Acute Toxic Leukoencephalopathy Following Fentanyl Overdose: A Case Report

SINAI HOSPITAL
A LifeBridge Health Center
Rehabilitation Institute
ABBEL - Anil Bhave Biomechanics & Engineering Labs Research Division
CARE BRAVELY

Katerina Havlik, DO; Alexandra Chenowith, BS; Matthew Bankert, DO;
Christine Yunjae Wang, MD; Sarah A. Eby, MD; Mariam Keramati, DO; Jordan Wickstrom, PhD
ABBEL Research Division, Rehabilitation Institute at Sinai, Sinai Hospital of Baltimore, Baltimore, MD

Case Presentation

Presentation

- 33-year-old male
- Presented to the emergency department
- Progressive confusion and generalized weakness

Physical Exam

- Lethargic
- Slowed speech
- Paranoia, flat affect
- Limited participation with motor & sensory exam

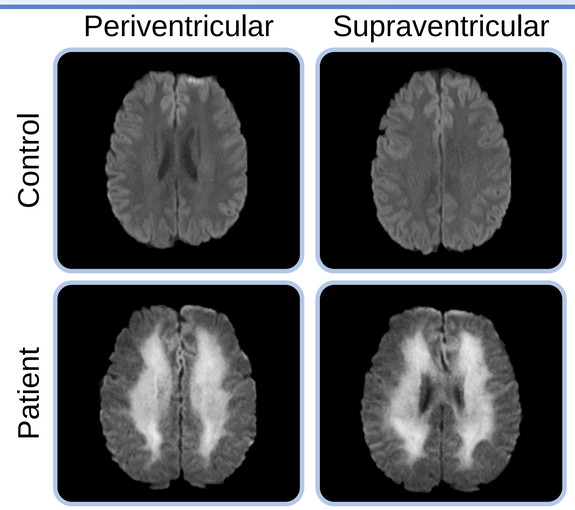
Initial Results

Test	Results
BMP, CBC, Phos, TSH, troponins	Within normal limits
Urine toxicology	Negative
Serum alcohol	Negative
CT head without contrast	Negative for acute pathology
Electroencephalography	Diffuse cortical slowing, no evidence of epileptic activity
Lumbar puncture	No evidence of infection
Blood, CSF, and urine cultures	Negative

Patient Timeline

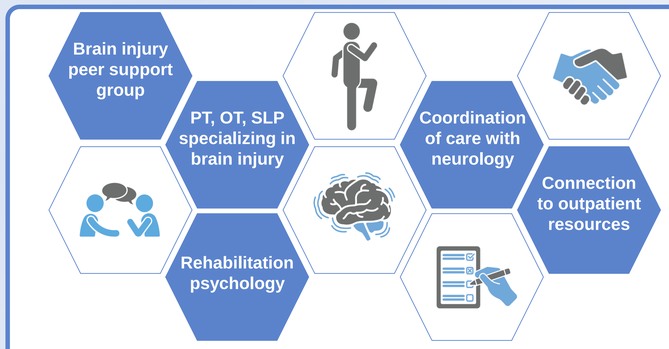
- **04/05/23**: Admitted for fentanyl/cocaine overdose
- **04/09/23**: Discharged home
- **05/14/23**: Admitted with weakness and AMS
- **05/25/23**: Intubated and admitted to ICU
- **06/14/23**: Admitted to inpatient rehabilitation facility
- **06/30/23**: Discharged home with outpatient follow-up
- **01/13/25**: Neuropsychology evaluation

DW-MRI



**DW-MRI performed on 5/17/2023 confirmed ATL diagnosis*

Therapy & Outcomes



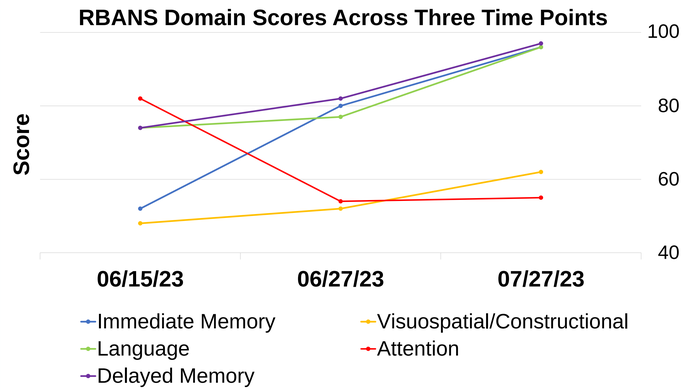


Figure 1. Patient's Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) scores (maximum score: 160)

Pathophysiology

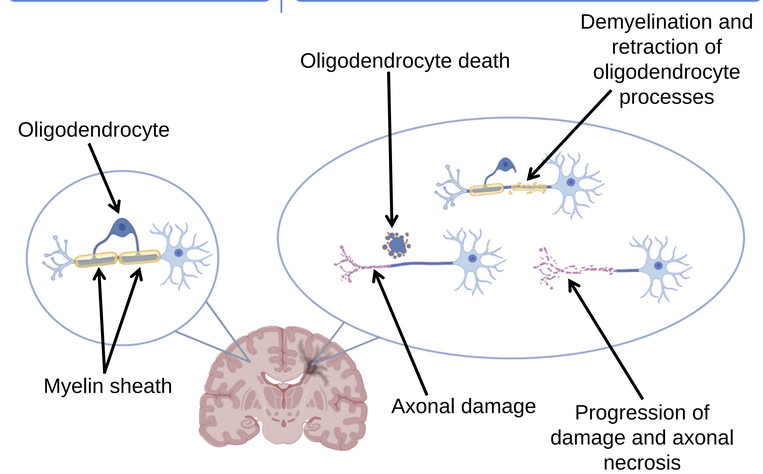


Figure 2. Proposed pathophysiology of acute toxic leukoencephalopathy. Oligodendrocytes are primarily affected. Myelin damage may reverse, but ongoing demyelination can cause permanent axonal loss.[1]

Discussion

Supporting Literature

- Mortality rates in opioid-associated acute toxic leukoencephalopathy (ATL) have been reported to be as high as 40%[2]
- Opioid-associated ATL is increasingly recognized but underdiagnosed[1]
- MRI findings are highly characteristic, typically showing symmetric restricted diffusion in the periventricular and deep white matter[3]

Conclusions

- Early recognition and imaging are essential to treating ATL
- Specialized rehabilitation and coordinated follow-up enabled significant recovery
- Addressing stigma and improving access to care are key in optimizing outcomes for patients with substance use history

References