Non Exertional Heat Stroke and Elevated Troponin

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51 year old female admitted to the ER

c/c: Altered mental status

HPI: Patient was living in a old house with no central air conditioning and was reportedly doing well until the day before

PMH:
* Diabetes
* Asthma
* Well-controlled HTN
* Bipolar disorder
* Schizophrenia
Further History

* Social History:
  * No alcohol or drug use

* Medications:
  * Valsartan
  * Metoprolol
  * Metformin
  * Quetiapine
  * Lithium
  * Fluphenazine
* **BP**: 129/65 mmHg
* **PULSE**: 96/min
* **RR**: 22/min
* **FiO2**: 60%
* **TEMP**: 108.1 Fahrenheit !!!! (rectal)
Obese female, intubated and sedated

Pupils 2 mm size and sluggishly reactive to light

No muscle rigidity

Reflexes hypoactive

Otherwise normal exam
### Lab Data

#### CBC
- **BNP:** 156
- **Myoglobin:** 232 ng/ml
- **CK-MB:** 1.6 ng/ml

#### BMP
- **CPK:** 96 units/L
- **Troponin:** 0.16 ng/ml
- **UDS:** negative
Initial EKG showed sinus tachycardia with non-specific T wave abnormality in the anterior leads.

Subsequent EKG showed normal sinus rhythm.
Heat Stroke

- Temp > 40°C
- CNS Dysfunction

- Exertional
- Non Exertional

- Cooling Measures
- Hemodynamic Support
Pathophysiology

- Increased Temperature + Thermoregulatory Failure
  - Multi-organ dysfunction
  - Increased rate of enzymatic reactions
  - Tissue ischemia
  - Cellular denaturation/death
**Clinical Presentation**

**PHYSICAL FINDINGS**

- Flushing (cutaneous vasodilation)
- Tachypnea
- Excessive bleeding
- Altered mentation or seizures

**LAB FINDINGS**

- Leukocytosis
- Hemo concentration
- Evidence of DIC
- Hypokalemia/hyperkalemia
- Lactic acidosis
- Elevated transaminases
Back to the patient.....

- Cooling blankets, infusion of cold saline and aggressive hydration
- Extubated within 48 hours
- Continued to have confusion and agitation - treated with Haldol and Lorazepam
- Troponin continued to trend up in spite of overall improvement
Troponin Level

<table>
<thead>
<tr>
<th>Date</th>
<th>cTnI (ng/ml)</th>
<th>Creatinine (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-Jul</td>
<td>0.16</td>
<td>2</td>
</tr>
<tr>
<td>20-Jul</td>
<td>3.39</td>
<td>2.4</td>
</tr>
<tr>
<td>21-Jul</td>
<td>12.38</td>
<td>1.8</td>
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<tr>
<td>22-Jul</td>
<td>11.15</td>
<td>1.4</td>
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<tr>
<td></td>
<td>6.28</td>
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Temperature

<table>
<thead>
<tr>
<th>Date</th>
<th>Temp(F)</th>
<th>CPK - units/ L</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-Jul</td>
<td>108.1</td>
<td></td>
</tr>
<tr>
<td>20-Jul</td>
<td>105</td>
<td>102.5</td>
</tr>
<tr>
<td>21-Jul</td>
<td>101.8</td>
<td>96</td>
</tr>
</tbody>
</table>
Mechanism of Troponin Elevation

* Increased cardiac output (cardiac output increases about 3 L/min for each 1°C)
* Severe sepsis-like syndrome
* Neural mediation
* Ventricular strain
* Coronary endothelial dysfunction
Elevation of cardiac troponin I during non-exertional heat-related illnesses in the context of a heatwave

Pierre Hausfater*1, Benoît Doumenc2, Sébastien Chopin1, Yannick Le Manach3, Aline Santin4, Sandrine Dautheville5, Anabela Patzak6, Philippe Hericord7^, Bruno Mégarbane8, Marc Andronikof9, Nabila Terbaoui10 and Bruno Riou1,3
* Very few case reports about troponin elevation and its significance in heat stroke, especially non-exertional heat stroke

* Troponin levels significantly elevated in non-survivors of heat stroke (1) (7.4 vs 1.1 ng.mL\(^{-1}\), \(P < 0.01\))

* No reports, to our knowledge, of cardiac catheterization demonstrating normal coronary arteries in patients of heat stroke

Patient Course

* Patient started on ACS protocol

* Cardiology consulted

* 2D –ECHO - Normal

* Cardiac catheterization - Clean coronaries
**Conclusion**

* Troponin elevation is an independent adverse prognostic factor in heat stroke(1)
* Troponin elevation in heatstroke patients is rarely related to anatomic coronary lesions
* Severe increases in troponin ( > 1.5 ng /ml) indicate severe myocardial damage(1)
* Early identification of prognostic variables in the ER is essential to determining the therapeutic priorities

References


Thank you!