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


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