

# Exercise-associated collapse in a cyclist wearing a Heart rate monitor

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## Introduction:

Exercise-associated collapse (EAC) is a distressing entity for patients and serves as a diagnostic challenge for clinicians. Most often, EAC represents a benign condition, but a complete evaluation must exclude underlying cardiac disease. More than 60 million US residents own a wearable heart rate monitor device, making these a potential tool of diagnostic utility in patients with syncope.<sup>(1)</sup>

## Case Presentation:

A 52-year-old man with a history of well-controlled hypertension presented to the emergency department after a syncopal episode. He described a transient loss of consciousness following a 40-mile outdoor bike ride. He reported feeling weak after the session and decided to douse himself with cold water after which he lost consciousness and collapsed. The fall was witnessed by his wife who confirmed the duration of unconsciousness to be under a minute. She denied any seizure-like activity and said the patient was confused prior to and after the event for a few minutes. The patient did not experience any palpitations or chest pain prior to the event and does not have a history of previous syncopal episodes, substance abuse, or a family history of sudden cardiac death.

Interestingly, the patient was wearing an Apple Watch™ which recorded his heart rate during his exercise routine and this syncopal episode. Vital signs were stable. The physical exam was unremarkable. Lab work showed creatinine of 2.0 mg/dL, CK 242 IU/L, and troponin < 0.03. EKG showed sinus bradycardia with no ST changes. The echocardiogram revealed normal structure and function with an ejection fraction of 61%. The patient was managed with IV fluids and put on telemetry which showed no arrhythmias. Revision of his heart rate recorded on the watch proved valuable by documenting progressive decline and ultimately bradycardia during the time of the reported collapse which supported a diagnosis of EAC precipitated by a vagal stimulus in the form of cold-water exposure following intense exercise. Revision of his heart rate recorded on the watch proved valuable by documenting progressive decline and ultimately bradycardia during the time of the reported collapse which supported a diagnosis of EAC precipitated by a vagal stimulus in the form of cold-water exposure following intense exercise. The patient was discharged from the hospital the following day after the correction of underlying laboratory abnormalities following fluid resuscitation.

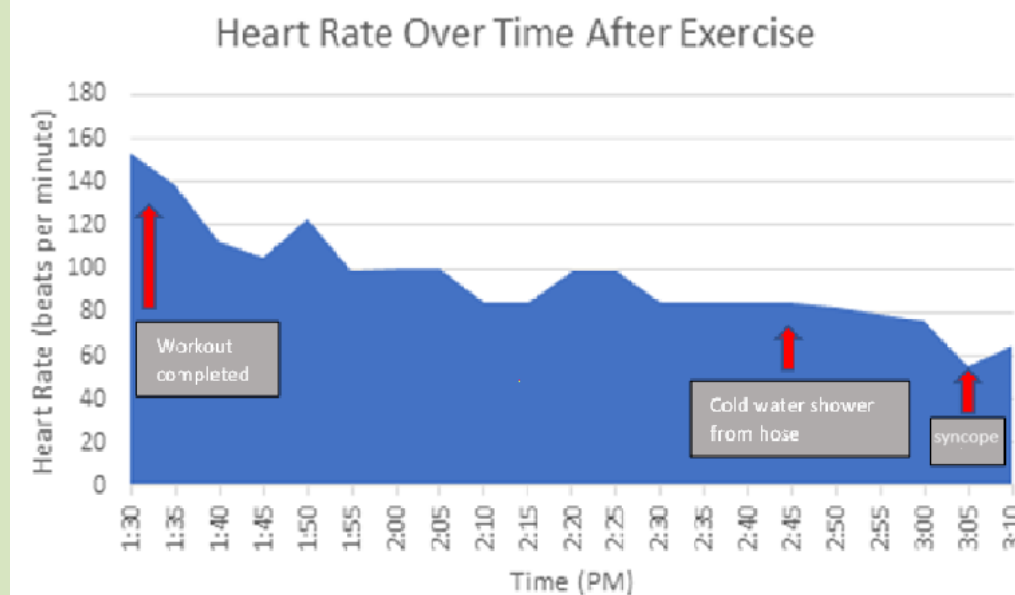


Figure 1. Heart rate over time following exercise, leading up to EAC.

## Discussion:

This case raises an important question regarding the utility of heart rate monitoring devices. In our patient's case, the gradual decline in heart rate following the cold-water exposure and eventual bradycardia around the reported time of his event suggested a neurocardiogenic mechanism. HRM may demonstrate utility in differentiating between vasovagal and orthostatic events while also ruling out more malignant causes.

(1) Holko M, Litwin TR, Munoz F, Theisz KI, Salgin L, Jenks NP, Holmes BW, Watson-McGee P, Winford E, Sharma Y. Wearable fitness tracker use in federally qualified health center patients: strategies to improve the health of all of us using digital health devices. *NPJ Digit Med.* 2022 Apr 25;5(1):53. doi: 10.1038/s41746-022-00593-x. PMID: 35469045; PMCID: PMC9038923.