Journal of Medical Clinical Case Reports

Myocardial Bridges and Competitive Sports Activity in Athletes An Anecdotal Case Report

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Submitted : 15 Feb 2025 ; Published : 4 Mar 2025

Citation: Bolognesi, M. (2025). Myocardial Bridges and Competitive Sports Activity in Athletes: An Anecdotal Case Report. *J Medical Case Repo 7*(1):1-3. DOI : https://doi.org/10.47485/2767-5416.1103

Abstract

Myocardial bridging is a congenital anomaly with an intramural course of a coronary artery in which a more or less long segment of a coronary branch, instead of running normally on the epicardial surface of the heart, dips into the myocardium and is surrounded by a ring or cuff of muscle fibres that can cause extrinsic "throttling" of the artery during systolic contraction. The guidelines for granting eligibility for competitive sport have evolved over time: from 2009, when any case of myocardial bridging meant exclusion from eligibility, to today, when only significant bridging, i.e. "long" bridging > 1 cm and > 3 mm deep, restricts competitive sport activity. Incidentally, some myocardial bridging can be very detrimental and potentially dangerous for athletes, especially if the tunneled artery has a proximal stenosis and the athlete has a positive ex-ECG stress test. The purpose of this case report is simply to make physicians in general, and sports cardiologists in particular, think about this delicate issue so that they know how to make the right decisions.

Keywords: Myocardial Bridging, Athletes, Ex_ECG Stress Testing, Computed Tomography Coronary Angiography.

Introduction

Myocardial bridging (MB) is an intramural course of a coronary artery in which a more or less long segment of a coronary branch, instead of running normally on the epicardial surface of the heart, dips prematurely into the myocardium and is surrounded by a ring or cuff of muscle fibres, which can cause extrinsic "throttling" of the artery during systolic contraction (Patrizi & Tardini 2024; Zeppilli et al., 2024; Gentile et al., 2021). Most asymptomatic athletes have myocardial bridges, which may be suspected by a positive ex-ECG stress test showing myocardial ischaemia and require further investigation such as computed tomography coronary angiography (CTCA) to rule out coronary artery disease (Silva et al., 2018; Cohen et al., 2010).The guidelines for granting eligibility for competitive sports have evolved over time: from 2009, when any case of myocardial bridging indicated exclusion from eligibility, to today, when only significant bridging, i.e. "long" bridges > 1 cm and > 3 mm deep, restrict competitive sports activity (Patrizi & Tardini 2024; Zeppilli et al., 2024). In this short editorial, the author describes the case of a middle-aged athlete with a positive Ex_ECG stress test due to significant and potentially dangerous myocardial bridging detected during pre-participation sports screening.

Case Report

A 40-year-old young adult cyclist in apparently good health presented to our sports cardiology centre for a pre-participation assessment to obtain a competitive cycling fitness certificate. His detailed family and medical history was unremarkable. Objective examination, laboratory tests and simple spirometry were normal. The resting ECG was normal (Figure 1). However, the exercise stress test (Figure 2) was positive for signs of reduced coronary reserve and inducible myocardial ischaemia at an external load of 175 watts at a heart rate of 150 bpm in the absence of symptoms. The test was therefore stopped due to the athlete's exhaustion. The positive exercise test for inducible subendocardial ischaemia in an asymptomatic athlete led to a request for further evaluation with Coronary AngioTAC, which was performed a few weeks later at a cardiovascular imaging centre of excellence. The study (Figures 3-4) showed no coronary calcium but a mild proximal stenosis of the anterior descending artery, which tunneled into the myocardium over 2 cm at a depth of approximately 4 mm in the mid-section. The diagnosis was therefore a deep and significant myocardial bridging of the anterior interventricular artery with a mild proximal stenosis with positive remodelling. Unfortunately, this type of congenital anomaly of the coronary arteries does not allow the granting of fitness to compete according to the regulations in force in Italy (see Cocis 2023).

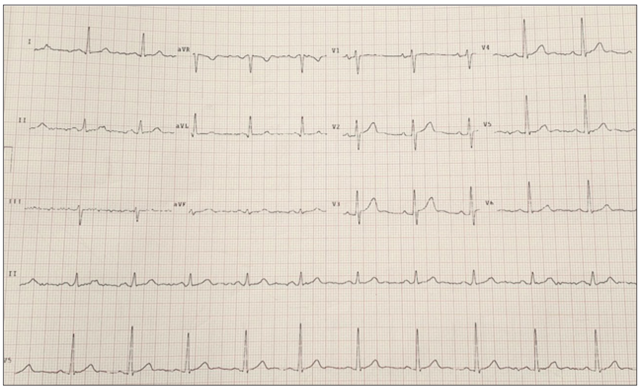


Figure 1: Shows normal ECG at rest.

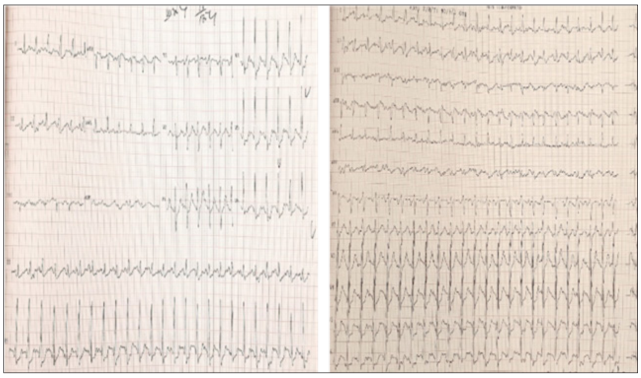
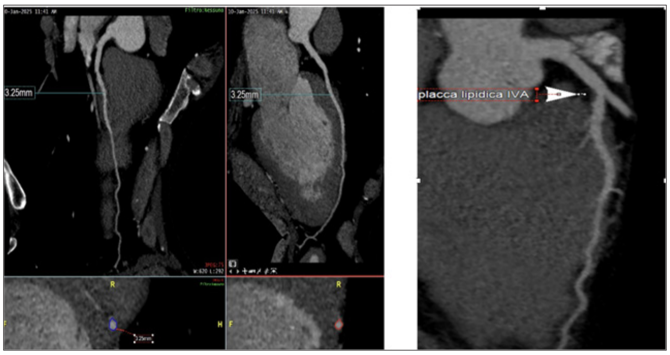


Figure 2: Positive Ex_ECG stress test with ST segment changes.



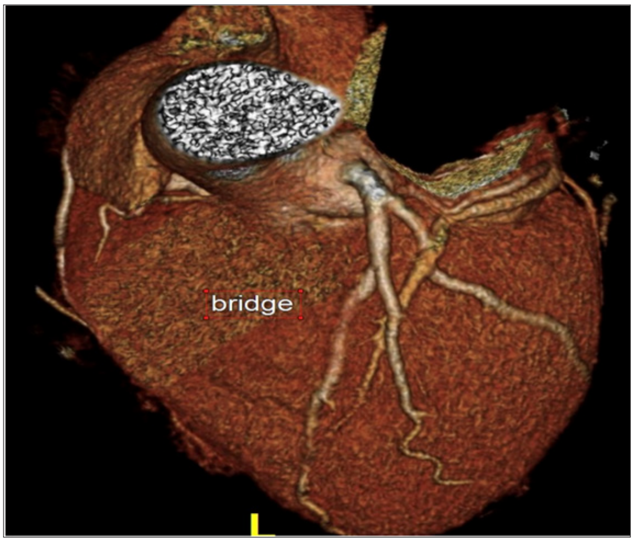


Figure 3-4 : CTCA characteristics of long and deep myocardial bridges

Discussion

Myocardial bridges, in which the myocardium overlies a coronary artery segment, are a relatively common finding among coronary artery anomalies (CAAs) identified in autopsy series and computed tomography angiography (CCTA) in athletes (Gentile et al., 2021; Silva et al., 2018; Cohen et al., 2010; Pelliccia et al., 2005; Angelini et al., 2002; Angelini et al., 1983). Among the congenital anomalies, the most common is of course the 'intramuscular' course of a coronary branch (i.e. myocardial bridge) (Angelini et al., 2002; Angelini et al., 1983). One (or more) branches of a main epicardial coronary artery (usually the anterior descending) extend a greater or lesser distance into the myocardium and are surrounded by muscular tissue. A myocardial bridge is a common finding at autopsy, but in the majority of cases it is a thin muscular tract that causes only mild compression of the vessel during systole (Angelini et al., 1983). More significant bridges can be visualised in vivo with coronarography and increasingly with Coro-TC, a test that can define the length and depth of the intramyocardial segment. Most myocardial bridges remain clinically silent. However, long (>1 mm) and deeply tunneled (≥3 mm) segments of the anterior descending coronary artery can cause significant symptoms of exertional chest tightness and exercise-induced ischaemia on exercise stress testing (EST). Such bridges have been associated with sudden cardiac death (SCD) (Patrizi & Tardini 2024; Zeppilli et al., 2024; Gentile et al., 2021; Silva et al., 2018; Cohen et al., 2010; Pelliccia et al., 2005). Athletes with an incidental diagnosis of myocardial bridge or coronary fistula without evidence of exercise-induced myocardial ischaemia (on ECG and/or stress echocardiography/CMR and/or exercise radionuclide scan or CTCA) may be cleared for all competitive sports (Zeppilli et al., 2024; Gentile et al., 2021; Silva et al., 2018; Cohen et al., 2010; Pelliccia et al., 2005).I B Athletes with a long (>1 cm) and deeply tunneled (≥3 mm) myocardial bridge or with a coronary fistula and significant shunt with evidence of induced myocardial ischaemia or exercise-induced significant ventricular arrhythmias should not participate in competitive sports (Zeppilli et al., 2024; Gentile et al., 2021; Silva et al., 2018; Cohen et al., 2010; Pelliccia et al., 2005). In selected cases, athletes may be re-evaluated at selected centres six months after surgical correction without exercise-induced myocardial ischaemia.

Conclusion

Treatment may be medical, with physical activity restriction and/or administration of beta-blockers or calcium channel blockers, interventional, with stent implantation (considered by the majority to be a suboptimal solution), or surgical, with resection of the myocardial bridge ('debridement') where technically feasible. In elite athletes, particular attention must be paid to the possibility that local atherosclerotic pathology may be 'added' to the congenital defect, with plaque localised in the area immediately anterior to the myocardial bridge and/or diffuse.

Conflicts of Interest

The author has no competing interests to declare.

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