Yield of MRI in Patients with Probable Hypertensive Hemorrhage

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Outline

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- Methods
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  - MRI Findings
- Conclusion

Background and Purpose

- Hypertensive hemorrhage, characteristically originating in deep structures of the brain, is the common type of nontraumatic intracerebral hemorrhage (ICH).
- Advanced imaging, such as MRI, can identify culprit lesions in unexplained ICH, but we hypothesized that the diagnostic yield of brain MRI would be low.

Acute intraparenchymal hemorrhage centered in the right basal ganglia and internal capsule with mild surrounding edema and local mass effect on the right frontal horn.

Examples

Intraparenchymal hemorrhage centered along the left basal ganglia.

Examples

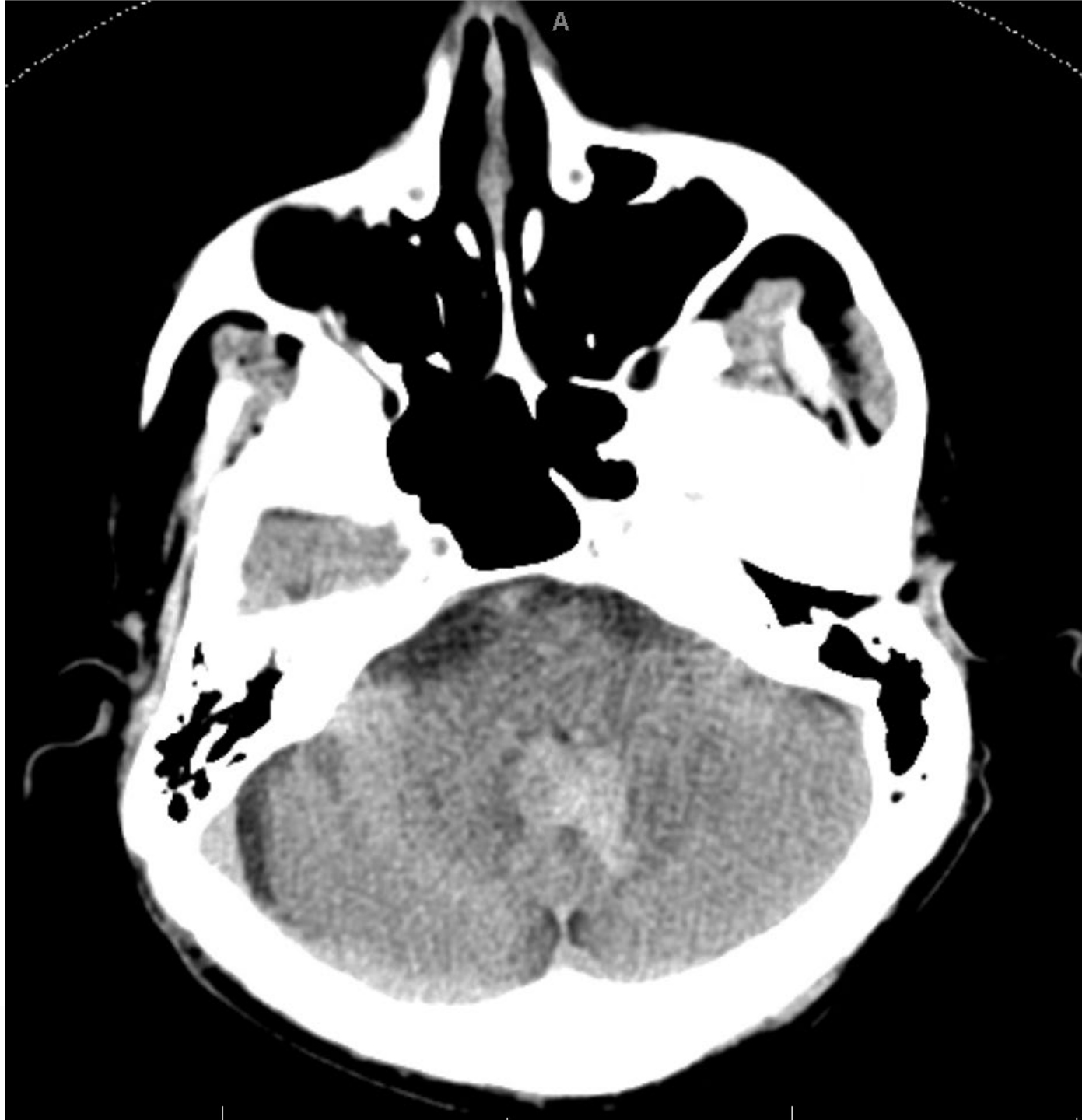
Acute parenchymal hemorrhage centered in the right thalamus extending across the posterior limb of the right internal capsule into the subinsular region.

Examples

Acute midbrain hemorrhage with intraventricular hemorrhage expanding the third ventricle with small amount of hemorrhagic extension into the aqueduct of Sylvius

Examples

Acute intraparenchymal hemorrhage within the medial aspect of the left cerebellar hemisphere extending into the posterior lobe of the cerebellar vermis

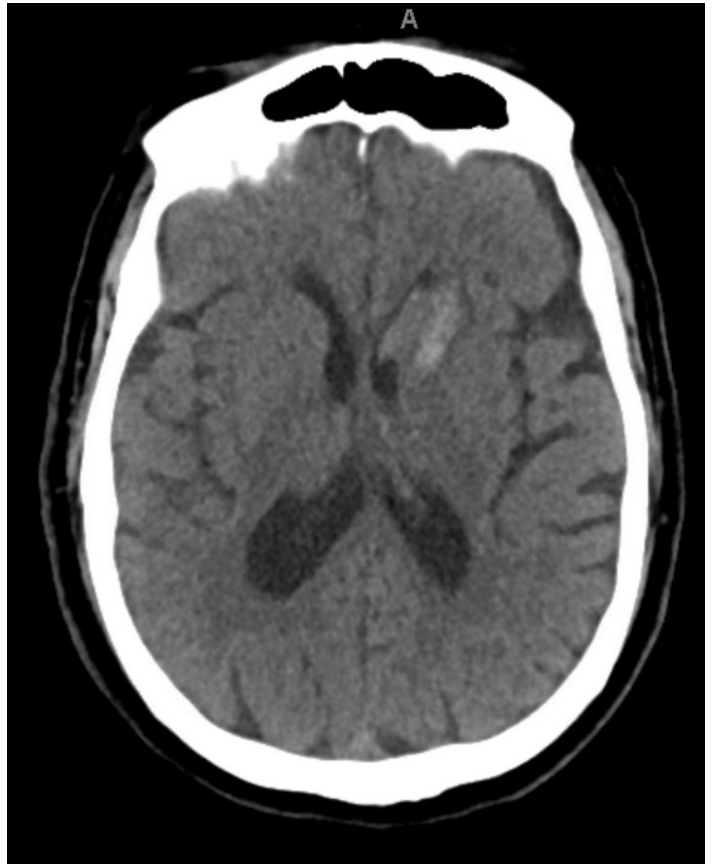


Examples

Ovoid shaped hematoma in the right external capsule deforming the right putamen

Methods

- Retrospective review of cases of spontaneous ICH over a 5-year period and included cases where hypertensive hemorrhage was the most likely diagnosis.
- Patient history and demographics, initial blood pressure, and the results of the initial noncontrast head CT and subsequent imaging studies were recorded.



Small (less than 30 mL) acute intraparenchymal hematoma in the left basal ganglia, with typical location for hypertensive hemorrhage

ED Triage Vitals		
BP	02/16/18 1151	(!) 210/110
MAP (mmHg)	02/16/18 1200	160
Pulse	02/16/18 1151	(!) 137
Resp	02/16/18 1151	(!) 29
Temp	02/16/18 1158	99.4 °F (37.4 °C)
SpO2	02/16/18 1151	99 %

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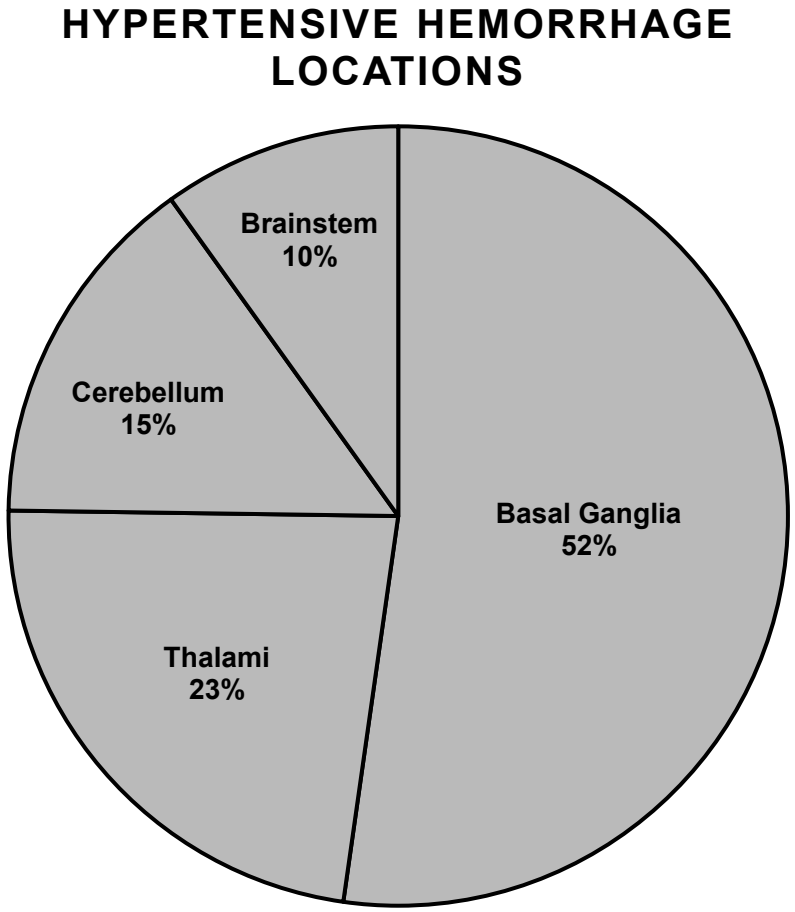
Results

- 222 patients met study inclusion criteria:
  - Median age of 67
  - 43.2% female sex
  - 188 patients (84.7%) had a history of hypertension
  - 14 (6.3%) had a urine drug screen positive for cocaine or amphetamines during their hospital admission.
- 173 of the patients (77.9%) were hypertensive (mean arterial pressure >100 mmHg) on arrival.
- Hemorrhage Locations:
  - 116 (52.3%) in the basal ganglia or internal capsules
  - 51 (23.0%) in the thalami
  - 33 (14.9%) in the cerebellum
  - 22 (9.9%) in the brainstem.



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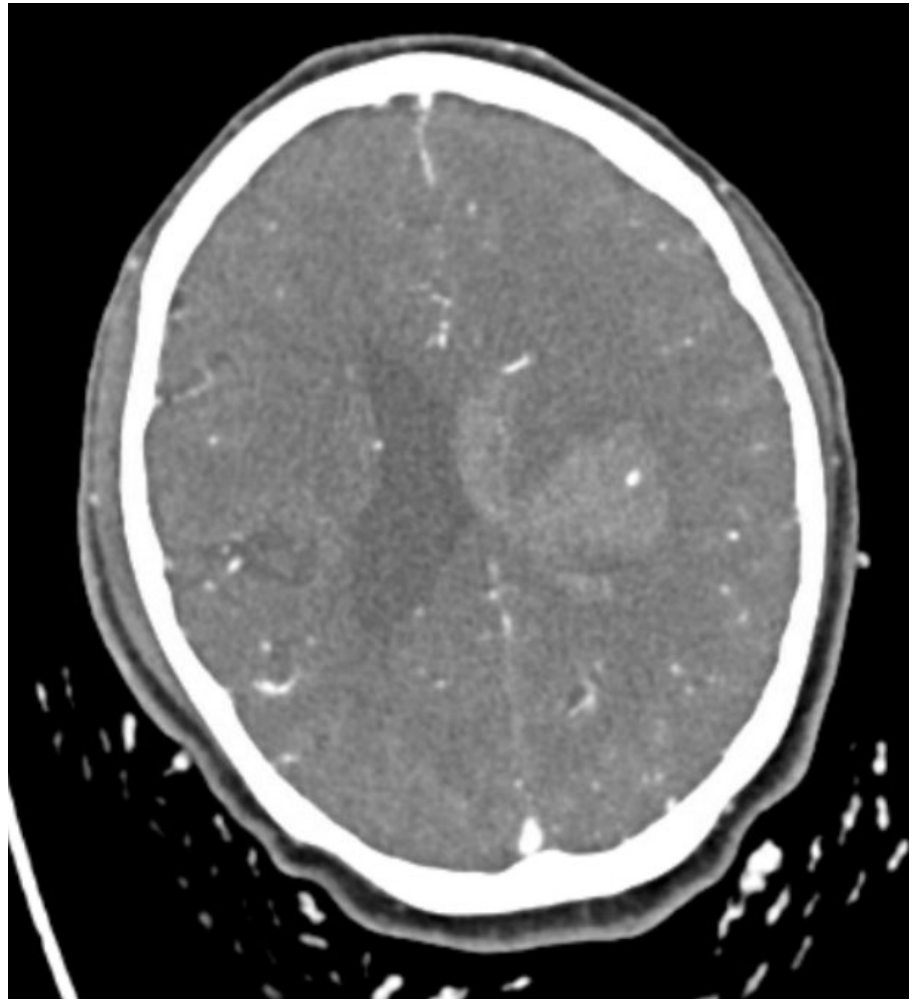
CTA Results

- Head CTA was obtained in 161 (72.5%) of the patients and demonstrated an underlying vascular lesion in 1 patient (dural arteriovenous fistula) and a “spot sign” in 17 patients.
- Hematoma expansion occurred in 49 patients overall (22.1%) and in 9 of the patients with a positive “spot sign” on CTA (52.9%).

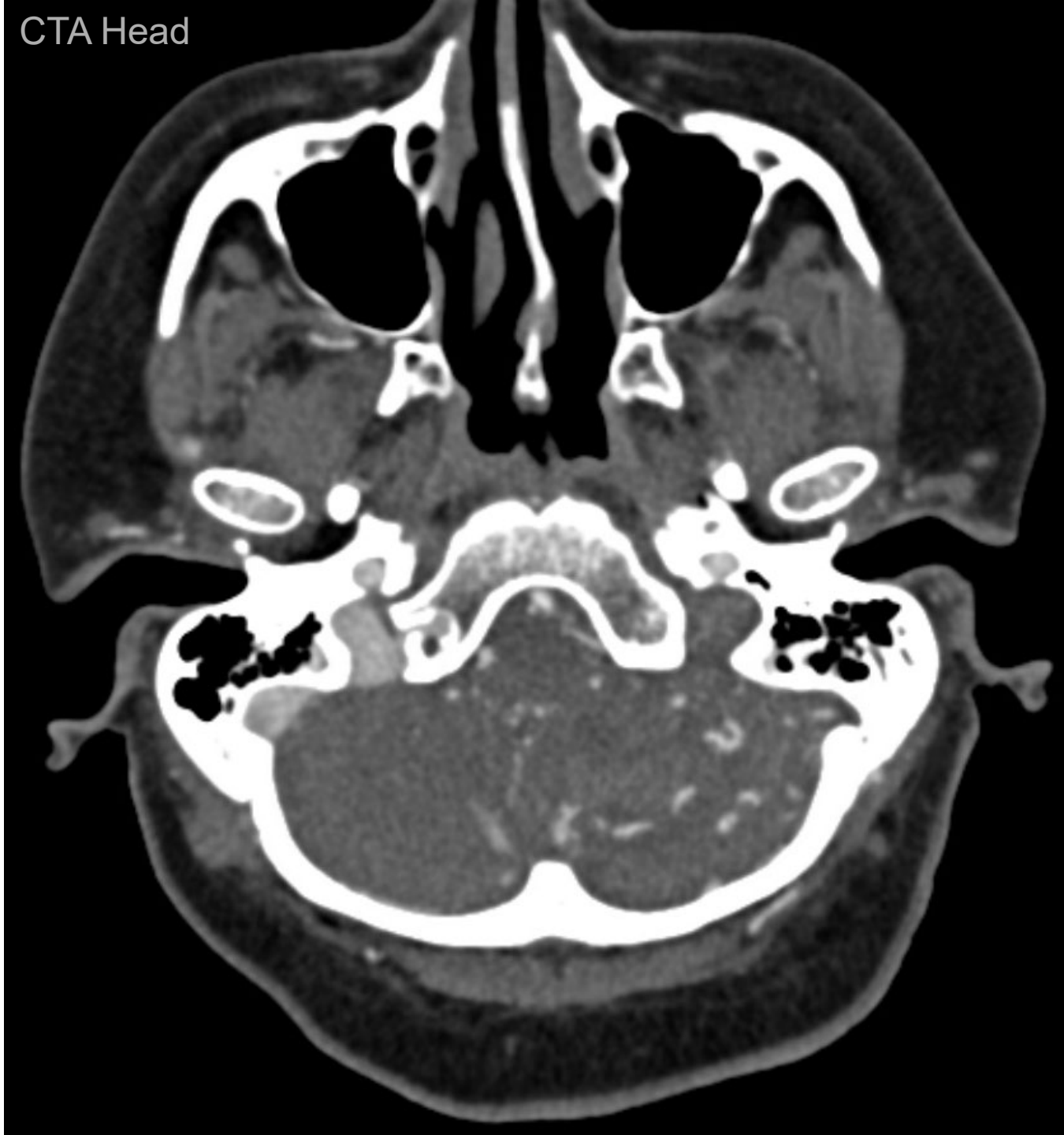


CTA Results Cont.

Acute parenchymal hematoma centered in the medial left cerebellar hemisphere with extension into the fourth ventricle.

CTA Results Cont.

Thrombosed left sigmoid sinus and jugular bulb.



CTA Underlying Lesion

Asymmetrically prominent venous structures in and overlying the left cerebellar hemisphere, which in combination with the finding of venous sinus thrombosis is most suggestive of a dural AVF.

MRI Results

- Brain MRI was obtained for 120 (54.1%) of the patients at a median interval of 0.97 days following the initial head CT, and of these studies, 85 (70.8%) included postcontrast imaging.
- Only 1 MRI study (0.8%) identified a culprit lesion, which was interpreted as a probable hemangioblastoma adjacent to a cerebellar hematoma.

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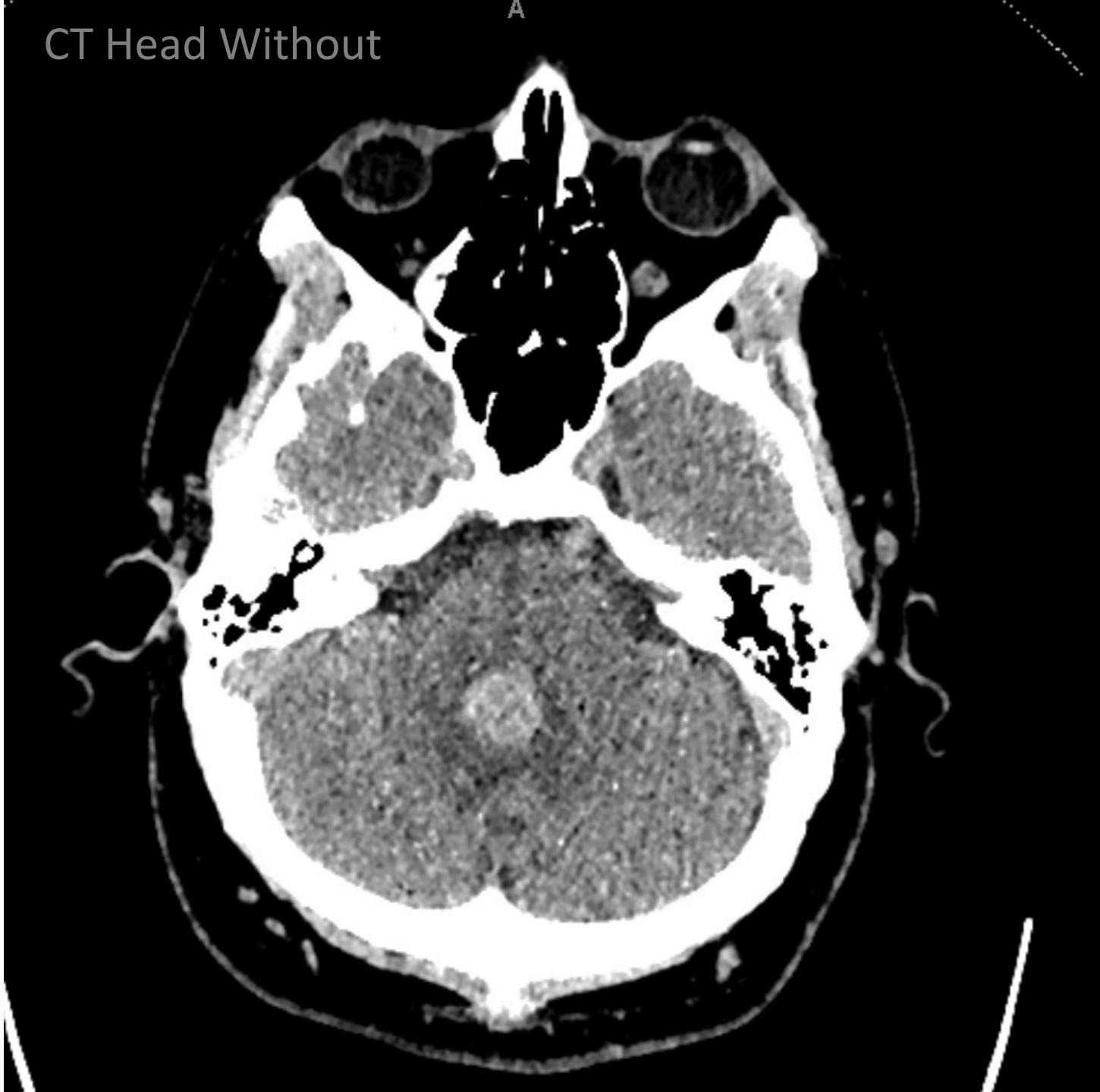
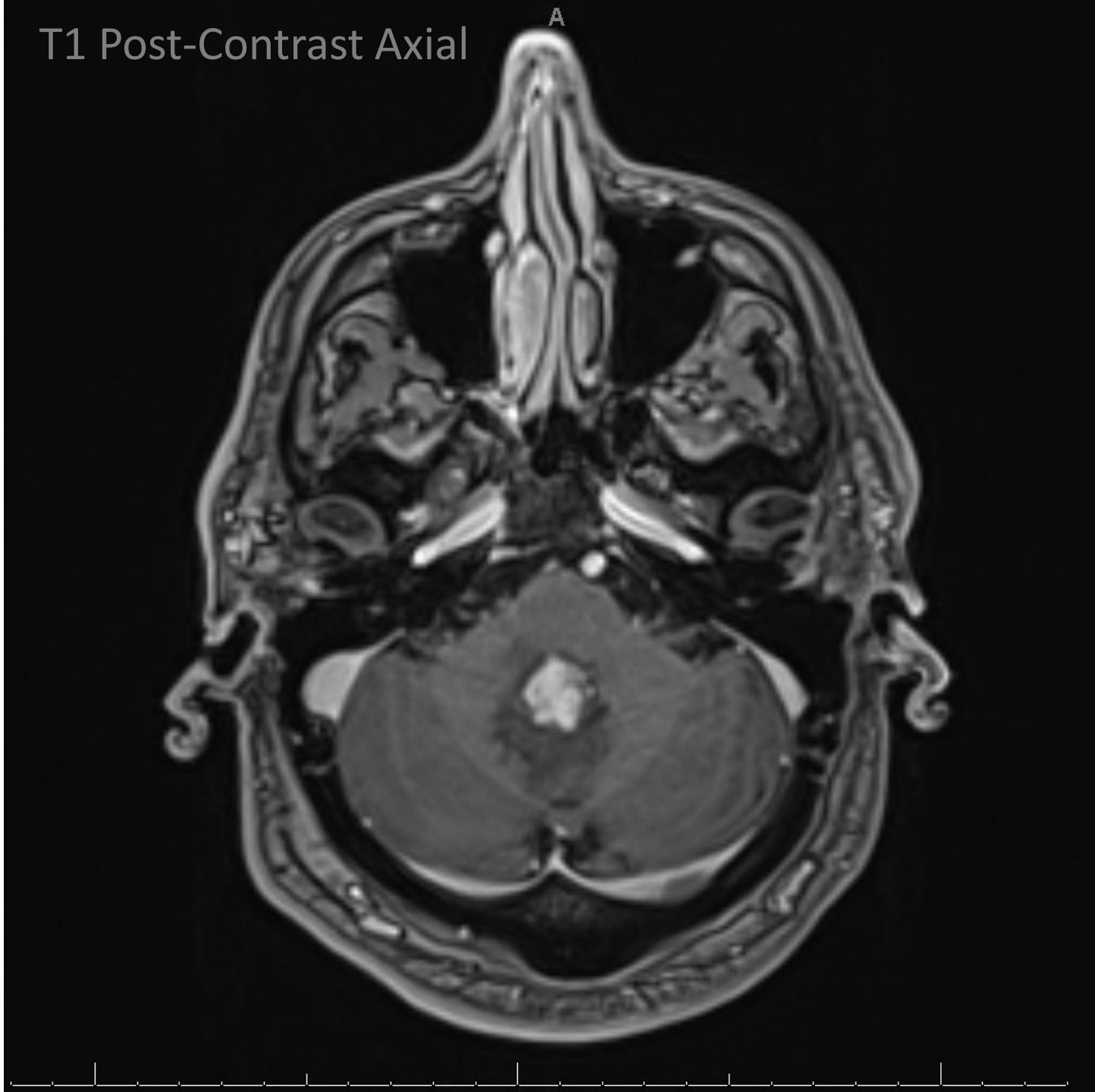
MRI Results

Rounded acute parenchymal hematoma centered in the inferior vermis



MRI Results

Enhancing lesion measuring 1.9 cm along the ventral aspect of the cerebellar vermis with adjacent edema signal. Differential considerations include a primary CNS neoplasm such as hemangioblastoma (favored) or solitary metastatic lesion



MRI Results

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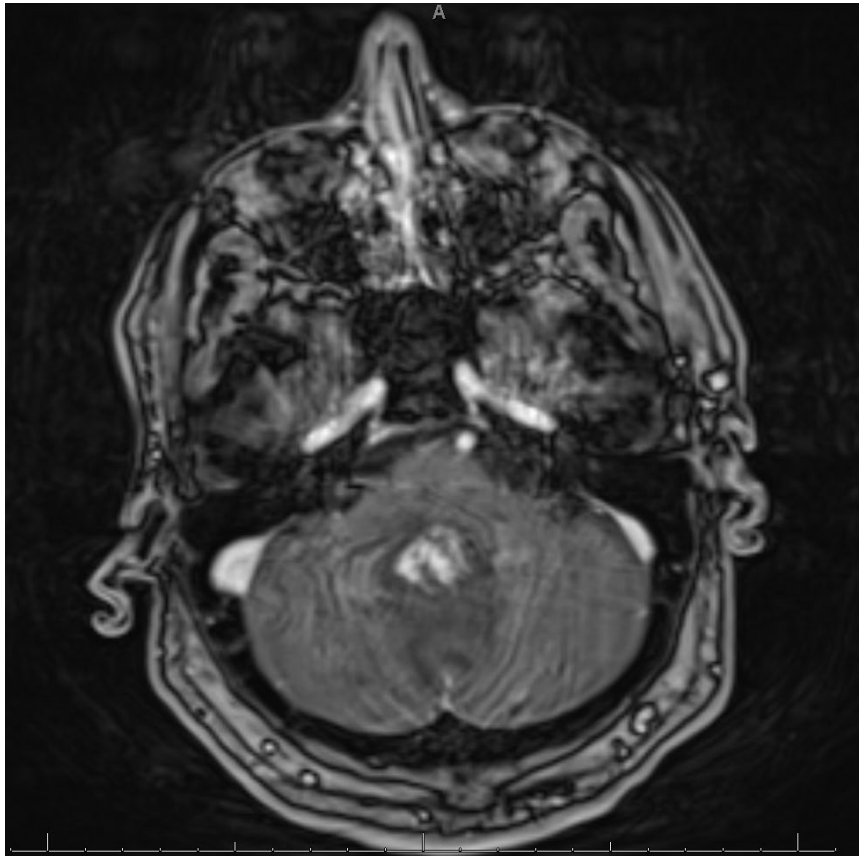
Case Cont.

- Pt discharged on decadron taper
- Re-presented 4 days later with ataxia, nausea, and vomiting
- Pt had repeat imaging

T2

T1 Post-Contrast



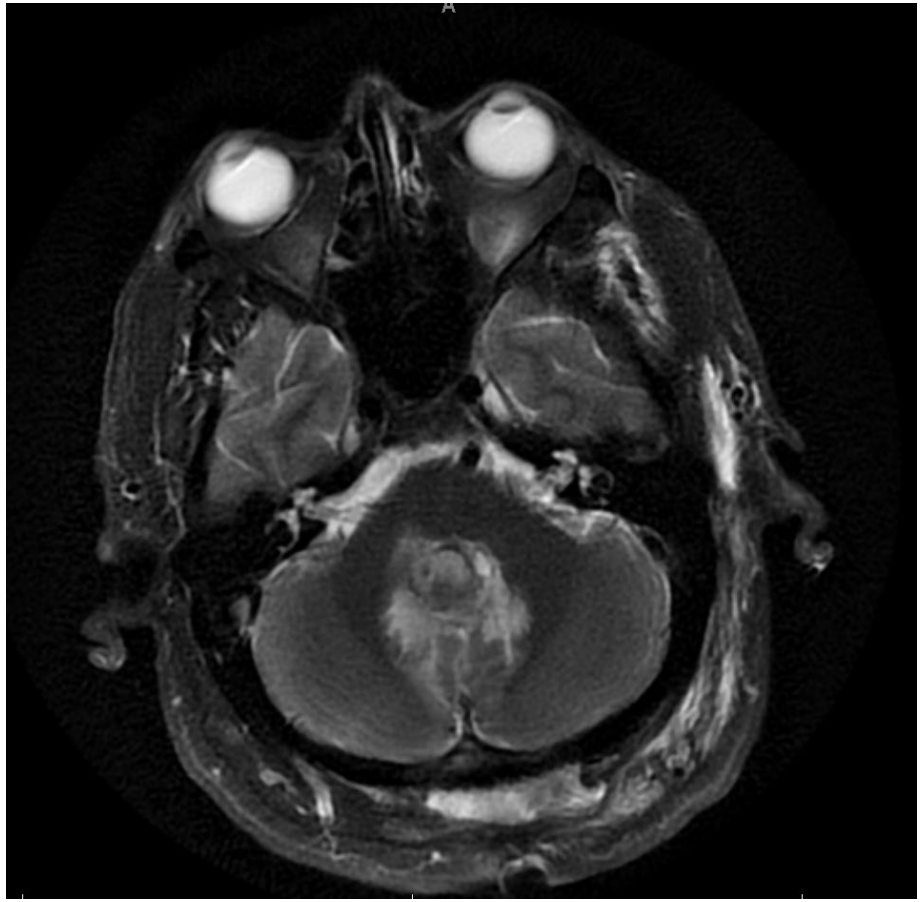
In comparison with prior brain MRI, there has been slightly increased size of avidly enhancing, T2 hyperintense mass lesion centered along the ventral aspect of the cerebellar vermis.

Slightly increased surrounding edema with worsening hydrocephalus and transependymal flow of CSF. Primary differential considerations include hemangioblastoma, ependymoma, and solitary metastasis.

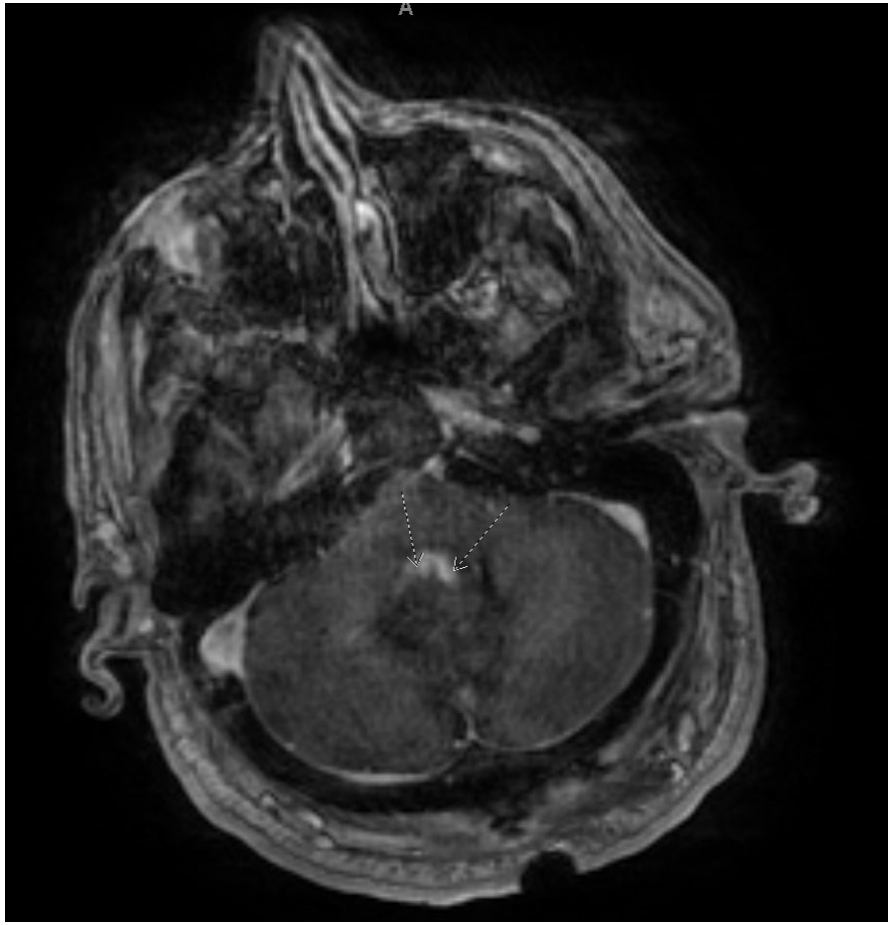
Case Cont.

- Pt received craniotomy for total cerebellar tumor resection

T2



T1 Post-Contrast



Postsurgical changes of recent suboccipital craniotomy and debulking of avidly enhancing mass along the anterior vermis protruding into the fourth ventricle.

Case Cont.

- Pathologic diagnosis:
  - Pilocytic Astrocytoma

Final Pathologic Diagnosis

A. BRAIN, CEREBELLUM, BIOPSY:
Pilocytic astrocytoma, WHO grade 1.
Focal hemorrhage.
See Comment and Special Stains.

B. BRAIN, CEREBELLUM, BIOPSY:
Pilocytic astrocytoma, WHO grade 1.
Hemorrhage and focal acute inflammation.
See Comment.

Comment

The biopsies demonstrate a bland glial neoplasm with mild nuclear pleormophism, relatively low cellularity, and hyalinized vasculature. Rosenthal fibers and occasional eosinophilic granular bodies are present. Mitotic activity, endothelial proliferation, and necrosis are not appreciated. Hemorrhage and focal acute inflammation are also present.

Conclusion

- Brain MRI obtained in the acute evaluation of patients with probable hypertensive hemorrhage rarely uncovers a culprit lesion.
- Clinical Relevance/Application: Because brain MRI adds little value in the workup of cases of probable hypertensive hemorrhage, routine ordering of MRI in this cohort should be reconsidered.

Thank you!