Neuroimaging in mild TBI

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Historically, routine types of neurological imaging for mTBI include CT and Conventional MRI, both of which are usually normal in mild TBI (mTBI). Newer MRI methods may demonstrate more abnormalities following mTBI than just CT or Conventional MRI alone (Brody et al 2015). These include, but are not limited to, SWI, DTI, rs-fMRI, ASL and Volumetry. Susceptibility Weighted Imaging (SWI) uses contrast to highlight differences between tissues that can show changes in blood products in the brain. Diffusion Tensor Imaging (DTI) can detect brain abnormalities in white matter through its sensitivity to microstructural axonal injury. Resting State Functional MRI (rs-fMRI) measures changes in blood perfusion to determine if pathways of communication within the brain have been disrupted. ASL (arterial spin labelling) uses spatially selective inversion of inflowing arterial blood as a method to label blood flow and measure perfusion. Lastly, volumetric MRI measures the volume and structure of regions in the brain and can detect changes in the volume of gray matter that may result from mTBI.

These specific types of imaging can be incorporated into research in order to learn more about concussions, their diagnosis, and their prognosis. This is the case for the GE-NFL Study on Advanced MRI Applications for mild TBI. By utilizing a research pack for neurological imaging that includes SWI, DTI, Volumetric T1, ASL, and rs-fMRI, researchers have been able to detect abnormalities, including white matter lesions, in the brains of several patients who have suffered from mTBI. Overall, neuroimaging is evolving such that white matter abnormalities, changes in gray matter volume, and blood perfusion in the brains of mTBI patients may be visualized. However, these scans cannot be used conclusively and these techniques are limited to research tools at this time. Therefore, continued study is necessary to further validate these software techniques.

Biography

Teena Shetty is a Fulbright scholar who received her medical degree and bachelor’s degree with honours from Brown University and her master of philosophy degree in medicine from the University of Cambridge. Her residency was completed at Weill Cornell Medical College, New York-Presbyterian Hospital. Dr. Shetty received her fellowship training in neuromuscular diseases at Harvard Medical School, Brigham and Women's Hospital and in neuromuscular diseases and intraoperative monitoring at Hospital for Special Surgery. Dr. Teena Shetty is now a neurologist at Hospital for Special Surgery and is triple board-certified in neurology, neuromuscular medicine, and electrodiagnostic medicine. Her research interests include concussion, post-operative neuropathies, muscle diseases, and intraoperative monitoring, and she has authored more than 30 publications on these topics.

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