Computed Tomography Perfusion Imaging in Patients with Seizures

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Introduction

Computed tomography perfusion (CTP) imaging permits rapid semi-quantitative assessment of regional brain blood flow in patients for stroke and cerebrovascular disease. An acute stroke with salvageable tissue would theoretically produce decreased CBF, normal or elevated CBV, and increased MTT. CTP findings during and after seizures are mixed and its diagnostic utility is unclear.

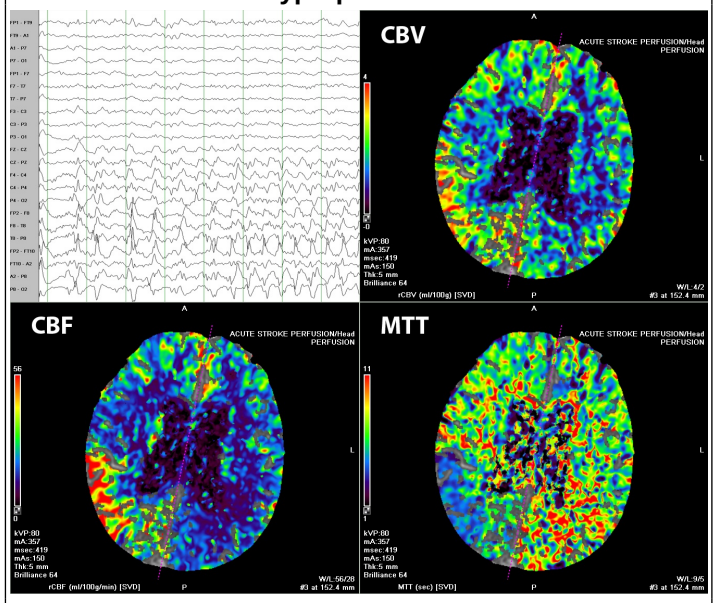
Methods

We performed a two-year retrospective review of patients with a clinical diagnosis of seizures who underwent CTP imaging during workup of post-ictal deficits presenting as possible stroke. A total of 65 patients were found and those with known previous strokes or old perfusion deficits were excluded (n=11).

Results

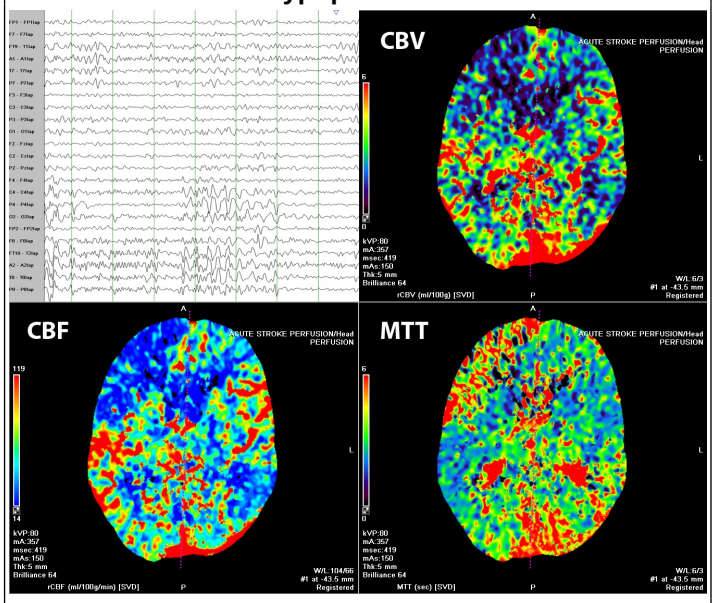
Most patients who were eventually diagnosed as having seizures had normal CTP images; only 10 patients (19%) had abnormal scans (6 with hyperperfusion and 4 with hypoperfusion). Patients who were scanned within a shorter time interval from seizure onset were significantly more likely to have hyperperfusion (99 versus 493 minutes, $p<0.05$). All of the patients with hyperperfusion were found to have ongoing seizure activity on EEG.

Hyperperfusion



94 year old female who presented with altered mental status, head turning and gaze deviation. She was found to have increased CBF, CBV and decreased MTT in the right parieto-occipital region. EEG demonstrated epileptogenic activity in the right parietal lobe. MRI was performed which demonstrated no acute stroke.

Hypoperfusion



83 yo male with left sided hemiparesis and facial droop. The CTP demonstrated decreased CBF, CBF and increased MTT. He had epileptiform activity over the right frontal and temporal regions. The MRI was negative for stroke.

Conclusions

CTP is an excellent diagnostic study to rule out ischemic pathology but may often be normal in patients with seizure. This may be related to the interval between seizure ictus and CTP. However, a finding of paradoxical hyperperfusion rather than hypoperfusion on CTP in a patient with neurological deficit should prompt suspicion of ongoing seizure activity.

References

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