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Rhabdomyolysis in a Previously Healthy 33-Year-Old Man

Urgent message: Life-threatening degrees of rhabdomyolysis can be seen in young, healthy patients with stable presentation and nearly normal examination findings.

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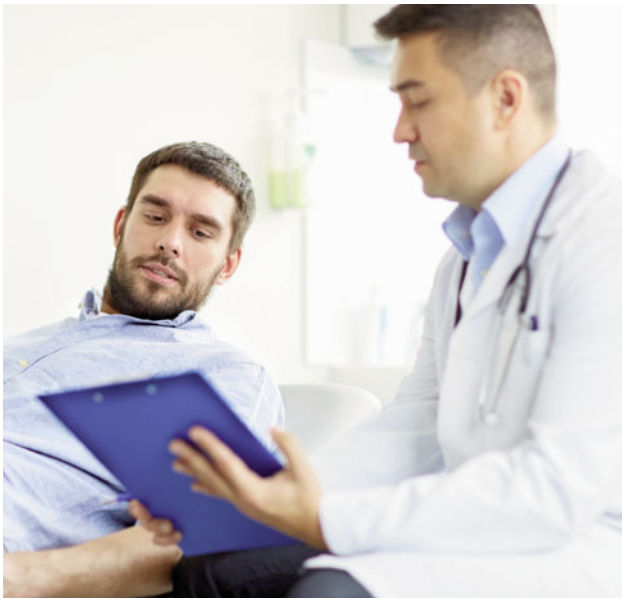
Introduction

This case demonstrates the importance of considering and ruling out rhabdomyolysis in patients with myalgia. We describe a case illustrating the management and work-up of myalgia in a young, healthy individual to identify the underlying cause. As with many illnesses, the linchpin to make the diagnosis is often found in the history.

Case Presentation

A 33-year-old healthy male presented to urgent care reporting diffuse muscle pain and soreness since the previous evening, with associated weakness, headache, and discoloration of his urine. He presented to the urgent care center concerned for dehydration. The patient exercises regularly and most recently lifted weights yesterday. He denies strenuous exercise or excessive exertion, outside of his usual regimen. Patient denies alcohol, drug, or supplement use.



Physical Examination

The initial physical examination revealed a patient in no acute distress, with vital signs as follows:

- Temperature PO: 36.2° C
- Heart rate: 79 bpm
- Blood pressure: 144/95 mmHg
- Respiratory rate: 20 breaths/min
- O_2 sat: 100% on room air

The patient's lungs were clear to auscultation bilaterally, respirations were nonlabored, and breath sounds were equal. The cardiovascular examination revealed normal peripheral perfusion and a regular heart rate and rhythm without murmur. Extremities showed no sign of edema, swelling, tenderness, or ecchymosis. The abdomen and back were nontender. The neurologic examination showed no focal neurologic deficit; cranial nerves II through XII were intact; and normal sensory, motor, speech, and coordination findings.

Diagnostic Results

An electrocardiogram showed no acute changes. A urine sample was collected and demonstrated dark, tea-colored urine. Urine dipstick showed heme-positive urine. An IV was started; the patient received a 1 L fluid

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Complete Metabolic Profile		
Albumin	**3.4 g/dL**	**Low**
BUN	12 mg/dL	Normal
Calcium	**8.1 mg/dL**	**Low**
CO_2	22 mmol/L	Normal
Chloride	110 mmol/L	Normal
Creatinine	0.91 mg/dL	Normal
Glucose	88 mg/dL	Normal
Potassium	4.2 mmol/L	Normal
Sodium	139 mmol/L	Normal
Protein, total	6.7 mg/dL	Normal
Bilirubin, total	0.4 mg/dL	Normal
ALT	**382 Units/L**	**High**
AST	**1,253 Units/L**	**High**
Alk phos	76 units/L	Normal

Further lab studies showed a *severely elevated creatine kinase (CK) of 102,650 units/L* (reference: 60-400 units/L), consistent with diagnosis of acute rhabdomyolysis.

bolus. He was then transferred to the ED.

Upon arrival to the ED, the patient immediately received a 2 L bolus of normal saline. The patient was then able to produce enough urine for a formal urinalysis and urine myoglobin levels, which revealed the positive dipstick was secondary to myoglobin in the urine.

Complete metabolic profile (CMP) was concerning for hypocalcemia, hypoalbuminemia, and elevated aminotransferases.

Diagnosis

The patient was diagnosed with acute rhabdomyolysis.

Overview

Rhabdomyolysis is a potentially life-threatening condition of skeletal muscle breakdown, which results in the release of intracellular muscle contents—such as myoglobin, creatine kinase, aldolase, lactate dehydrogenase, alanine aminotransferase, aspartate aminotransferase, and electrolytes—into the bloodstream.[1] This condition should be suspected in patients with the classic triad of muscle pain, weakness, and tea-colored urine, especially in the setting of myoglobinuria. Myoglobinuria is seen only in cases of rhabdomyolysis and presents as a positive result for blood on urine dipstick, in the absence of RBCs on urine

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sedimentation. While this presentation raises suspicion for the disease, the gold standard for definitive diagnosis of rhabdomyolysis is measurement of the serum CK. Diagnosis is confirmed with concentrations 5-10 times the upper limit of normal (<100 units/L), typically in the range of 500–1,000 units/L.

Of note, urine discoloration secondary to myoglobinuria is only seen in half of cases and therefore, is also not the primary indicator of the illness. In addition, routine lab tests can vary significantly depending on the underlying cause of the rhabdomyolysis and should not be relied on for diagnosis.[2] On physical exam, muscle tenderness and swelling may be seen; however, the swelling usually develops, if it occurs, with volume repletion. Therefore, a normal physical exam also does not exclude the diagnosis of rhabdomyolysis.

Thus, the duty falls on the physician to obtain a CK level on patients with high suspicion for rhabdomyolysis. Patients who present with the aforementioned triad of symptoms in the setting of one of the causes of rhabdomyolysis are prime candidates for evaluation of CK level. Common causes of acute rhabdomyolysis include mechanical injury from trauma or excessive muscle activity, alcohol or drug abuse, toxins, lying in one position (for example, when a patient gives a history of passing out after excessive use of alcohol for a prolonged period), medications, or infection. In patients with extreme physical exertion, risk increases with conditions causing dehydration, including severe heat or humidity and the abuse of diuretics, as seen in some athletes.

Once diagnosed, the severity of rhabdomyolysis varies and is strongly correlated with the extent of enzyme elevation. Regardless of severity, initial management and treatment of rhabdomyolysis can be managed in most urgent care settings. Early fluid resuscitation is key to treatment and prevention of further complications. However, it is the severity of the syndrome and presence or absence of complications upon patient presentation that dictates next-steps for the patient.

While in the urgent care center, if the patient's urine is tea-colored and heme-positive, the author would err

on providing IV fluid boluses and referring the patient to the emergency department for further testing as described above. Additionally, if the patient cannot tolerate PO fluid intake or is unable to recognize the potential seriousness of their diagnosis, transfer to the ED and potential admission is warranted to ensure adequate hydration. Complete evaluation of patients with suspected severe rhabdomyolysis should include serum myoglobin levels, creatinine, electrolytes, uric acid, and liver function tests, as well as urinalysis and urine screen for myoglobinuria.[3,4] If, however, the patient is only trace positive, is tolerating PO fluids, is amenable to increasing their PO fluid consumption, another course of action would be to discharge home with close follow-up and expectant observation.

Additional indications for ED transfer

Rhabdomyolysis-induced acute kidney injury. Acute kidney injury (AKI) is a common, potentially life-threatening complication of severe rhabdomyolysis. This is seen in 15%–33% of cases of rhabdomyolysis and is most common in cases due to alcohol, drugs, or trauma.[5] Risk of AKI is higher in patients with CK level >5,000 units/L.[2] Therefore, close monitoring of renal function, in addition to serial CK levels, is suggested in these patients. As such, patients with CK levels >5,000 units/L should be considered for transfer to the ED for more aggressive fluid resuscitation, renoprotective management, and admission. Physicians caring for such patients should be aware that CK level elevation peaks 1–3 days after initial muscle injury and will decline 3–5 days after cessation of the muscle injury.

Rhabdomyolysis-induced electrolyte abnormalities or cardiac arrhythmias. Fatal complications from severe rhabdomyolysis include cardiac arrest and respiratory failure. Therefore, patients with severe rhabdomyolysis should receive an immediate ECG to assess for cardiac arrhythmias due to electrolyte imbalances. Upon admission, the patient should be placed on continuous cardiac monitoring.

Take-Home Points

This case of rhabdomyolysis could have resulted in severe complications if left undiagnosed and untreated. It was prudent that the clinician at the UC use her clinical judgement and refer the patient to the ED at the appropriate time. The patient's early volume resuscitation was critical in preventing permanent renal damage. It is important to consider rhabdomyolysis in patients with the triad of myalgia, weakness, and urine discoloration. In patients whose cause of rhabdomyolysis is mechanical injury, patients may not realize that they exerted themselves to such a significant level. A thorough history should be taken to exclude co-risk factors such as dehydration, medication use, and recent illness. Moreover, a serum CK level must be attained to assess severity of rhabdomyolysis in order to identify appropriate treatment for individual patients. ■

Summary

- The "classic triad" of rhabdomyolysis includes muscle pain, weakness, and tea-colored urine.
- Initial management and treatment of rhabdomyolysis can be accomplished in most urgent care settings.
- Common causes of acute rhabdomyolysis include mechanical injury from trauma or excessive muscle activity, alcohol or drug abuse, toxins, lying in one position (eg, a patient who admits passing out after excessive use of alcohol for a prolonged period), medications, or infection.
- In patients with extreme physical exertion, risk increases with conditions causing dehydration, such as severe heat or humidity and abuse of diuretics.
- Complete evaluation of patients with suspected severe rhabdomyolysis should include:
  - Serum myoglobin levels
  - Creatinine
  - Electrolytes
  - Uric acid
  - Liver function tests
  - Urinalysis and urine screen for myoglobinuria
- Rhabdomyolysis is a potentially life-threatening condition of skeletal muscle breakdown, resulting in the release of intracellular muscle contents (eg, myoglobin, creatine kinase, aldolase, lactate dehydrogenase, alanine aminotransferase, aspartate aminotransferase, and electrolytes) into the bloodstream.

References

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