Case Report
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A case of rate dependent bundle branch block presented with atypical course of the disease

Abstract

Rate dependent bundle branch block is a common phenomenon. It occurs with or without underlying heart structural defects, and might be associated with tachycardia or less likely bradycardia. The condition is associated with bad cardiac prognosis and needs close follow up with a cardiologist. We are presenting a case of rate dependent bundle branch block, with normal heart rate, which might be considered tachycardia for this particular patient.

Keywords: rate dependent bundle branch block, tachycardia, syncope

Volume 9 Issue 4 - 2019

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Received: June 17, 2019 | **Published:** July 10, 2019

Case report

A 83 years old woman with past medical history of coronary artery disease, had four stents nine years ago, colon cancer, finished the chemotherapy course and resection fourteen years ago, iron deficiency anemia, diverticulosis of large intestine, fibromyalgia, osteopenia, presented with an episode of syncope. Patient stated she has been in her usual health when she woke up that morning. Patient took her medications which were amlodipine 10mg daily, Aspirin 81mg daily, HCTZ 25mg Daily, Metoprolol succinate 50 daily, Rosuvastatin 20mg Daily, then was doing her daily activities when she felt weak and nauseated then went to her bed and fell next to it. Syncope was witnessed by daughter who stated that patient lost consciousness for about three minutes, covered in cold sweat, no shaking, no bladder or bowel incontinence were noted. Patient did not remember any of these events. Patient's vitals were within normal limits except the heart rate was 50bpm. Basal metabolic panel and complete blood count were normal. Troponin was negative. EKG (Figure 1) demonstrated HR of 50bpm.

Repeated EKG with Sinus bradycardia, HR 60bpm with 1st degree block and new LBBB. (Figure 2) Echocardiography: ejection fraction 60–65%, non significant for any changes.

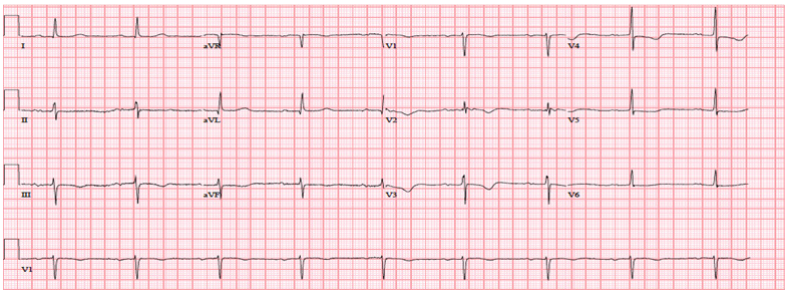

Figure 1 Demonstrated HR of 50bpm.

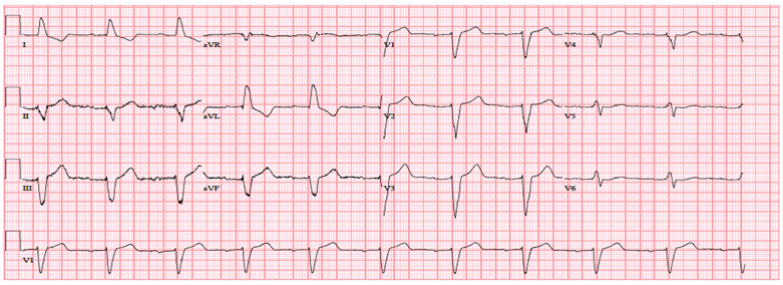

Figure 2 Echocardiography: ejection fraction 60-65%, non significant for any changes.

Patient was admitted to Cardiology Critical Care and held all of her blood pressure medication and got diagnosed with rate dependent bundle branch block (RDBBB). After stabilization, Patient was discharged to follow up with her cardiologist.

Discussion

The phenomenon known as "intermittent (rate–dependent or transient) bundle branch block (RDBBB)was first described by Lewis[1] in 1913 and demonstrated experimentally by Drury and Mackenzie in 1934.[2] In most cases, RDBBB occurs when a critical heart rate is exceeded, and has been attributed to a prolongation of recovery in the diseased bundle branch.[3,4] Less common cases have been reported in which bundle branch block develops after long diastolic intervals or during slowing of the heart rate.[5–8] Several hypotheses have been proposed to explain these phenomena, including concealed conduction,[9] hypoxia,[10] vagal effects[2,11] and super normality of the affected bundle.[12] Recently, Singer et al. demonstrated that depolarization of depressed Purkinje fibers can lead to propagation impairment and can produce slow conduction or even blockade.[13]

Since most of the cases occurs during tachycardia. Comeau et al. reported that intermittent RDLBBB occurred frequently during exercise stress testing.[14] RDLBBB may occur in the presence or absence of recognized cardiac disease. [15–17]Although there are several reports describing the electrophysiology of RDLBBB,[18–20] the effects of RDLBBB on left ventricular function have not been described. Studies in dogs and humans have shown that ventricular pacing may produce abnormal left ventricular performance.[21,22]

Bundle branch refractory periods are usually shorter than the cycle lengths (CL) encountered at physiological ranges of heart rates. In addition, bundle branch refractory periods normally decrease with a decrease in cycle length. RDBBB will occur when the spontaneous (or driven) CL becomes equal to or exceeds the refractory period of a bundle branch. There are three mechanisms by which this could occur, these being: 1) an absolute increase in bundle branch refractoriness with preservation of the normal cycle length–refractory period relationships; 2) an alteration of the normal bundle branch refractory period–cycle length relationship with either an increasein refractory period with decreasing CL(negative slope), no change in refractory period with decreasing CL (zero slope), or less than normal decrease in refractoriness with decreasing CL(positive slope, but less positive than normal); 3) a combination of 1) and 2).[23–25]

In our patient, she experienced RDBBB while her heart rate is only in the 60s, and it fades away when the heart rate is in the 50s. the only explanation to that is the slight increase in the patient heart rate considered tachycardia for her even if it is considered normal heart rate for other healthy individual.

Conclusion

Rate dependent bundle branch block might involve left or right bundle, occurs during tachycardia or less likely bradycardia. It also might occur even if the heart rate is within normal range but it is considered tachycardia for the patient.

Acknowledgment

None.

Conflict of interest

None.

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Citation: Marco S, Marian S, Mina S, et al. A case of rate dependent bundle branch block presented with atypical course of the disease. *MOJ Clin Med Case Rep*. 2019;9(4):76–78. DOI: 10.15406/mojcr.2019.09.00308