogeneous intra-axial lesion in the Right posterior parietooccipital region with significant surrounding vasogenic edema

T1 post contrast

- Nodular enhancing intra-axial mass in the right temporo-occipital lobe with intralesional hyperintensity suggestive of central necrosis



T2/FLAIR

- Hyperintensity extending along the right temporparietal-occipital lobe

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Final Dx:

Glioblastoma Multiforme IDH wildtype MGMT methylated

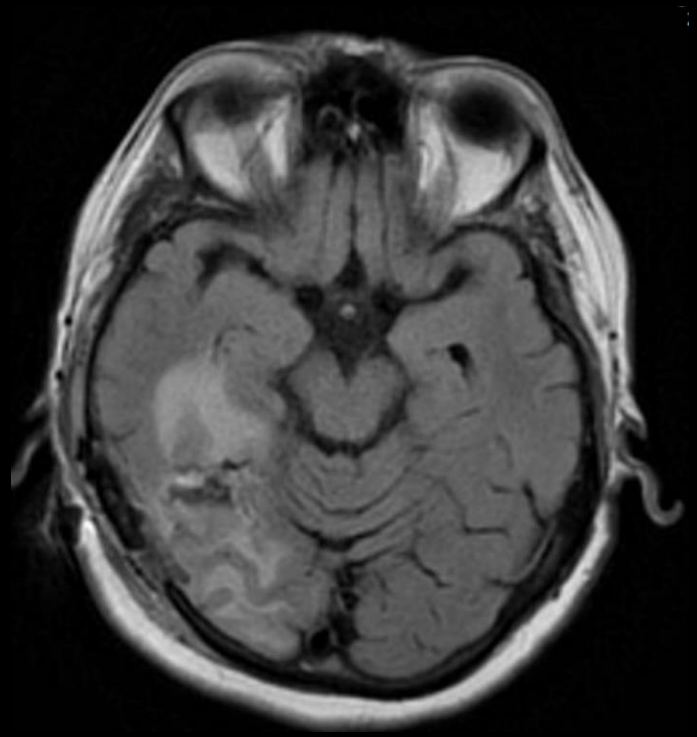
Case Discussion

- Definition: Glioblastoma multiforme is a grade 4 astrocytic tumor [5]
- 5-year survival rate of 5% [2]. The most aggressive primary brain tumor with rapid growth, necrosis, and microvascular proliferation [3].
- Risk factors: Age (PI 65-75), Genetic tumor syndromes (Li-Fraumeni, lynch, etc), prior radiation
- Clinical Features [4,5] :
  - General symptoms like new or worsening headaches, nausea, vomiting, seizures, and fatigue, as well as focal symptoms such as weakness or numbness on one side of the body, balance problems, personality or behavioral changes, memory loss, confusion, and speech, vision, or hearing issues
  - IDH-wildtype (90%): Poor prognosis. IDH gene normal
  - MGMT methylated: DNA repair enzyme. Methylated (silenced) promoter region renders tumor cells unable to repair damage by alkylating chemo: better prognosis
  - Imaging Features: heterogeneous, poorly defined, and infiltrative mass with central T2 hyperintensity corresponding to a central necrotic core, irregular peripheral enhancement, and surrounding vasogenic edema

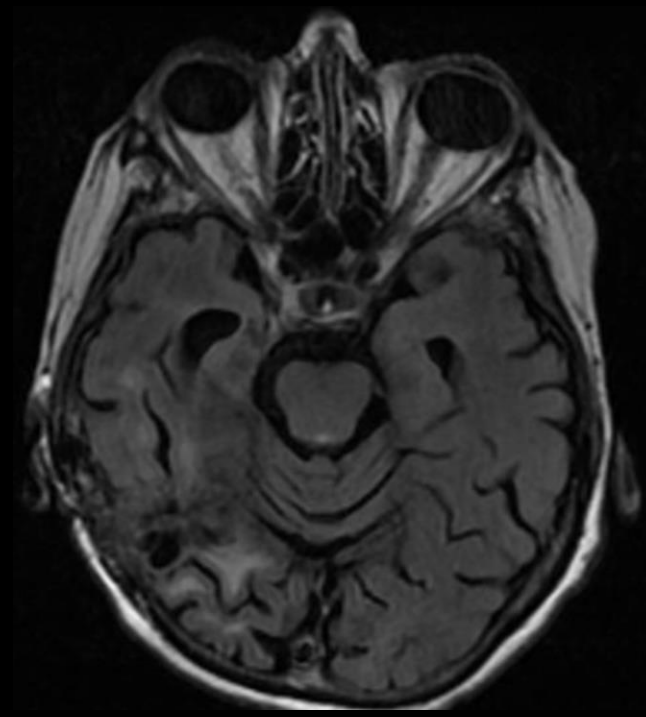
Patient followup

- Tumor resected
- Completed chemoradiation with temozolomide for 6 months
- Patient and family ultimately decided upon comfort care and treatment was stopped
- 2 years post resection patient is admitted for fall and MRI showed:

Findings post resection (unlabeled)

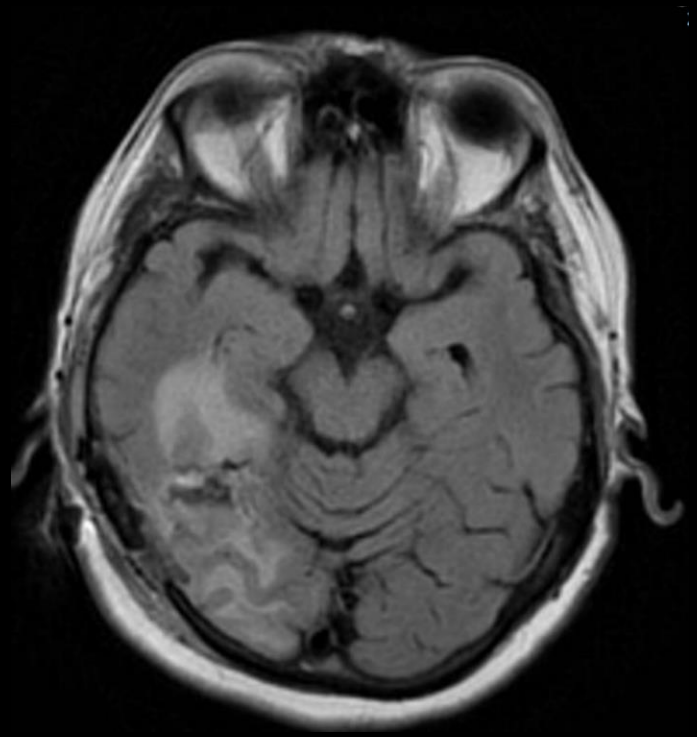


T2 FLAIR PROP:
Immediately post resection:



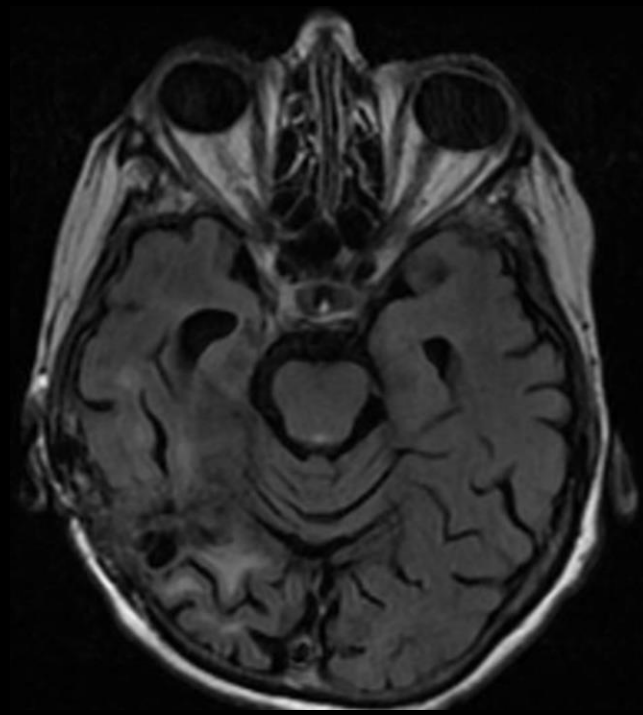
T2 FLAIR
2 years post resection:

Findings post resection



T2 FLAIR PROP:
Immediately post resection:

No definite evidence for residual or recurrent tumor. Surrounding confluent hyperintense signal favored to be related to postoperative edema

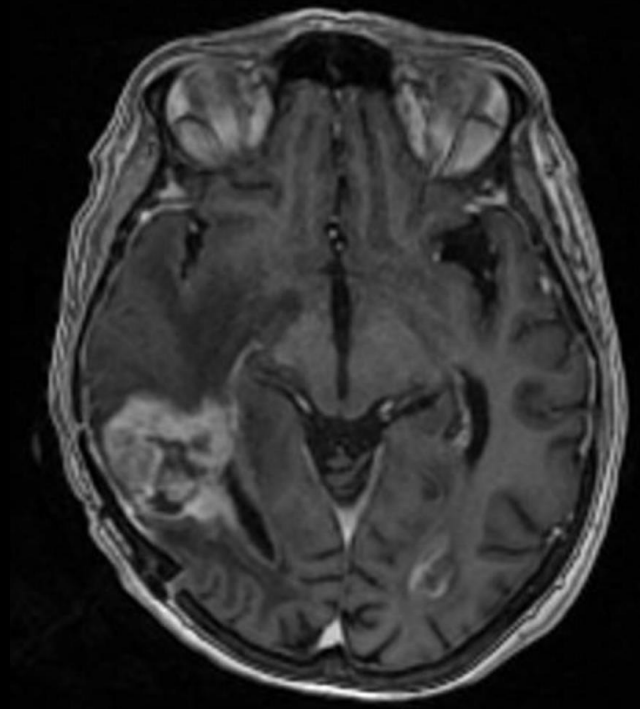


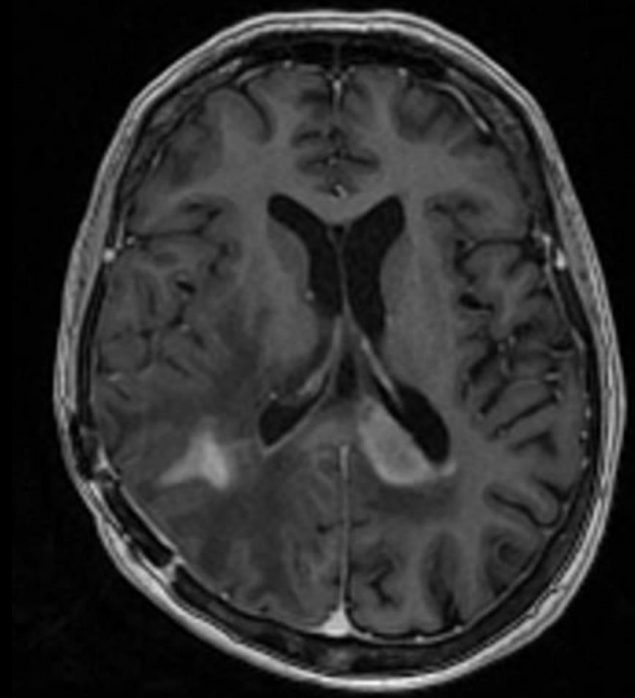
T2 FLAIR
2 years post resection:

Mild scattered focal areas of hyperintensity on T2/FLAIR-weighted sequences involving the white matter likely nonspecific in nature

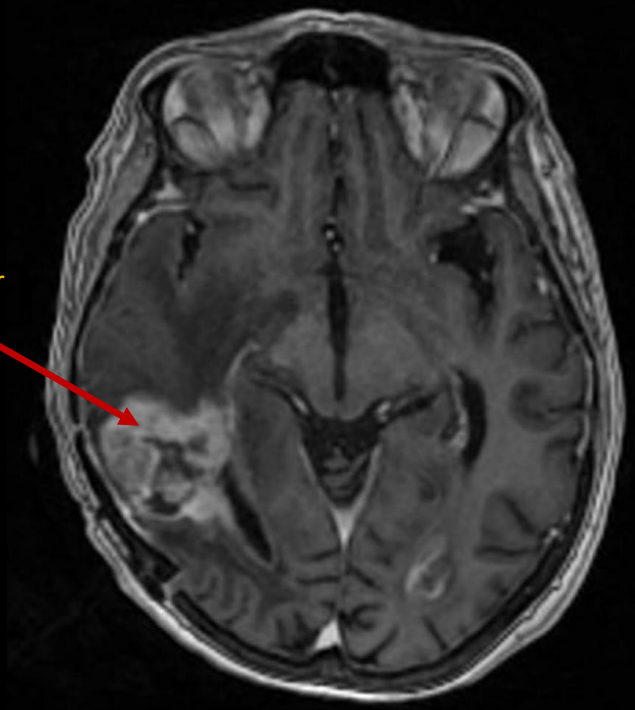
Findings 34 months post resection (unlabeled)

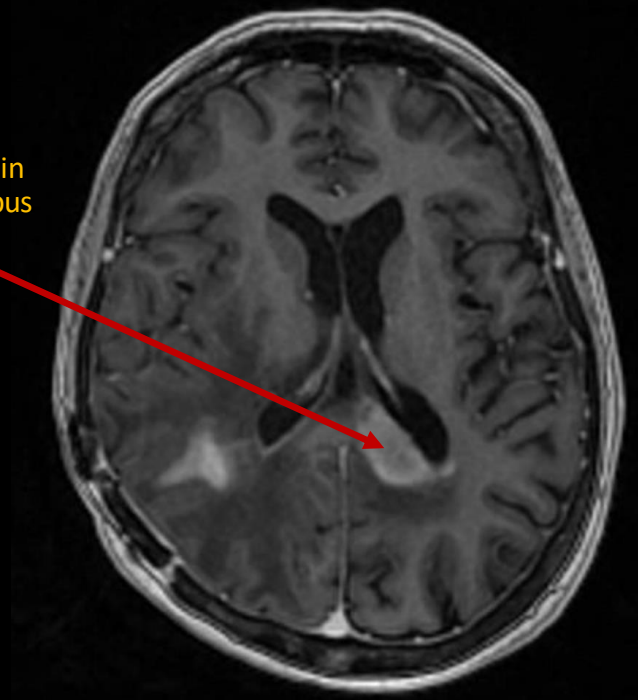
10 months later patient gets another MRI after presenting with recurrent falls and confusion





Findings 34 months post resection (labeled)





T1 3D FSPGR:

-Locally recurrent tumor in previous surgical bed.
-Intraventricular extension of tumor, as evidenced by new ependymal enhancement.
-Surrounding vasogenic edema.

-Vasogenic edema greater throughout right than left
-New lesion within the splenium of the Corpus Callosum

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Case conclusion

- No further treatment pursued. Two months later patient unfortunately passed away
- Cause of death attributed to recurrent glioblastoma with raised intracranial pressure secondary to cerebral edema as well as Chronic Myeloid Leukemia (CML), all contributing to failure to thrive

Key Takeaways:

- Initially mass was thought to be metastasis from previous urothelial carcinoma
- MRI is gold standard in diagnosing and monitoring; Characteristic features:
  - Thick Irregular margins
  - Central necrosis surrounded by Irregular rim enhancement
  - Hyperintensity of Vasogenic edema
  - Intralesional Hyperintensity + Hemorrhage

References:

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2. Tamimi AF, Juweid M. Epidemiology and Outcome of Glioblastoma. In: De Vleeschouwer S, editor. Glioblastoma [Internet]. Brisbane (AU): Codon Publications; 2017 Sep 27. Chapter 8. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470003/ doi: 10.15586/codon.glioblastoma.2017.ch8
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4. Melhem J, Detsky J, Mary Jane Lim-Fat, Perry J. Updates in IDH-Wildtype Glioblastoma. *Neurotherapeutics*. 2022;19(6):1705-1723. doi:https://doi.org/10.1007/s13311-022-01251-6
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