A Case Report on Nebivolol Induced First Degree Heart Block

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Abstract: *First - degree heart block is a condition of abnormally slow conduction through the AV node. It is defined by ECG changes that include a PR interval of greater than 0.20 without disruption of atrial to ventricular conduction. Here we present a case of an 85 - year - old male who has experienced first - degree heart block. The patient has a history of hypertension for which he was taking a tab. nebivolol 2.5 mg 0 - 0 - 1. during his hospital visit, he was advised to take an ECG which showed a first - degree heart block. Nebivolol is a beta - blocker class of drugs used to treat hypertension. We report a case of nebivolol - induced first - degree heart block. [1]*

Keywords: Nebivolol, Heart block, ECG

1. Introduction

The medicine known as nebivolol is used to control and treat high blood pressure. This medication belongs to the beta - blocker class. According to whether they block beta - 1 receptors in cardiac muscles, beta - 2 receptors in the lungs and smooth muscles, or both, beta - blockers can be divided into two groups. Nebivolol is categorized as a cardio selective beta - blocker since it functions as a beta - 1 adrenergic receptor antagonist by blocking beta - 1 receptors. Based on its ability to dilate blood vessels, beta - blockers are alternatively categorized as vasodilators or non - vasodilators.

Nebivolol is a cardio selective beta - blocker since it functions by blocking beta - 1 adrenergic receptors. Additionally, it stimulates nitric oxide (NO) synthase, which results in NO - mediated vasodilation, acting on the vascular endothelium. Through beta - 3 agonism, nebivolol increases the endothelium's production of NO synthase, which lowers systemic vascular resistance. [2]

A PR interval on electrocardiogram (ECG) longer than 0.20 seconds without interruption of atrial to ventricular conduction is considered a first - degree heart block. The PR interval is typically measured in intervals of 0.12 to 0.20 seconds. The term "marked" refers to a first - degree heart block when the PR interval lasts more than 0.30 seconds. The P waves may occasionally occur inside the earlier T waves [2]

In older patients, fibrotic alterations in the cardiac conduction system seem to be a common cause. First - degree AV block can also be caused by coronary heart disease, myocardial infarction, electrolyte abnormalities (especially hypokalemia and hypomagnesemia), inflammation, infections (endocarditis, rheumatic fever, Chagas disease, Lyme disease, diphtheria), medications (antiarrhythmics Ia, Ic, II, III, IV, and digoxin), infiltrative diseases (sarcoidosis), collagen vascular diseases (SLE, rheumatoid arthritis, and scleroderma), idiopathic degenerative diseases (Lenegre and Lev diseases), and neuromuscular disorders are also factors that can be identified as causes of first - degree AV block.

Other than normal observation for growing conduction delay, very few people require treatment. Since affected patients have shown an elevated risk of developing a higher degree of AV block or atrial fibrillation, routine evaluation is important.

2. Case Report

An 85 - year - old male patient who is a known case of Hypertension, type 2 diabetes mellitus, and chronic kidney disease stage 3 (e GFR 35 ml/min/1.73 m2) came to the hospital. For hypertension, he was on Tab nebivolol 2.5 mg 0 - 0 - 1. He was having long - standing type 2 diabetes mellitus and systemic hypertension. Since the patient had a complaint of frothing of urine and on - and - off edema, he was taking consultation with a nephrologist. He sought to consult the consultation of cardiologist and the doctor advised him to take ECG on April 7, 2022. His blood sugar levels were found to be elevated. The patient's condition was good until Nov 2022, during which ECG showed SR RBBB LABH First - degree heart block, nebivolol was suspected to be the cause as there was no other reason. Hence, nebivolol 2.5 mg was stopped.

3. Discussion

Nebivolol is a beta blocker class of drug used in the management and treatment of hypertension. A beta - blocker blocks beta - 1 receptors in cardiac muscles, beta - 2 receptors in the lungs and smooth muscles, or both, putting them into one of two categories. Nebivolol is categorized as a cardio selective beta - blocker since it functions as a beta - 1 adrenergic receptor antagonist by blocking beta - 1 receptors [2]

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by blocking beta - 1 receptors. Additionally, it stimulates nitric oxide (NO) synthase, which results in NO - mediated vasodilation, acting on the vascular endothelium. Through beta - 3 agonist, nebivolol increases the endothelium's production of NO synthase, which lowers systemic vascular resistance. Beta - blockers, like carvedilol and labetalol, also cause vasodilation, but they do so by blocking alpha - adrenergic receptors. With the highest beta - receptor affinity of all beta - blockers, it is categorized as a third - generation beta - 1 adrenergic receptor antagonist and is well tolerated in patients with lung disease [2]

Nebivolol reaches a peak plasma concentration after 1.5 to 4 hours. Nebivolol is 98 % protein - bound and binds primarily to albumin. Nebivolol is metabolized in the liver mainly via CYP2D6 and then directly by glucuronidation. The metabolites that are hydroxyl and glucuronide have pharmacological activity. It's crucial to remember that CYP2D6 metabolizes nebivolol. Nebivolol is excreted 35 % through urine and 44 % via faeces; patients who are poor metabolizers excrete 67 % of the nebivolol in urine and 13 % in faeces. [2]

This case shows a scenario where first - degree heart block is caused due to the prolonged use of nebivolol, which is confirmed by ECG. since the patient do not have any cardiac history, this sudden block is suspected due to the medication that he was taking the past years.

4. Conclusion

Hence, Beta Blockers used for the treatment of hypertension has the potential to cause heart block. Thus, physicians should be aware about the effects to suspect the cause for the condition. The withdrawal if the suspected drug can reduce the risk of complications.

Conflict of Interest:
The authors declared that there is no conflict of interest.

Abbreviations:
ECG: Electrocardiogram
SR: Sinus rhythm
RBBB: Right bundle branch block
AV: Atrio ventricular

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