



COMMENTARY

Died Pheidippides after the world's first (super-ultra)-marathon from Takotsubo syndrome?

Terá Pheidippides morrido de Takotsubo depois da primeira (super-ultra)-maratona mundial?

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Observation

The world's first marathon took place in Greece in 490 BC.¹ Only a single runner participated and according to the Greek historian Herodotus (approximately 490-430 BC), it was the heralded Pheidippides who took the job of a report runner (hemerodromos) in the army.² Report runners were the most efficient form of communication across large distances in ancient Greece, which, at that time, was split into numerous city-states (polis) and did not have an efficient road network. Since Greece is hilly in most parts, hemerodromoi were superior to horsemen, particularly over long distances. The distance between Marathon and Sparta is approximately 200 km and it usually took two days for hemerodromoi to cover it. Pheidippides' mission was to report the landing of the Persian fleet at the coast of Marathon to the people of Sparta (Lacedemonians) and to ask for military support for the forthcoming battle. The Lacedemonians agreed to come and to support the Athenians and asked Pheidippides to run ahead and announce their backing.

Meanwhile, however, the Athenians surprisingly triumphed over the Persians without the help of the Lacedemonians despite being outnumbered. In spite of the defeat, the Persian fleet sailed to Athens to attack

the city from the seaside. The return run of Pheidippides to Marathon is historically not proven but the Roman historian Lucian (approximately 120-180 AD) wrote 600 years later that the report runner "Philippides" (most likely he meant Pheidippides) was the one who reported the victory of the Athenians over the Persians to the highest authorities (Archontes) of Athens after another approximately 40 km run from Marathon to Athens (the world's first marathon).³ This information implies that Pheidippides ran back from Sparta to Marathon and further to Athens. After announcing the victory to the Archontes with the words "Rejoice, we have won", Pheidippides died suddenly.

In the museum next to the Asklepeion in Kos the cast replica of a marble grave stele is exhibited with the following explanation: "Grave stele depicting the sudden cardiac death (SCD) of a dying warrior runner. Possibly the original is the monument of the warrior who announced the victory of the battle of Marathon to the Athenians and dropped down dead (Theseion, Athens, c. 490-480 BC). The typical sign of a heart attack is precordial pain accompanied very often by a sensation that the patient's chest is exploding. Note the expression of the fingers in the hands (Figure 1).

The cause of Pheidippides' SCD remains elusive but several speculations have tried to explain the condition. The first explanation is that Pheidippides experienced a myocardial infarction and cardiogenic shock after two ultra-marathons and a marathon within a few days. However, nothing is known about his risk factors, his medical history,

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Figure 1 Replica of a grave stele depicting the sudden cardiac death of a dying warrior runner (the original is in the Theseion, Athens, c. 490-480 BC)

and an autopsy was not carried out during these times. Second, it is conceivable that the exhaustive exercise resulted in stress cardiomyopathy, also known as Takotsubo syndrome (TTS) with heart failure and systolic dysfunction eventually accompanied by fatal ventricular arrhythmias and cardiogenic shock. TTS mimics myocardial infarction clinically, biochemically, and electrocardiographically but coronary arteries are usually normal in TTS.⁴ The TTS hypothesis about Pheidippides' SCD is supported by several reports about extensive physical activity-related TTS in the scientific literature.⁵⁻⁷ In pathophysiological terms, sympathetic over-activity may lead to extensive catecholamine release and overstimulation of myocardial adrenergic receptors, leading to contraction failure.

In conclusion, a normal marathon distance is tolerable for the healthy heart but may be fatal after two ultra-marathons shortly before, despite being accustomed to such extreme strain.

Ethical approval

The study was approved by the institutional review board.

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Author contribution

Josef Finsterer was responsible for design, literature search, discussion, first draft, critical comments, and final approval, FS and AF: literature search, discussion, critical comments, final approval.

Conflicts of interest

None declared.

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