AMSER Case of the Month January 2025

26 year old male presenting with subacute vertigo and loss of balance

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Patient Presentation

- 26 year old male with no PMH presenting to ED with dizziness, gait instability, nausea + vomiting, for past 3 days
- 3 days ago, he was sitting in his car when he suddenly felt a spinning dizziness with nausea, 9/10 dull headache over left temple, falling over to his left side.
    - **Trauma history:** Passenger in MVA 1 week ago, was T boned on his side

- These symptoms **have progressively worsened** over last 3 days, but headache at 3/10 now

Pertinent Labs

Exam:

- Nystagmus on left gaze, gait instability w/ falling to left. Remainder of exam normal.
- Denies weakness, sensory changes, fHx strokes/hypercoagulable disorders

Imaging:

- **Initial CTH negative** at at community hospital

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 8: **Head trauma with suspected intracranial arterial injury due to clinical risk factors or positive findings on prior imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CTA head and neck with IV contrast	Usually Appropriate	☢☢☢
Arteriography cervicocerebral	May Be Appropriate	☢☢☢
MRA head and neck with IV contrast	May Be Appropriate	O
MRA head and neck without and with IV contrast	May Be Appropriate (Disagreement)	O
MRA head and neck without IV contrast	May Be Appropriate (Disagreement)	O
CT head without IV contrast	May Be Appropriate (Disagreement)	☢☢☢
Radiography skull	Usually Not Appropriate	☢
MR spectroscopy head without IV contrast	Usually Not Appropriate	O
MRI functional (fMRI) head without 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
MRI head without IV contrast with DTI	Usually Not Appropriate	O
CT head with IV contrast	Usually Not Appropriate	☢☢☢
CT head without and with IV contrast	Usually Not Appropriate	☢☢☢
HMPAO SPECT or SPECT/CT brain	Usually Not Appropriate	☢☢☢
FDG-PET/CT brain	Usually Not Appropriate	☢☢☢

This imaging modality was ordered

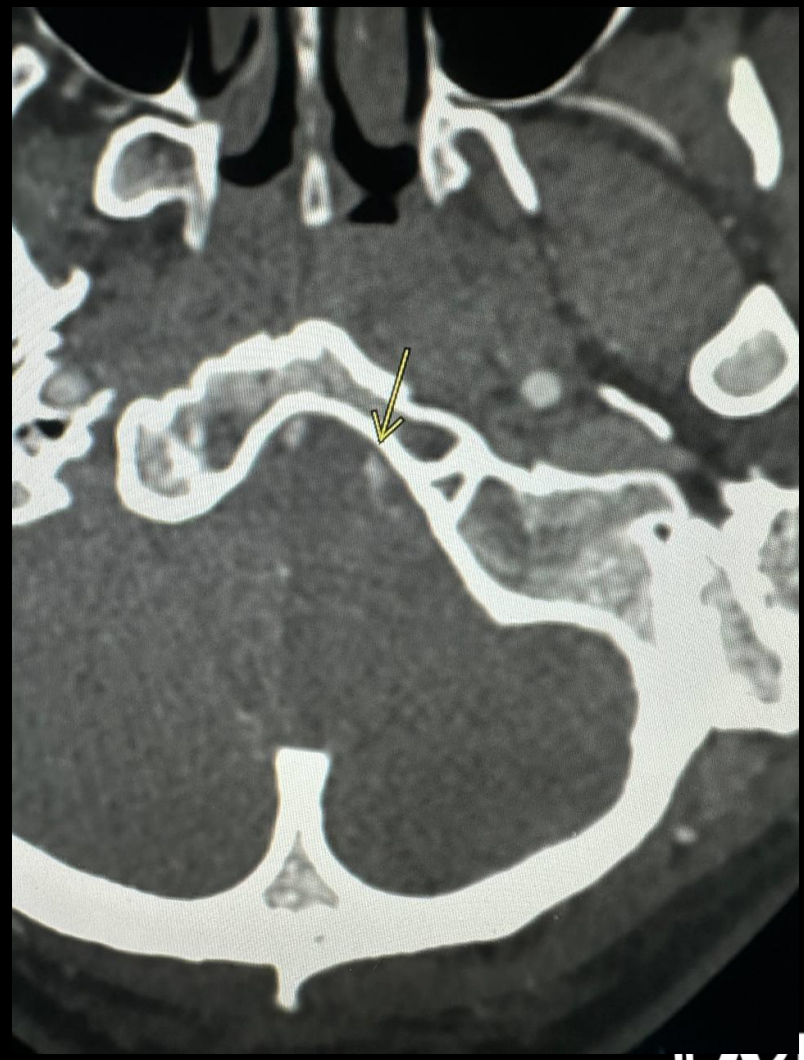
Findings (unlabeled)

CTA Axial/ Sagittal

Findings (labeled)

2 mm saccular pseudoaneurysm involving anterior aspect of left vertebral artery V3 seg @ C1 transverse foramen (BIFFL grade 3)

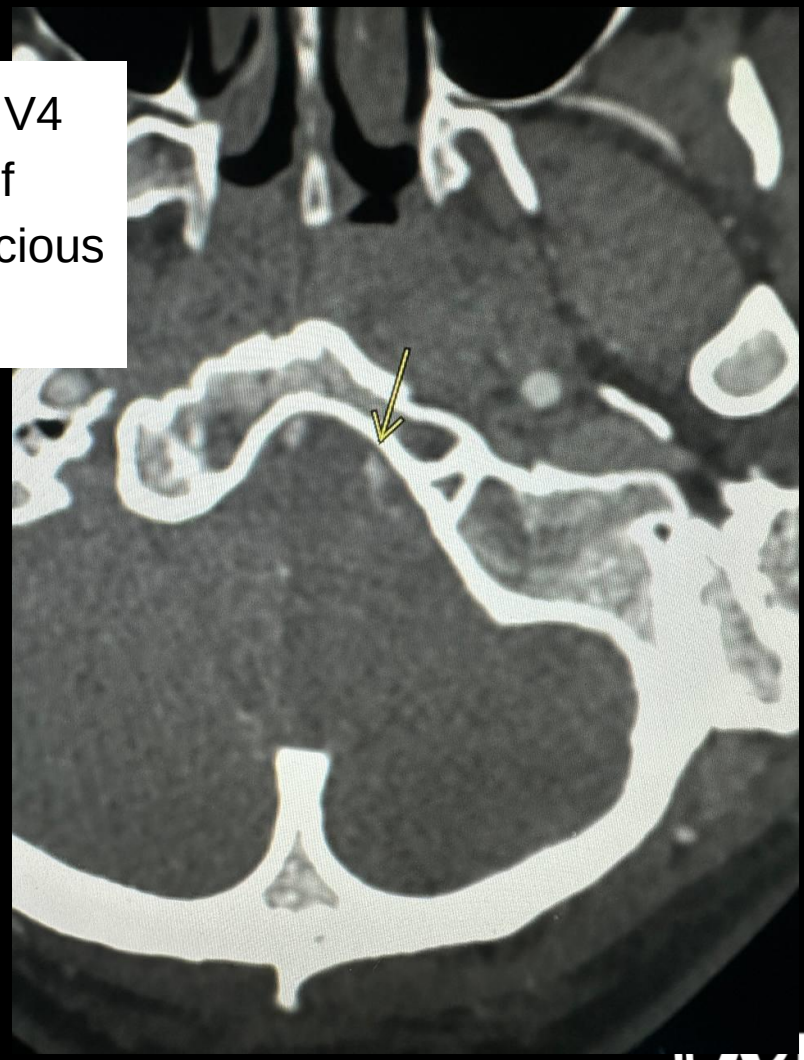
Findings (unlabeled)



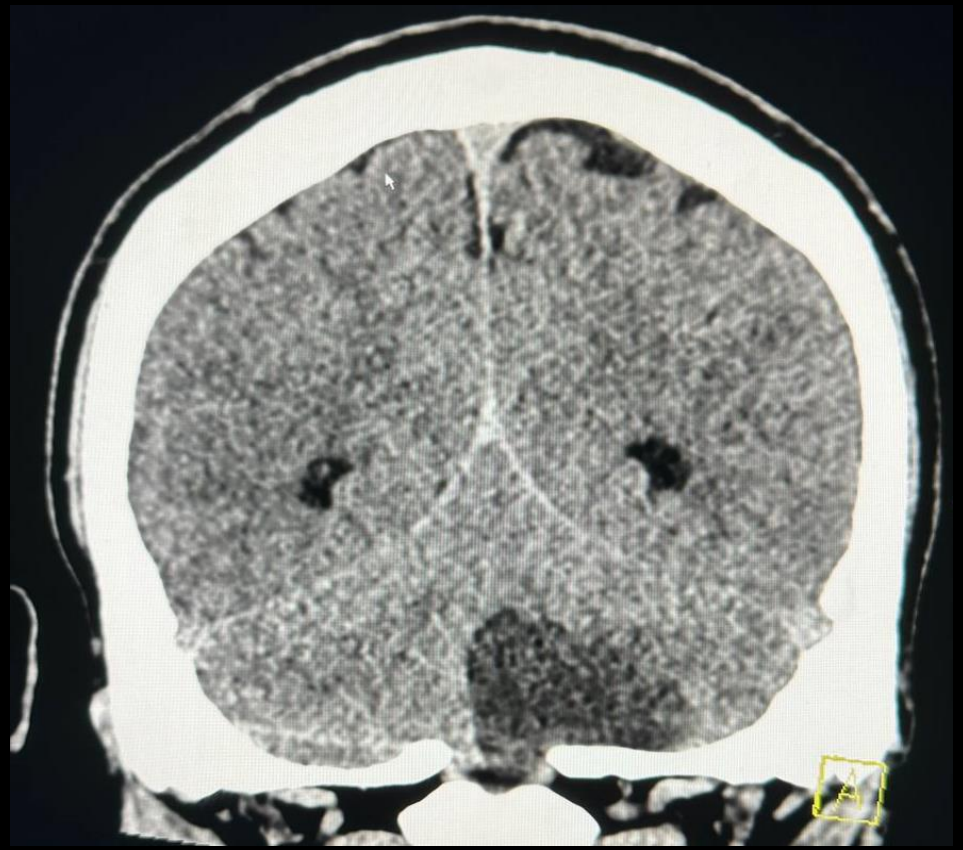
CTA Axial

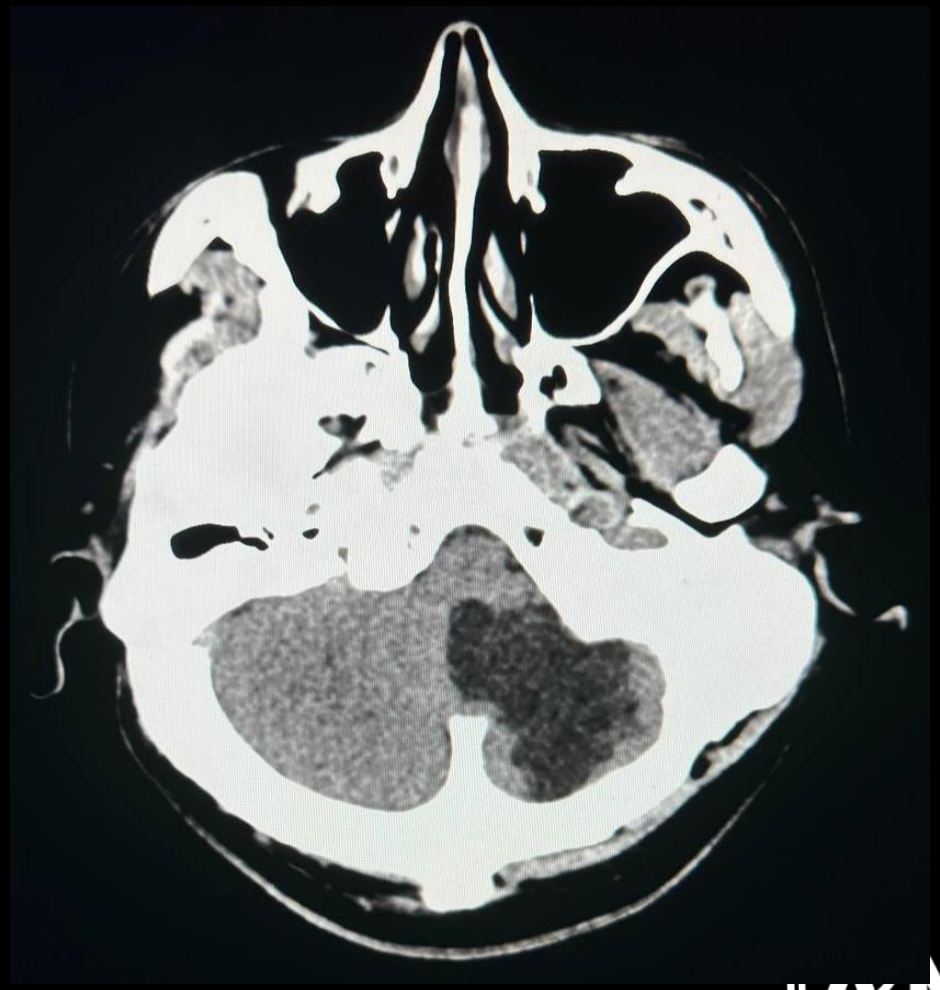
Findings (labeled)

Mild irregularity of V4 segment at level of PICA origin, suspicious for grade 1 injury



Findings (unlabeled)





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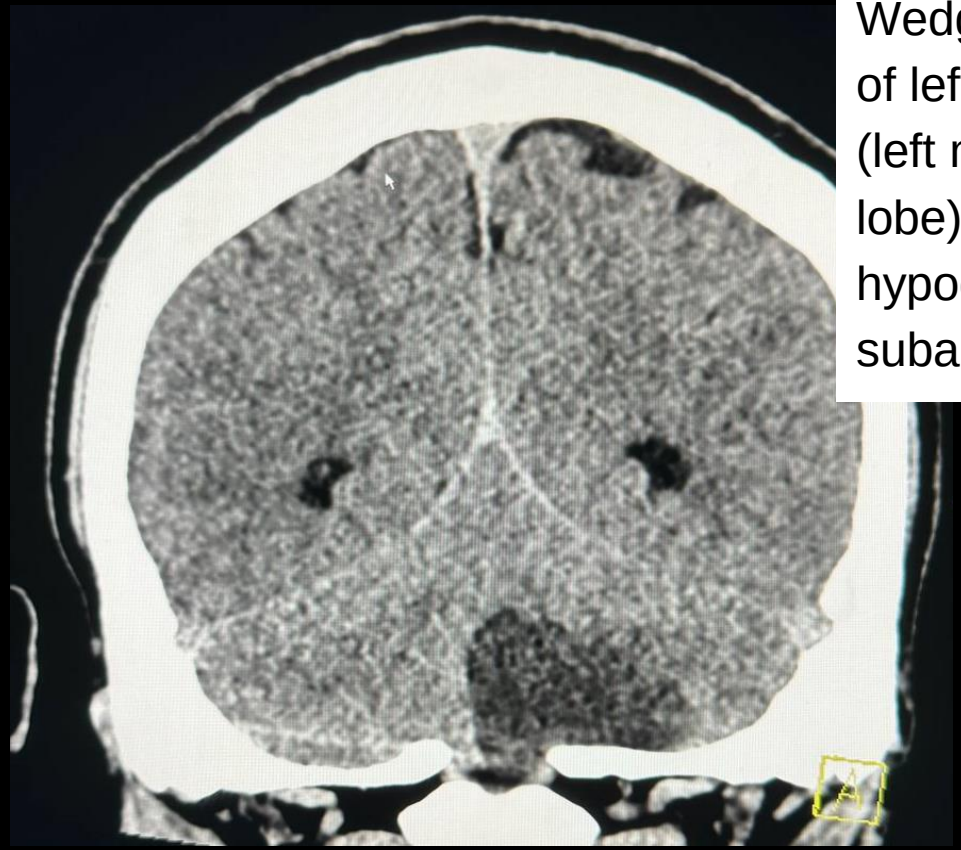
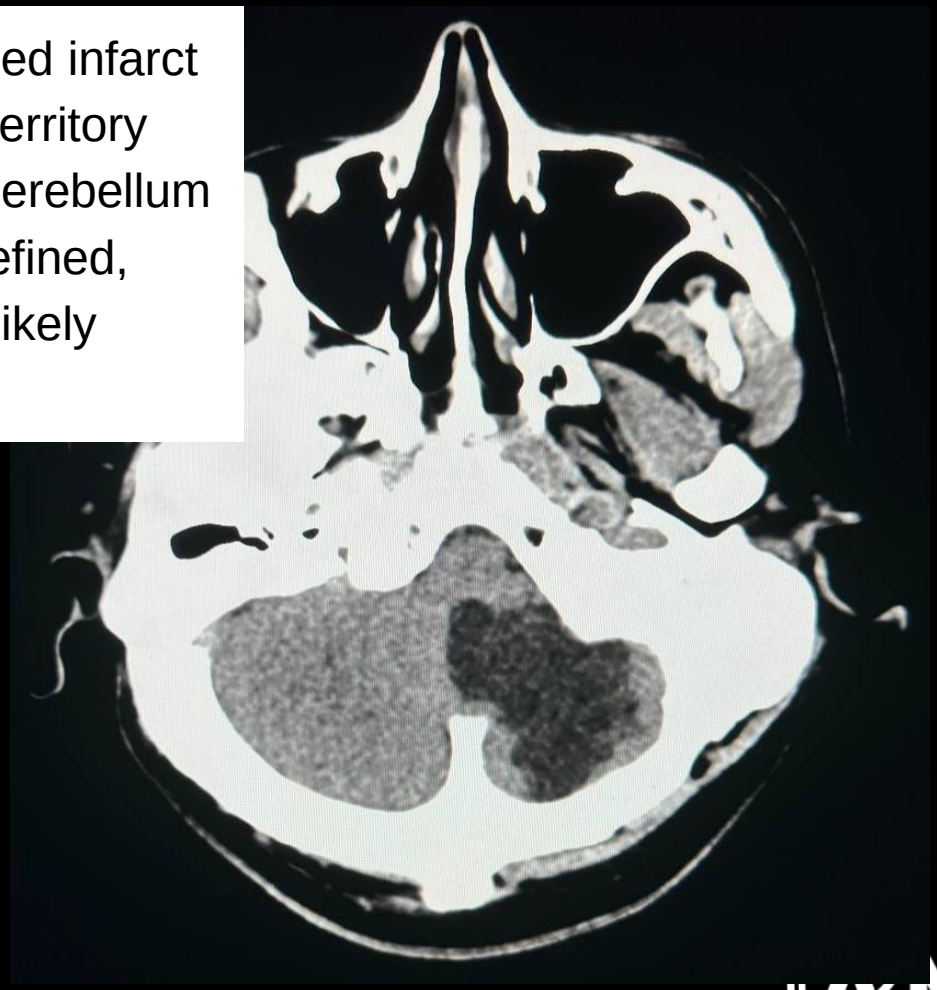


Wedge-shaped infarct of left PICA territory (left medial cerebellum lobe), well defined, hypodense, likely subacute



Final Dx:

Subacute/Acute PICA territory cerebellar stroke secondary to blunt cerebrovascular injury to left vertebral artery

Case Discussion

The reported incidence of blunt cerebrovascular injury (BCVI) has increased from approximately 0.1% to 1.0% of patients with closed head/neck trauma, with increased screening of asymptomatic patients.

Symptomatic patients will have developed secondary strokes, which are associated with significant morbidity of up to 80% and mortality of up to 40% [1].

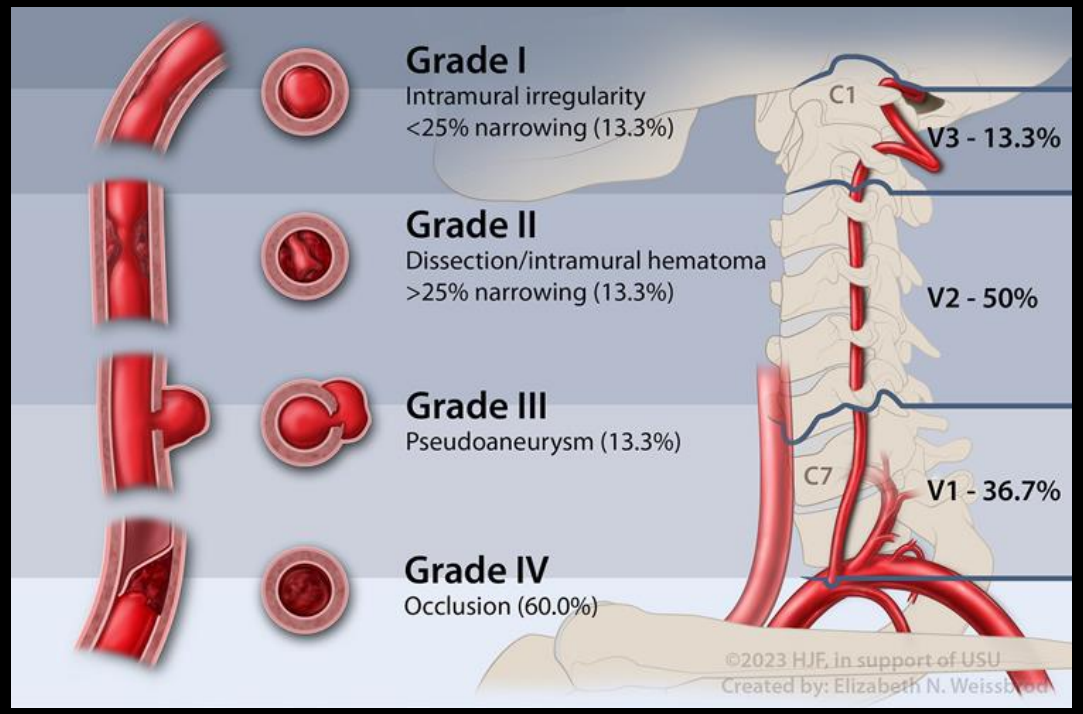
There is a variable latent period between vascular injury and symptom onset, with 17% to 36% developing symptoms >24 hours after injury

-Our patient had 4 days elapse between his MVA and symptom onset

When screening appropriately based on clinical or imaging risk factors, approximately 52% to 79% of patients with detected BCVI are asymptomatic [2].

Cerebrovascular injury is also a potential concern in the less common setting of penetrating head/neck trauma.

Case Discussion: BIFFL Grading



[Figure 1]

The BIFFL scale or grade illustrates the spectrum of blunt cerebrovascular injury (BCVI) seen on angiography (both CTA and DSA)

The risk of stroke increases with increasing grade of carotid artery injury [3]

- grade I: 8%
- grade II: 14%
- grade III: 26%
- grade IV: 50%
- grade V: 100%

The risk of stroke does not correlate with increasing grade of vertebral artery injury [4]

- grade I: 6%
- grade II: 38%
- grade III: 27%
- grade IV: 28%
- grade V: no clear data, but generally accepted to have poor outcomes

Grade V- Transection with blood extravasation, hemodynamically significant AVF

References:

[1] Bromberg WJ, Collier BC, Diebel LN, et al. Blunt cerebrovascular injury practice management guidelines: the Eastern Association for the Surgery of Trauma. J Trauma 2010;68:471-7.

[2] George E, Khandelwal A, Potter C, et al. Blunt traumatic vascular injuries of the head and neck in the ED. Emerg Radiol 2019;26:75-85.

[3] Biffl WL, Moore EE, Offner PJ et-al. Blunt carotid arterial injuries: implications of a new grading scale. J Trauma. 1999;47 (5): 845-53. J Trauma (link) - Pubmed citation

[4] Cothren CC, Moore EE. Blunt cerebrovascular injuries. Clinics (Sao Paulo). 2006;60 (6): 489-96. Pubmed citation

[Figure 1] Created by Elizabeth N. Weissbrod