Stroke School

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Disclosures

- I receive a stipend for my role as Medical Director
- I have no commercial disclosures or conflicts of interest

Main Objectives

- Part 1: Obtain a history and examination in five minutes in the ED
- Part 2: Read a plain noncontrast CT scan of the head and recognize thrombus, infarction, hemorrhage
- Part 3: Identify the stroke syndrome and the etiology

Part 1: History and Exam

Stroke History in 2 Minutes

- Last seen normal, or last known well: this is the time of onset
  - Time of onset is not necessarily when the patient was found
  - Time of onset is not necessarily when there was an abrupt change if the patient changed from having a mild deficit to a severe deficit
  - “When was the last time today that Mr. Jones was walking and talking normally?”

What are the symptoms?

- Weakness in face, arm or leg
- Speech difficulty
- Sensory changes
- Vision changes
- Ataxia

Describing symptoms

- For weakness, say what the patient can do rather than estimate a power rating:
  - "Lifts the arm against gravity but can't sustain against light resistance" is likely more informative than estimating an MRC scale rating
- Keep in mind that it's very rare for language to be in the right hemisphere
  - It should be very rare to see "Left hemiparesis and aphasia"

“Sudden onset…”

- How quickly did symptoms reach maximal severity?
  - Symptom onset is often described as sudden
  - But symptoms often worsen after “sudden onset”
  - “Sudden onset right face and arm numbness” becomes “Sudden onset right face numbness which got worse over the next 30 minutes and spread to the right arm”

Medications, Comorbidities

- Anticoagulants? Other meds?
- Medical conditions, especially any recent trauma or surgery?
- Recent stroke or TIA?
- Allergies?

Vitals includes Glucose

- Stroke and TIA mimics include:
  - Hypertension, e.g. Posterior reversible encephalopathy syndrome
  - Hyper or hypoglycemia

- Paramedics often take vitals and glucose and it’s one of the first things you should note when the patient comes in to ED

History in 5 minutes or less.

- When last known to be well?
- What were the symptoms?
- How quickly did symptoms reach worst severity?
- Any change in symptoms since onset?
- Vitals from paramedics?
- Medical conditions, including allergies?
- Medications, especially anticoagulants?
- If on anticoagulants, when last taken?
- Recent trauma, surgery, or stroke?

Case 1

- Mrs. Smith calls paramedics after hearing her husband fall out of bed at ~2150h. He is unable to get up on his own and his left arm and leg were not moving. He didn’t notice anything wrong with the left side.

Case 1

- They had been in Ottawa earlier that day for a lung biopsy.

- After the biopsy, ~1500h, he was unable to walk to the car and needed help from two people to get in to a wheelchair and then in to the car. His left leg was dragging.

Case 1

- At home, ~ 1800h, he needed help from two neighbours and his wife to get in to the house where he then went to bed.
- He woke up at around ~2000h and clearly said he felt unwell and drank a glass of water which was brought to him by his wife.
- He then went back to sleep and was heard to fall out of bed at 2150h.

What else would you like to know?

Some key points on history for Case 1

- Time last known well is not clear
- The full extent of the symptoms are not clear
- Medications?
- Why a lung biopsy?

Examination in 3 minutes

- Vitals and brief general physical exam
- NIH Stroke Scale:
- *Consciousness*
- *Gaze*
- *Visual Fields*
- *Face, arm, leg weakness/clumsiness*
- *Sensory loss*
- *Language*
- *Dysarthria*
- *Inattention*

Let’s practice the 3 minute stroke exam

- Please pair off and practice

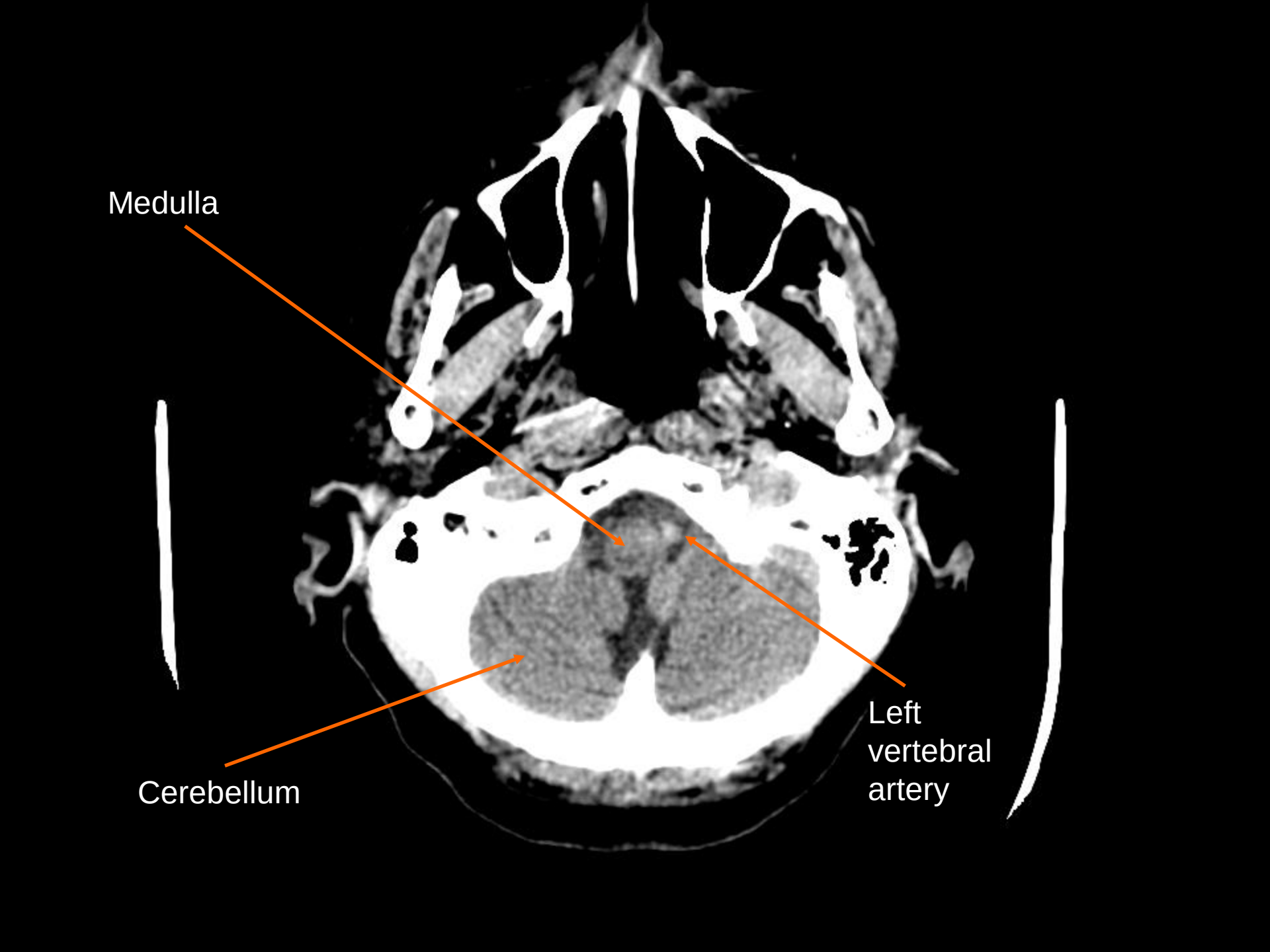
Part 2: How to read a CT scan

We will learn the following:

- Recognize basic anatomical structures on a plain CT head
- Recognize acute thrombus in the MCA
- Recognize acute ischemic stroke
- Recognize acute intracranial hemorrhage

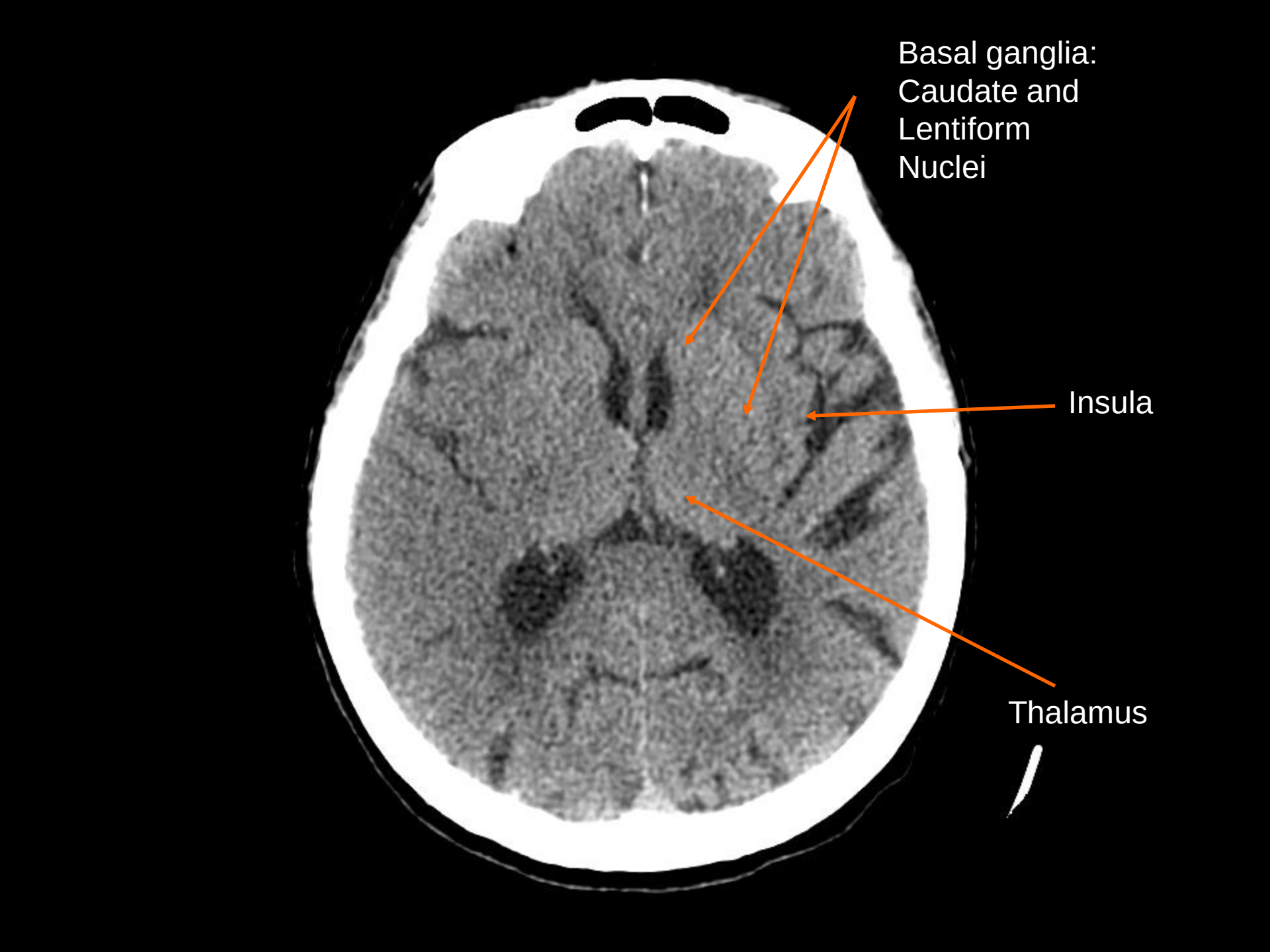
Reading a plain CT head

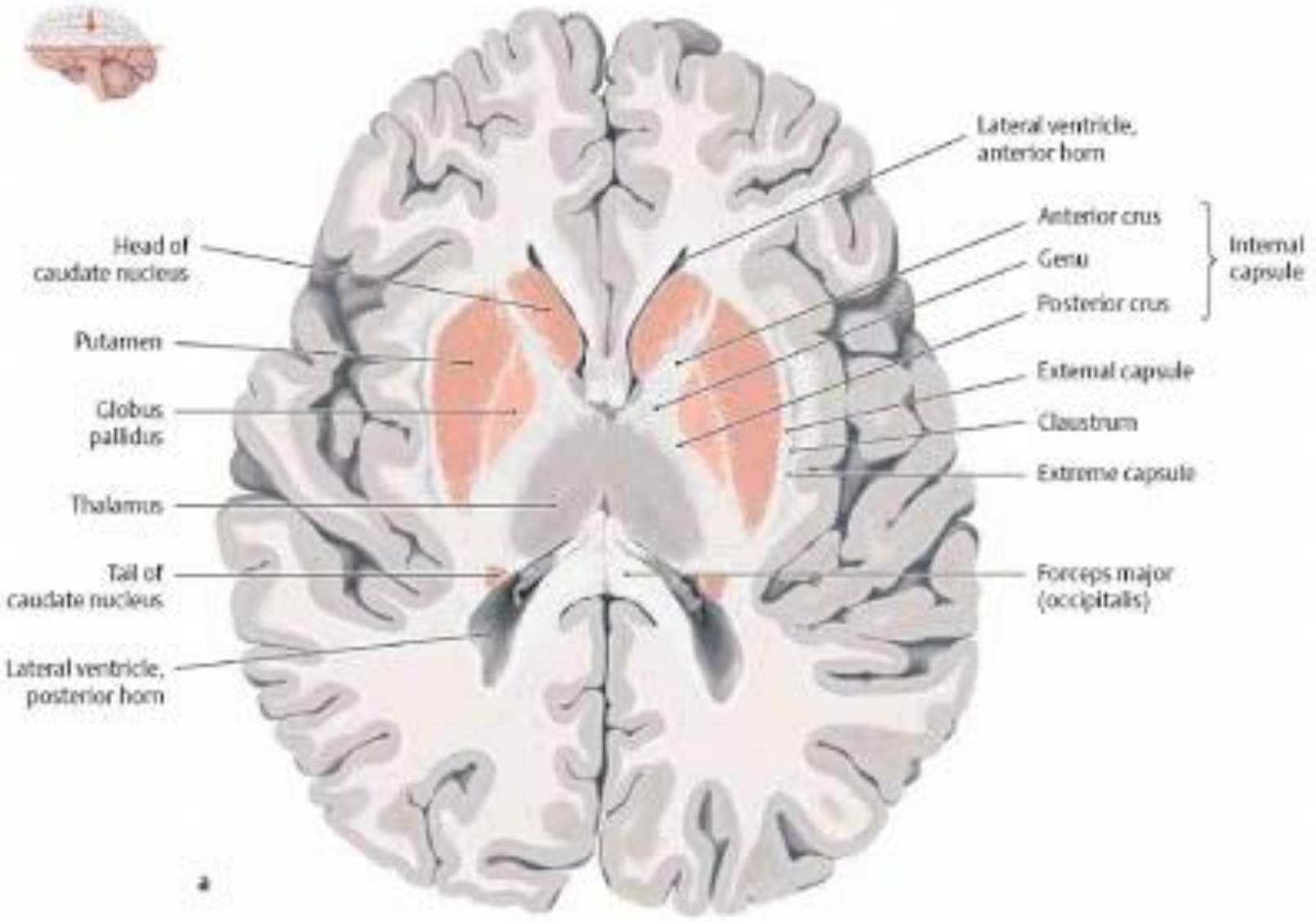
- Know the following levels on an axial CT:
  - Medulla, Cerebellum, and Vertebral Arteries
  - Pons, and Basilar Artery
  - Midbrain, and Proximal Middle Cerebral Arteries
  - Basal ganglia and Insula
  - Corona radiata
  - Centrum semiovale

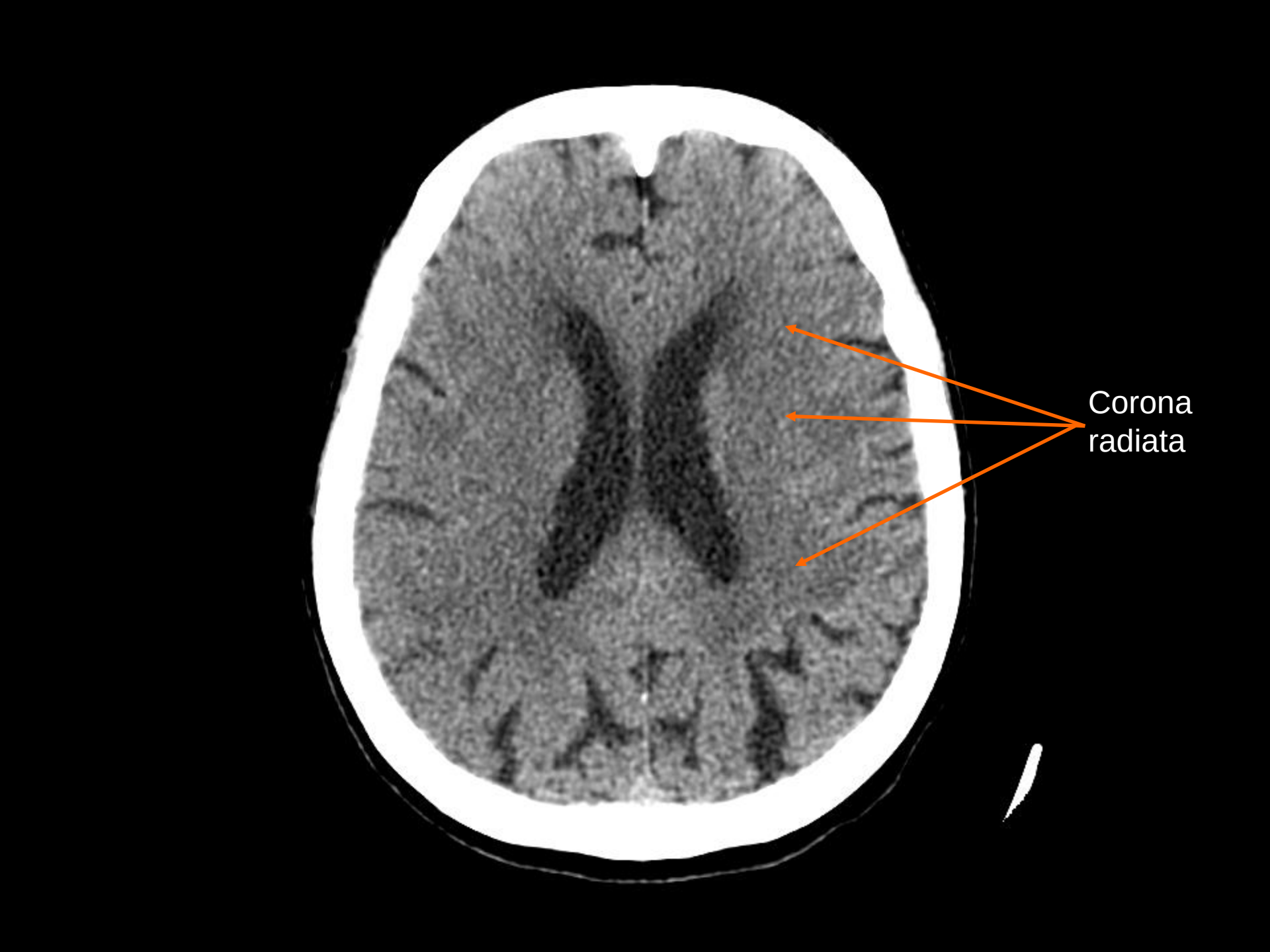

Medulla
Cerebellum
Left
vertebral
artery

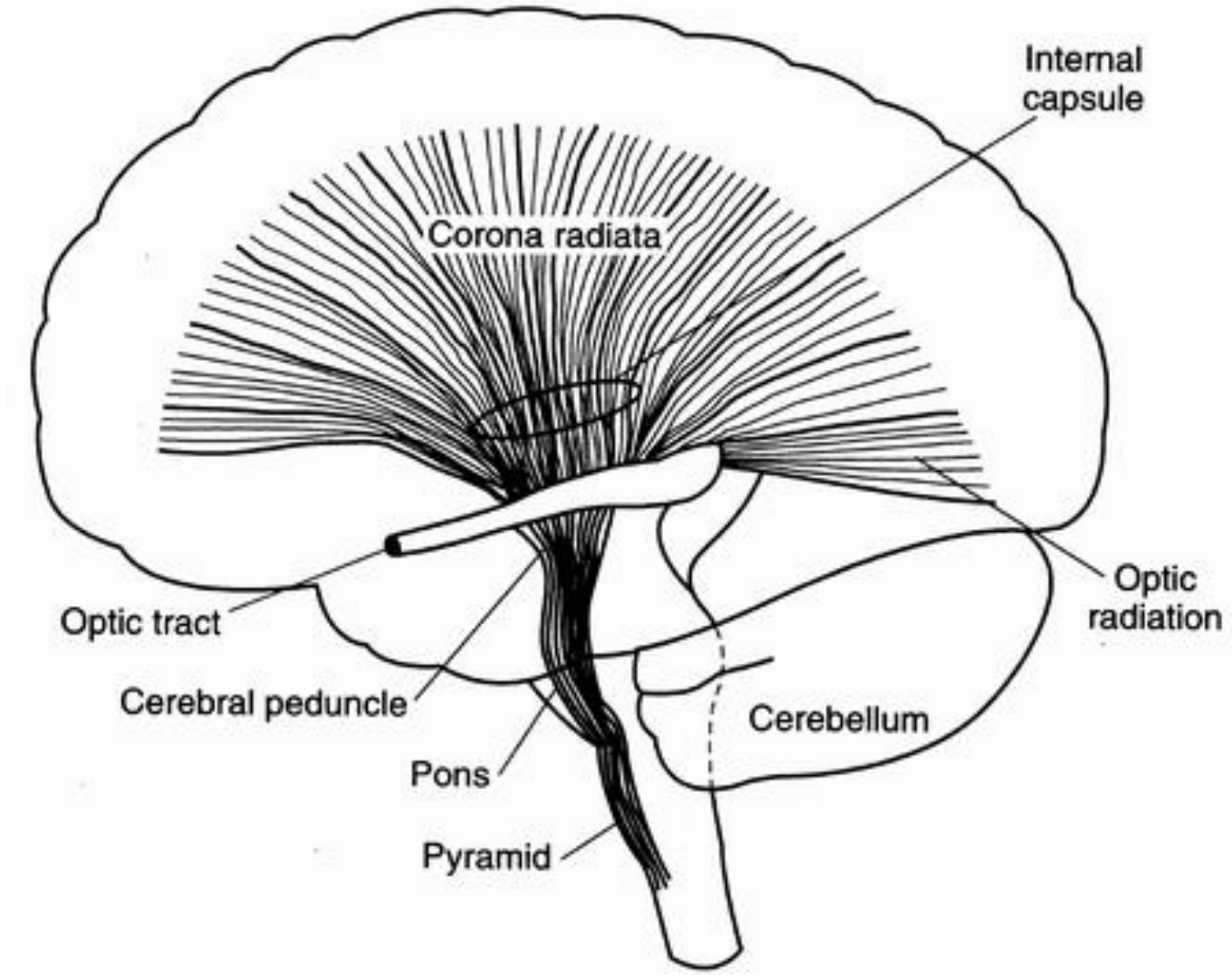

Pons
Basilar artery

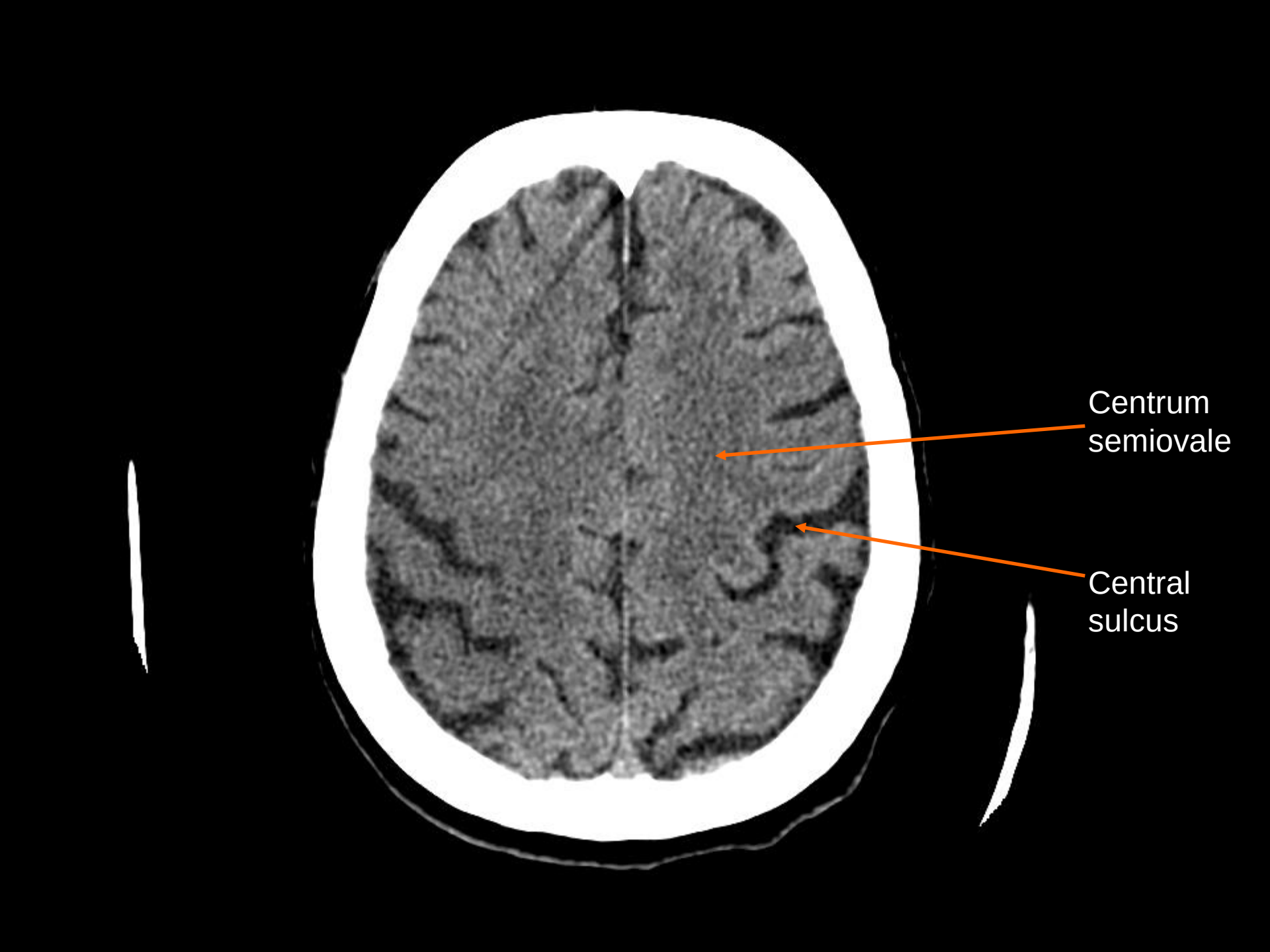

Midbrain
Middle
cerebral artery


Basal ganglia:
Caudate and
Lentiform
Nuclei
Insula
Thalamus


Lateral ventricle, anterior horn
Head of caudate nucleus
Anterior crus
Genu
Posterior crus
Internal capsule
Putamen
External capsule
Globus pallidus
Claustrum
Extreme capsule
Thalamus
Tail of caudate nucleus
Forceps major (occipitalis)
Lateral ventricle, posterior horn
a

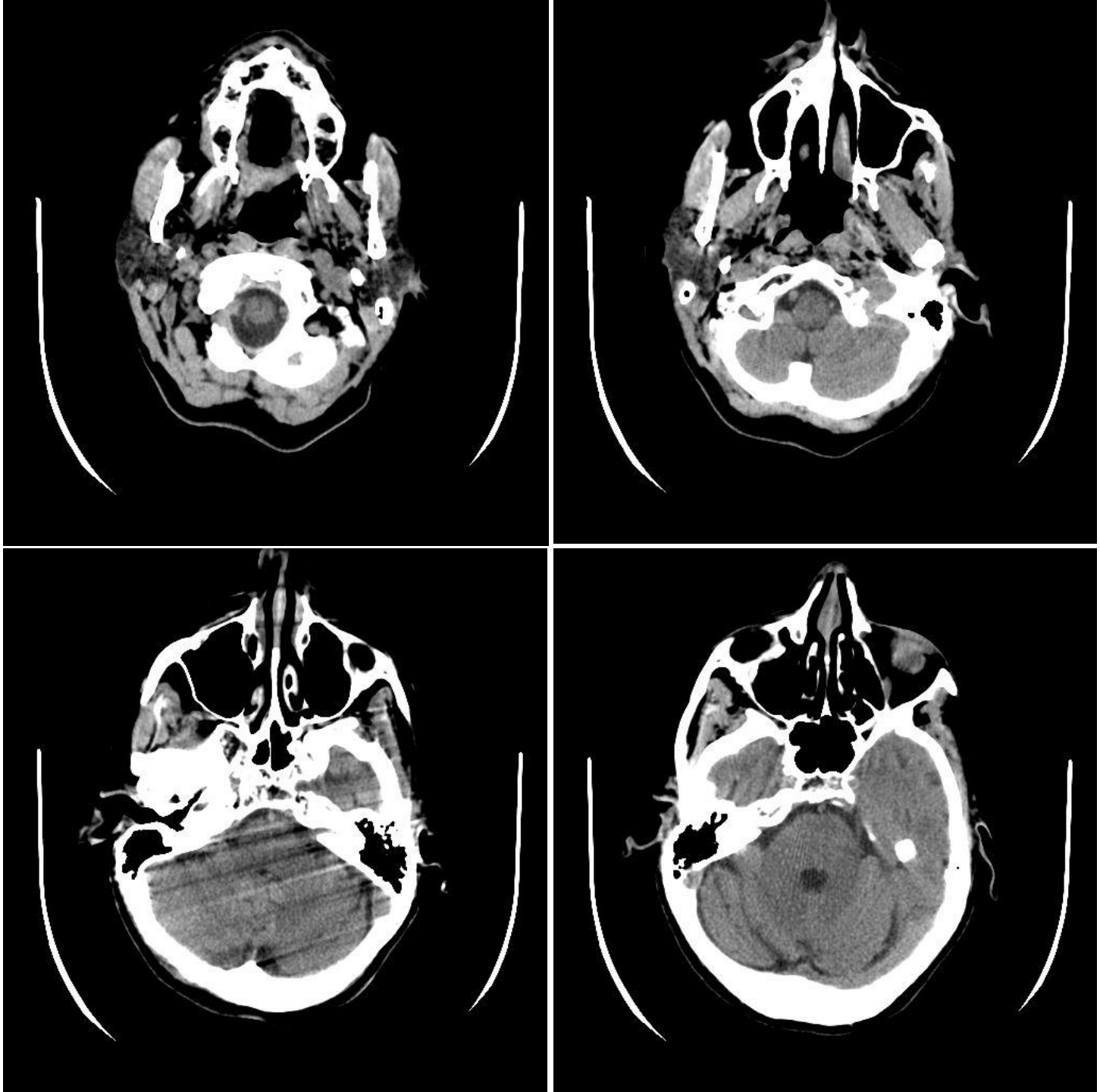

Corona
radiata

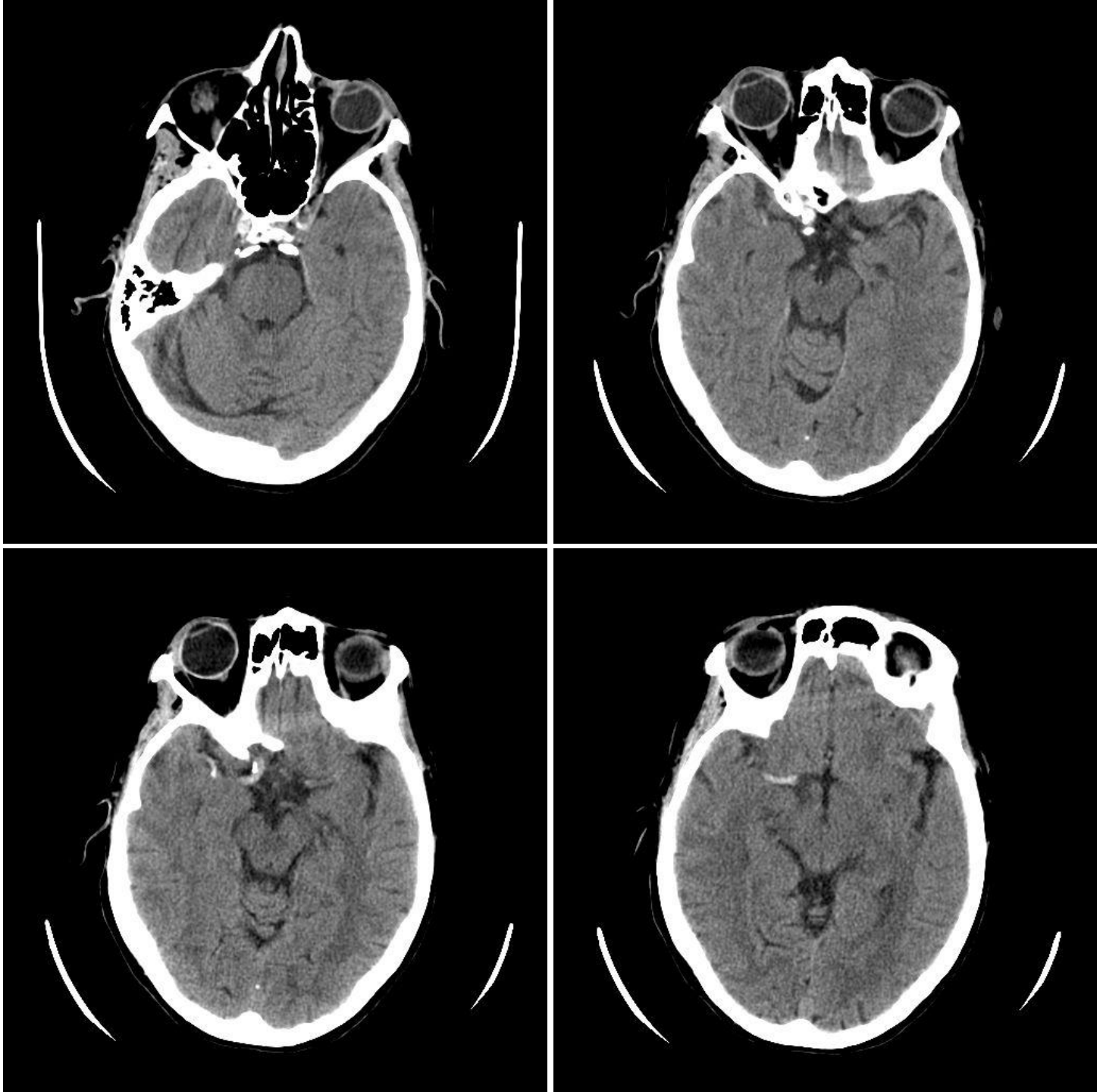

Internal capsule
Corona radiata
Optic radiation
Optic tract
Cerebral peduncle
Cerebellum
Pons
Pyramid

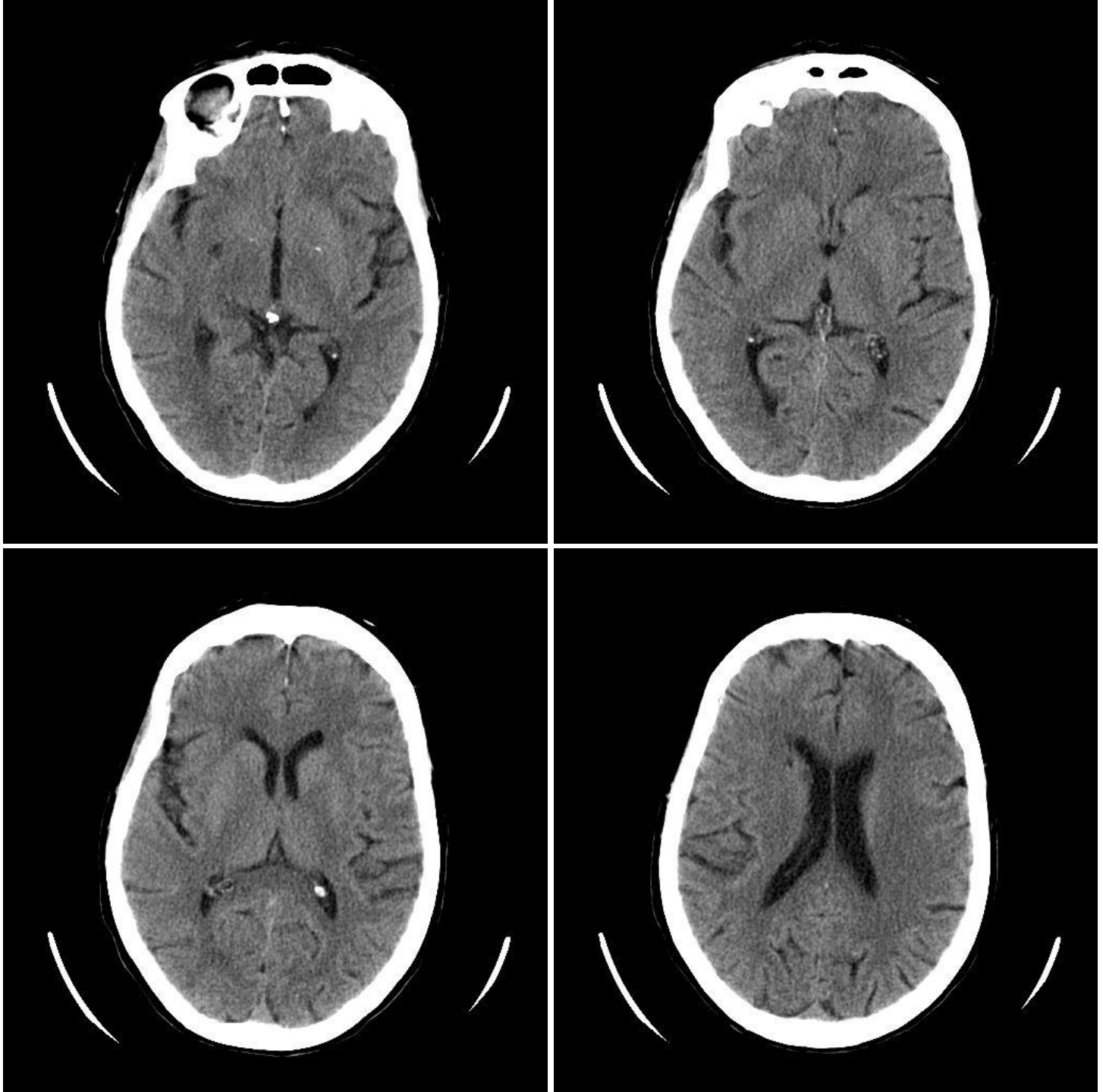

Centrum semiovale
Central sulcus

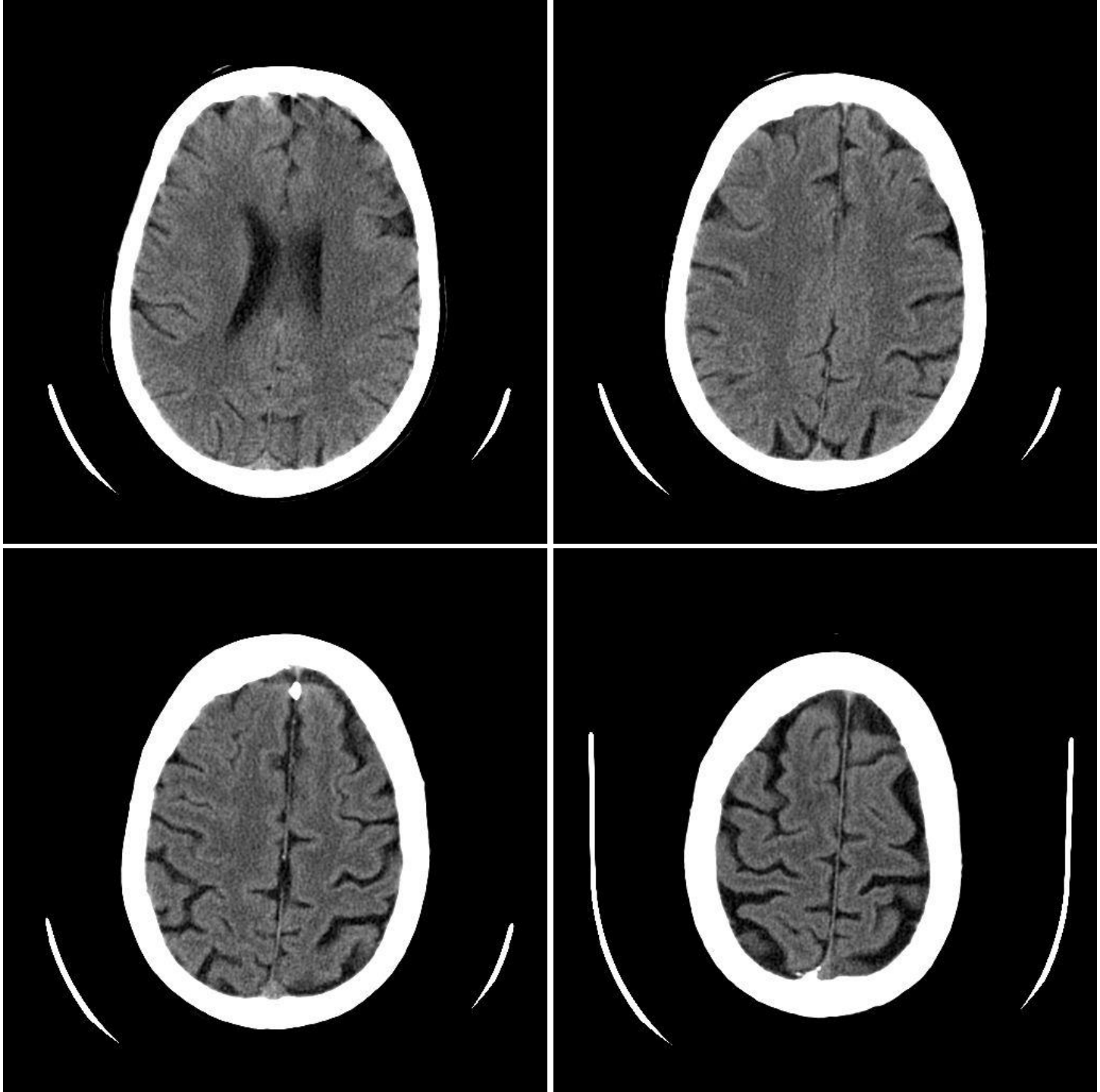
Recognize acute thrombus

- As you review the following slides, recall that the Midbrain level is where you see the proximal MCA (and distal ICA)





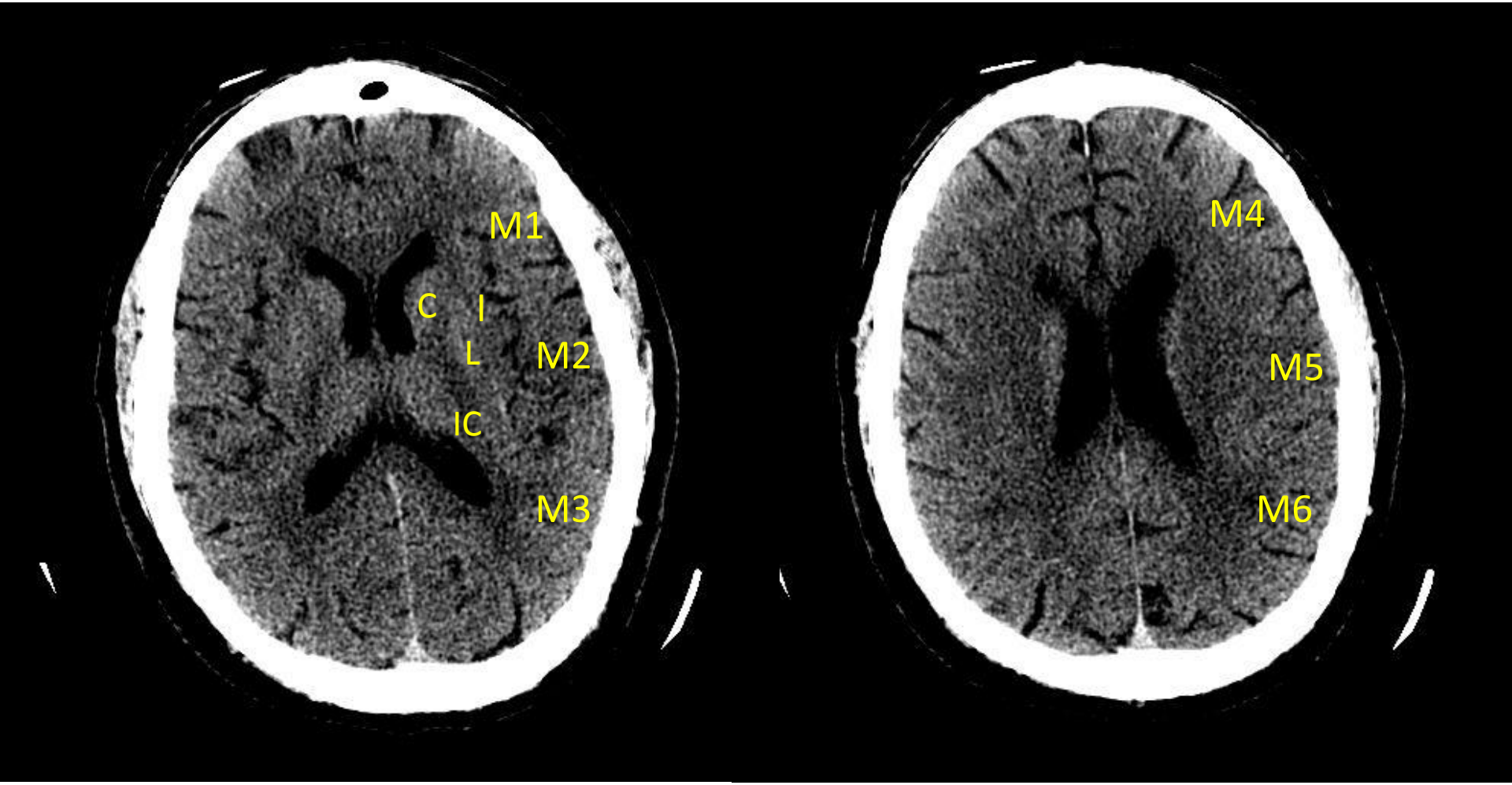




Detecting early cerebral ischemia on CT scan

- Loss of grey-white differentiation
  - You may have to adjust the brightness and contrast (the “window width” and “window level”)
- Loss of sulci
- Use the same system every time you look at a CT for possible acute stroke
  - For example, the Alberta Stroke Program Early CT Score (ASPECTS)

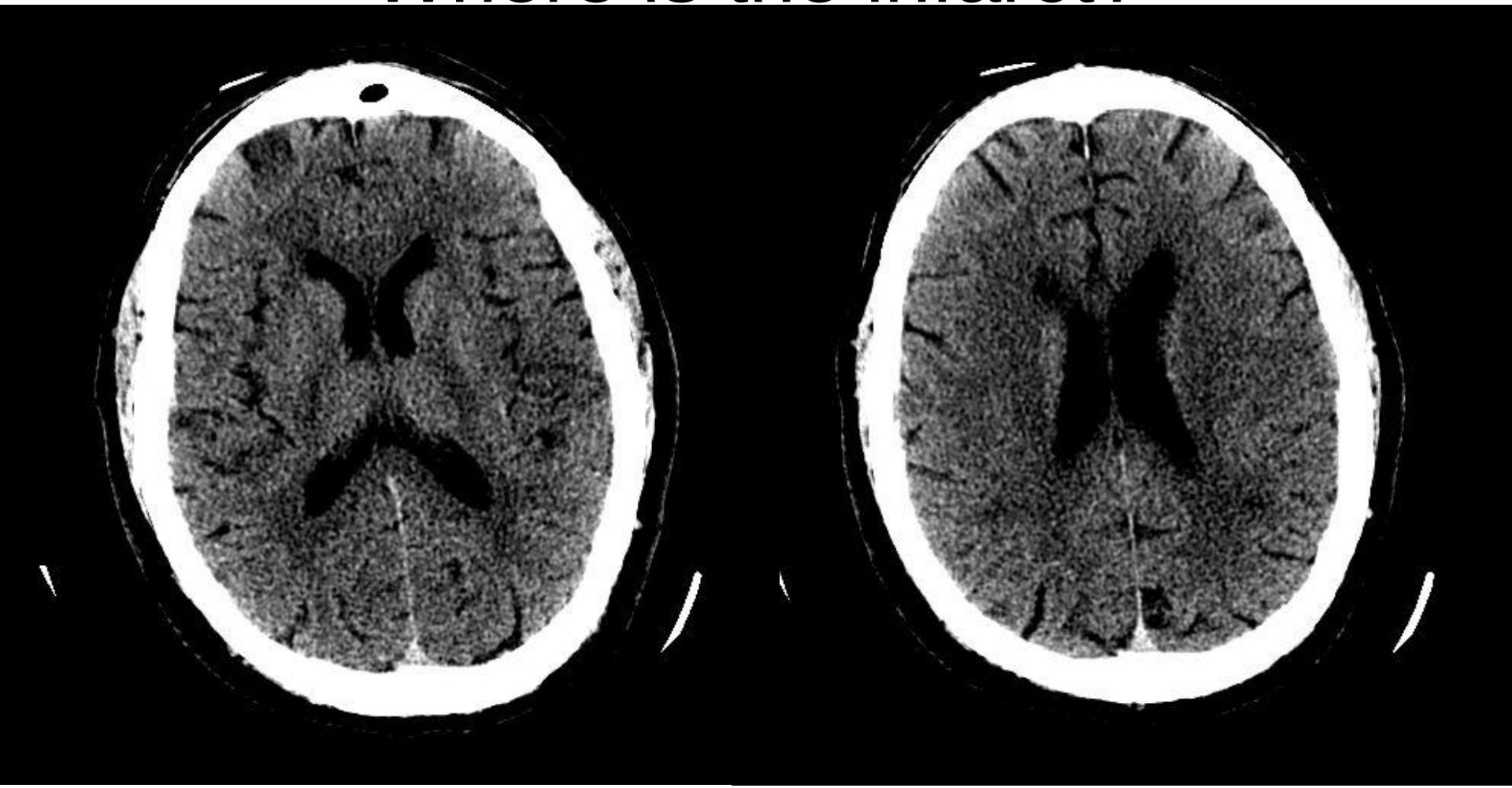
Alberta Stroke Program Early CT Score



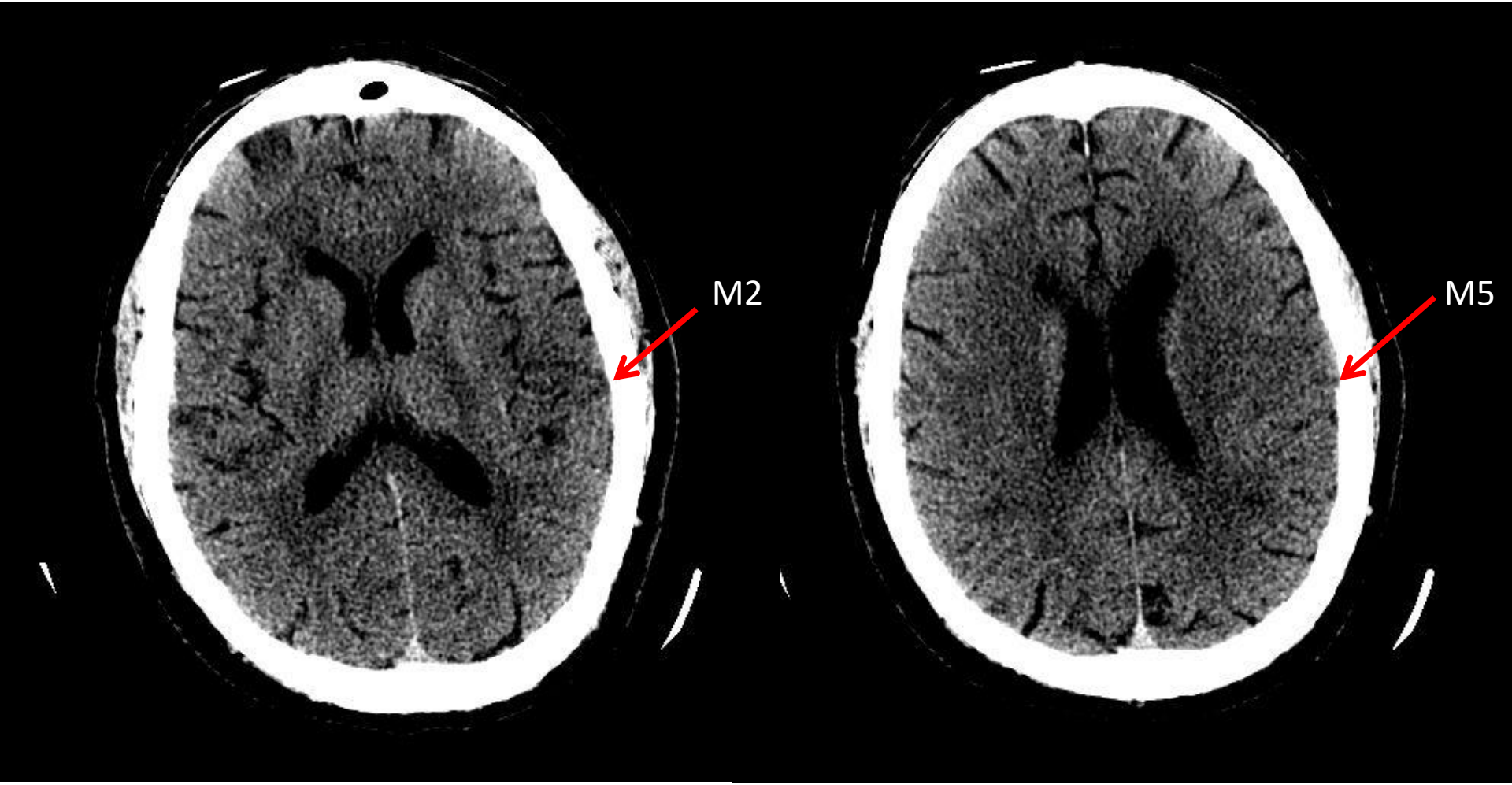
C = caudate, L = lentiform, I = insula, IC = internal capsule

M1, M2, M3 = anterior, lateral, posterior MCA territory; M4 to M6 are above the lentiform nuclei

Right hemiparesis and aphasia: Where is the infarct?

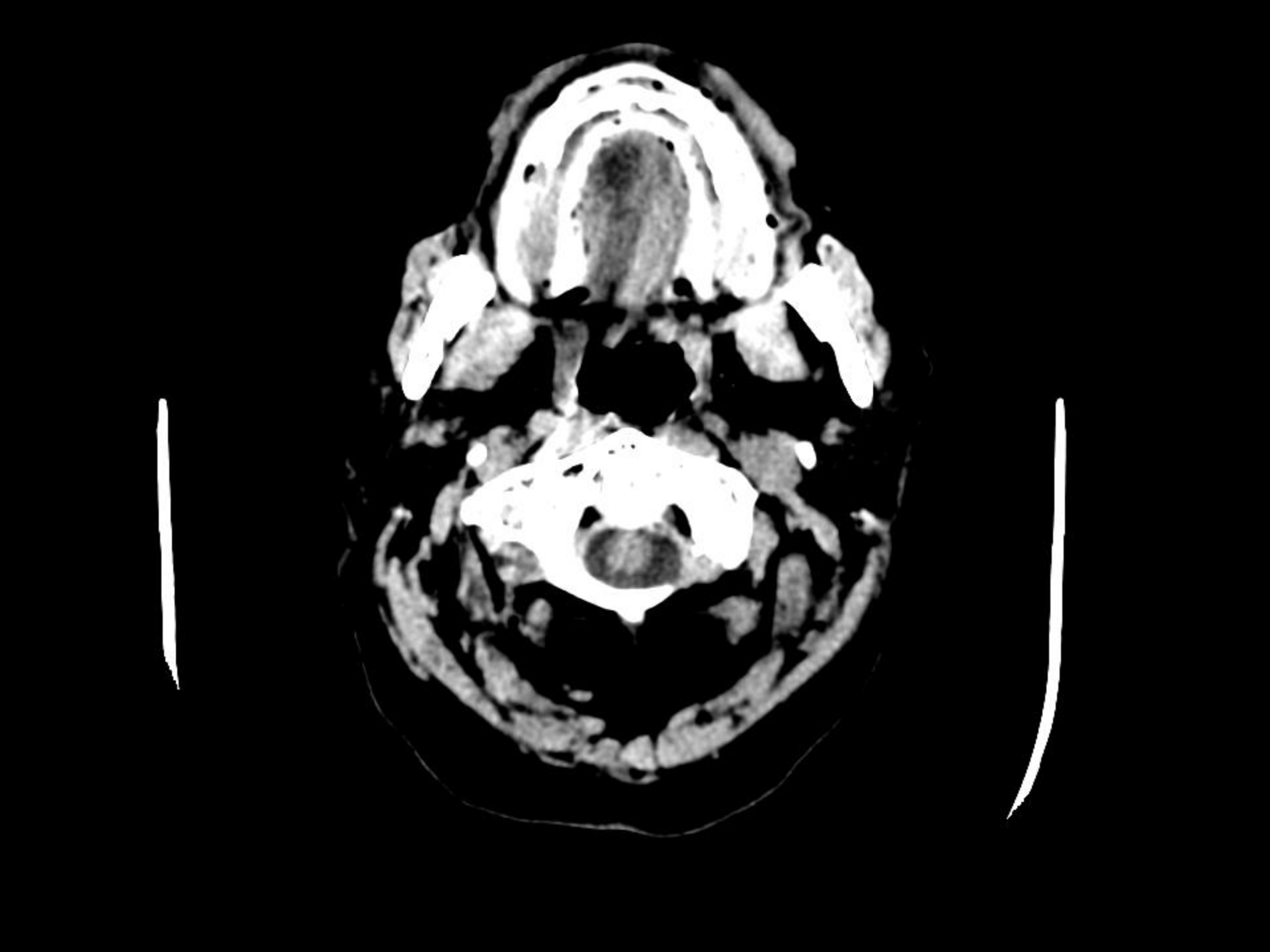


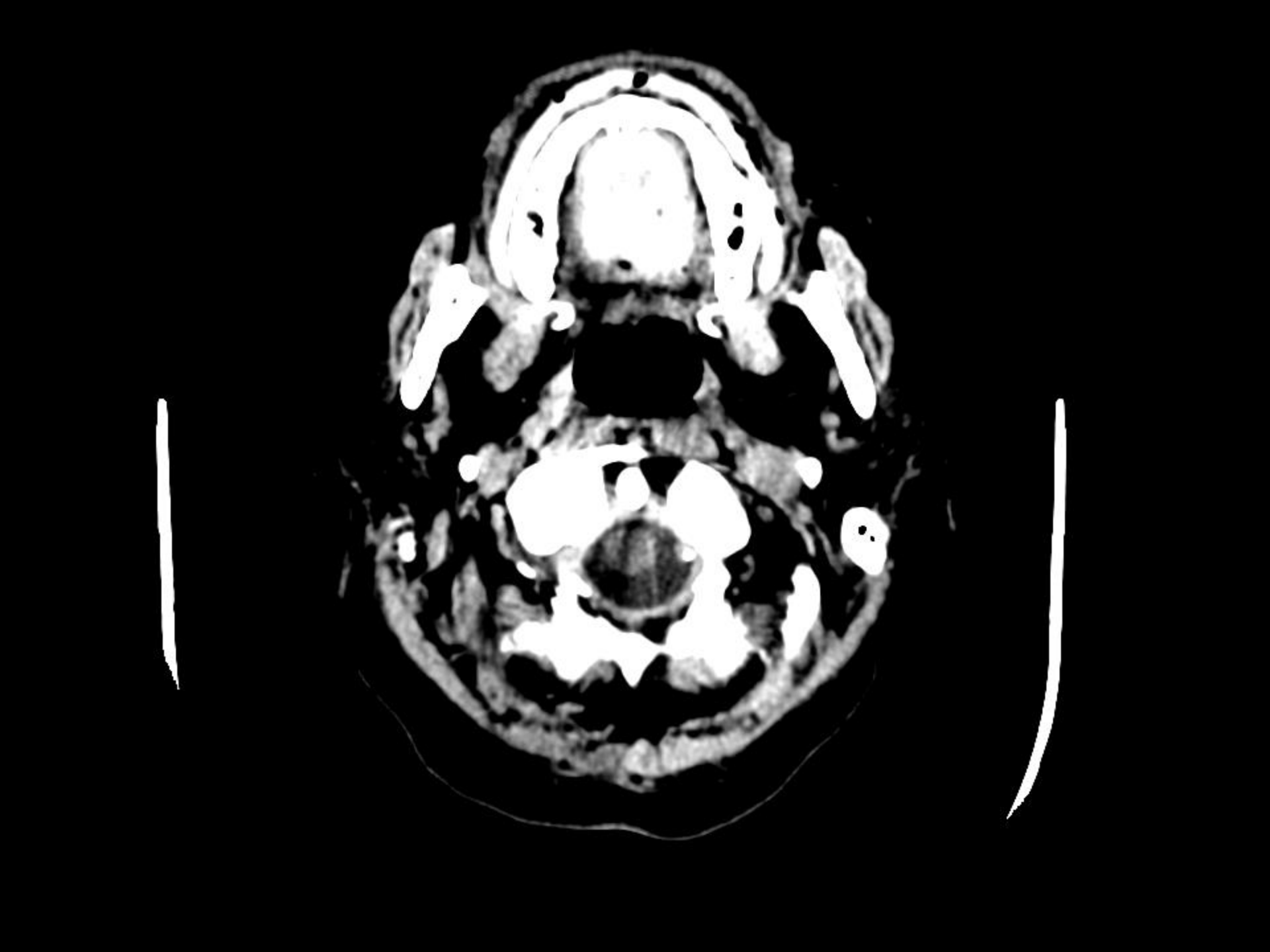
Can you see the infarct using ASPECTS?

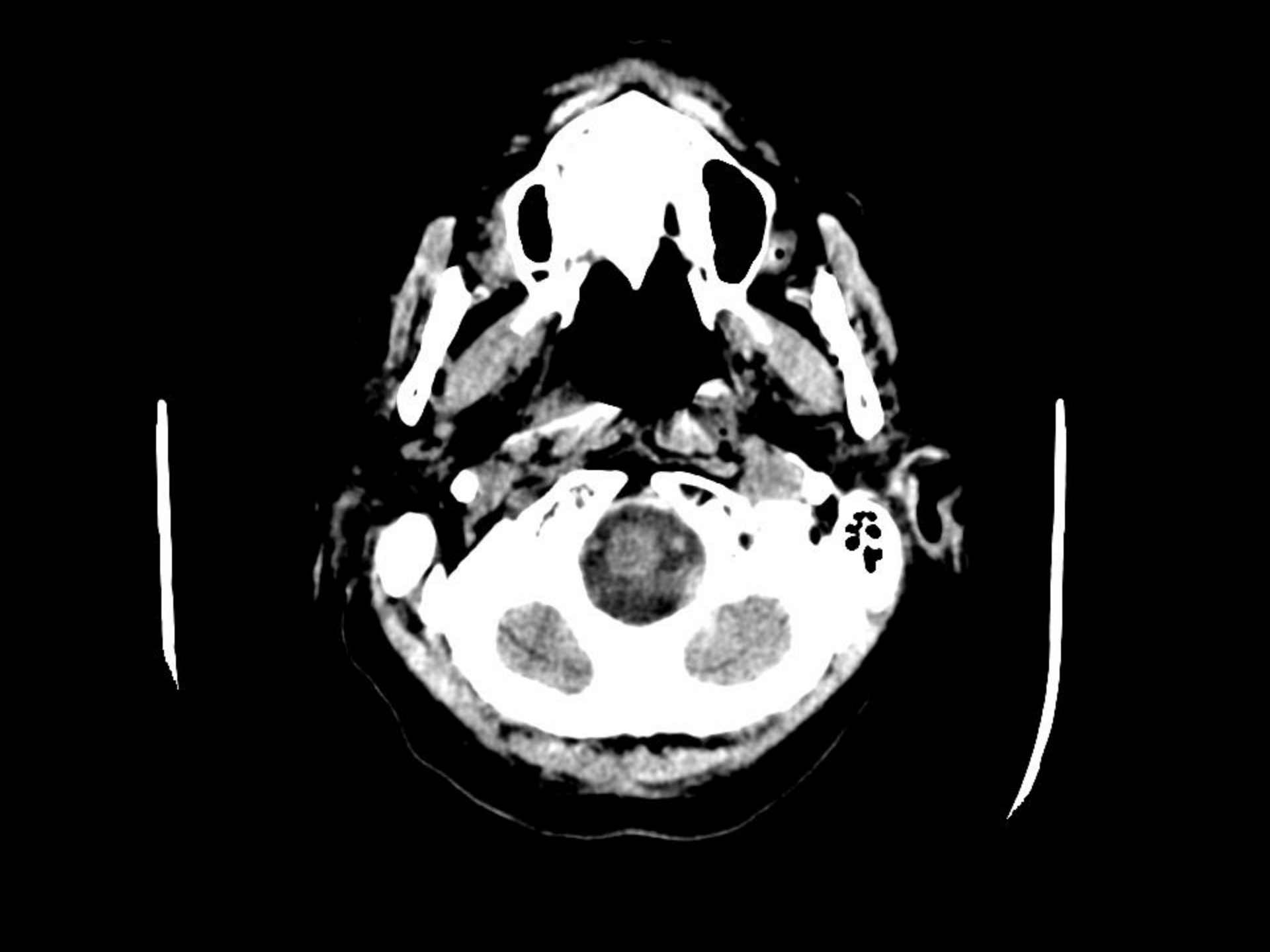


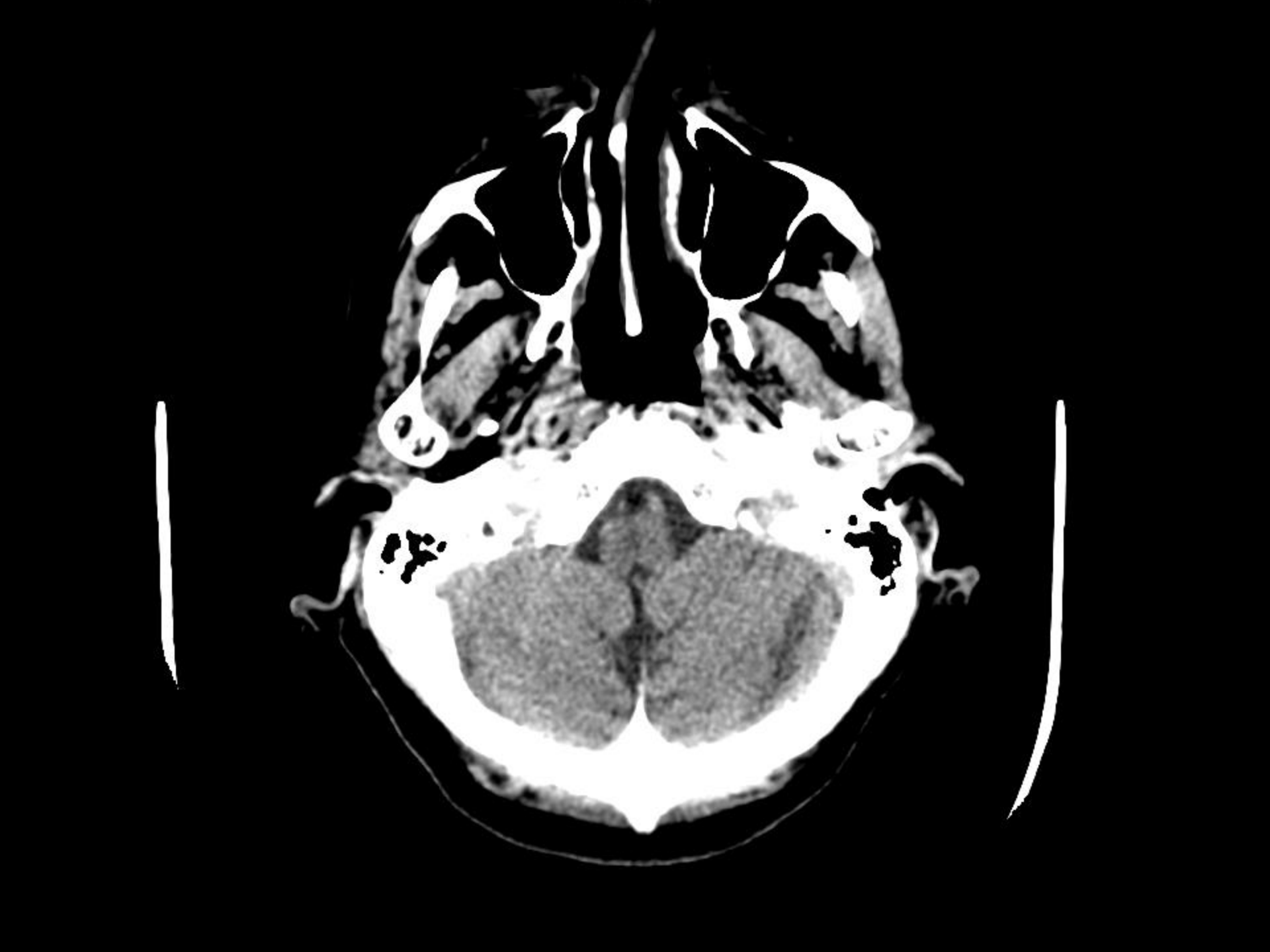
Case 2

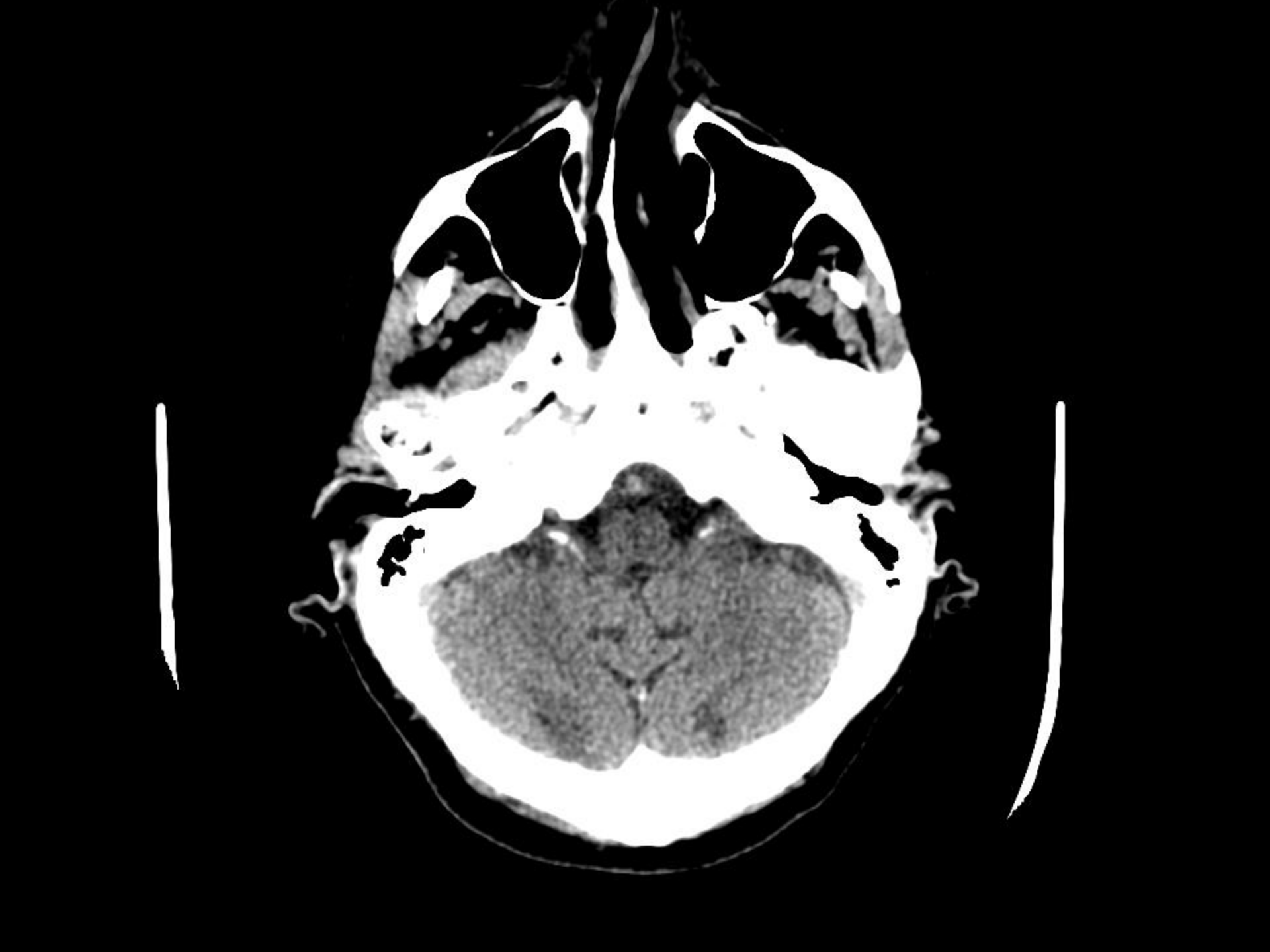
- 77 year old female with left hemiparesis, left homonymous hemianopia, left side sensory loss

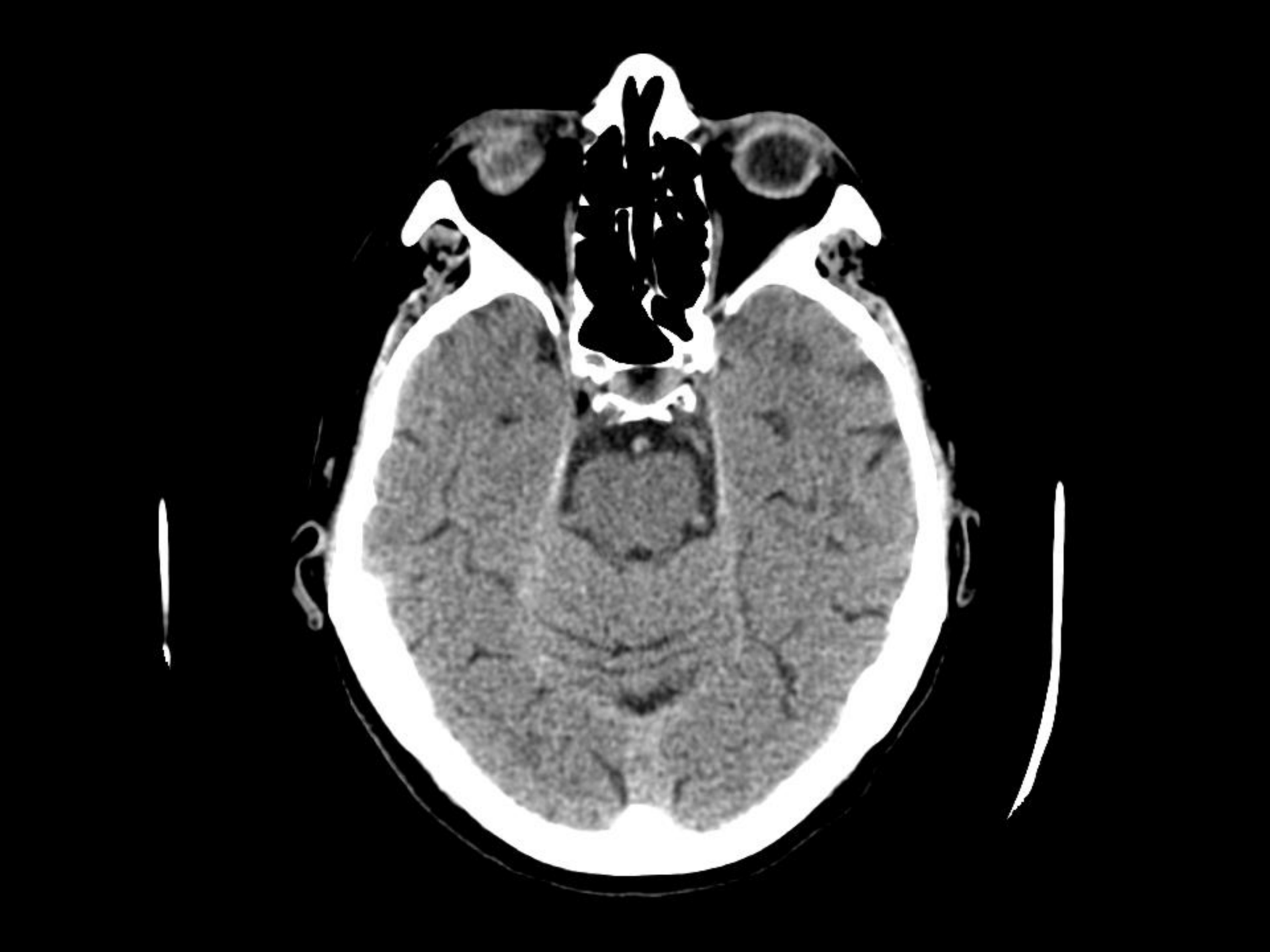


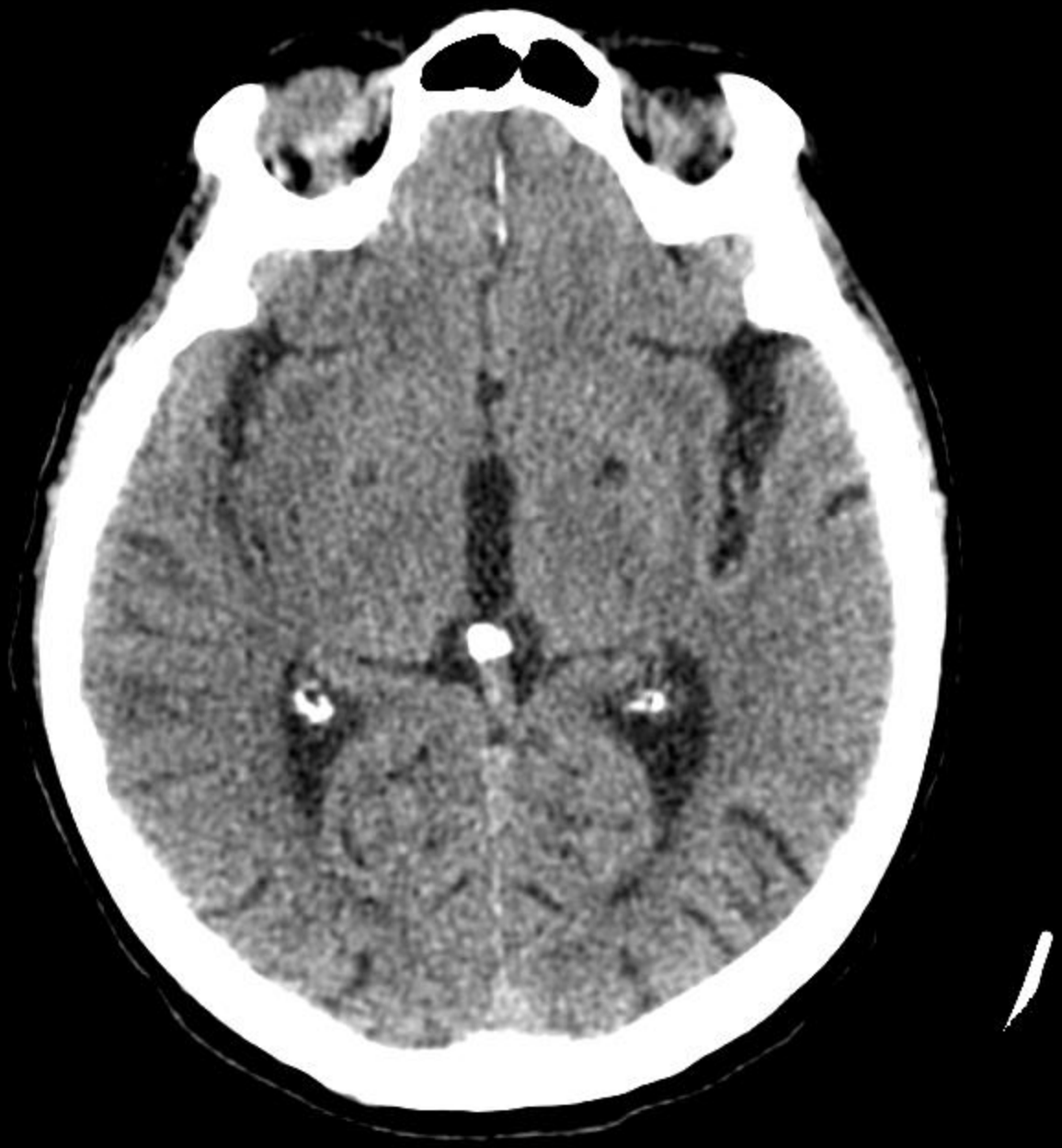


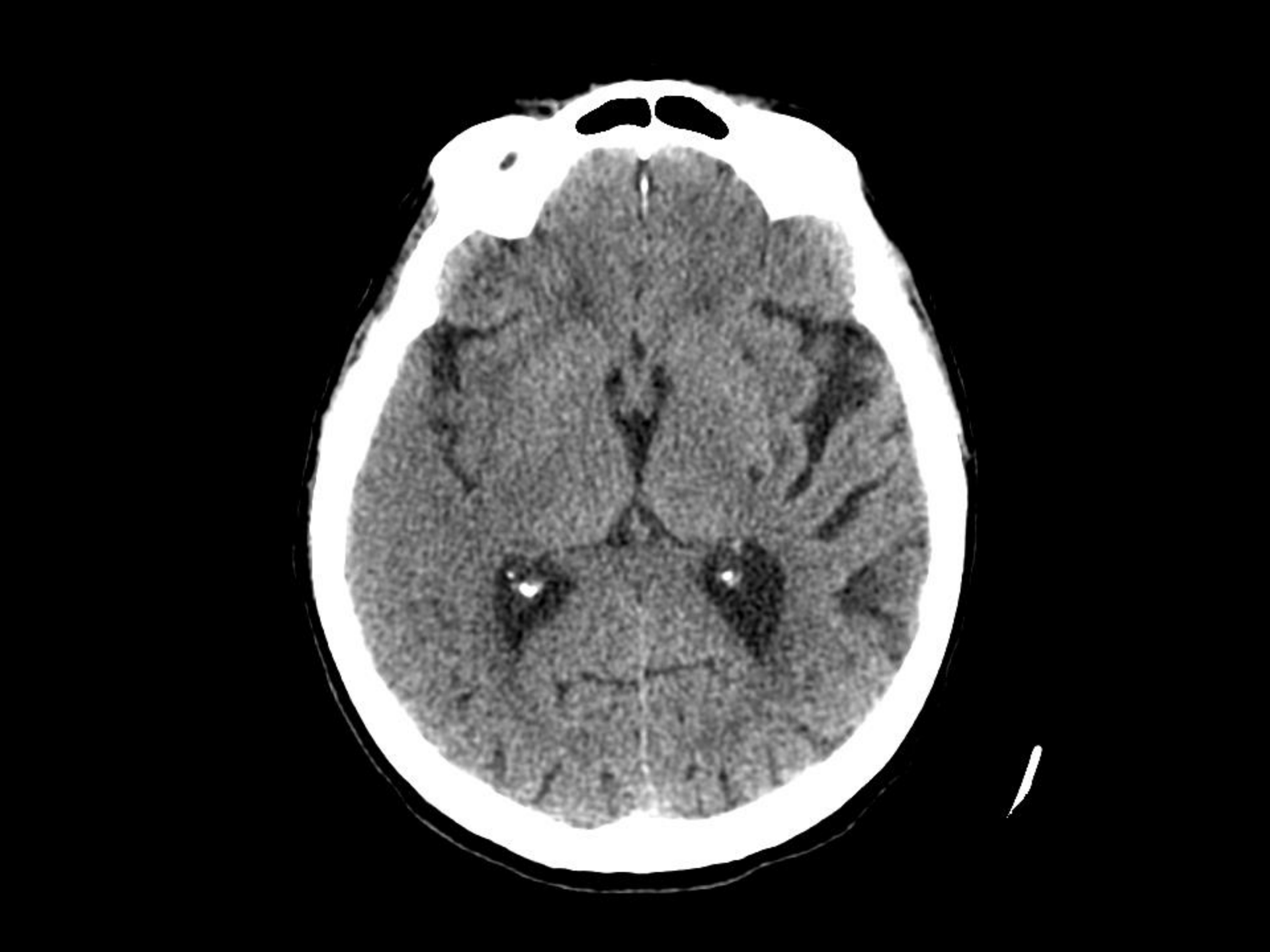


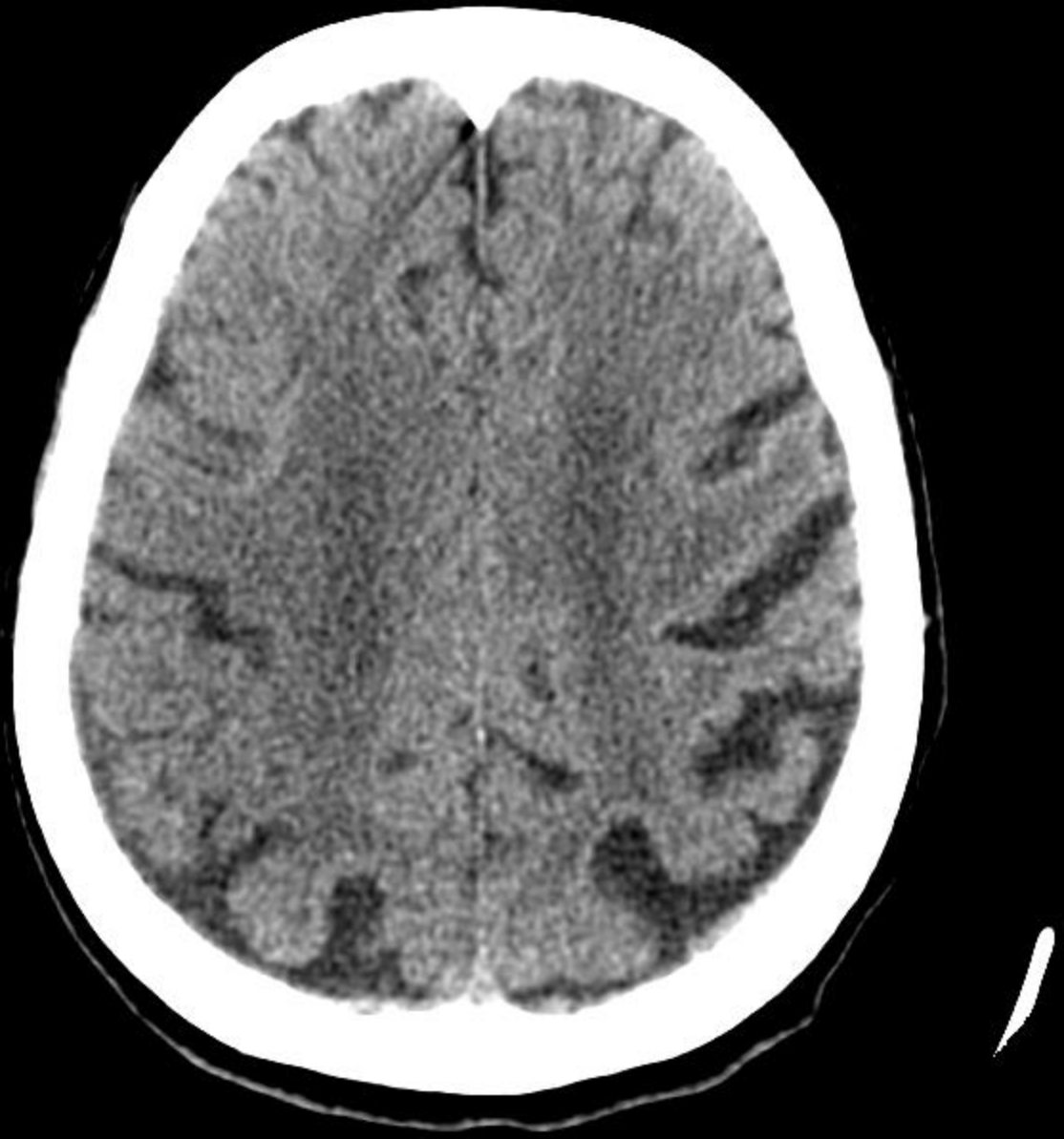


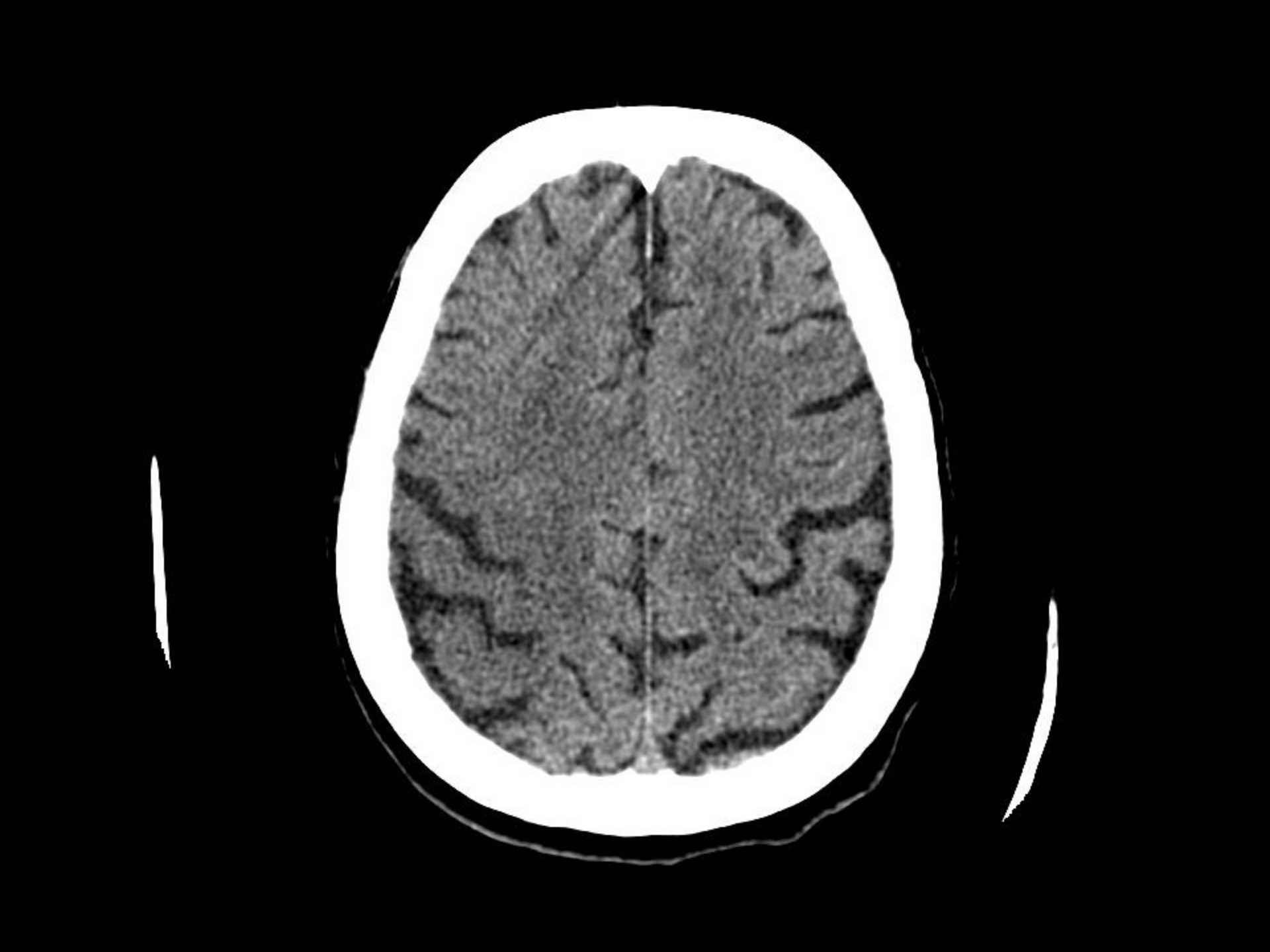


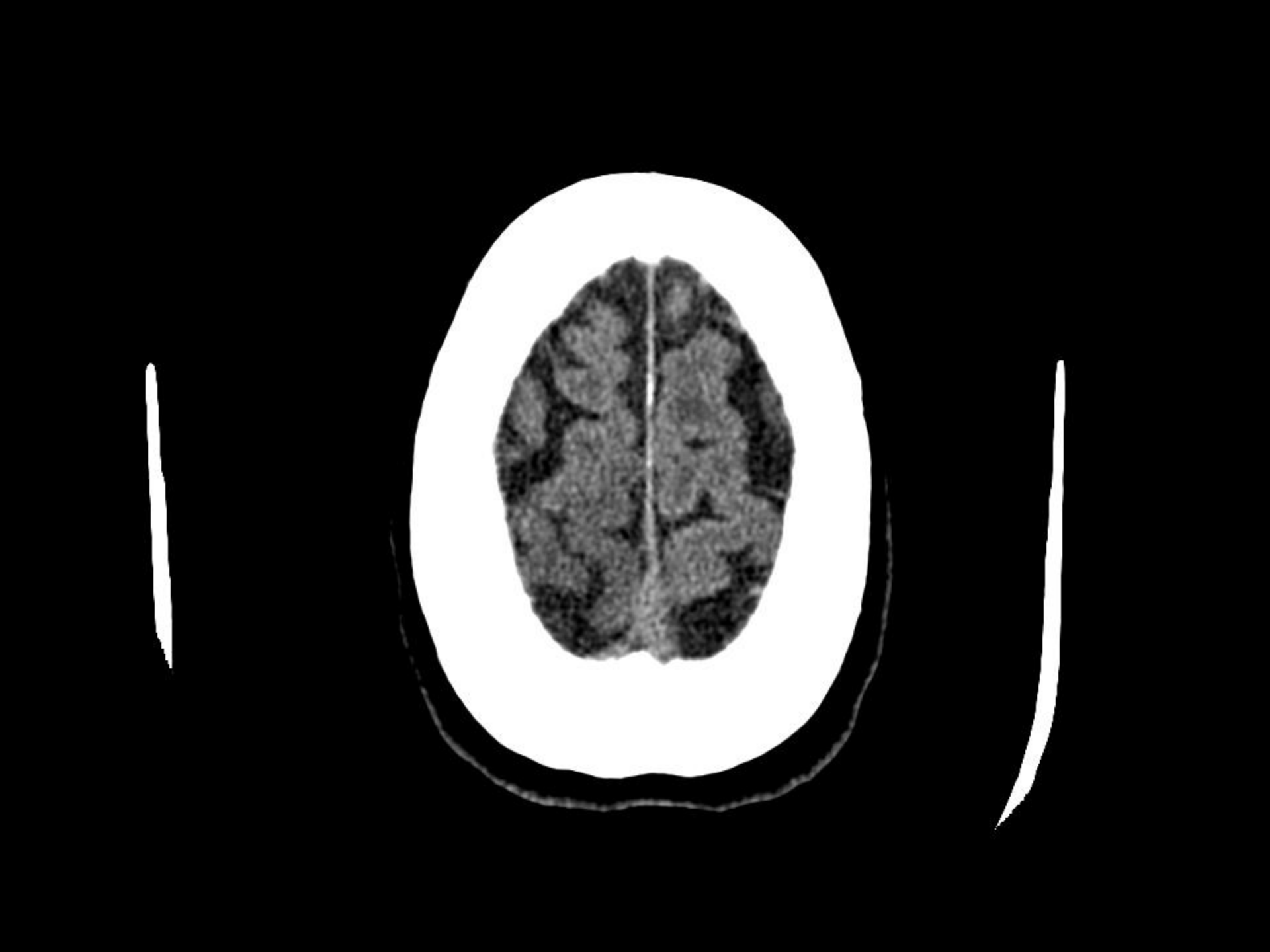


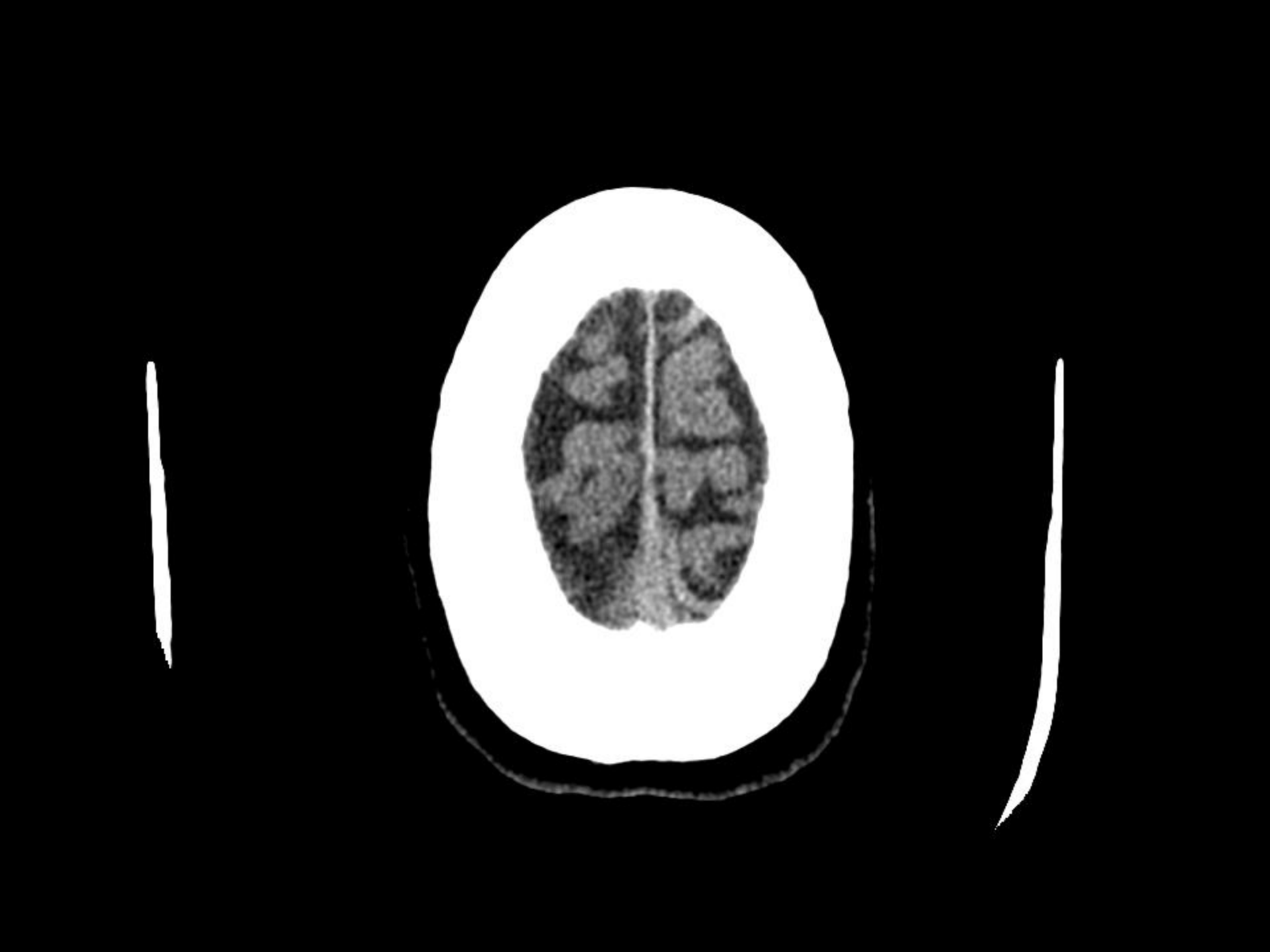


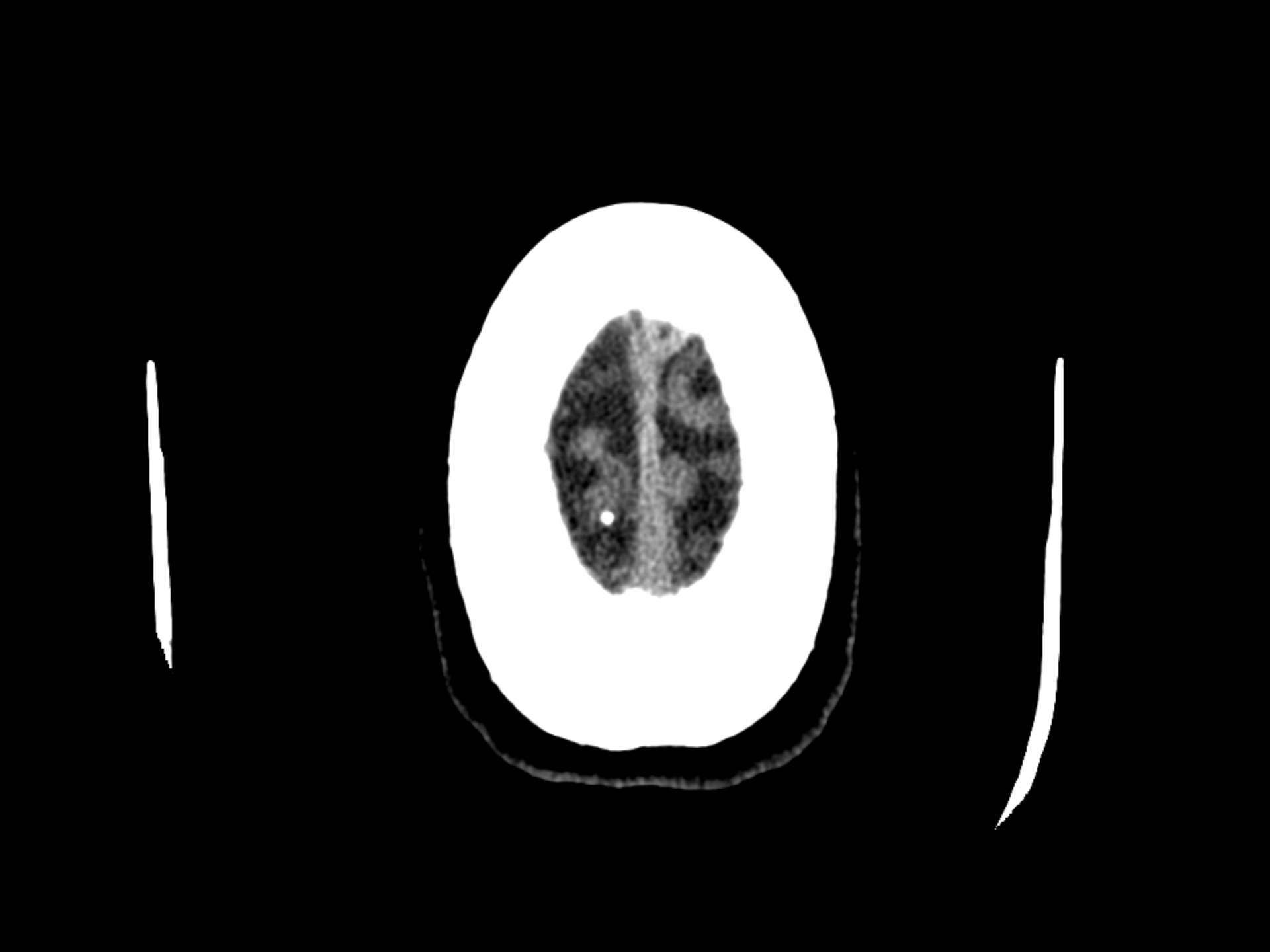












Intracranial Hemorrhage

- http://radiopaedia.org/articles/intracranial-haemorrhage

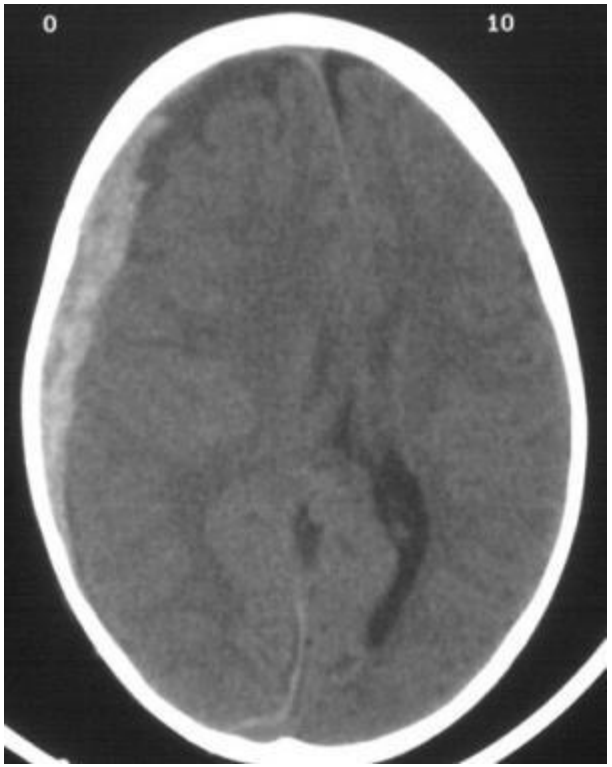
Subarachnoid hemorrhage, acute

Lobar hemorrhage, acute

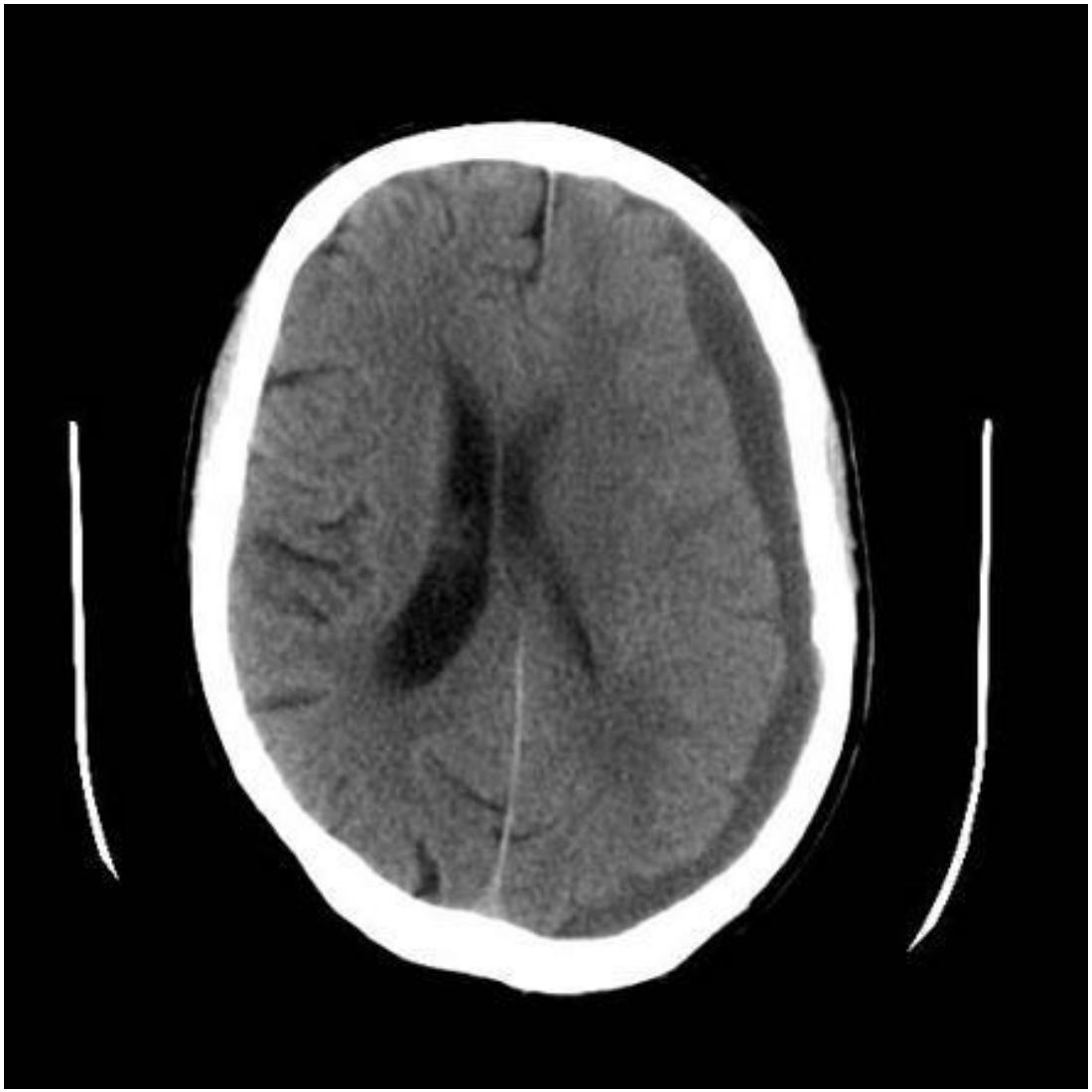
Intraventricular hemorrhage, acute

Epidural hemorrhage, acute

Subdural hematoma, acute



Subdural hematoma, chronic



Subdural hemorrhage, acute on chronic