# AMSER Case of the Month
# October 2025

## 62 year-old presenting with left sided weakness and stroke-like symptoms.


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# Patient Presentation

- A 62 year-old with history of cerebrovascular accident with some residual left sided weakness. Admits to bilateral lower extremity weakness with increased weakness and transient numbness on left side. Denied headache, lightheadedness, or tingling in extremities.
- Vital signs showed elevated blood pressure, otherwise within normal limits.
- Neurological exam was unremarkable.

# What Imaging Should We Order?

# Select the applicable ACR Appropriateness Criteria

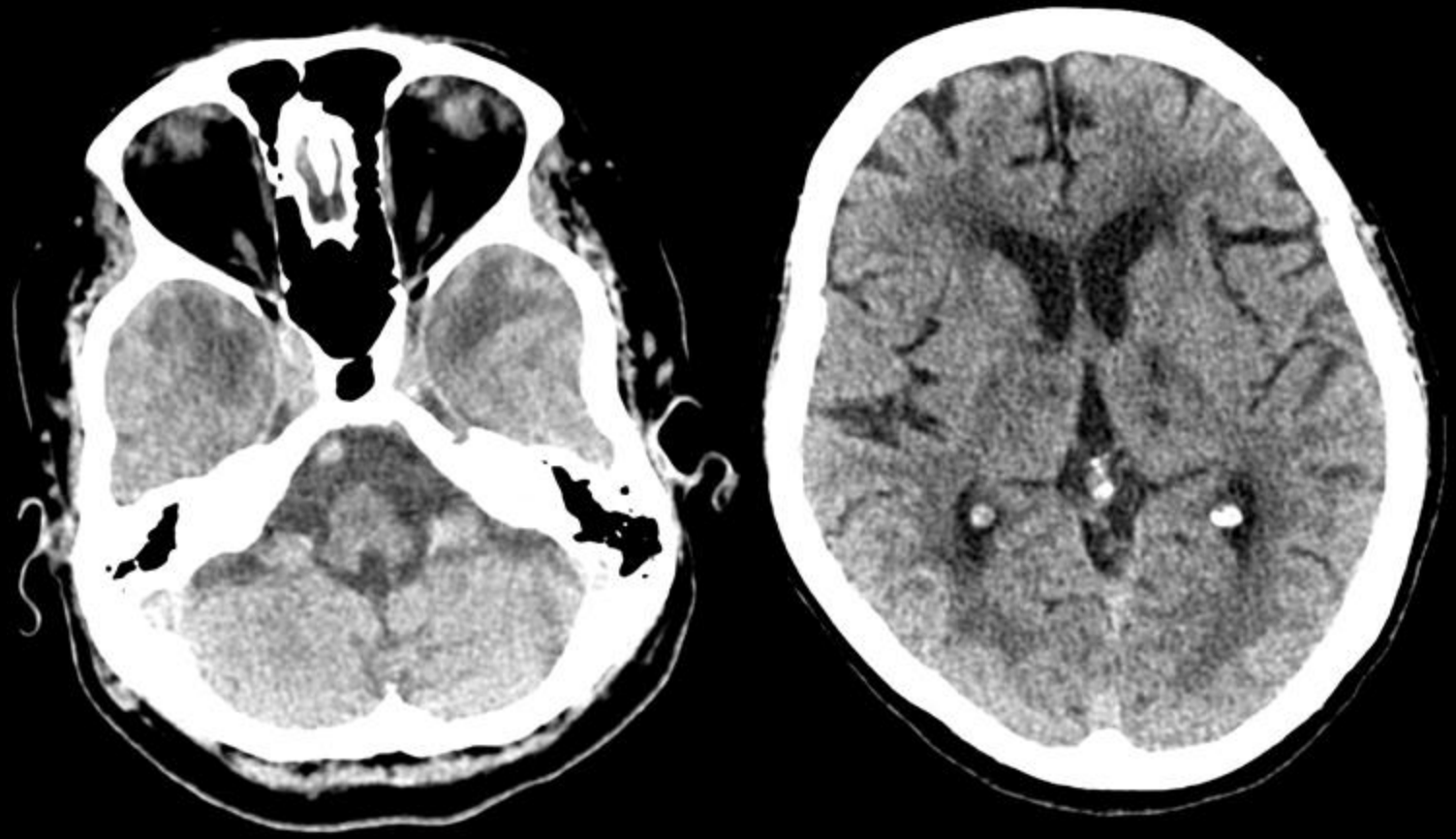
**Variant 2:** **Adult. Focal neurologic deficit. Clinically suspected acute ischemic stroke. Initial imaging.**

| Procedure | Appropriateness Category | Relative Radiation Level |
|---|---|---|
| MRI head without IV contrast | Usually Appropriate | O |
| CT head without IV contrast | Usually Appropriate | ☢☢☢ |
| CTA head with IV contrast | Usually Appropriate | ☢☢☢ |
| CTA neck with IV contrast | Usually Appropriate | ☢☢☢ |
| US duplex Doppler carotid artery | May Be Appropriate | O |
| MRA head without IV contrast | May Be Appropriate | O |
| MRA neck without and with IV contrast | May Be Appropriate | O |
| MRA neck without IV contrast | May Be Appropriate | O |
| MRI head perfusion with IV contrast | May Be Appropriate | O |
| CT head perfusion with IV contrast | May Be Appropriate | ☢☢☢ |
| US duplex Doppler transcranial | Usually Not Appropriate | O |

This study was ordered by the Family Medicine physician

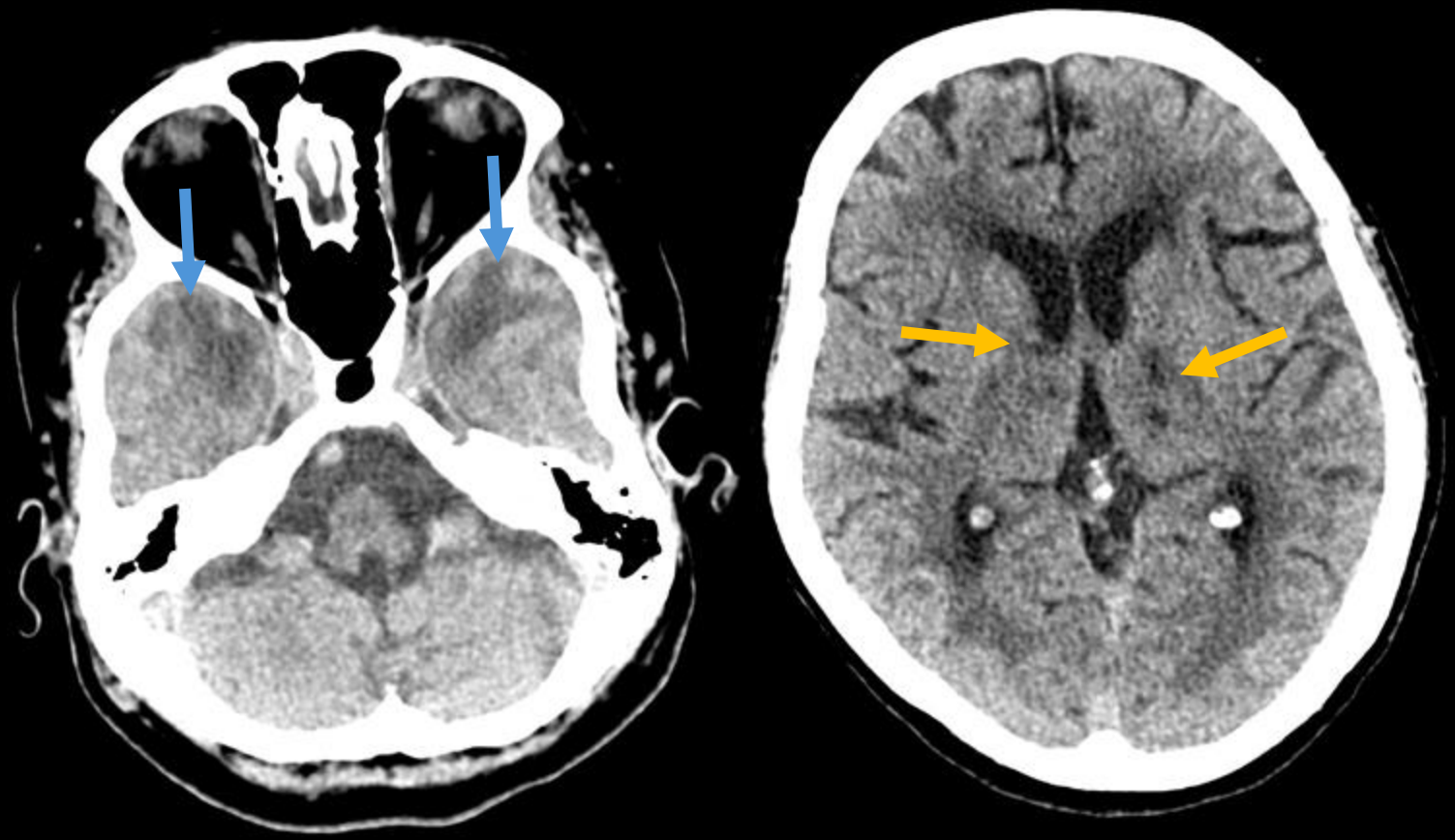
# Findings (unlabeled)

Axial non contrast Head CT



# Findings (labeled)

Axial non contrast Head CT

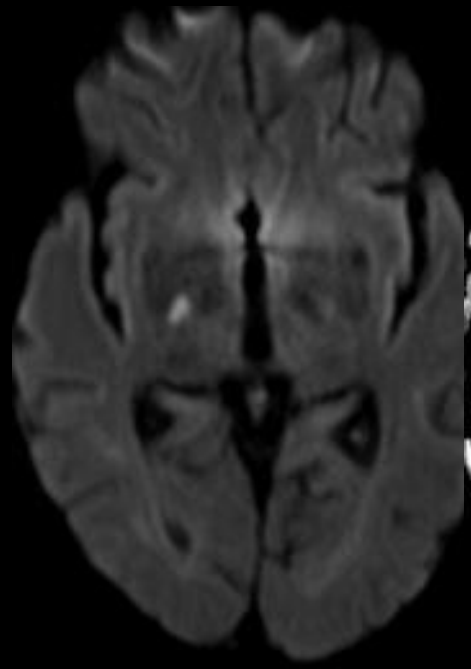


Symmetric hypoattenuation in the anterior temporal lobe white matter. Multiple chronic appearing lacunar infarcts in the deep gray nuclei.

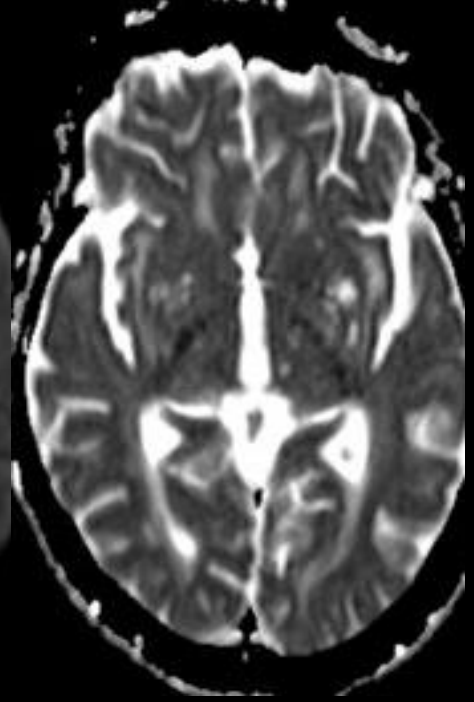
* An MRI of the brain was recommended based on these CT Head findings.

# Findings (unlabeled)

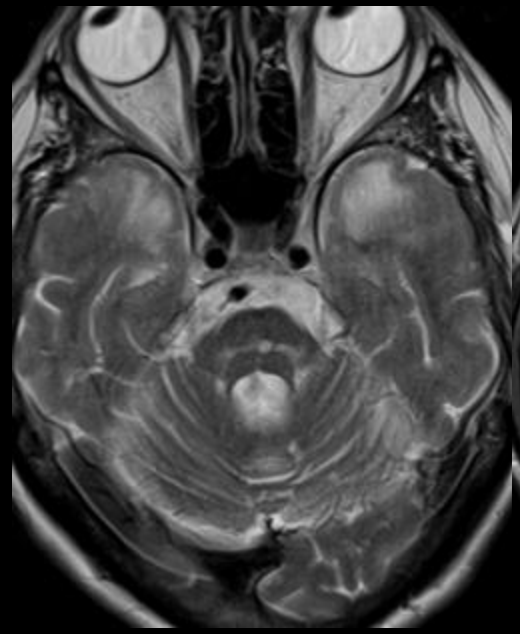
Axial DWI



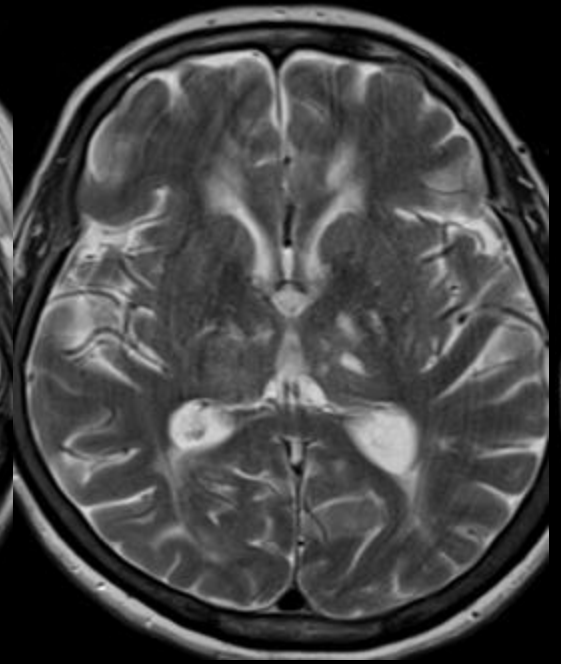
Axial ADC



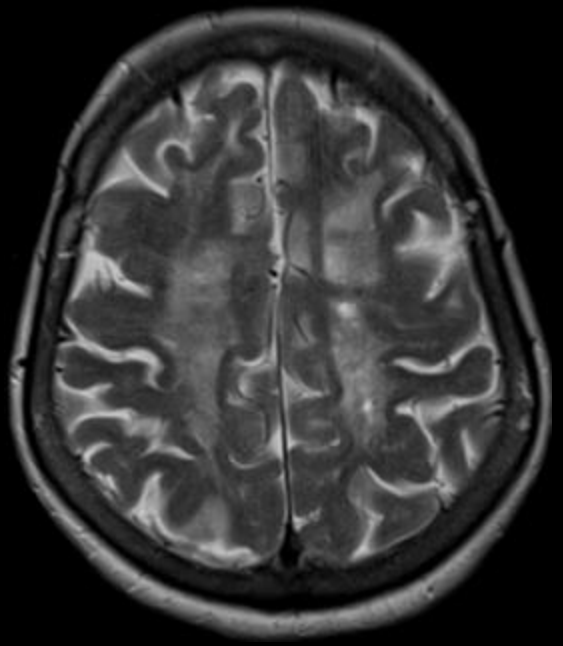
Axial T2



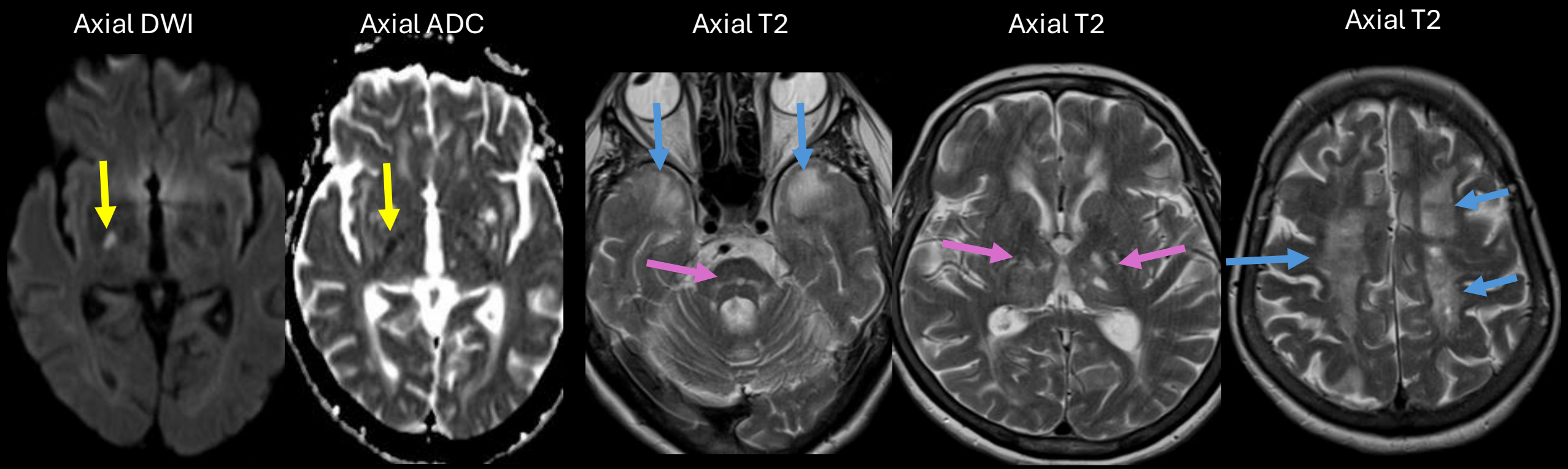
Axial T2



Axial T2



# Findings (labeled)




Acute infarct in the posterior limb of the right internal capsule. No hemorrhage was present on SWI (not included). Multiple old lacunar infarcts in the brainstem and deep gray nuclei and extensive white matter hyperintensity in the cerebral hemispheres, notably involving the anterior temporal lobes.

## Final Dx:

Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL)

# CADASIL - Discussion

**Presentation**

- Most common initial symptom is migraine with aura (usual onset in 30s), often atypical, with features such as hemiplegic, basilar-type, or prolonged aura.[1,2,4]
- By the 5th decade patients can experience recurrent subcortical ischemic events, transient ischemic attacks or lacunar strokes (mean onset ~46–49 years).[1]
- Less common presentations include confusion, seizures, and focal neurological deficits. [1]
- In more advanced stages, patients may develop cognitive impairment, mood disturbances, or psychiatric symptoms.[1,4]

**Pathology**

- CADASIL is a non-atherosclerotic, non-amyloid small vessel arteriopathy caused by mutations in the NOTCH3 gene on chromosome 19. This leads to accumulation of granular material within the media of small and medium-sized arteries.[2,3,4]
- Degeneration and loss of smooth muscle cells results in progressive thickening and fibrosis of the vessel wall, adventitial scarring, and luminal narrowing. These changes impair cerebral blood flow and vascular reactivity, contributing to chronic ischemic damage seen in CADASIL.[3,4]

# CADASIL - Discussion

**Imaging Findings**

On MRI

- T1 - Hypointense lesions in the white matter, reflecting areas of chronic tissue loss, gliosis, or cavitation. [2]
- T2 - Hyperintense signal in the periventricular and deep white matter, with a predilection for the anterior temporal poles, external capsules, and superior frontal gyri. [2]
- FLAIR - Confluent white matter hyperintensities with high sensitivity, especially in the anterior temporal poles and external capsules, which are characteristic of CADASIL. [2]
- DWI/ADC - Acute subcortical infarcts appear as areas of restricted diffusion (hyperintense on DWI, hypointense on ADC). [2]

On CT

- Chronic lacunar infarcts in the basal ganglia, thalamus, and deep white matter are often visible, especially in advanced disease, but are not specific to CADASIL. [2]
- Diffuse or patchy leukoaraiosis is also often present. [2]
- Cortical atrophy may be appreciated. [2]

# CADASIL - Discussion

**Treatment**

- There is no current disease modifying treatment.[2]
- Aggressive control of modifiable risk factors such as hypertension and smoking cessation is the cornerstone according to the American Heart Association.[2]
- Antiplatelet therapy can be considered for secondary treatment but is not indicated for a CADASIL patient with no history of ischemic stroke.[2]

**Prognosis**

- Highly variable but progressive neurologic decline is expected, and median life expectancy is reduced to the 6th and 7th decade.[1,2]
- Clinical severity and rate of progression are influenced by the specific NOTCH3 mutation, burden of lacunar infarcts, and control of vascular risk factors, but even with optimal management progression is typically inevitable over time.[2]

**Case Discussion**

- A diagnosis of CADASIL was suggested based on the imaging findings and recommendation was given for Notch3 gene mutation testing.
- This patient tested positive for a missense mutation of the Notch3 gene.

# References:


1. Dichgans M, Mayer M, Uttner I, et al. The phenotypic spectrum of CADASIL: clinical findings in 102 cases. *Ann Neurol*. 1998;44(5):731-739. doi:10.1002/ana.410440506
2. Meschia, J. F., Worrall, B. B., Elahi, F. M., et al. (2023). Management of inherited CNS small vessel diseases: The CADASIL example: A scientific statement from the American Heart Association. *Stroke, 54*(10), e452–e464. https://doi.org/10.1161/STR.0000000000000444
3. Okeda, R., Arima, K., & Kawai, M. (2002). Arterial changes in cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) in relation to pathogenesis of diffuse myelin loss of cerebral white matter: Examination of cerebral medullary arteries by reconstruction of serial sections of an autopsy case. *Stroke, 33*(11), 2565–2569. https://doi.org/10.1161/01.str.0000032620.91848.1c
4. Viitanen, M., & Kalimo, H. (2000). CADASIL: Hereditary arteriopathy leading to multiple brain infarcts and dementia. *Annals of the New York Academy of Sciences, 903*, 273–284. https://doi.org/10.1111/j.1749-6632.2000.tb06377.x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