Seizure in 100 mile Ultra Runner

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Medicine and Science in Ultra-Endurance Sports Case Reports

- Case reports are an incredible way of learning
- Because ultra-endurance athletes are rare in the population, case reports are often more critical

- [http://ultrasportsscience.us/case-reports/](http://ultrasportsscience.us/case-reports/)
- [http://ultrasportscasereports.blogspot.com](http://ultrasportscasereports.blogspot.com)
- E-mail: avpiv711@sbcglobal.net or ultrasportsscience@gmail.com
2016 Tahoe Rim Trail Endurance Races

• 30 year old female runner competing in the TRTER 100 mile race

• Experienced runner- Started doing ultra marathons in 2011 and has finished two 100 mile races including 2014 TRTER 100 miler

• Mile 50- started to feel “strange” and off

• Developed tonic/clonic seizure just short of mile 57. Resolved after a few minutes. Brought down from Hobart aid station to finish with safety runner

• At finish line- alert/conscious/slowly responsive
Differential Diagnosis?/ What to?

- TRTER does have iStats available as well as 3% hypertonic saline
Runner’s Past History

- Diagnosed with Primary Generalized Seizures at age 21
  - Gets both tonic-clonic and absence seizures
- Initially started on depakote but had major weight loss
- Eventually changed to lamotrigine
- Started running once seizures were under control
  - First marathon in 2010
  - First 50K in 2011
Runners with epilepsy

Dai Green (Wales)- 400 M hurdles

Flo-Jo (USA)- WR 100/200 M (1998)
Diane Von Deren

- Ultramarathoner with temporal lobe epilepsy
- Had lobectomy done- since then has done events of 300-1000 miles
ILEA Seizure Classification

- Generalized onset
  - Motor
    - Tonic-clonic, clonic, tonic, myoclonic, atonic, epileptic spasms, myoclonic-tonic-clonic, myoclonic-atonic
  - Nonmotor (absence)
    - Typical, atypical, myoclonic, eyelid myoclonia

- Focal onset
  - Motor
    - Aware, impaired awareness, unknown awareness/atonic, clonic, epileptic spasms, hyperkinetic
  - Nonmotor
    - Aware, impaired awareness, unknown awareness, autonomic, behavior, cognitive, emotional, sensory
Issues for athletes with epilepsy

- Prevalence of epilepsy ranges around 5-7/1000 in US
- Be aware of possible risks of exercise (special attention to swimming, contact sports)
- Avoid triggers for seizures
  - Sleep deprivation
  - Electrolyte disturbances
- Manage side effects from seizure medications!!
Comorbid medical issues in people with epilepsy

- Major issue for many people with epilepsy is loss of control over their health and their life
- Typically patients with epilepsy exercise less than unaffected adults (Shrine 2005, Gaitatzis 2005)
- Self-esteem, social functioning and quality of life all affected
- Rates of depression/anxiety range from 13-35% and are higher for those with uncontrolled epilepsy
- Maybe a combo of the underlying condition along with medication side effects
FIG. 3. Prevalence of comorbidity among adults aged 18 years or older with and without seizures—National Health Interview Survey, 2002.
Important side effects from seizure medications for sports med docs/athletes

- Drowsiness (almost all)
- Dizziness
- Weight gain/weight loss
- Nausea, anorexia
- Hyponatremia (carbamazepine, oxcarbazine)
- Pharmacokinetics may change with extreme physical exercise as well
Known triggers for seizures (Nakken 2005, Ferlisi 2014)

#1) Emotional Stress

#2) Sleep deprivation

#3) Tiredness/fatigue

- Alcohol, hyperthermia, electrolyte disturbances, low blood sugar, sunshine/flickering light, non-compliance, hyperventilation at rest (but not with exercise!)
Does exercise help or cause seizures?

- American Medical Association 1968—Recommended against exercise for patients with epilepsy, changed mind in 1974
- Nakken-2005—#9 self reported cause of seizures
- 2/400 patients identified exercise as trigger
- No evidence that minor head trauma induces seizures
- Small study on patients with temporal lobe epilepsy show no evidence of seizures during/after exercise
Exercise and seizures

- 204 people with epilepsy in Norway- only 2% had true exercise induced seizures. 36% of people felt better seizure control with exercise

- Studies using exercise as an intervention have either shown no change in seizure frequency or a decrease in seizure frequency
  - Studies unfortunately have limited duration (usually months)
  - Intensity of exercise does NOT seem to induce seizures

- EEG waveforms often improve with physical activity

- American Academy of Pediatrics 2008- No limitations for children with controlled seizures
Fig. 3. Summary of possible mechanisms by which exercise may help persons with epilepsy cope positively with stress. Exposure to a stressful event is processed in limbic areas, which project to the hypothalamus (activating the hypothalamic–pituitary–adrenal axis (HPA). From there the autonomic nervous system (ANS) is activated, resulting in the release of adrenaline; this, in turn, can indirectly elevate the release of noradrenaline (NA) in brain from projections originating in the locus coeruleus. Stress also leads to the release of corticotropin-releasing hormone (CRH), which results in pituitary secretion of adrenocorticotropic hormone (ACTH). As a result, corticosterone is released from the adrenal cortex. Corticosterone acts on many peripheral organs but also feeds back on the pituitary and hypothalamus, thereby turning down the activity of the axis. Furthermore, corticosterone reaches extra-hypothalamic brain regions (prefrontal cortex, amygdala, and hippocampus). Within the hippocampus, several stress-related hormones affect cellular function. The adapted brain stress system induced by regular exercise leads to the activation of several seizure-inhibitory components (NA, adenosine, neurosteroids, GABA_A receptor, sensory inputs), reducing seizure susceptibility.
Lessons I learned from our runner

- Always does runs longer than 6 miles with someone who understands she has a seizure disorder
- Brings extra lamotrigine with her on all runs as does her safety runner
- Has medical alert bracelet on for all runs
- Has developed iron deficiency anemia from her lamotrigine and works closely with hematologist
- Neurologist wants her to be active and works with her on dosing
Gracias!
References


