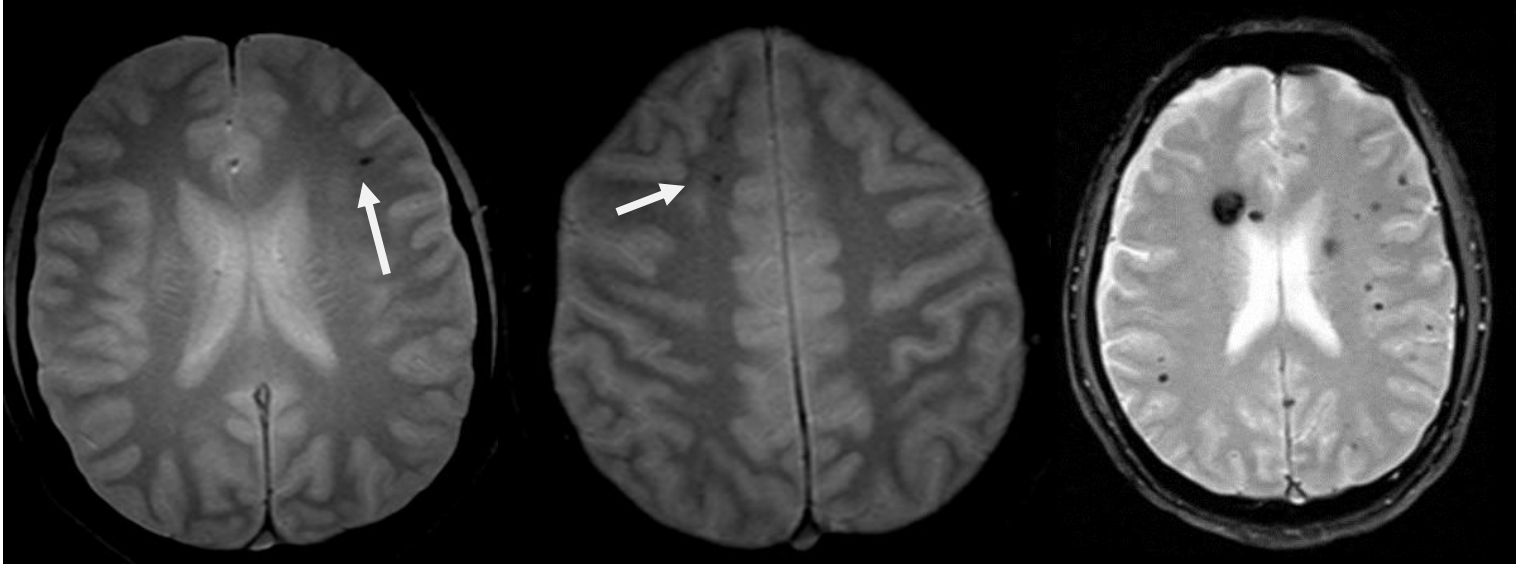


**DIFFUSE AXONAL INJURY (DAI)/ TRAUMATIC BRAIN INJURY (TBI)**



**Fig. 1a**

**Fig. 1b**

**Fig. 2**

**CLINICAL PRESENTATION:** A young patient presented with headaches a few weeks after a motor vehicle accident (MVA). An MRI was ordered. Additional gradient-echo imaging was performed due to history of trauma.

**IMAGING FINDINGS:** (Fig. 1a, 1b) A 3T MRI (3 Tesla MRI) of the brain was performed at AIC-Palmdale. Additional hemorrhage-seeking gradient echo sequence was obtained in the axial planes (shown above). They demonstrate several subtle dark punctate foci in the subcortical frontal centrum semiovale bilaterally. These are ONLY seen on gradient echo images and not on T1, T2 or FLAIR images. They represent subtle areas of magnetic susceptibility artifacts due to **micro-hemorrhages**. They are consistent with mild form of DIFFUSE AXONAL INJURY (DAI).

(Fig. 2) This is another patient showing a more severe form of DAI.

**DISCUSSION:** **Diffuse Axonal Injury (DAI)** is a common form of **Traumatic Brain Injury (TBI)**. Its correct diagnosis could sometimes be challenging, as it may not be visible on a routine MRI and may only be seen on Gradient Echo pulse sequences which exaggerate magnetic susceptibility artifacts from **micro-bleeds** (as in this case). In severe types, it could be devastating, frequently causing long-term coma. In milder forms, it could present with a concussion. Unlike direct focal brain trauma, DAI is more widespread due to traumatic shearing forces such as rapid rotational or deceleration forces seen most commonly in **Motor Vehicle Accidents (MVA)** or **Child Abuse (Shaking Baby Syndrome)**. DAI is a shearing injury to the axons within the white matter tracts causing stretching of the axons especially at the grey-white matter junction. It could also occur in the corpus callosum.

**3T MRI is more sensitive than 1.5T MRI for detection of DAI. ROUTINE MRI MAY MISS IT.**

**MVA is the most common cause of DAI and TBI.**

**PET-CT may also be helpful to diagnose areas of hypo-metabolism as a result of mild TBI.**

*Ray Hashemi, MD*

Ray H. Hashemi, M.D., Ph.D.

Diplomat American Board of Radiology