MAGNETIC RESONANCE IMAGING (MRI) AND DIFFUSE TENSOR IMAGING (DTI) FINDINGS IN PATIENTS WITH PERSISTENT POST CONCUSSIVE SYNDROME (PPCS)

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Background

Management of Persistent Post Concussive Syndrome (PPCS) may include neuro imaging studies to exclude structural abnormalities. Traditional imaging modalities may be giving way to more sensitive imaging modalities like 3T MRI and DTI, which are becoming more available and readily utilized for brain trauma protocols.

Purpose

The purpose of this study is to investigate incidence of structural abnormalities in mild traumatic brain injury (mTBI) patients with PPCS utilizing 3T MRI scanning and Diffusion Tensor Imaging (DTI).

Methods

- 70 PPCS patients, ages 10-72, who:
  - Completed 3Tesla (3T) MRI with DTI 3-6 months after injury
  - Avg symptom score 52.68/87 (moderate to severe)
  - Imaging at same center with identical protocols.
  - All reads by same group of 6 neuro radiologists using same criteria
- DTI included FA and ADC values for 5 Corpus Callosum (CC) Regions of interest (ROIs) and visual impression of fiber tract abnormalities.
- Exclusion criteria included:
  - Moderate/severe TBI
  - Seizure disorder
  - Missing DTI interpretations
  - Artifact/motion degradation.

Figure 1: Percentage of abnormalities detected on 3T MRI

Results

- 38/70 (54.28%) patients had abnormalities on 3T MRI.
- White matter (WM) lesions were in 32 of 38 (88.89%)
  - Nonspecific WM foci in 22 cases and specific lesions in 10.
  - Pineal cysts were in 3 (7.89%).
  - Hemosiderin deposition in 2 (5.26%).
  - Ventriculomegaly in 1 case (2.63%).
- 49/55 patients (89.09%) had DTI abnormalities on visual impression by neuroradiologist:
  - 23 had mild abnormalities (46.93%)
  - 6 had mild-to-moderate (12.24%)
  - 18 had moderate (36.73%)
  - 2 had moderate-to-severe (4.08%).
- Injured regions included 32.85% anterior, 24.28% mid body, and 42.85% posterior.
  - 19 patients (50%) had more than one region of abnormality.
- Of the 49, 18 had WM lesions on 3T MRI (36.73%).
- Quantitative analysis of FA and ADC values showed abnormalities outside normative data in 36.58%.

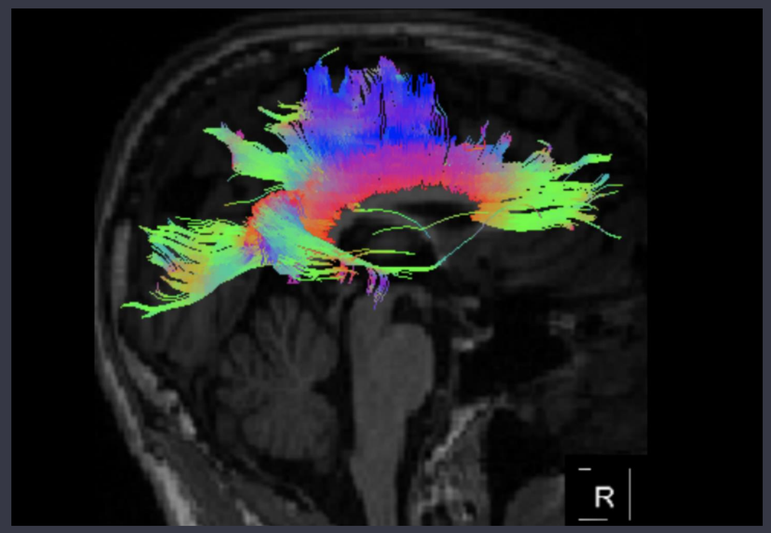

Image 1: Example 3T MRI with DTI Study

Conclusions

Brain MRI abnormalities appear to be common in patients with mTBI and PPCS who undergo 3T MRI with DTI scanning with the majority of findings consistent with white matter injury.

Significance

Findings indicate that a more defined imaging sequence such as 3T images and DTI show significant rates of abnormalities and may be useful to help identify micro structural abnormalities in PPCS patients that may be clinically relevant.

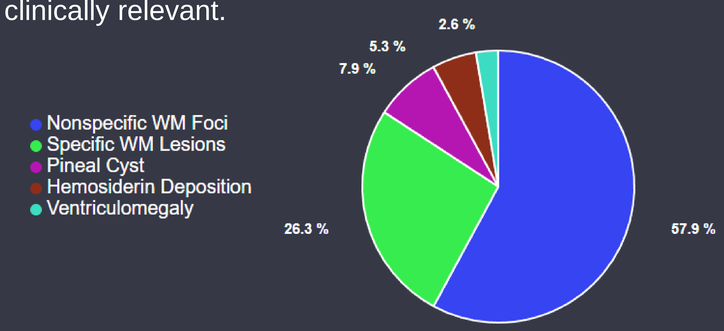

Figure 2: Distribution of 3T MRI Abnormalities Detected

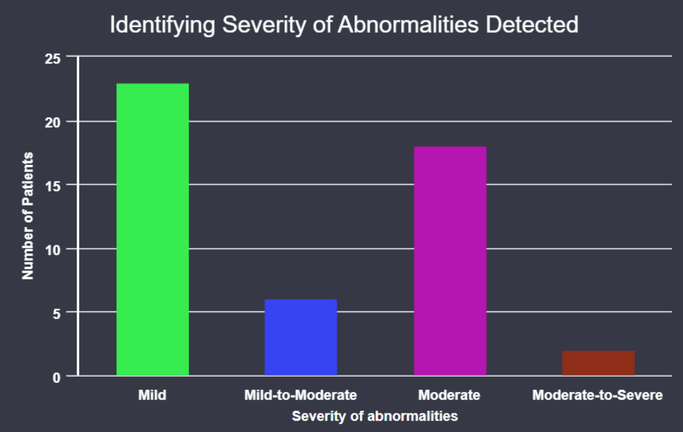

Figure 3: Severity of DTI Abnormalities Detected On Neuroradiologist Visual Impression