Why Kidneys Don’t Like to Dance

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Patient Presentation

• 20 year old healthy African-American male

• One day history:
  • Lightheadedness upon standing
  • Generalized weakness
  • Nausea
  • Dark, red urine

• He denied trauma, falls, muscle soreness, or history of similar symptoms
Patient Presentation

- Physical exhaustion from step dancing
- Poor water intake for several days
Patient History

• Past Medical History: None

• Allergies: NKDA

• Medications: None

• Social History:
  • No tobacco, alcohol, or drug use
  • College student

• Family History:
  • Hypertension and Diabetes Mellitus II
Physical Exam

- **T: 97.2  BP: 134/83  HR: 55  RR: 20  O₂: 97%**
- **General: Physically fit appearing male in NAD anicteric, no pallor**
- **Cardiovascular: bradycardia, regular rhythm**
- **Abdomen: BS+, soft, nontender, nondistended**
- **Extremities: pulses 2+, no muscle tenderness**
## Laboratory Data

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<th>137</th>
<th>103</th>
<th>17</th>
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<td>UA: Brown color, 3+ blood, 0-2 RBCs, 3+ protein</td>
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<td>CK: 584 Urine myoglobin: negative</td>
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<td>AST: 42 Alk phos:46 Bili T: 1.8</td>
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**Laboratory Data**

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Workup of Red Urine

Urinalysis: + Blood

No

Colored substances:
- Rifampin
- Beeturia
- Porphyria
Workup of Red Urine

Urinalysis: + Blood

Yes

Urinalysis: + RBCs

Yes

Gross Hematuria

No

Colored substances:
- Rifampin
- Beeturia
- Porphyria
Workup of Red Urine

Urinalysis: + Blood

Yes

Urinalysis: + RBCs

Yes

Gross Hematuria

No

Colored substances:
- Rifampin
- Beeturia
- Porphyria

No

Pigmenturia:
- Myoglobin
- Hemoglobin
Workup for Hemolysis

- Positive urine hemoglobin
- LDH: 629 (120-240 units/L)
- Haptoglobin: 6 (36-195 mg/dL)
- Peripheral blood smear: normal, with some burr cells and rare schistocytes
Differential Diagnosis for Acute Hemolysis

- Infection (malaria, clostridium, typhoid, mumps)
- G6PD deficiency
- Paroxysmal Nocturnal Hemoglobinuria
- Microangiopathic Hemolytic Anemia
- Medications (triamterene, rifampin, methyldopa)
- Auto-immune
- Hemoglobinopathies
Back to the History
Step Dancing
Diagnosis

March Hemoglobinuria
AKA: Foot-Strike Hemolysis
Acute Tubular Necrosis from hemoglobin pigment nephropathy
March Hemoglobinuria

- Acute episode of hemolysis associated with repeated and prolonged trauma to the extremities
- Mechanical trauma to red blood cells in peripheral vessels
- First described in 1881 in a German soldier
Pathophysiology


Predisposing Factors

• Red blood cell skeletal membrane protein abnormalities

• Lower baseline levels of haptoglobin
Symptoms

• Dark red urine after exercise

• Other symptoms may include:
  • Nausea and abdominal cramps
  • Aching back and leg pain
  • Secondary to vasoconstriction from free hemoglobin binding nitric oxide
Treatment

- Changing running surfaces
- Using softer shoes or insoles
- Protective gloves for Karate enthusiasts
Take Home Points

• Learn the approach a patient with dark, red urine

• Recognize that repeated trauma to an extremity can cause intravascular hemolysis and hemoglobinuria
References

- Davidson, JL. March or Exertional Haemoglobinuria. *Seminars in Hematology.* Vol. 6, No. 2 (April), 1969, 150-161.