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A Multidisciplinary Approach to Rapid Diagnosis and Management of CHANTER Syndrome in an Adolescent Male, Case Report

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Abstract

Objectives: Opioid toxicity is becoming increasingly prevalent in the pediatric population and naloxone resistant syndromes must be recognized rapidly and treated accordingly.

Methods: A case study of a 14-year-old male was reviewed and analyzed.

Results: The patient presented to the emergency department (ED) hemodynamically unstable with a Glasgow coma scale (GCS) of 3, fentanyl and tetrahydrocannabinol (THC) positive on urine drug screen (UDS), without improvement on naloxone administration. Initial computed tomography (CT) brain imaging showed parenchymal abnormalities necessitating magnetic resonance imaging (MRI). On the subsequent MRI, the patient was found to have cerebellar, hippocampal, and basal nuclei edema with restricted diffusion.

Discussion: The MRI pattern suggests a recently emerging opioid related hypoxic anoxic brain injury. After a prolonged hospital course including intensive inpatient care, multiple neurosurgical operations, radiologic discussions, familial care conferences, and extensive physical rehabilitation, the patient made a remarkable recovery. Rapid identification of this syndrome is critical for appropriate care. Potential complications arising from this condition include elevated intracranial pressures (ICPs) and hydrocephalus, as occurred in this case, which may require surgical intervention. The recent 2023 brain death guideline changes accurately capture this patient's isolated infratentorial injury, highlighting adherence to the new guidelines and the potential for recovery with a multi-disciplinary approach to care, including physical medicine and rehabilitation interventions.

Differential

Opioid-Related Condition	Key Features	Management
Opioid Related Hypoxic Injury	Altered mental status (AMS), bradypnea, coma	Opioid antagonists, supportive care
CHANTER (cerebellar, hippocampal, and basal nuclei edema with restricted diffusion syndrome)	Polysubstance use, any age, and key neuroimaging findings as in title.	Opioid antagonists, supportive care, with low threshold for neuroimaging, possible neurosurgical consult
POUNCE (pediatric opioid use-associated neurotoxicity with cerebellar edema syndrome)	Polysubstance exposure, usually <3 years age, gray matter sparing and cerebellar involvement	Opioid antagonists, supportive care, with low threshold for neuroimaging, possible neurosurgical consult
OAA (opioid-associated amnestic syndrome)	Bilateral hippocampal injury, polysubstance use	Opioid antagonists, supportive care, with low threshold for neuroimaging
HLE (heroin-inhalational leukoencephalopathy) "Chasing the Dragon"	Motor "restlessness", progressing to terminal stage spasms, paresis, and mutism with cerebellar white matter lesions.	Opioid antagonists, supportive care, with low threshold for neuroimaging, possible neurology consult

Case Report

Patient Characteristics: A 14-year-old Caucasian male with history of bipolar disorder, attention deficit hyperactivity disorder (ADHD), and suspected substance use disorder was brought to the emergency department (ED) by ambulance after being found unresponsive at home.

Presentation: Tachycardic, tachypneic, hypertensive to 170s/90s, and severely obtunded with a GCS of 3. Initial examination revealed intact brainstem reflexes including: cough, gag, and pupillary. Diagnostic evaluation was notable for urine toxicology positive for tetrahydrocannabinol (THC) and fentanyl, acute kidney injury (potassium of 6.0 and creatinine of 1.27), rhabdomyolysis (creatinine kinase of 2800), coagulopathy (INR of 1.9), elevated inflammatory markers (C-reactive protein of 17), transaminitis (AST and ALT of 1200).

Interventions: Craniectomy and extra-ventricular drain placement (EVD), tracheostomy and gastrostomy, EVD adjustment x 2, intense management of paroxysmal sympathetic hyperactivity (PSH), and acute rehabilitation (physical, oropharyngeal, cognitive, and neuropsychiatric)

Outcome: At two years from injury, is at cognitive baseline, has persistent right sided foot drop and leg hypertonia, able to ambulate 10ft independently, with one forearm crutch >1000 ft, and has been attending high school in person.

Neuroimaging

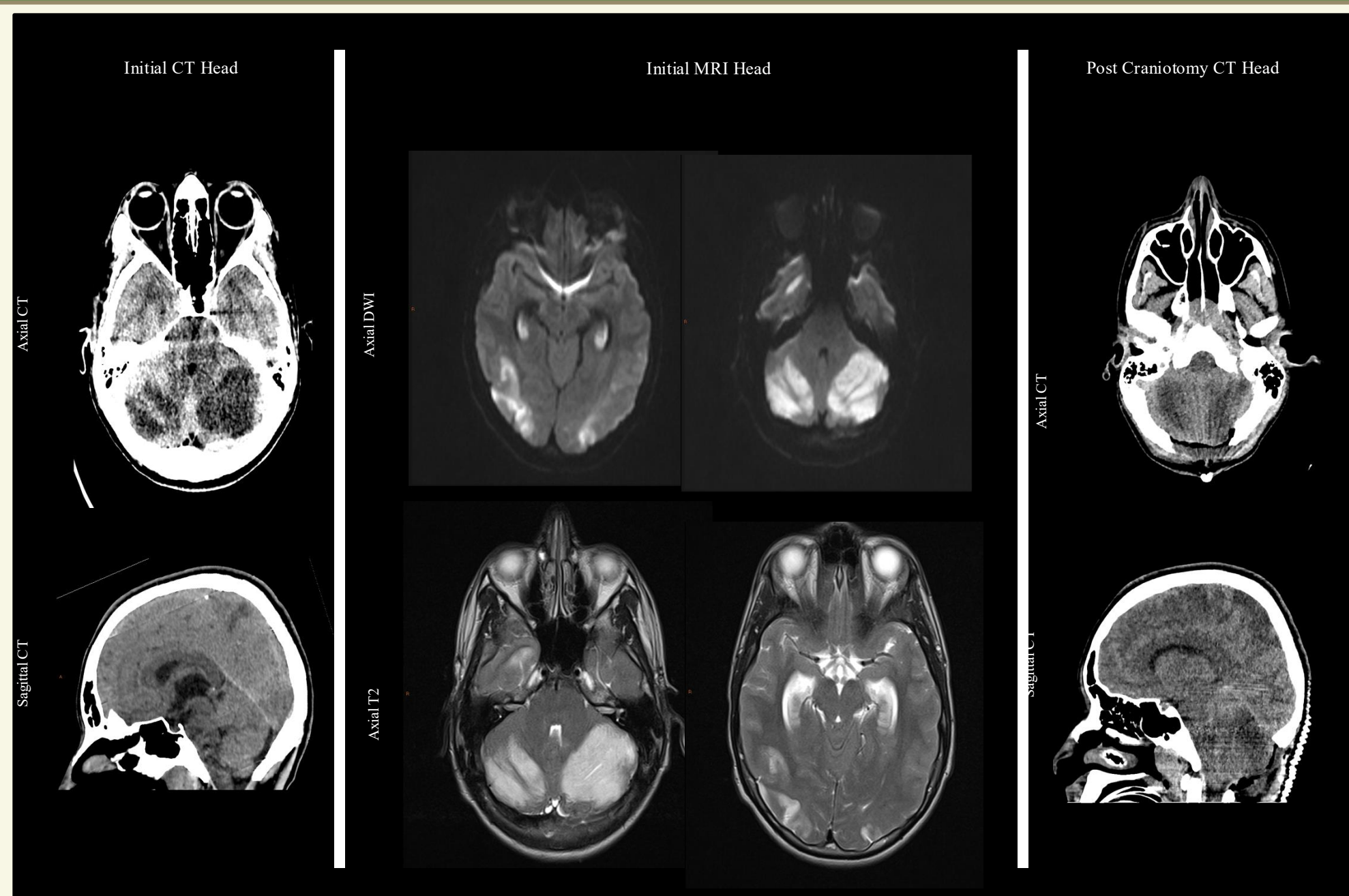


Figure 1: Initial and postsurgical imaging for the patient. Initial head CT shows loss of grey-white differentiation in the cerebellar hemispheres and effacement of the prepontine cistern due to edematous mass effect. Initial MRI (axial DWI and T2) shows diffusion alteration throughout the cerebellar hemispheres and affected supratentorial regions with associated T2 hyperintensity. Postoperative axial and sagittal non-contrast CT images show postsurgical changes from the suboccipital craniotomy.

Timeline of Patient's CHANTER Syndrome Recovery

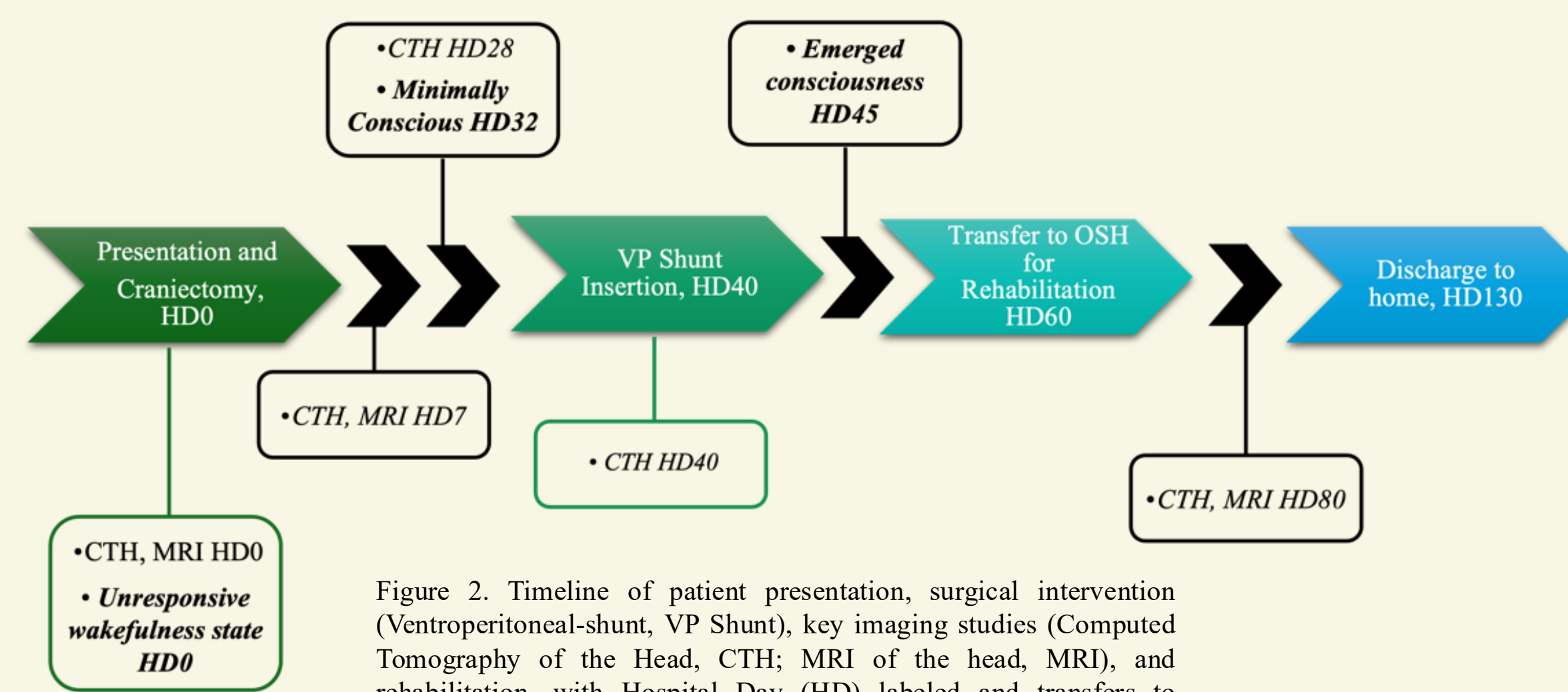


Figure 2. Timeline of patient presentation, surgical intervention (Ventriculoperitoneal-shunt, VP Shunt), key imaging studies (Computed Tomography of the Head, CTH; MRI of the head, MRI), and rehabilitation, with Hospital Day (HD) labeled and transfers to outside hospitals (OSH) included.

Discussion & Conclusion

Discussion: The 2023 updates to the pediatric and adult brain death guidelines^[14] are of particular importance, which address the increasing recognition of infratentorial lesions presenting similar to brain death. These guidelines state that isolated infratentorial lesions causing brainstem compression are insufficient to diagnose brain death without additional catastrophic supratentorial injury. This update is highly relevant to this case report, since once his infratentorial compression lesion was relieved, he was stabilized and made a recovery close to his baseline status

Conclusion: This case involved a 14-year-old male with CHANTER syndrome from a fentanyl overdose. His presentation highlights the need for rapid recognition and treatment, emphasizing the crucial role of multidisciplinary teams (neurosurgery, neurology, critical care, PM&R) as well as adherence to the most recent brain death guidelines. While recovery can be slow and initial prognosis poor, this case shows marked recovery is possible with rapid identification, medical stabilization, and intensive rehabilitation.

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