

Heart, Lung and Circulation (2018) xx, 1–11
 1443-9506/04/\$36.00
<https://doi.org/10.1016/j.hlc.2018.05.003>

1 **Sports Cardiology – Example Illustrative** 2 **Cases**

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The following four cases are typical of the dilemmas faced by sports cardiologists on a regular basis. These are real-life cases and, for each, in addition to a focussed discussion, the authors openly discuss the clinical predicament and give their personal viewpoints. The cases are designed to be engaging and informative, demonstrating the benefits of expertise in sports cardiology when confronted with athletes with cardiologi- cal conundrums.

Keywords

Sports cardiology • Athletes • Endurance athletes • Safety • Sudden cardiac death

9 **Case 1: Master Athlete With a** 10 **High Heart Rate**

11 **Q3** This is a case of a 66-year-old master cross-country skier and
 12 mountain bike champion. He trains for long distances on a
 13 regular basis and noticed on his own heart rate monitor that
 14 his heart rate was increasing to high levels during exercise.
 15 Investigations revealed a normal echocardiogram and a Hol-
 16 ter monitor revealed paroxysmal atrial fibrillation. As part of
 17 the investigatory process, his physician wanted to exclude
 18 the presence of coronary artery disease.

19 A computed tomography coronary angiogram showed
 20 that he had an elevated coronary artery calcium score of
 21 1080 Agaston Units (AU) with likely triple vessel coronary
 22 artery disease. He was found to have a normal fasting cho-
 23 lesterol but a markedly elevated lipoprotein (a).

24 A stress electrocardiograph (ECG) was organised and
 25 showed sinus rhythm with ST depression in the infero-lateral
 26 region after 8 minutes of a standard Bruce protocol treadmill
 27 (Figure 1).

28 He saw a cardiologist who advised aspirin, treatment with
 29 a statin and recommended he stop training and competing.
 30 Subsequently, with the aim of getting his low density lipo-
 31 protein (LDL) less than 1 mmol/L, his statin dose was
 32 increased and ezetimibe was added.
 33
 34

35 An exercise stress echocardiogram was performed by a
 36 second cardiologist. There were no symptoms of premature
 37 breathlessness or chest pain and he had an elite exercise
 38 capacity for his age. No inducible wall motion abnormalities
 39 were identified and he was advised that he could return to
 40 sport training and competition without restriction.

41 He remained asymptomatic for 2 years but then had an
 42 episode of abdominal pain and dyspepsia after an inten-
 43 sive bout of mountain biking. He attended his local Emer-
 44 gency Department, the serum troponin was negative and
 45 the ECG revealed new T wave inversion in the lateral leads.
 46 Repeat exercise stress echocardiography was negative for
 47 inducible ischaemia but the lateral T wave inversion
 48 persisted. Hence coronary angiography was organised
 (Figure 2).

49 A significant mid-left anterior descending artery lesion
 50 was found, and a stent was inserted. Interestingly, the
 51 patient's clinical status did not alter and he did not per-
 52 ceive any clinical benefit. As a participant in a veteran
 53 athlete research trial, he underwent cardiopulmonary exer-
 54 cise test achieving a VO₂ max 170% of predicted. The ST
 55 segment depression was unchanged (Figure 3) despite
 56 being fully revascularised. There was a short episode of
 57 paroxysmal atrial flutter and, importantly, he remained
 asymptomatic.

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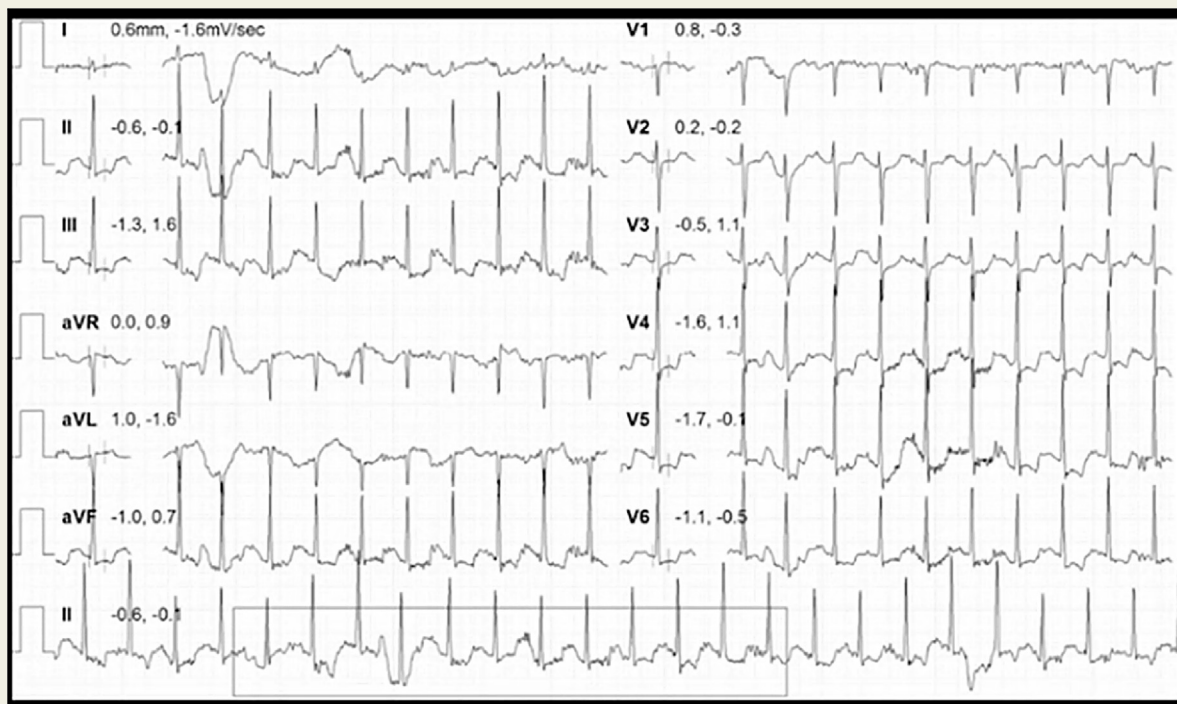


Figure 1 Exercise ECG at 8 minutes of a Bruce protocol with infero-lateral ST depression.

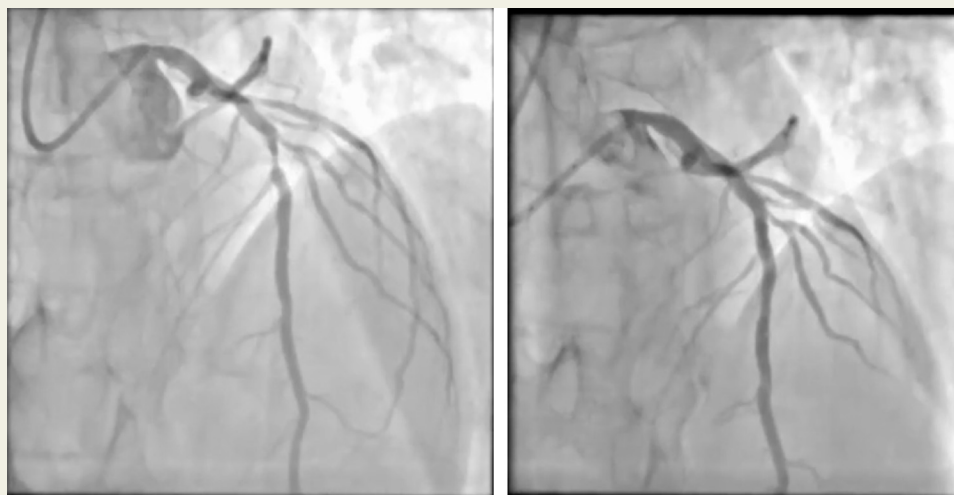


Figure 2 Left coronary artery in an right anterior oblique view with a lesion in the mid part of the left anterior descending artery (left panel) which was treated with a coronary stent (right panel).

Discussion: Coronary Artery Disease in Veteran Athletes

There have been some concerns that chronic endurance exercise may promote accelerated atherosclerosis but there is a lack of evidence to support this theory. Coronary artery disease in male veteran athletes is more common than in their sedentary counterparts. In a study of 152 master athletes, of whom 106 were male, 11.3% were found to have coronary artery calcium scores ≥ 300 AU,

significantly higher than in non-athletes [1]. The precise mechanisms for this remain elusive and further work is required to explore the roles of possible inflammatory mediators which may be released during prolonged exercise. According to updated Bethesda guidelines, athletes with coronary artery disease should have an assessment using exercise ECG or exercise echocardiography to determine the presence of inducible ischaemia [2]. Importantly, a shared decision-making process involving both the athlete and physician should be followed to determine the

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