20 y/o football player with traumatic head injury

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CT without contrast
T2 FLAIR
Susceptibility Weighted Imaging (SWI)
Cerebral Hemorrhage (Diffuse Axonal Injury)
CT without contrast

- Small focal hyperdensity seen in right frontal lobe
- Hemorrhagic shearing injury
T2 FLAIR

- Small focal hyperintensity seen in right frontal lobe due to edema
- Indicative of acute injury

Note: localized subarachnoid hemorrhage seen adjacent to cerebral hemorrhage obscuring the sulcus
SWI

- Hypointensity representing deoxyHb seen in right frontal lobe

Note: subarachnoid hemorrhage also visible on SWI
**Cerebral Hemorrhage**

**Causes:** Trauma, hypertension, amyloid angiopathy, ischemic stroke conversion, cocaine, neoplasm, coagulopathies, venous infarct, aneurysm (e.g. mycotic)

**Common locations:** Basal ganglia, thalamus, pons, cerebellum, subcortical white matter

**Clinical Presentation:** Sudden focal deficit that progressively worsens, headache, vomiting

**Imaging:** *Clinical presentation is nonspecific, imaging is mandatory*

- **CT:** non-contrast CT is study of choice, CTA for underlying vascular lesion
  - Blood appears hyperdense initially, becomes more hypodense with time
  - Can be surrounded by hypodense area representing edema

- **MRI:** evaluate for underlying mass, cerebral amyloid angiopathy
  - Appearance of blood on T1/T2 depends on stage (see next slide)
  - Acute blood and hemosiderin appear dark on SWI
# Imaging of Intracerebral Hemorrhage

<table>
<thead>
<tr>
<th>Phase</th>
<th>CT</th>
<th>T1</th>
<th>T2</th>
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<tbody>
<tr>
<td>Hyperacute</td>
<td>Hyperdense</td>
<td>Isointense</td>
<td>Hyperintense</td>
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<tr>
<td>(&lt;12h)</td>
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<tr>
<td>Acute</td>
<td>Hyperdense</td>
<td>Isointense</td>
<td>Hypointense</td>
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<tr>
<td>(12h – 2 days)</td>
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<tr>
<td>Early subacute</td>
<td>Hyperdense</td>
<td>Hyperintense</td>
<td>Hypointense</td>
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<td>(3 – 7 days)</td>
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<tr>
<td>Late subacute</td>
<td>Isodense</td>
<td>Hyperintense</td>
<td>Hyperintense</td>
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<tr>
<td>(8 days – 1 month)</td>
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<tr>
<td>Chronic</td>
<td>Hypodense</td>
<td>Iso or Hypointense</td>
<td>Hypointense</td>
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<tr>
<td>(&gt; 1 month)</td>
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References


Ansari, Wolansky. Cerebral Hemorrhage. Radiology Online (2021)