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Carrie Schmitt  
_Henry Ford Health System_, cschmit1@hfhs.org

Imran Tarrar  
_Henry Ford Health System_

Alicja Wasilewski  
_Henry Ford Health System_

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Stimulant Induced Chorea
Carrie Schmitt, DO MS, Imran Tarrar, MD & Alicja Wasilewski, MD
Psychiatry Residency, Henry Ford Allegiance Health

Introduction
Adderal, a Dextroamphetamine/Levoamphetamine salt, a synthetic compound similar to methamphetamine, is a widely used stimulant type medication commonly used to treat Attention Deficit Hyperactivity Disorder and Attention Deficit Disorder in children, adolescents, and adults. It works through a mechanism of increasing the release of both norepinephrine and dopamine in the central nervous system, thereby enhancing cognitive effects of increased wakefulness, improved cognitions of focus and concentration, and decreasing hyperactivity, impulsivity and inattentiveness. But at higher doses or through methods of abuse Adderal can cause signs of impaired cognitive function, signs of psychosis, and produce movement disorders, such as chorea.

![Chemical Structures of Amphetamine and Methamphetamine](Image 1)

**Figure 1** Chemical Structures of Amphetamine and Methamphetamine

Chorea is characterized by abnormal involuntary movements that can consist of short, irregular, asymmetrical, sudden, unexpected, non-stereotypy movements.

![Image of Chorea](Image 2)

**Figure 2** Image of Chorea

Chorea can have various causes including:
- Hereditary diseases (Huntington’s, Wilson’s, Lesch Nyhan, Friedreich’s Ataxia),
- Post-infectious syndromes (Sydenham’s chorea),
- Medical (thyrotoxicosis, HIV, cerebrovascular),
- Immune-mediated (SLE, Celiac),
- Endocrine and metabolic (pregnancy, polycythemia vera),
- Drug-induced (levodopa, neuroleptics, anti-convulsants, oral contraceptive pills),
- Misuse of psychostimulants (cocaine, methamphetamine, amphetamine).

Case Report
A 39 year old female with a past psychiatric history of mood disorder, anxiety, and attention deficit disorder was initially admitted to the hospital ICU unresponsive status post-cardiac arrest of unknown origin. While in the ICU and intubated, the patient had an additional episode of ventricular tachycardia and subsequent cardiac arrest, necessitating defibrillation and shock.

Days after admission:
- Day 1: Cardiology consultation for evaluation of causation of cardiac arrest. Likely etiology peripartum cardiomyopathy. The patient, G15P10, recently delivered her 10th child less than 1 month prior to admission.
- Day 3: Neurology consultation for concerns of unresponsiveness. Patient starting to regain consciousness, still intubated, but requiring medical and physical restraints due to agitation.
- Day 5: Psychology consultation for assessment and management of mood disorder. On MDE, patient presented pleasant, cooperative, no use of restraints noted, and did not show any signs of mood alteration, depression, or anxiety. Most prominent feature on MDE was cognitive impairment with difficulties in attention, concentration, registration, and short-term memory. Cause of cognitive impairment speculated as related to anoxia from recent cardiac arrest. History of “street drug” use elicited by family, patient denied.
- Day 9: Psychiatry re-consultation for behavior of severe agitation, aggression towards hospital staff, requiring the use of physical restraints after being transferred from the ICU to the medical floor. On MDE, patient was A0X1, very disorganized, hyperverbal, loud, agitated, and displaying prominent choreathetotic movements of involuntary jerking surrounding the face, shoulders, and pelvis. Patient necessitated assistance when walking due to movements and instability. Patient’s home medications of Celsexa 20 mg daily, Adderal 30 mg twice daily, and Ativan 1 mg daily. Patient denied any history of drug abuse, but did admit to possibly taking more than prescribed after recent birth of her 10th child (22 days prior).

Labs
CMP: AST/ALT (47/17), Alk Phos (148)
CBC: WBC (21.9), H/H (10.5/533.7), Platelets (454), Neutrophils (19.27)
TSH (1.59), Troponin (0.02), Lactate (6.6), Procalcitonin (1.36), UA (-)
UDS: (+) amphetamine, (-) benzodiazepine, (-) EtOH
MAPS: Adderal script filled 4 days prior to hospital admission

Imaging
CT Head: (-) EKG: sinus rhythm with occasional PVCs and LAD ECHO: EF 35%, global hypokinesis with LV dilation 24 hour EEG: moderate diffuse encephalopathy, (-) epileptiform activity

Discussion
It is well known that at high doses or through forms of misuse and abuse that stimulants can cause movement disorders, such as chorea. But there is additional research supporting evidence that at lower doses or commonly prescribed doses over an extended long period of time that stimulants can cause changes in cell processes and surface structure in the brain, most notably in the nigrostriatal pathway of the dorsal striatum and substantia nigra, leading to a possible dose-dependent relationship to some of the adverse effects seen with stimulants as is such a possibility in this case.

Upon regaining consciousness, this patient demonstrated movements of: involuntary, abrupt, random, repetitive, non-stereotypy, jerking, which are consistent with choreathetosis. After discussion with the patient and obtaining collateral information with family members and the Michigan MAPS system, it was concluded that the patient’s movements were due a combination of prolonged Adderal use through prescription and the recent self-increase in the amount of Adderal. Patient believed the increase would help with fatigue and low energy after the birth of her 10th child. This unprecedented increase of the stimulant lead to the development of acute chorea, which resolved within days after no stimulant use.

Treatment: In this case, treatment included stopping the suspected offending agent, which was Adderal. Providing supportive care as needed, including benzodiazepines for agitation. We recommended avoiding the use of antipsychotic medications altogether due to the potential cardiac complications as the patient was status-post 2 cardiac arrests and diagnosed with a peripartum cardiomyopathy.

Conclusion
This case illustrates the importance of considering prolonged prescribed stimulant use in the context of misuse as a development of chorea.

References

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