Reversible cause of severe LV Dysfunction in Left Bundle Branch Block

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Abstract

Left Bundle Branch Block (LBBB) is an electrocardiographic abnormality characterized by delayed conduction in the left bundle branch of the heart's electrical system. LBBB can have significant implications on cardiac function, particularly in severe cases where it leads to LV dysfunction. However, it is essential to recognize that LBBB-induced LV dysfunction is a potentially reversible cause of heart impairment. This article explores the relationship between LBBB and severe LV dysfunction, highlighting the possibility of complete recovery through appropriate interventions.

Case Presentation

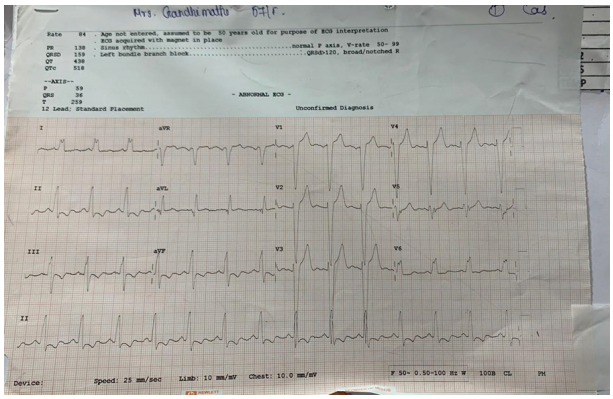
A 56-years-aged female came to ER, with a history of bronchial asthma for 10 years, and presented with complaints of chest pain on exertion and breathlessness on exertion for the past 4 months, which aggravated over the previous week.

Her physical examination revealed no abnormality. Laboratory investigations were within normal limits. ECG revealed LBBB (left bundle branch block) with QRS width 160 msec. Echocardiography revealed asynchronous contraction of the left ventricle with intra and inter-ventricular delay and severe LV dysfunction with an ejection fraction (EF) of 15%. With these findings, the patient was diagnosed to have LBBB with severe lv dysfunction. She was admitted to CCU.

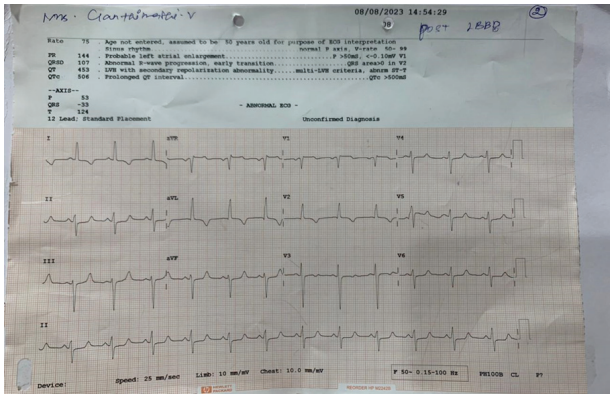
For this patient, CRT (cardiac resynchronization therapy) was the ideal choice of treatment but considering the cost, LBBP (left bundle branch pacing) was planned. Before proceeding with LBBP, the patient was taken for CAG (coronary angiography) to rule out coronary artery disease. CAG revealed normal coronaries. LBBP was done, and placed in the conduction system to ensure optimal synchronization of ventricular contraction.

The patient experienced significant symptomatic improvement following the LBBP procedure. After 2 days, a follow-up ECG revealed narrow QRS 106 msec and Echocardiography revealed marginal improvement in interventricular LV contractility. This improvement is a positive sign indicating that the resynchronization therapy is effectively addressing the underlying LV dysfunction

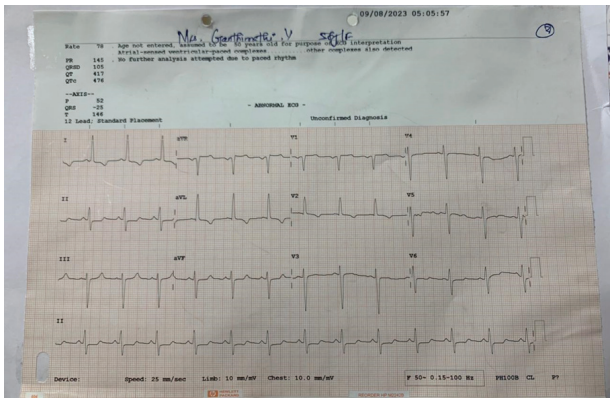
Pre-procedure ECG



Post procedure ECG



Day 2 Post OP ECG



Discussion

Left bundle branch block (LBBB) is a condition that affects the electrical conduction system of the heart. It occurs when there is a delay or blockage of electrical signals in the left bundle branch, which is responsible for transmitting impulses to the left ventricle. LBBB can be caused by various factors, including heart disease, such as coronary artery disease or heart valve problems, and certain medications. It can also occur as a result of aging or be present from birth.

One of the primary effects of LBBB occurs when the electrical signal within the heart encounters a blockage or delay in the left bundle branch, resulting in delayed activation of the left ventricle. This delay disrupts the normal coordination and synchronization of cardiac contractions, leading to inefficient pumping of blood and subsequent LV dysfunction. Over time, the strain on the LV can cause further deterioration of cardiac function and the development of heart failure symptoms, which is reflected in the electrocardiogram (ECG) as widened QRS complexes. Other ECG characteristics of LBBB include broad or slurred S waves in leads I, aVL, V5, and V6 and widened R waves in leads V1 to V3.

Clinically, LBBB may present with symptoms such as fatigue, dyspnea, exercise intolerance and palpitations. However, many people with LBBB may be asymptomatic, it can also be an incidental finding on a routine ECG.

LBBB may be associated with an increased risk of cardiovascular events, such as heart failure, heart attack, arrhythmias. It is important for an individual with LBBB to undergo further evaluation, to determine the underlying cause and assess their cardiovascular health.

Treatment of LBBB depends on the underlying cause and the presence of associated symptoms or complications. In some cases, treatment may involve managing underlying heart conditions, such as coronary artery disease or heart failure. In severe cases where LBBB leads to heart failure symptoms, a pacemaker may be implanted to help regulate the heart's electrical activity.

Conclusion

In this case, 56 years old female with chest pain on exertion experienced significant improvement in symptoms and LV contractility following LBBP.

LBBP has emerged as a promising intervention for managing LBBB patients by restoring synchronous ventricular activation. This approach offers potential benefits such as improved cardiac function, reverse remodelling, symptom relief, and reduced heart failure hospitalizations. The patient needs long-term follow-up to evaluate the sustained benefits of pacing and monitor for potential complications associated with device implantation. Implementing left bundle branch pacing may have economic implications, including device costs, procedural expenses, and availability of expertise.