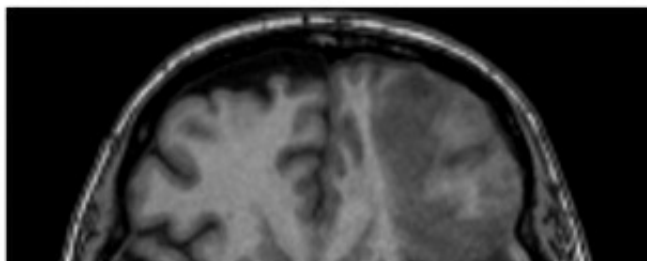
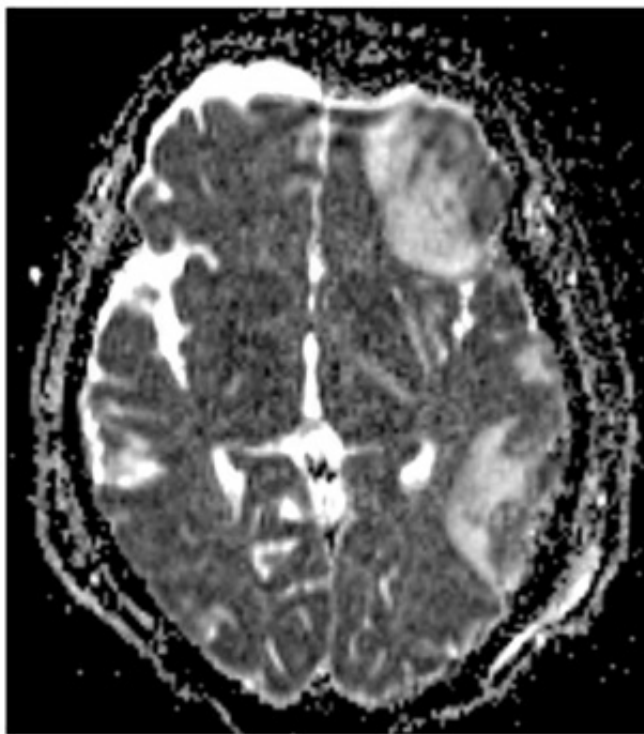
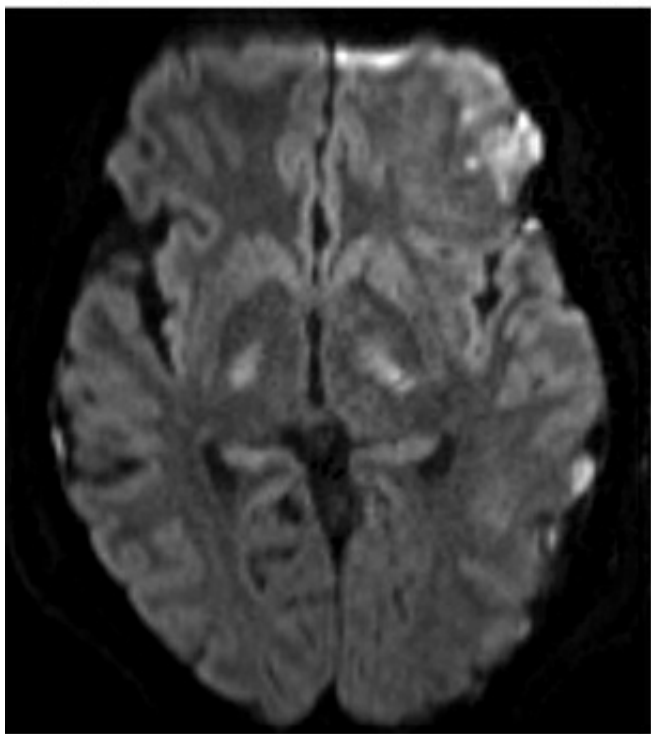
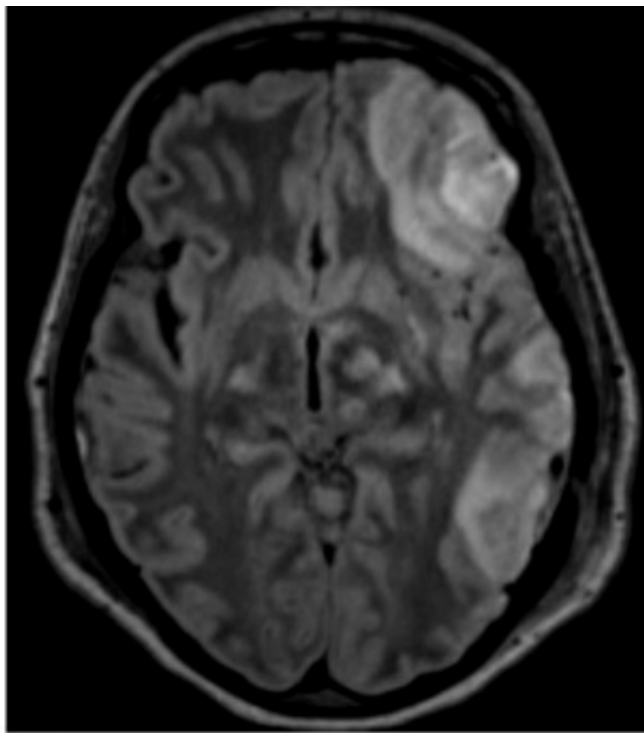




Cerebral Edema

Last Updated: October 1, 2018



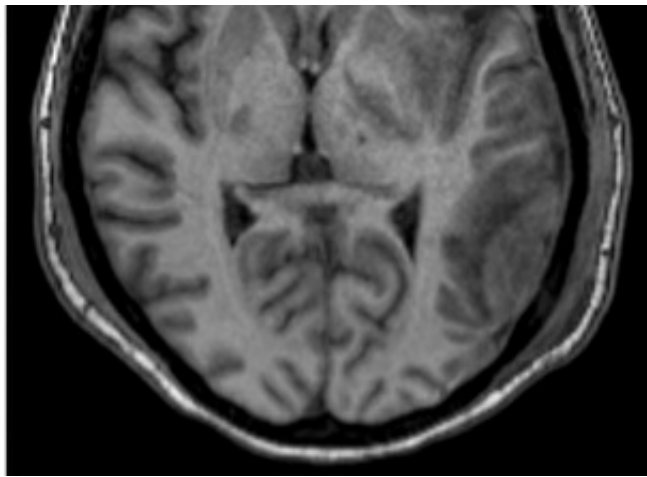


Figure 1: Lateral left frontal and temporal contusional edema is of low density on this CT image (top row left). FLAIR image (top row right) demonstrates the hyperintense edema in the lateral left frontal lobe and lateral left temporal lobe. The involvement of the cortex implies a component of cytotoxic edema, while white matter involvement may be either cytotoxic or vasogenic in etiology. Diffusion-weighted imaging (middle row left) demonstrates hyperintensity in a smaller region of the lateral left frontal lobe and lateral left temporal lobe. The ADC (Apparent diffusion coefficient) image (middle row right) shows a sizeable component of hyperintense vasogenic edema with a smaller component of low signal-intensity cytotoxic edema in the more superficial contusion of the lateral left frontal and temporal lobes. The edema is predominantly hypointense on this T1-weighted image (bottom row), but the areas of more superficial hyperintensity imply a small hemorrhagic component to these contusions.

- 10-20% of moderate to severe brain injuries
- Traumatic edema is usually cytotoxic (due to intracellular edema)
- Children and young adults are most commonly affected
- Develops within the first 2-3 days after trauma
- Can be focal or diffuse

Neuroimaging

- CT findings
 - Low-density brain
 - Decreased gray-white differentiation
 - Effacement of sulci
 - Effacement of subarachnoid spaces
 - Compressed ventricles
 - Vasogenic edema, which is more prominent in the white matter
 - Cytotoxic edema, which is more prominent in the gray matter
 - Secondary effects of cerebral edema include brain herniation, vascular compression and infarction
- MRI findings
 - Hypointense edema on T1 weighted imaging
 - Hyperintense edema on T2 weighted imaging
 - DWI with ADC maps demonstrate
 - High ADC values in vasogenic edema due to extracellular edema
 - Low ADC values in cytotoxic edema due to intracellular edema
 - MR Angiography helps identify secondary effects of vascular compression
 - MR Venography helps determine secondary effects of dural venous sinus compression
 - MR Spectroscopy
 - Decreased NAA, elevated Choline from membrane breakdown
 - Lactate indicates cell death and hence poor prognosis

- Nuclear Medicine findings
 - PET and PET/SPECT may show decreased regional cerebral blood volume
- Differential for traumatic cerebral edema
 - Anoxic encephalopathy
 - Metabolic encephalopathy
 - Pressure-related edema

For more information, please see the corresponding chapter in [Radiopaedia](#).

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