A Syndrome of Acute Cerebellar and Hippocampal Restricted Diffusion: A Potentially Fatal Stroke Mimic

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Introduction

Abnormally restricted diffusion on MRI is often associated with ischemic stroke, but other conditions can present similarly. We present six cases of an unusual pattern of restricted diffusion in the bilateral hippocampi and cerebellar cortices leading to obstructive hydrocephalus. Patients present with decreased level of consciousness and require osmotic therapy and/or CSF flow diversion. This pattern of injury is distinct from findings typical for ischemic, anoxic, or toxic injury, suggesting it may represent an under-recognized syndrome which we term CHANTER (Cerebellar, Hippocampal, And basal Nuclei Transient Edema with Restricted diffusion).

Methods

- We identified an ad hoc series of patients at our two institutions between years 2014 and 2017 who presented to the neurosurgical ICU with severe, otherwise-unexplained cerebellar edema.
- We retrospectively identified several commonalities in history, presentation, and imaging.

Figure. Diffusion-weighted MRI of selected brain regions

Restricted diffusion shown here was correspondingly hypointense on apparent diffusion coefficient mapping (not shown). Cases from University of Tennessee Health Science Center (not shown) demonstrated a similar pattern.

Results

Between two institutions, we identified six patients with similar presentations of decreased responsiveness and hypoxia in the context of exposure to opiates or other exposures (table). Ages ranged from 33 to 59 years, and four patients were male. All patients demonstrated similar imaging findings (figure) and all required medical or surgical intervention due to obstructive hydrocephalus secondary to cerebellar edema. The five patients who survived to discharge demonstrated variable degrees of physical and memory impairment on discharge and follow up.

Table. Patient characteristics and outcomes

	Patient 1: 54F	Patient 2: 59M	Patient 3: 49F	Patient 4: 50M	Patient 5: 35M	Patient 6: 33M
Acute exposure	hydromorphone	BZD, cocaine, opiates	heroin	cocaine, fentanyl	amphetamine, etOH	cocaine, BZD, etOH
Clinical presentation	unresponsive, apneic after in-hospital hydromorphone	unresponsive, extensor posturing, hypoxic	found unresponsive, cyanotic	found unresponsive; last well 2 days prior	encephalopathy, decreased activity	found unresponsive
Initial GCS	3	5	7	3	11	3
Hospital interventions	MV, HTS, EVD, SubOcc	MV, HTS, EVD, SubOcc	MV, HTS, EVD, SubOcc	MV, HTS, EVD; had pre-existing SubOcc	HTS	MV, HTS
Disposition	trach/PEG, acute rehabilitation	in-hospital death	PEG, shelter home	SNF	acute rehabilitation	home with supervision
Followup	2 months: moderate cognitive impairment; mild-moderate weakness, wheelchair-bound	n/a	1 month: mild dysarthria only	6 months: cognitive and memory deficits; living at nursing home	3 months: abulia, memory and cognitive issues, mild hemiparesis; living with family	2 years: end-stage renal disease; living alone with home health

BZD = benzodiazepines; etOH = ethanol; EVD = extraventricular drain; F = female; HTS = hypertonic saline; M = male; MV = mechanical ventilation; n/a = not applicable; PEG = percutaneous endoscopic gastrostomy; SNF = skilled nursing facility; SubOcc = suboccipital decompressive craniotomy; Trach = tracheostomy

Conclusions

- CHANTER is potentially novel syndrome of cerebellar, hippocampal, and basal nuclei restricted diffusion
- CHANTER is distinct from anoxic brain injury, ischemic stroke, and toxidromes such as “chasing the dragon.”
- Aggressive early management of cerebellar edema and hydrocephalus may be warranted, given the potential for good outcomes