An Unfortunate Case of a Fallen Spartan.

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BACKGROUND

- In today's society, extreme high-intensity obstacle courses have become very popular across multiple generations
- Given the sheer intensity of the physical challenges and competition, many competitors have sustained some degree of injury during their race
- We present a unique case in which an unfortunate competitor experienced a heat stroke complicated by severe rhabdomyolysis, acute coronary syndrome, acute renal failure, and disseminated intravascular coagulation (DIC) in an otherwise healthy participant

CASE PRESENTATION

- A 37-year-old male developed sudden confusion and had collapsed 3 hours into a local obstacle race. Within the medical tent, he was noted to be febrile to 104°F with a heart rate of 180bpm
- He was taken to a local emergency room where he remained severely confused and febrile. He was intubated for airway protection and given a total of 7 liters of normal saline in conjunction with ice packs and fan for management of his heat stroke
- Initial labs indicated acute renal failure with a creatinine of 3.69mg/dL, severe rhabdomyolysis with a creatine kinase (CK) of 22,000U/L, an NSTEMI with a Troponin I of 5.81ng/mL (peaking at 6.25ng/mL), and thrombocytopenia with a platelet count of 78,000/cmm

HOSPITAL COURSE

- Despite being started on aggressive fluid hydration, his rhabdomyolysis progressively worsened with CK peaking at 115,000U/L (Figure 1) before eventually normalizing
- As anticipated, his renal function deteriorated during his hospitalization with his creatinine peaking at 7.86mg/dL before renal replacement therapy was initiated for volume overload
- His Type 2 NSTEMI was managed conservatively per cardiology
- His thrombocytopenia initially had plateaued between 30-40,000/cmm in the following days after admission. Work-up revealed evidence of DIC (Table 1) without presence of active bleeding. His platelet count and coagulation studies had gradually recovered and normalized prior to discharge
- Over time, his mental status returned to baseline, he was extubated and his metabolic derangements recovered. Unfortunately, his renal function did not convalesce prior to discharge

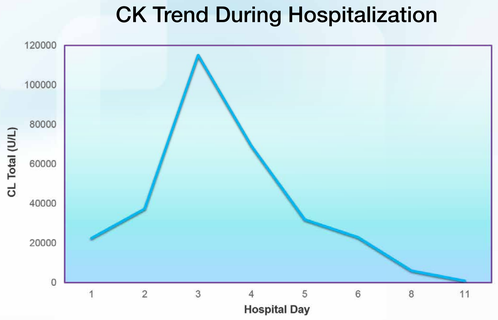

Figure 1: Creatine kinase trend during hospitalization.

Table 1

DIC Panel	N
PT (s)	20.1
INR	1.8
PTT (s)	34.5
D-Dimer (ug/dL)	5.68
Fibrinogen (mg/dL)	254

Table 1: Disseminated intravascular coagulation (DIC) panel revealing evidence of DIC based on the Internal Society of Thrombosis and Haemostasis scale.

DISCUSSION

- In rare cases, severe heat stroke has been associated with disseminated intravascular coagulation[1,2]
  - Interestingly, heat stroke and it's complications are rarely seen in women due to the protective effect of estrogen on muscle[2,3]
- Mechanism of action is thought to be secondary to direct thermal injury to the vascular wall as well as thromboplastin release from damaged muscle cells leading to the activation of the coagulation cascade[4,5]
- DIC in combination with AKI occurring in exertional heat stroke has been shown to be a poor prognostic factor with mortality rates up to 93% when both are present[6]
  - Fortunately, our patient survived despite these odds and has recovered quite well
- As clinicians, we must be vigilant of temperature-related illness and it's associated conditions, both common (e.g. rhabdomyolysis) and rare (e.g. DIC)

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