CT artifact masquerading as pathology involving basilar artery

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Clinical Presentation

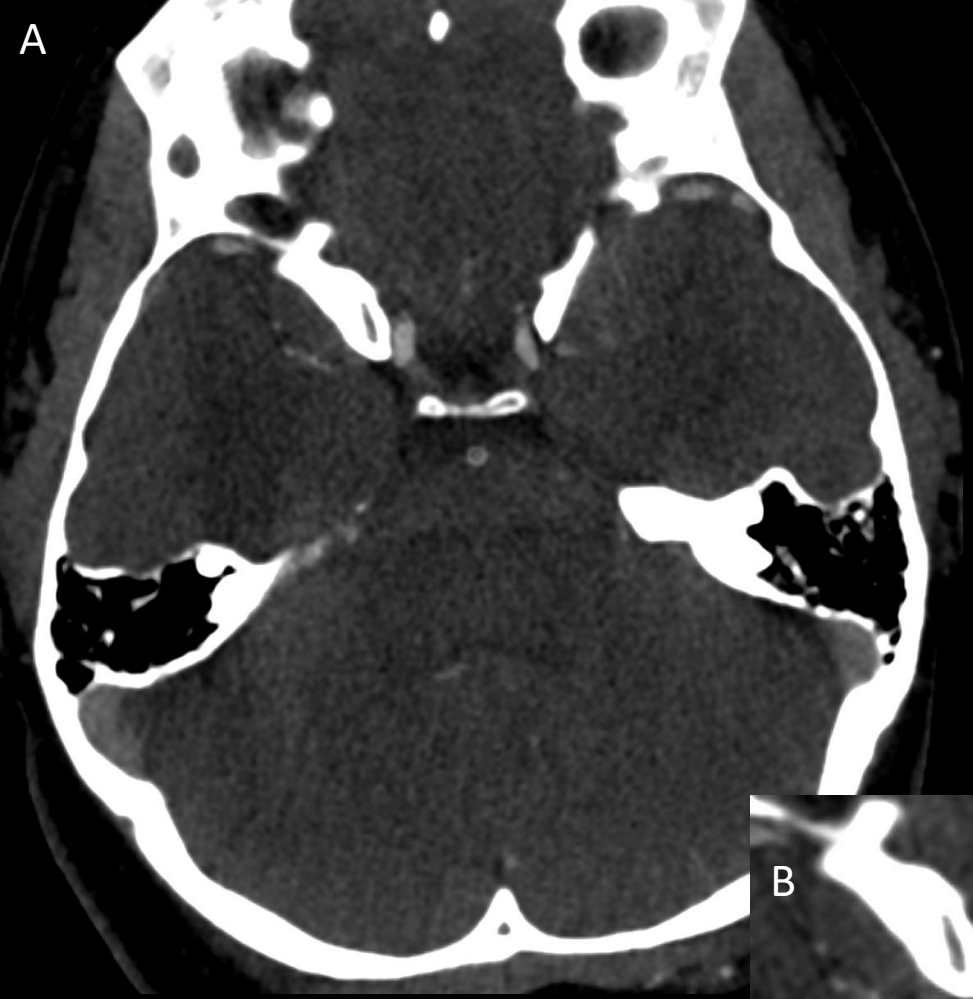
A 31-year-old woman presented to the emergency department with sudden onset of dizziness 2 days ago followed by headache and nausea. Neurological exam was unremarkable.

Imaging

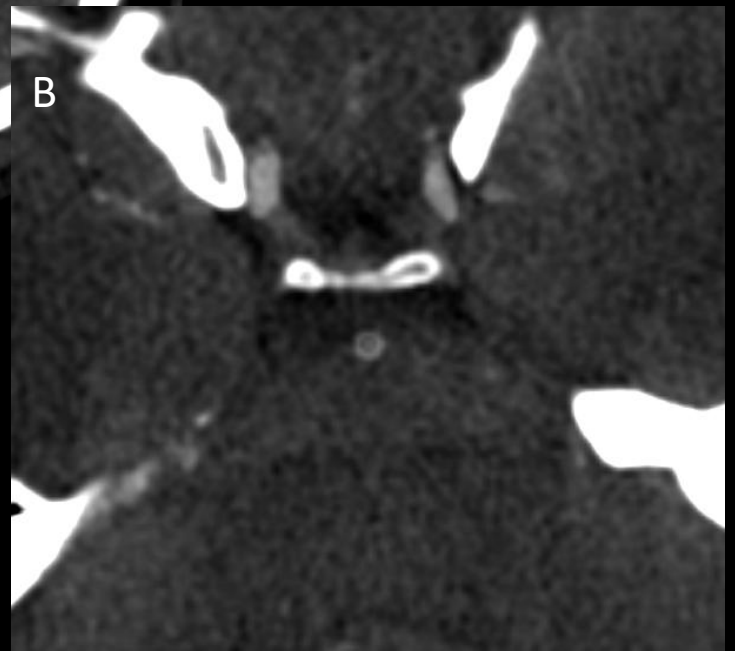
- CT head and CTA neck demonstrated no significant abnormality.

- CTA head showed apparent low-density filling defect within the basilar artery concerning for nonocclusive thrombus. The defect had following characteristics:
  - Oriented along the z-axis.
  - Target like appearance with central high density and peripheral low density in zoomed up thin section images.
  - Tram-track like appearance in coronal and sagittal reconstructions.

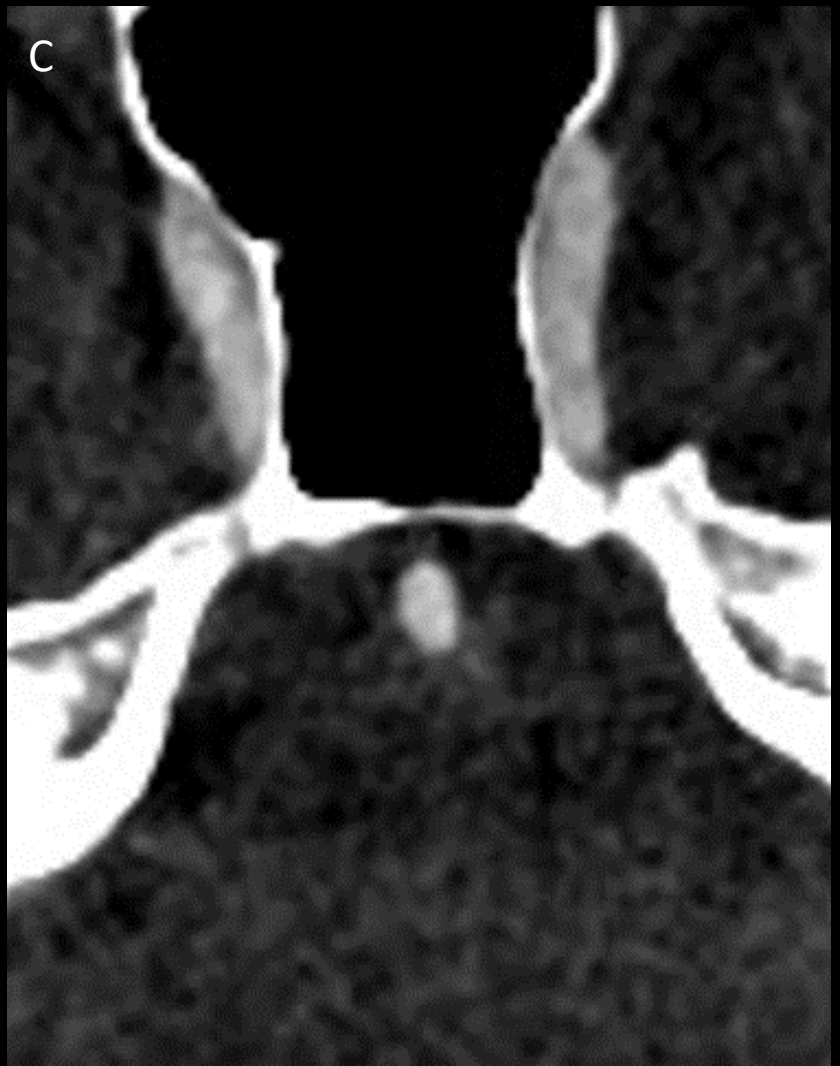
- This was felt to represent artifact (isocenter artifact) and was reported as such, with recommendation for follow-up MRA/CTA if further assessment is clinically warranted.

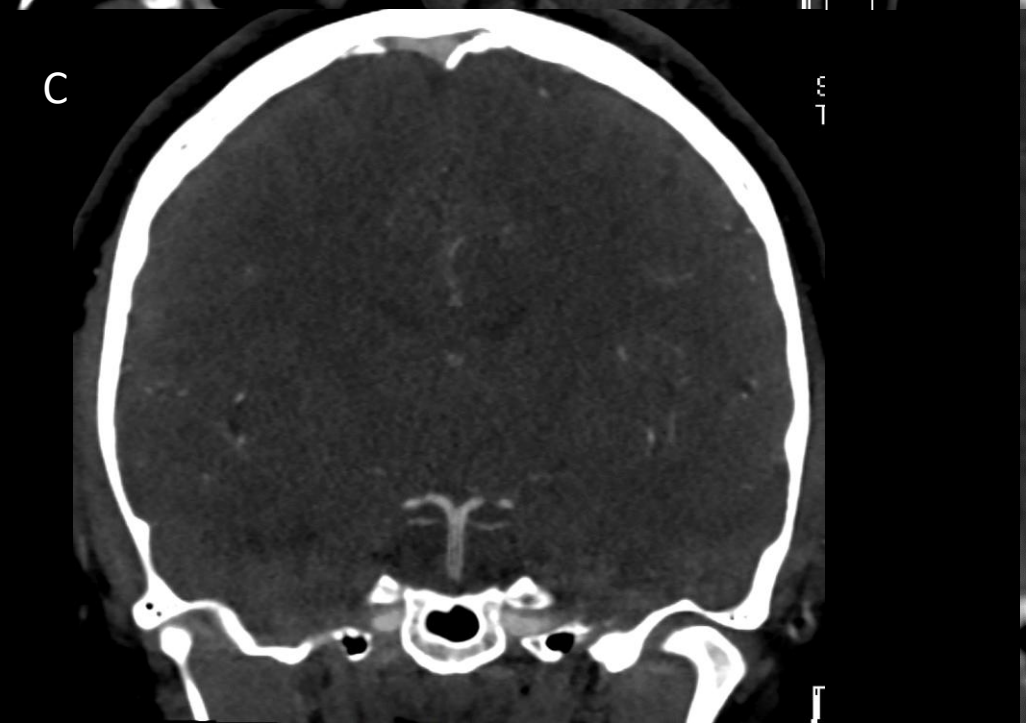


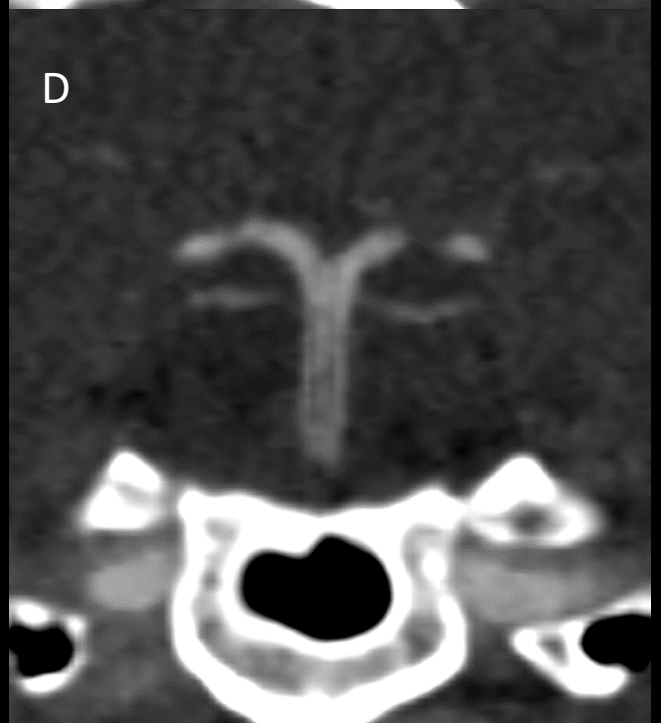
Axial CTA image (A) showing low-density filling defect within the basilar artery with target like appearance with central high density and peripheral low density as noted in the zoomed-up image (B).



Cine axial images (C). Please click on the image below to play.







Low-density linear filling defect within the basilar artery in the sagittal (A) and coronal (C) reconstructions showing tram-track like appearance better appreciable in the zoomed-up sagittal (B) and coronal (D) images

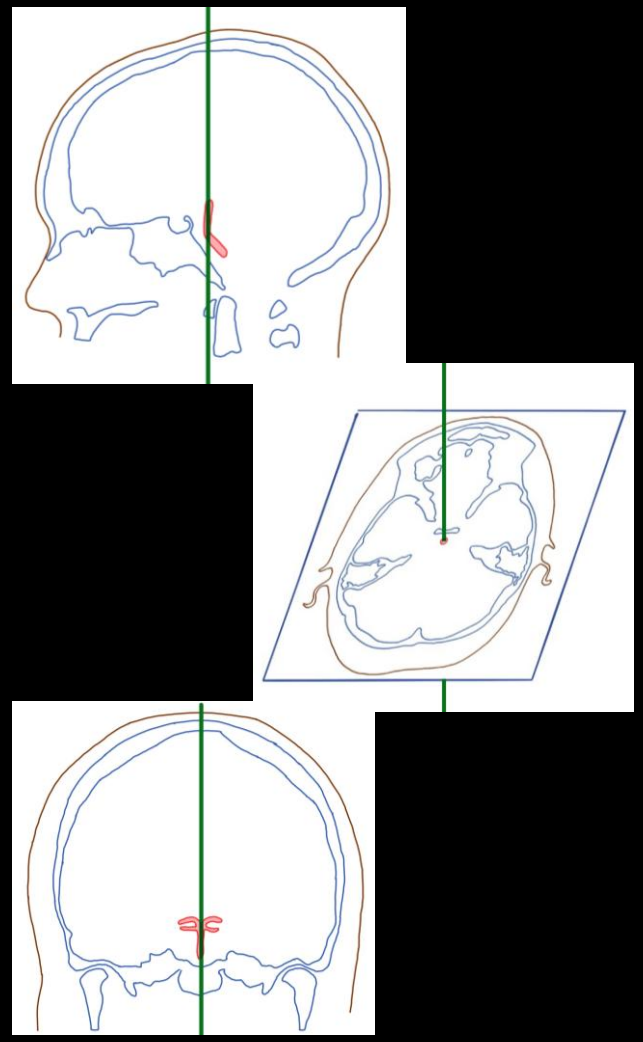
Management

- Clinical service opted for a follow-up CTA head.

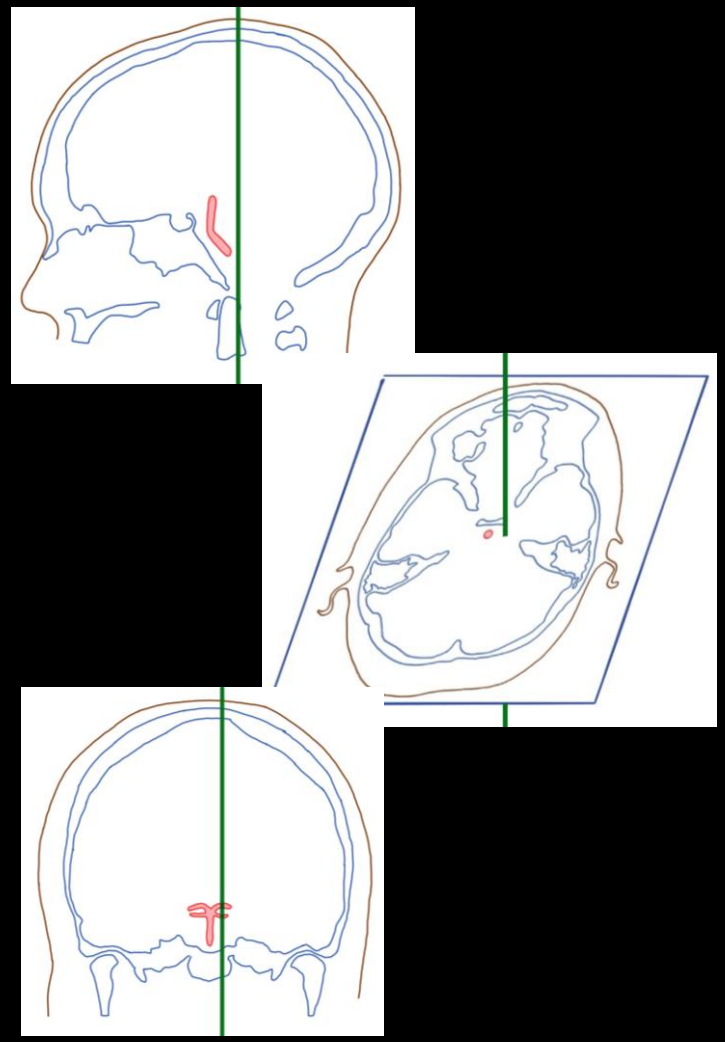
- For the follow-up CTA, the CT technician was advised to position patient’s head with relatively different centering and tilt from prior study in order to change the position of basilar artery with respect to the gantry isocenter.

Graphic representation of relationship of the gantry isocenter (green line) with basilar artery (red structure) with change in head position

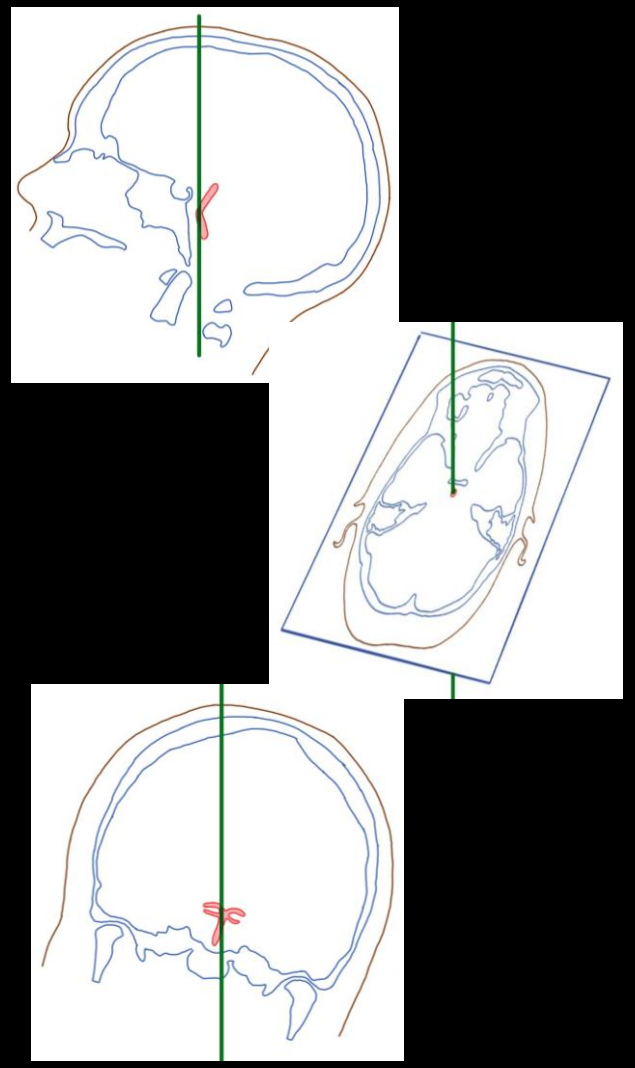
Isocenter aligned with basilar artery



Change in head offset with respect to gantry

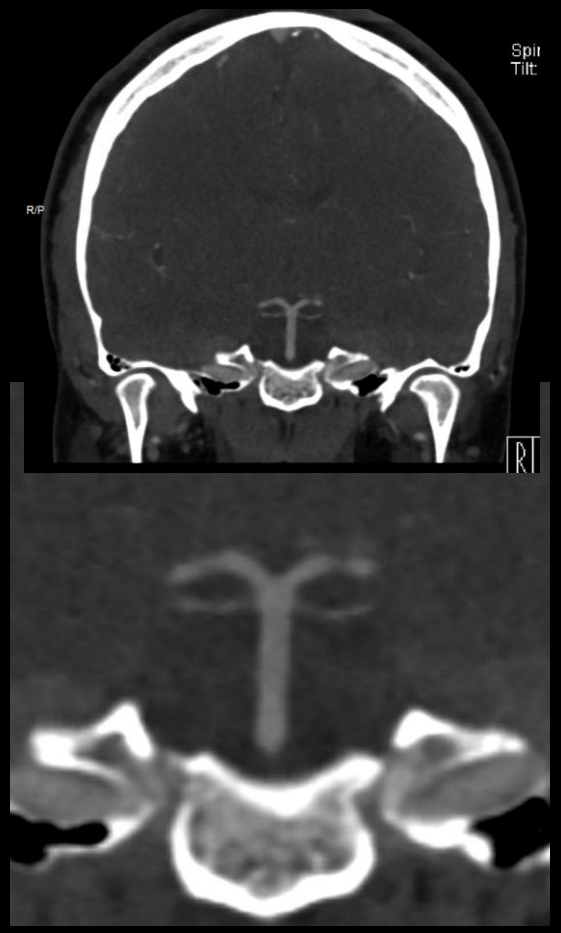


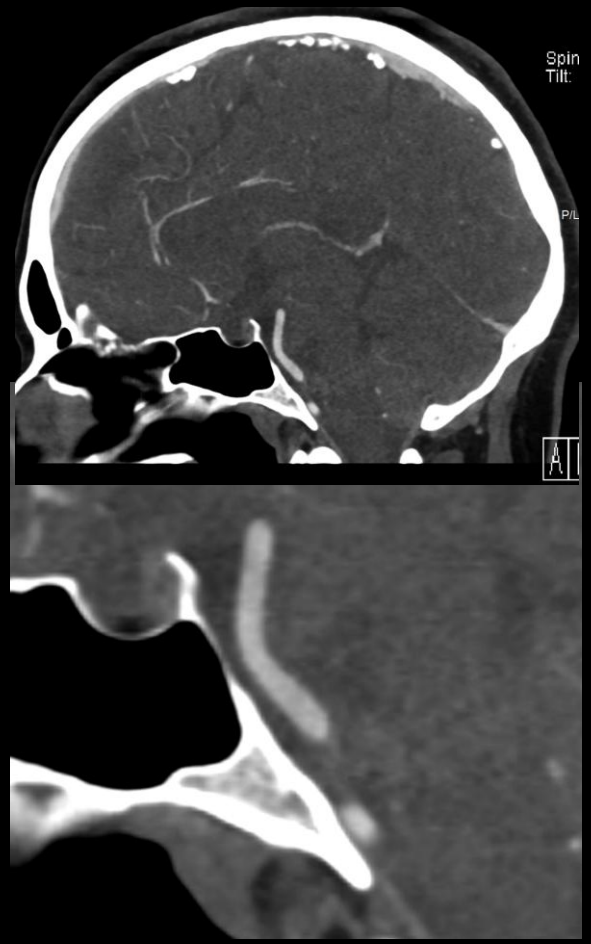
Change in head tilt with respect to gantry

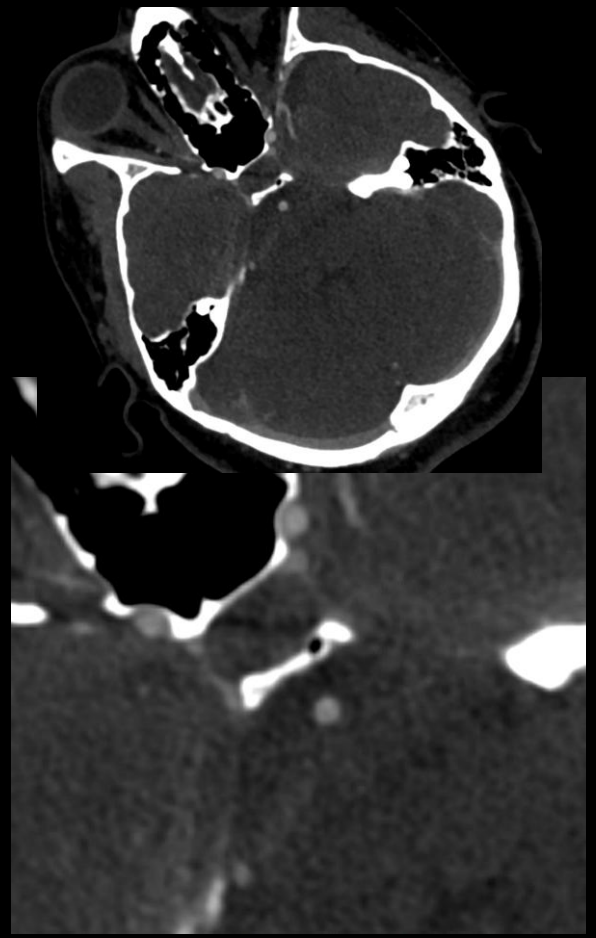


Outcome

- Follow-up CTA which did not show the filling defect in the basilar artery confirming artifact.







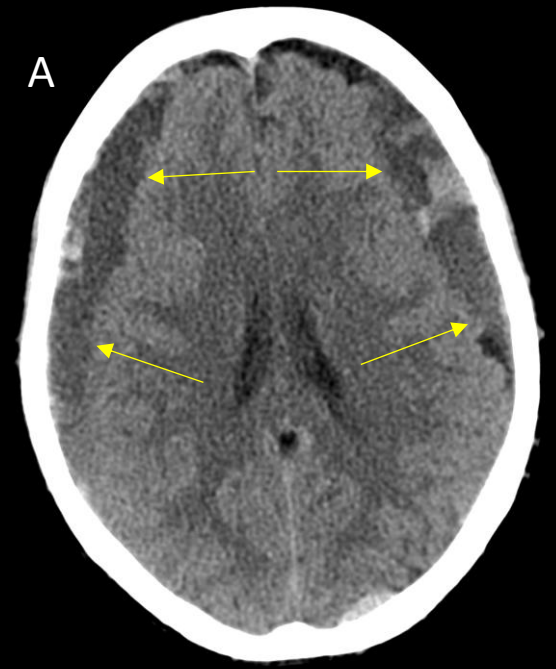
Follow-up CTA images showing lack of the previously seen filling defect in the coronal (A), sagittal (B) and axial (A) planes as well as zoomed-up images (D, E, F).

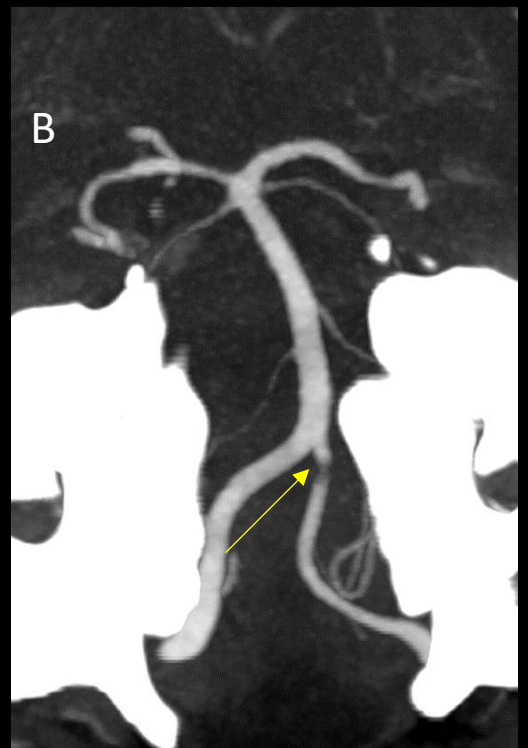
Isocentric artifact

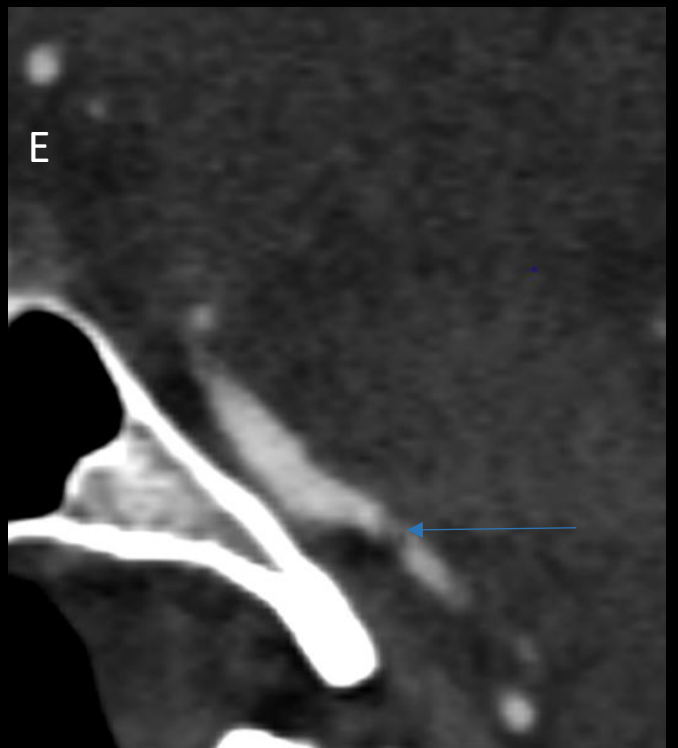
- Any artifact that presents in a manner which demonstrates the circular data collection of CT:
  - Rings centered on iso-center
  - Arcs centered on iso-center
  - Lines emanating from source to detector array
- May be caused due to detectors problems such as gain, offsets, and linearity or due to debris in x-ray beam path

Companion case: Axial CT brain image (A) of a patient presenting with bilateral subdural hemorrhages (yellow arrows).

Apparent filling defect / narrowing in the distal left V4 segment in the coronal (B) and axial (C) MIP images (yellow arrows) of concurrent CTA for same patient. Target like appearance (green arrow) in zoomed up axial CTA images (D) with vertically oriented tram-track like appearance (bue arrow) in CTA sagittal reconstruction (E) which was suggestive of isocenter artifact.







Take Home Points

- Isocenter artifact can sometimes raise concern for pathology especially when superimposed of a denser structure. Basilar artery due to its anatomic position can sometimes be located at the isocenter and in such cases the artifact can simulate pathology such as thrombosis or dissection.
- In case of doubt, a follow up with a different modality such as MRA can be performed. Alternatively, a CTA can be repeated with additional measures to mitigate reoccurrence of artifact by changing position and / or tilt of body part relative to the gantry.

Take Home Points

- A catheter angiography can also be performed if necessary but can usually be avoided with a follow-up MRA or CTA.
- This artifact can be difficult to recognize if only a small portion of the structure overlies the artifact (as seen in the companion case). Close observation of thin section images for the target like appearance can be helpful in such cases. Knowledge of this artifact would help avoid misdiagnosis and unnecessary additional investigations.