Central States Orthopedic Specialists

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COMMON MEDICAL ILLNESSES IN ATHLETICS: SICKLE CELL TRAIT

A recent review of high school and college athletics published in 2007 stated that there were four main causes of non-traumatic sports-related deaths and listed them in order of occurrence:

Cardiovascular Conditions
Hyperthermia (Heatstroke)
Acute Rhabdomyolosis tied to Sickle Cell Trait
Asthma

Pathology:

Sickle Cell Trait (SCT) is the inheritance of one gene for sickle hemoglobin and one gene for normal hemoglobin. As a review, hemoglobin is the oxygen carrying protein in the blood; specifically in the red blood cells (RBC) . In the patient without SCT, the red blood cell maintains its common circular shape and therefore slides quite easily through even the smallest blood vessels known as capillaries. However, during moments of intense, sustained, heroic-type exertion in the patient with SCT; the sickle hemoglobin can change the shape of the RBC from round to quarter-moon or "sickle." This is known as Exertional Sickling. When this change occurs, it is much more difficult for the sickle-shaped RBC's to travel through the body's smallest blood vessels. As a result, the sickle-shaped RBC begins to clog and logjam various blood vessels, thus restricting the flow of oxygen to tissues like muscles. When muscles specifically are deprived of oxygen, they break down rapidly and their contents quickly diffuse into the bloodstream at exceedingly higher than normal levels Rhabdomyolosis) . When these levels hit the blood's filtration system (kidneys), it is subjected to this overload which can rapidly cause kidney damage, kidney failure, and subsequent death if left untreated.

Prevalence in Athletes

Incident rates of Sickle Cell Trait (SCT) are considered quite rare when evaluating populations as a whole. However, it is much more prevalent when considering specific populations subgroups such as African Americans, in which 8% have SCT. That is a 1:12 ratio. In addition, when examining African Americans in populations such as the military and athletics where high intensity exertion is more common, the numbers are far more prevalent.

United States Military:

1987 Study:
Risk of unexplained sudden death:
"28x higher in black recruits with SCT vs black recruits without SCT"

1994 Study:
"30-fold higher risk of exercise-related death in black recruits with SCT versus black recruits without SCT"

Athletics:

2011 Study:
"The rate for fatal exertional sickling collapse in NCAA black DI football players (2004-08) is 1:805"

2012 Study:
"22-fold higher risk of fatal exertional sickling collapse in NCAA black DI football players versus black DI football players without SCT (2004-2008)"

Unlike the other listed causes of non-traumatic death in sports, exertional sickling is not correlated with the rapid collapse and unresponsive nature of a cardiovascular condition, it is inconsistent with the high heat and humidity associated with a heat illness, and it does it present with the gasping or wheezing breath sounds like that of an asthma attack.

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Exertional Sickling: Signs and Symptoms

Causation:
Exertional Sickling is an injury whose cause is intensity. Too much, too fast, too long, and too hard are the commonalities seen in past deaths. For example:

High School:
-In a survey of 9 high school exertional sickling deaths from 2000-2011, 8 were in football and 7 occurred during conditioning.

NCAA DI:
-Of the 10 NCAA exertional sickling deaths reported in a 2011 study, exercises included 800 yards of running in a 15 min period in one instance and 700-1100 yards of running in another.

Recognition:
The patient suffering from exertional sickling (ES) usually progresses from general weakness to pain; with or without swelling. Carrying this thought, several patients complained that their legs 'felt like Jell-o." Not surprisingly, these patients have been very commonly misdiagnosed as either being out of shape or suffering a heat-related illness. However, keep in mind the following distinguishing characteristics:

-The ES episode is ***not exclusive to pre-season*** workouts as much as it is exclusive to ***an intense workout*** at any point in the season.

-The ES patient typically hyperventilates but ***does not wheeze or gasp*** like the asthmatic and usually ***has no history of asthma***.

-The ES patient is ***responsive and coherent*** unlike the disorientation that occurs with a heat illness.

-The ES patient reports pain and cramping in the legs and the lower back, but the ***cramping is not excruciating nor is it the noticeable "rock hard' cramp*** present in heat and/or dehydration induced cramp.

Exertional Sickling: Treatment and Prevention

Treatment:
1. Recognize the difference between an ES episode and other common illnesses and conditions
2. Immediately remove from activity
3. Monitor vital signs for any signs of distress.
4. Administer high flow oxygen at 15liters/min via a non-rebreather facemask if available
5. Cool the athlete if necessary
6. Strictly monitor alertness and orientation. If any deterioration occurs, call 911 and attach an AED

Prevention:
1. Does your athletic physical form ***specifically ask*** about Sickle Cell Trait and Sickle Cell Disease? *All 50 states screen at birth.
2. Athletes with SCT ***should be excluded*** from performance tests that are not sport specific such as mile runs, serial sprints, etc…
3. If intense exertion periods are required, the athlete with SCT should be given ***longer recovery time.***
4. Monitor an SCT patient very closely in any workout at a new, higher altitude .
5. The SCT athlete should not be permitted to workout or exercise if they are ill.

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A Note to the Reader…..

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