Hemispheric Hypoperfusion in Acute Stages of Migraine with Prolonged Aura

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Introduction

• Migraines are a prevalent neurological disorder affecting 10-15% of the population.
• One third will experience migraine with aura.
• Typical migraine aura consists of visual, sensory, and/or speech disturbance lasting less than 60 minutes.
• Pathophysiology has yet to be elucidated, but theories include vasospasm during aura, vasodilatation during aura, and cortical spreading depression (CSD).
• Evaluating vascular changes associated with migraine aura is difficult due to the unpredictable nature of attacks and because blood flow imaging is often not readily available.

Objective

This case illustrates abnormalities seen on computed tomography perfusion (CTP) imaging in the acute stages of migraine with prolonged aura.

Case History

• 43 year-old male with hyperlipidemia, headaches, and chronic pain presented to an academic hospital emergency department with severe headache, agitation, and word-finding difficulties.
• Patient was in his normal state of health until approximately 1 hour prior to arrival when he began experiencing a severe left parietotemporal headache associated with a paucity of speech and apparent agitation.
• There was no history of fever, focal weakness, vomiting, abnormal movements, or loss of consciousness.
• He had no prior experience of these specific symptoms and had no history of stroke or seizures.

CT Perfusion Brain shows minimally decreased flow perfusion in left frontal, parietal and occipital lobes (A); prolonged time-to-start (B) and prolonged time-to-peak (C) occurs within the imaged left cerebral hemisphere. MRI Brain DWI (D) and ADC (E) shows no acute infarct or injury. CTH (not shown) showed no acute abnormality.

Neurological Exam

• Vital signs were within normal limits except elevated systolic blood pressure (160-190 mmHg)
• Mental status: Agitated and alert but inconsistently able to follow commands.
• Right-sided gaze preference
• Minimal verbal output, though language was fluent and without dysarthria
• Face symmetric without evidence of cranial nerve deficits
• Deep tendon reflexes intact
• No vision loss or visual field cuts
• No focal weakness, full strength throughout
• No tremor or abnormal movements
• No limb ataxia

Stroke Alert Examinations:

• Stroke alert was called upon patient arrival to ED and he was immediately assessed by Neurology.
• Patient underwent stat CTP and MRI imaging.
• Patient was admitted and EEG was placed.
• No clinical or electrographic evidence of seizure occurred.
• Lab work was negative for evidence of infection, electrolyte abnormality, or elevated inflammatory markers.
• Patient remained monitored through the next day.
• Patient began showing improvement 2 hours after onset, and was back to baseline 8 hours later.
• He was discharged home on hospital day 2.
• Final diagnosis was migraine with prolonged aura

Hospital Course

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Discussion

• This case illustrates hypoperfusion in the early phase of migraine with aura. Early detection of cerebral blood flow changes during migraine suggests that aura symptoms correspond to hypoperfusion and the ensuing headache relates to reactive hyperemia.
• This patient, however, experienced aura and headache concurrent with findings of oligemia on CTP, which argues against the aforementioned vascular hypothesis.
• An alternate possibility is cortical spreading depression, which theorizes a pedilalation of hyperemia lasting several minutes, followed by mild oligemia, which may persist > 1 hour.
• This case in consistent with the expected perfusion changes and EEG slowing previously described secondary to prolonged cortical spreading depression.
• Other studies have documented similar patterns of cerebral hypoperfusion in acute stages of aphasic migraine as well as hemiplegic migraine.
• This may suggest a similar underlying pathophysiologysty across various subtypes of migraine with aura, despite differences in clinical presentation.
• Migraines are well-known mimics of cerebral vascular accident, and differentiating between the two has become increasingly important given increasingly frequent ICA use.

CTP Imaging

• Flow Fraction

EEG Data

48 hour EEG monitoring with mildly asymmetric diffuse slowing in clip A, demonstrated later in clip B. No epileptiform discharges occurred during recording.

References


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