

# A Clinical Case of “Painful” Left Bundle Branch Block in a Female Athlete: “Elective” or Neglected Nosographic Entity?

Massimo Bolognesi

Head of Centre for Sports Cardiology, Ausl della Romagna – District of Cesena, Via Ungaretti 494 47521 Cesena, Italy

## Corresponding author

Massimo Bolognesi, Head of Centre for Sports Cardiology, Ausl della Romagna – District of Cesena, Via Ungaretti 494 47521 Cesena, Italy.

**Received:** April 01, 2023; **Accepted:** April 10, 2023; **Published:** April 13, 2023

## ABSTRACT

Painful left bundle branch block is a rarely diagnosed chest pain syndrome. This syndrome is caused by intermittent, frequency-dependent LBBB in the absence of myocardial ischemia. Its prevalence, mechanism, detailed electrocardiographic features and effective treatments are still not well understood. With this case report, the author describes the clinical course of an athlete undergoing competitive sports pre-participation screening that led to the diagnosis of painful left bundle branch block syndrome.

**Keywords:** Left Bundle Branch Block, Chest Pain, Athlete, ECG, Coronary Computed Tomography

## Introduction

Left bundle branch block is a relatively common in patients with coronary artery disease, hypertension, cardiomyopathies, and valvular disease. Despite this, no ‘structural’ cardiac abnormality’ is detectable in some individuals presenting with left bundle-branch block, with the exception of conduction disturbance [1]. These patients, who have normal left ventricular function, normal haemodynamics and normal coronary arteries, make up about 12% of patients with LBBB, who in turn make up about 2% of patients examined in a Level II cardiology setting. Intermittent exercise-induced left bundle branch block (LBBB) is detectable in between 0.2% and 1.1% of exercise case series [2]. It has previously been considered an independent indicator of poor prognosis, and an expression of extensive and severe coronary artery disease when verified at heart rates <125 bpm [3]. However, in some patients the occurrence of left branch block during exercise is not associated with any structural heart disease, and the coronary arterial tree is also completely normal. The occurrence of left bundle-branch block during exercise is therefore a major diagnostic problem, especially if not preceded by ST changes indicative of reduced coronary reserve, requiring evaluation with radioisotopic stress-imaging [4,5]. Both techniques present problems of diagnostic accuracy, so the performance of a non-invasive cardiac imaging examination such as a coronary artery CT scan is now often required for complete patient assessment. The presence of angina is generally an accepted criterion in clinical practice to suspect the ‘ischaemic’ origin of left bundle branch block during exercise:

however, several authors have described a subgroup of patients who present with angina-like chest pain, in whom left bundle-branch block appears during exercise and is associated with chest pain, and who have angiographically normal coronary arteries [6]. This condition has been named “Painful left bundle branch block” (PLBB): after the first description in 1976, sporadic descriptions of single cases and/or small case reports were found in the literature especially between 1990 and 2000. So far not much is known about this clinical condition also from a pathophysiological point of view, and is often “incorporated” in syndrome X, with consequent imprecision in the diagnostic criteria and in the prognostic significance. For this reason, the author illustrates in this article an emblematic and anecdotal case that occurred in the competitive sports pre-participation screening setting at his Centre for Sports Cardiology.

## Case Report

A 53-year-old lady, who cycles competitively, presented to our Sports Cardiology Center to undergo pre-participation sports screening for renewal of her fitness certification. Her family history was negative for heart disease, and the physical examination was completely unremarkable. The results of laboratory testing including complete blood counts, and basic metabolic panel were normal. However, the athlete reported experiencing chest pain at the peak of high physical exertion at the precordial site radiating to the right shoulder, which usually subsided during exercise and to which she had never given much thought. The resting ECG (Figure 1) demonstrated normal sinus rhythm with narrow QRS complex, while a cycle ergometer exercise ECG stress test showed the appearance of a rate related LBBB (Figure 2) at a heart rate of 150 beats/ min associated with

her typical symptoms of chest tightness and shortness of breath. at the apex of the exercise, which, however, disappeared during the recovery phase as sinus rhythm was restored. A 2D TT echocardiography showed normal chambers, normal valves, and normal biventricular function. Consequently, the athlete underwent a coronary artery CT scan that showed a patent coronary artery tree (Figure 3 A-B-C) and the complete absence of structural heart disease. So, the athlete was discharged with the diagnosis of “Chest pain syndrome associated with intermittent left bundle branch block (LBBB) in the absence of myocardial ischemia”. In light of the subsequent findings, the athlete was considered fit for sports competition on beta-blocker therapy.

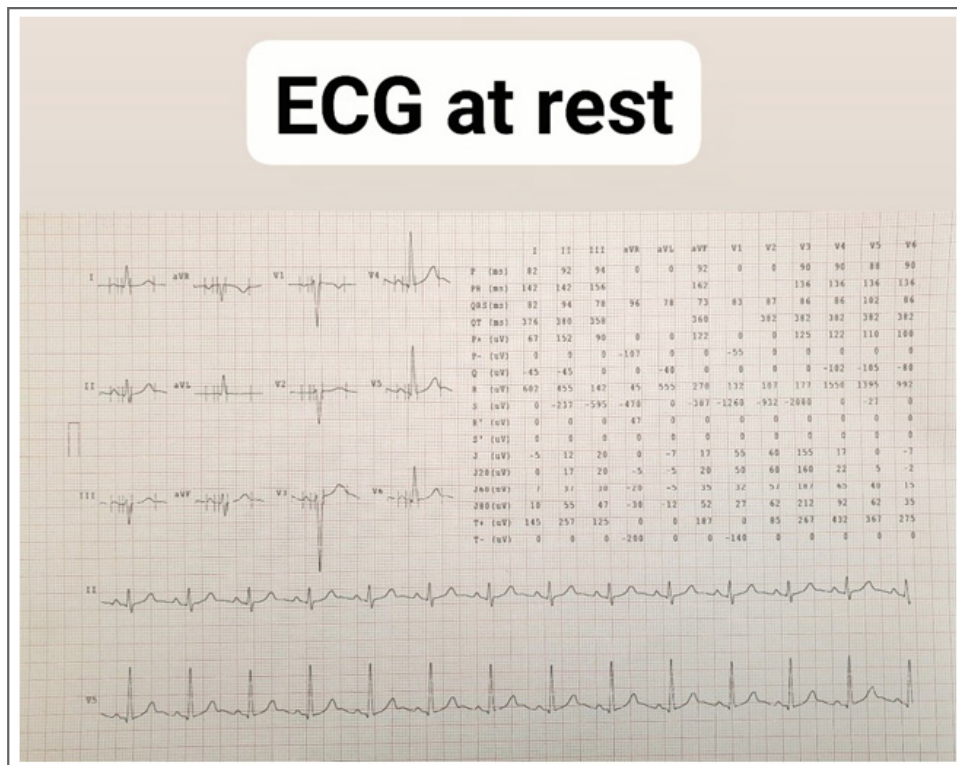


Figure 1: shows normal ECG at rest, with sinus rhythm and narrow QRS

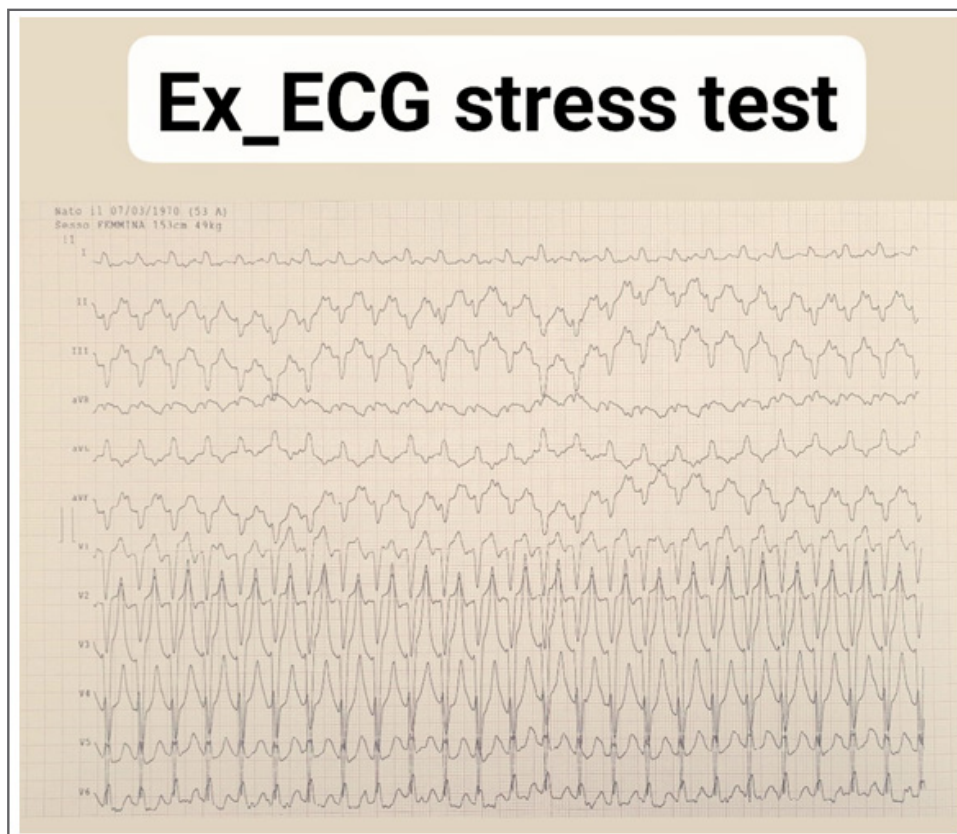
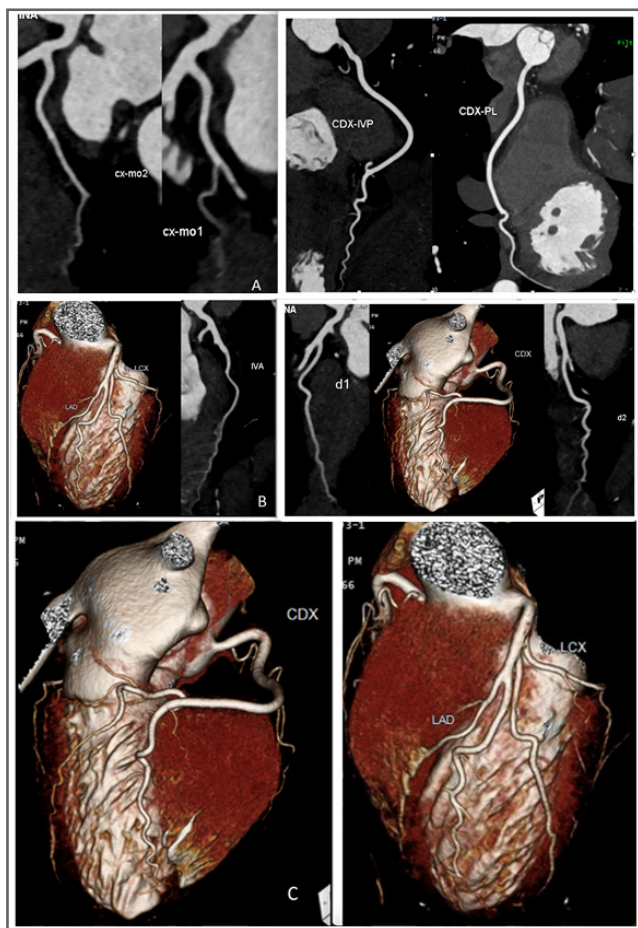


Figure 2: shows LBBB rate related at an heart rate of 150 beats/min



**Figure 3a-b:** show CTCA features with patent coronary arteries and absence of structural cardiomyopathy

### Discussion

Exercise-induced left bundle branch block (LBBB) is an infrequent phenomenon found in 0.5% of patients undergoing exercise stress testing [2]. This unusual variant which results in chest discomfort coinciding with the development of LBBB has been named “painful LBBB syndrome” and it can occur in patients with or without underlying structural heart disease [7].

The prevalence of this specific entity is unclear because of common comorbidities with similar clinical manifestations [8]. Painful LBBB syndrome can cause incapacitating symptoms with even modest exertion and lifestyle, and current therapies are not sufficiently effective [9]. Unfamiliarity with this syndrome has resulted in misdiagnosis of angina pectoris due to coronaropathy, particularly because of a strong association between exercise-induced LBBB and coronary artery disease [10]. No defined treatment protocols are available for patients with painful LBBB syndrome, but some studies have reported benefits with exercise training, cardiac resynchronization therapy by way of biventricular pacing, nonselective b-blocker therapy, and long-acting nitrates [11,12,13]. On the basis of observations from our case as well as those previously published in the literature, we found the following recommendations helpful in detecting painful LBBB syndrome: 1. abrupt onset of chest pain coinciding with the development of LBBB; 2. simultaneous resolution of symptoms with resolution of LBBB; 3. normal 12-lead ECGs before and after LBBB; 4. absence of myocardial ischemia during functional stress testing; 5. normal

left ventricular function and the absence of other abnormalities to explain symptoms; and 6. low precordial S/T wave ratio consistent with new-onset LBBB and inferior QRS axis.

### Conclusion

In patients experiencing chest discomfort, painful LBBB should be considered if significant coronary artery disease is first excluded. As seen in our patient, the development of exercise-induced LBBB and subsequent symptoms can be dynamic and progressive over time. The onset of symptoms probably warrants repeated testing, with particular attention to correlating the timing of LBBB with the onset of symptoms to establish a definite diagnosis. The author believes that the patient’s anxiety due to the painful LBBB syndrome was partially alleviated by the favorable outcome of coronary artery CT. Although the beta-blocker therapy administered may not completely resolve the painful symptoms, it will at least improve her quality of life.

**Conflict of interest:** None

**Acknowledgment:** The author would like to thank Dr. Rita Conti for her great support.

### References

- Jain AC, Mehta MC. Etiologies of left bundle branch block and correlations with hemodynamic and angiographic findings. *Am J Cardiol.* 2003. 91: 1375-1378.
- Grady TA, Chiu AC, Marwick TH. Prognostic significance of exercise induced LBBB. *JAMA.* 1998. 279: 153.
- Vasey C, O’Donnell J, Morris S, McHenry P. Exercise induced LBBB and its relation to coronary artery disease. *Am J Cardiol.* 1985. 56:892.
- Vieweg WV, Stanton KC, Alpert JS, Hagan AD. Rate-dependent LBBB with angina pectoris and normal coronary arteriograms. *Chest.* 1976. 69: 123-124.
- Virtanen KS, Heikkila J, Kala R, Siltanen P. Chest pain and rate-dependent LBBB in patients with normal coronary arteriograms. *Chest Mar.* 1982. 81: 326-331.
- Cannon R, Schenke WH, Quyyumi A, Bonow RO, Epstein SE. Comparison of exercise testing with studies of coronary flow reserve in patients with microvascular angina. *Circulation.* 1991. 83: 77-81.
- Loubeyre C, Tison E, Neuville C, Degroote P, Ducloux G. Painful left bundle-branch block during exertion [in French]. *Ann Cardiol Angeiol (Paris).* 1991. 40: 613-617.
- Tanaka H, Hiraishi M, Miyoshi T, Tsuji T, Kaneko A, et al. Exercise-induced left bundle branch block and subsequent mechanical left ventricular dyssynchrony resolved with pharmacological therapy. *Cardiovasc Ultrasound.* 2011. 9: 4.
- Shvilkin A, Ellis ER, Gervino EV, Litvak AD, Buxton AE, et al. Painful left bundle branch block syndrome: clinical and electrocardiographic features and further directions for evaluation and treatment. *Heart Rhythm.* 2016. 13: 226-232.
- Williams MA, Esterbrooks DJ, Nair CK, Sailors MM, Sketch MH. Clinical significance of exercise-induced bundle branch block. *Am J Cardiol.* 1988. 61: 346-348.
- Sechi LA, De Carli S, Zingaro L, Bartoli E. Resolution of rate-related left bundle branch block after nitrate therapy. *Eur Heart J.* 1996. 17: 150-151.



12. Anderson NS, Ramirez A, Slim A, Malik J. Exercise induced left bundle branch block treated with cardiac rehabilitation: a case report and a review of the literature. *Case Rep Vasc Med.* 2014. 2014: 204805.
13. Czuriga D, Lim PO. Cardiac resynchronization therapy relieves intractable angina due to exercise-induced left bundle branch block without left ventricular systolic dysfunction: a detailed case study. *J Cardiovasc Electrophysiol.* 2016. 27: 609-612.