Subdural Hematoma (SDH)

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Figure 1: Subdural hematomas can become quite large as on this head CT. Even though a component of this hematoma has a convex-medial appearance, the other characteristics (crossing the sutures and wrapping around the parenchyma) are define this as a subdural rather than epidural hemorrhage. This patient also has significant midline shift indicating subfalcine herniation. The right lateral ventricle is dilated, representing hydrocephalus, obstructed at the foramen of Monro.

Figure 2: This axial CT image through the brain demonstrates a dense subdural hematoma superficial to the left frontal lobe, crossing the expected location of the coronal suture (anterior midline arrows). Thin subdural blood is also present along the posterior falx (posterior midline arrow). Subarachnoid hemorrhage is also present within the medial bifrontal sulci (lateral arrow).

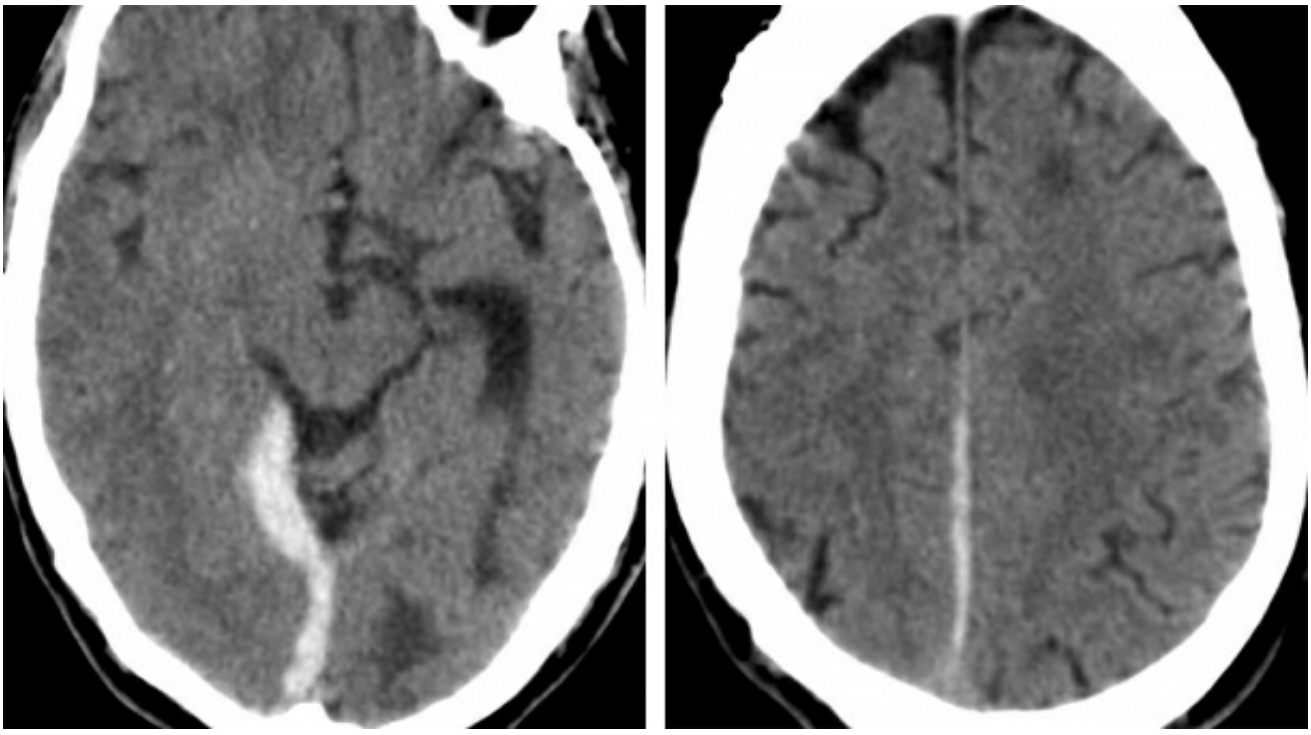

Figure 3: The acute posttraumatic subdural hematoma in this patient is seen on CT along the right tentoral leaf (left) and along the posterior aspect of the falx (right). Careful attention to the density and thickness of the falx can aid in detection of even very thin hematomas that may have prognostic implications in an otherwise normal study. Calcifications along the falx may have a similar appearance but are usually less dense.

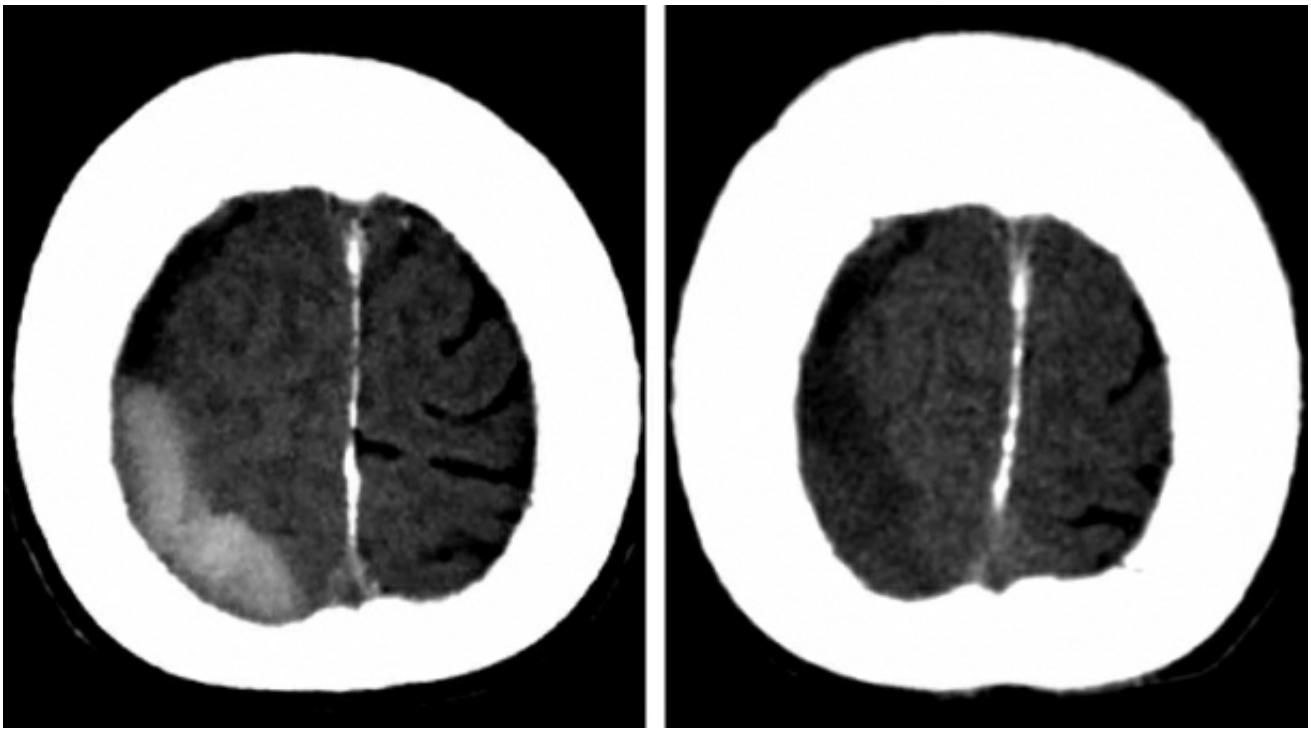

Figure 4: Axial CT images near the vertex demonstrate a dense acute hematoma superficial to the right parietal lobe (left) and a low density chronic subdural hematoma in the same patient 2 weeks later (right).

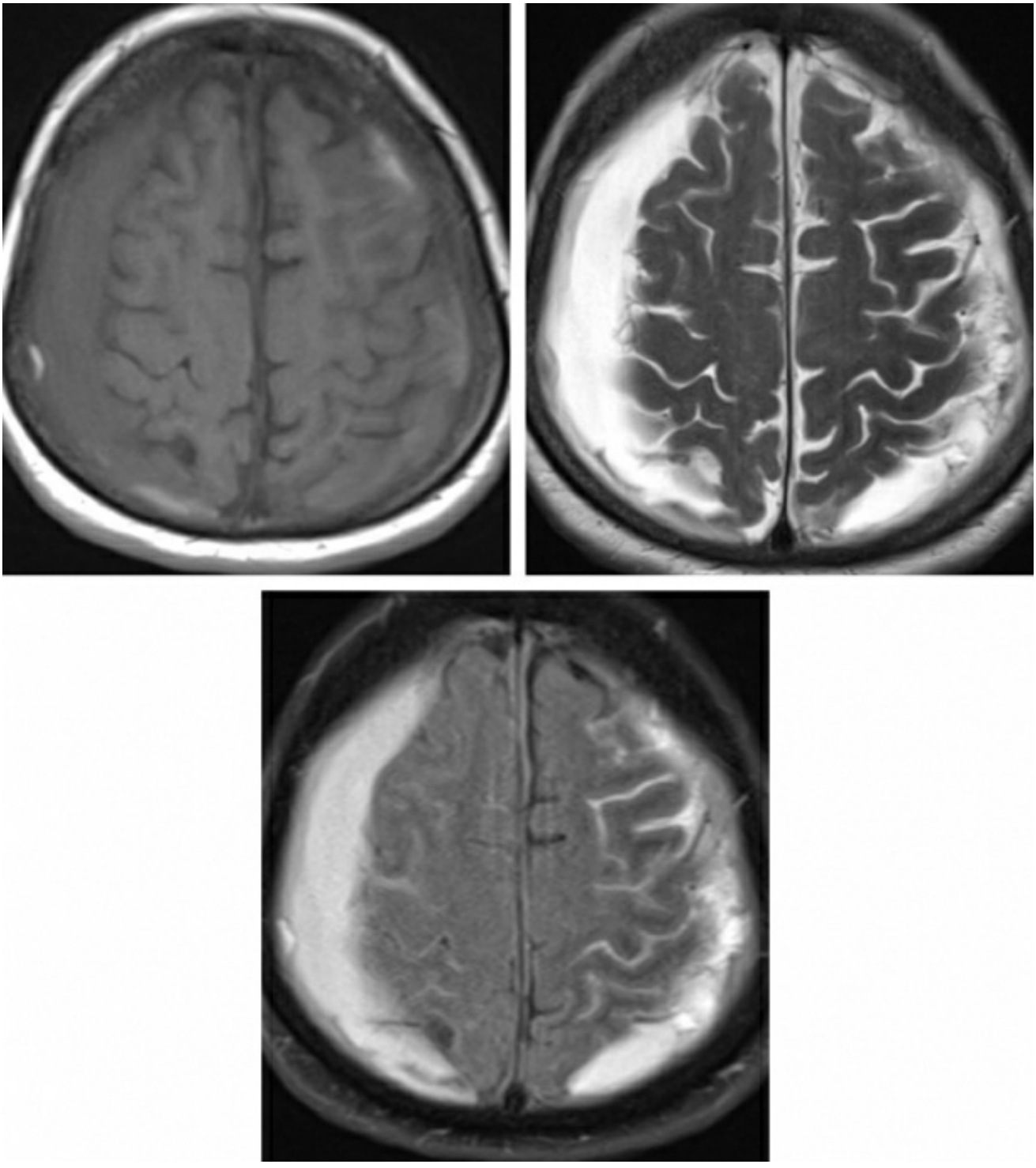

Figure 5: These subacute subdural hematomas are intermediate to bright in signal intensity on T1 (top row left) and hyperintense on both T2 (top row right) and FLAIR (bottom row). CSF

admixing within hematomas often introduces unexpected signal intensities, limiting the aging of hemorrhages. Hyperintense subarachnoid blood is also visible within the left cerebral sulci on FLAIR.

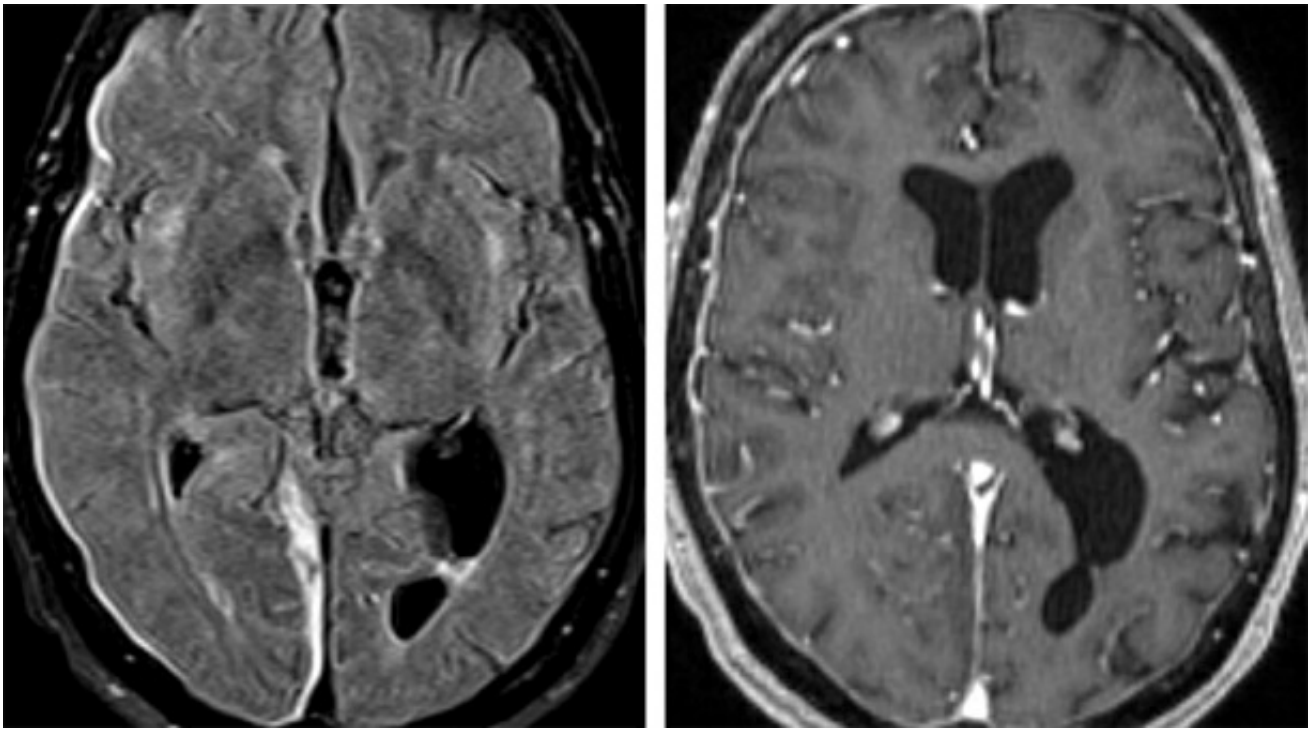

Figure 6: This thin FLAIR-hyperintense early chronic subdural hematoma (left) wraps around the right cerebral hemisphere. There is associated enhancement of the dura on contrast-enhanced T1 weighted image (right) that likely represents granulation tissue and hyperemia reactive to the hematoma.

- Hemorrhagic collection within the relatively weak dural border cell layer between the meningeal dura mater and the arachnoid mater
    - Location/Morphology
        - Supratentorial convexity (See Figure 1 and 2; for additional images reference Skull Fractures chapter) is the common location followed by peritentorial (See Figure 3)
        - Crescent-shaped and spreads diffusely over

affected hemisphere
        - Does not cross dural attachments
        - Freely crosses sutures
        - May extend along falx cerebri, tentorium cerebelli, floor of anterior and middle cranial fossa

Neuroimaging

- Modalities
    - CT without contrast and bone CT is the primary screening study for trauma
    - Coronal and sagittal reformats are best for small SDH
    - MRI is sometimes useful for determining the age of SDH
- CT Findings
    - CT without contrast
        - Hyperacute SDH (≤ 6 hours) – heterogenous density
        - Acute SDH (6 hours to 3 days) –
            - 60% cases are homogenously hyperdense
            - 40% cases are heterogeneous density and may show swirl sign if there is active bleeding
            - Rarely they are isodense as in cases of coagulopathy, anemia with Hgb < 8-10 g/dL
        - If no new hemorrhage occurs, the density slowly decreases
        - Chronic hematoma appears hypodense (See Figure 4)
    - CT with contrast
        - Hematoma displaces cortical veins
        - Dural membranes enhance when the hematoma is subacute
- MRI Findings

    - MRI signal of SDH is quite variable
    - Often displays similar evolution to intraparenchymal hemorrhage
    - Recurrent hemorrhage is common because of which acute and chronic blood products are noted even on the initial exam
    - Recurrent hemorrhage also often makes SDH signal very variable, making age estimation unreliable (See Figure 5)
    - Pia-arachnoid membrane tears can lead to CSF leakage into SDH collections that may further alter signal intensity by CSF dilution
    - For aging of blood on MRI, see Epidural Hematoma chapter
    - T1WI with contrast may show enhancement of the displaced cortical veins
    - Subacute or chronic hematoma may show enhancement of the overlying dura or internal enhancement on delayed scan (See Figure 6)
    - Diffusion weighted imaging is nonspecific showing heterogeneous signal
- Angiographic Findings
    - CT Angiogram (CTA) shows mass effect from extraaxial collection with displacement of cortical veins away from inner table
    - Digital subtraction angiography is performed if an underlying vascular lesion, such as an aneurysm or AV malformation is suspected on CTA
- Differential Diagnosis for subdural hematoma
    - Subdural hygroma
    - Subdural effusion and empyema

- Epidural Hematoma
- Pachymeningopathies (Thickened Dura)
- Tumor
- Chemical Shift Artifact (on MRI)

For more information, please see the corresponding chapter in Radiopaedia.

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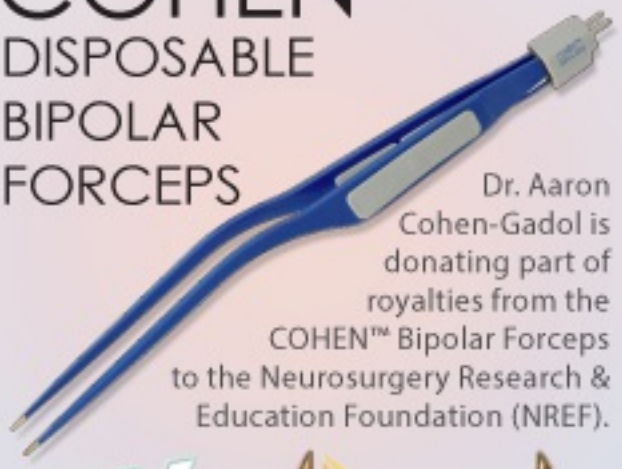

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