

TITLE: Nonketotic hyperglycemia causing left sided hemiballismus

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VISUAL CASE DISCUSSION:

A 31-year-old female presented to the emergency department experiencing involuntary movements of her left upper and lower extremities. The movements started suddenly two weeks prior to the date of presentation without identifiable inciting event. The movements improved when the patient focused on a task using the affected extremities but persisted at all times including during sleep. The right sided extremities were unaffected. Her movements are demonstrated in **video 1**. A head CT **image 1** was completed and showed asymmetric hyperdensity of the right caudate head and right globus pallidus/putamen. Her laboratory results returned a basic metabolic panel of: Na 125, K 3.6, Cl 93, bicarb 21, anion gap 11, BUN 6, Cr. 0.98, glucose 763. Her urine was negative for ketones and was significant for greater than 1000 of glucose. Her Hb-A1c was 15. The patient was diagnosed with nonketotic hyperglycemia causing left sided hemiballismus and admitted to the hospitalist service for further management of her hyperglycemia. During her hospital course, the patient had neurology and endocrinology consultations and glucose was controlled. She experienced resolution of the involuntary movements on hospital day two. Due to extenuating circumstances at home, the patient signed out against medical advice on hospital day two.

insert video

insert CT

INTERACTIVE QUESTIONS:

Question 1: 64-year-old female arrives with involuntary movements of her right upper and lower extremities for the past week. Her examination is remarkable for hemichorea. The remainder of her exam demonstrates normal sensation, full motor strength in all extremities and intact balance. Based on these neurological findings, which area of the brain is mostly likely affected?

A: Left cerebral cortex

B: Left basal ganglia

C: Left cerebellum

D: Right cerebellum

E: Right basal ganglia

Answer: Choice B is the correct answer. Choreiform movements originate in the basal ganglia on the contra-lateral side of the brain from where the symptoms are manifested. The patient above has intact coordination which would indicate an intact cerebellum and has normal gross sensation and strength which would indicate an intact cerebral cortex.

Question 2: A 43-year-old female presents to the emergency department with left sided hemiballismus. Onset was 10 days prior. CT imaging of the brain demonstrates hyperdensity in the right putamen, globus pallidus and caudate head. Her history is remarkable for diabetes mellitus type 2 and she has been without her usual medications for two weeks due to lack of insurance. You suspect nonketotic hyperglycemia causing left sided hemiballismus. What is the most important step in treatment?

A: Insulin

B: Haloperidol

C: Ativan

D: Restraints

E: Metformin

Answer: Choice A is the correct answer. With nonketotic hyperglycemia, the treatment for this condition is correction of the hyperglycemia. With correction of the hyperglycemia, the hemiballismus will typically improve. As insulin and controlling the glucose are the definitive treatment, these should not be delayed and therefore are the most important treatment. Such sedating medications such as haloperidol or Ativan may be given in some cases prior to recognition of the cause however once you suspect nonketotic hyperglycemia, treatment is glucose control. Restraints are not treatment for this condition and should not be applied unless the patient is in imminent danger of injuring themselves with the movements. Metformin is not indicated in the acute treatment of hyperglycemic events.

Question 3: A 74-year-old female presents to the emergency department with left sided hemiballismus. CT imaging of the brain reveals hyperdensity in the right putamen, globus pallidus and caudate head. Her history is remarkable for type 2 diabetes, hyperlipidemia, myocardial infarction and she has been off all of her medications for the past 2 weeks. You suspect nonketotic hyperglycemia causing left sided hemiballismus. What is the expected clinic course for this patient?

A: Worsening with lorazepam

B: Worsening with attempted glycemic control

C: Improvement with haloperidol

D: Hemiballismus is permanent

E: Resolution or near resolution with glycemic control

Answer: Choice E is the correct answer. In case series reported on nonketotic hyperglycemia¹⁻⁴, the patients experienced either complete or near complete resolution of their hemiballismus with glycemic control. There are no literature reports of lorazepam or glycemic control worsening symptoms. While treatment with haloperidol may result in some mild alteration in the movements, it does not produce the resolution that glycemic control offers. There were no case reports in the literature of permanent findings of hemiballismus caused by nonketotic hyperglycemia.

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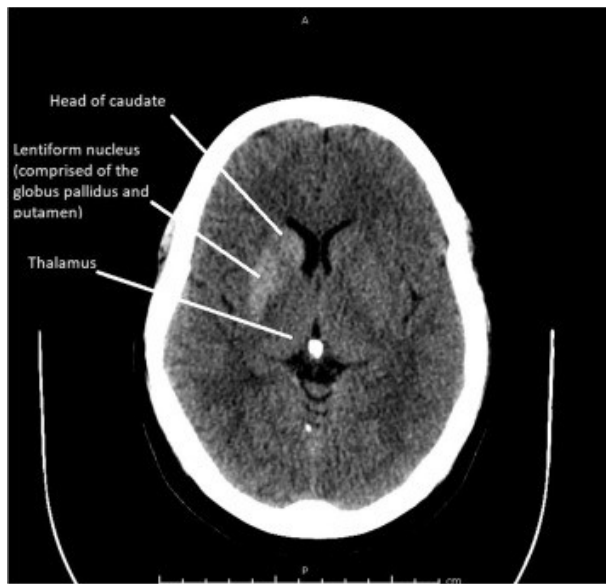


FIG 1 Head CT