"Have I lost my mind?"

DALHOUSIE UNIVERSITY Inspiring Minds

Jennie Stanley, MD, CCFP(EM)

David's case

David, 36, is found yelling and cursing in the middle of a busy road. Police are called to the scene and he becomes progressively more agitated and requires multiple attempts to subdue, eventually resulting in the use of a Taser for neuromuscular incapacitation to approach and restrain.

Because of his bizarre behaviour, David is brought to the ED for further assessment.

Medical history

David's family is contacted. They provide a history of daily cocaine use in the patient. The family has not heard from David for 3 days prior to the episode.

His past medical history is significant for asthma and hypertension. He takes salbutamol regularly and hydrochlorothiazide. He has no known psychiatric illness.

Examination

David's vital signs are as follows:

- Temperature: 39.9 ºC
- BP: 160/95 mmHg
- Heart rate: 120 bpm
- Respiratory rate: 30 breaths per minute
- Oxygen saturation: 96% on room air

He is agitated and yelling. His skin is flushed and diaphoretic. He has regular heart sounds with no murmurs appreciated. There are good breath sounds bilaterally. He is moving all limbs. There is no evidence of nuchal rigidity.

Turn to page 4 for more on David.

Questions & Answers

1. What is the differential diagnosis?

The differential diagnosis in a patient with fever, tachycardia and agitation includes:

- Infectious: encephalitis
- Toxic: cocaine, methamphetamine intoxication
- Structural: stroke, closed head injury
- Medication related: neuroleptic malignant syndrome
- Other: excited delirium

2. What is excited delirium?

Excited delirium is becoming a more common diagnosis. It is frequently listed as a cause of death in patients who die in police custody and, less commonly, in hospital. This is a term that is, at times, unfamiliar to the general public and also to many medical professionals. Excited delirium is a much-debated diagnosis and is not listed in the *Diagnostic and Statistical Manual of Mental Disorders-IV*. Although a universal definition of excited delirium is exceedingly difficult to find, a number of key pathologic features seem to come up regularly in the relevant literature (Table 1).

3. What are some of the underlying causes of excited delirium?

The following key pathologic features are usually present in excited delirium:

- hyperthermia with loss of compensatory response,
- acidosis from a variety of mechanisms and
- triggers "tipping the balance" that may lead to cardio-respiratory arrest if the diagnosis is not recognized.

Table 1

Common features of excited delirium

- Unbelievable strength
- Pain tolerance
- Endurance in fighting restraint
- Hyperthermia
- Bizarre and violent behaviour
- Aggression
- Hyperactivity
- Paranoia
- Incoherent shouting

Hyperthermia and acidosis may develop as a result of a number of factors (most commonly stimulant use), along with the physiologic effects of psychiatric illness and the medications used to treat it (or a combination of these two). Though these features are most frequently found to be the cause of excited delirium, the differential of the agitated patient is broad and further investigations should always be performed.

4. What specific underlying pathophysiologic processes may be involved?

Cocaine use/abuse

Chronic cocaine use results in increased stimulation of catecholamine receptors as well as a decreased re-uptake of these neurotransmitters. This leads to a lack of balance of excitatory and inhibitory tone in the central nervous system. Dopamine, specifically, is key in hypothalamic thermoregulation. As cocaine use interferes with dopamine homeostasis, it may lead to hyperthermia.

Psychiatric illness

Abnormalities in neurotransmitter function, specifically dopamine, may increase the risk of occuring in excited delirium patients with underlying psychosis. Chronic antidepressant or neuroleptic use may also be a factor.

Rhabdomyolysis

Rhabdomyolysis is a breakdown of muscle tissue that leads to excessive myoglobin in the blood stream. It can be caused by a variety of factors including prescription and drugs of abuse use, prolonged immobilization, systemic disease and severe overexertion or muscle trauma. Left untreated, it may lead to acute renal failure, acidosis, electrolyte disturbances and cardiac dysrhythmias resulting in death. Many pathophysiologic factors of patient in custody may increase their propensity to develop rhabdomyolysis (*i.e.*, physical struggle, drug and alcohol intoxication, use of Tasers, dehydration).

Dr. Stanley is a Staff Member, QEII Health Sciences Centre and Cobequid Community Health Centre, Dalhousie University, Halifax, Nova Scotia.

Publication Mail Agreement No.: 40063348
Return undeliverable Canadian addresses to:
STA Communications Inc.
955 boulevard St-Jean, Suite 306
Pointe-Claire, QC, H9R 5K3

David's case cont'd...

David was given 4 mg of intramuscular midazolam, which was effective in calming his behaviour.

The following was also noted:

- His infectious work-up was negative
- His ECG showed sinus tachycardia
- He had a metabolic acidosis with a pH of 7.30
- His creatine kinase level was elevated at 2,000 U/L with urine positive for myoglobin
- His renal function was within normal limits
- He received IV hydration and cooling measures and his urine was alkalinized

David was admitted to the internal medicine unit for ongoing treatment and monitoring. His mental status slowly normalizes and he later admits to having taken crack cocaine for 3 days prior to his admission.

Acidosis

Acidosis no doubt plays a role in many in custody deaths from excited delirium. A case series done in 1999 looked at five cases of restraint-related CV collapse in patients with excited delirium. All exhibited severe acidosis, the most severe of which was a patient with a pH of 6.25. Potential physiologic mechanisms include:

- acidosis secondary to stimulant-mediated vasoconstriction and anaerobic respiration,
- lactic acidosis due to physical altercation and restraint along with
- respiratory acidosis secondary to hypoventilation in the prone position (positional asphyxia) in addition to
- other physiologic mechanisms related to the patient's underlying medical conditions.

Acidosis leads to organ dysfunction and electrolyte disturbances that may result in death.

Neuroleptic malignant syndrome (NMS)

Many patients in police custody may be suffering from psychiatric illness. Consequently, they may be taking neuroleptic medications. A rare reaction to these medications is NMS, which may also present with many of the features of excited delirium. The important additional pathognomonic feature is muscle rigidity. Law enforcement officers are not trained to recognize this syndrome; hence, these patients may not receive appropriate treatment. The interventions required to attain control of such agitated prisoners may exacerbate the NMS leading to bad outcomes.

Hyperthermia and acidosis may develop as a result of a number of factors, along with the physiologic effects of psychiatric illness and the medications used to treat it (or a combination of these two).

Take-home message

- Have a high index of suspicion for excited delirium in agitated patients in police custody
- Patients with excited delirium have a high mortality risk
- Keep your differential diagnosis broad
- Pay attention for signs of hyperthermia, a key feature of excited delirium
- Initiate treatment early for signs of rhabdomyolysis and acidosis
- Get psychiatry involved if indicated once metabolic issues are corrected
- Patients with excited delirium should be admitted to the hospital

5. *What is the essential work-up of patients with excited delirium?*

Vital signs, oxygen saturation, blood sugar and an ECG should be taken as soon as possible. The history should focus on the risk factors for developing excited delirium (*i.e.*, stimulant use, prior psychiatric illness) or for an infectious etiology. The physical exam should include looking for signs of hyperthermia, as well as a full neurologic and CV exam aimed at identifying arrhythmias.

Perform investigations looking for signs of muscle breakdown (creatine kinase, urine for myoglobin), an ECG to look for arrhythmias and prolonged QT, electrolytes with calculation of the anion gap with or without blood gas to assess for acidosis. An infectious source should be investigated as necessary.

6. *What is David's appropriate initial management?*

David may require chemical restraints. Benzodiazepines should be considered as first-line treatment, with dose titrated to effect. He should receive cooling measures, hydration and (if rhabdomyolysis is diagnosed) alkalinization of the urine.

David should be admitted to the hospital for monitoring and treatment of electrolyte imbalance, acidosis and renal failure. A psychiatry consult may be indicated in some cases. Dx