Case Report

Title - Mobitz type 1 second-degree atrioventricular block in Anterior wall myocardial infarction – An extremely rare association.

Abstract

Arrhythmias can complicate the course of patients with ST-elevation myocardial infarction.These arrhythmias can include both tachyarrhythmias and bradyarrhythmias. Tachyarrhythmias range from Ventricular premature complexes to life-threatening ventricular tachycardia/ fibrillation. Bradyarrhythmias range from sinus bradycardia to complete heart block. These arrhythmias have theability to provoke hemodynamic consequences and increase mortality. Tachyarrhythmias are more common with AWMI and bradyarrhythmias are more common with IWMI. We report a case of Mobitz Type 1 (Wenkebach) second degree AV block in a patient with AWMI. Angiography showed a significant lesion in LAD after first septal and diagonal branch. After the successful PCI, this second degree AV block reverted to first degree AV block.To the best of our knowledge, there is no case report describing this association separately.

Key words: AV Block; Myocardial infarction; Type I second degree AV block; Wenkebach Type AV block

Abbreviations: AWMI: Anterior wall Myocardial infarction; IWMI: Inferior wall myocardial infarction; AV block: Atrioventricular block; LAD: left anterior descending; LCX: left circumflex; RCA: Right coronary artery; PCI; Percutaneous coronary intervention

Introduction

Ischemic injury can produce conduction block at any level of the AVor intraventricular conduction system. Such blocks can occur in theAV node and the bundle of His and produce various grades of AVblock.First-degree and type I second-degree AV blocks do not appear to affect survival, are most commonly associated with occlusion of the right coronaryartery, and are caused by ischemia of the AV node. Type II second degree AV block occurs with AWMIgenerally develops as a result of septal necrosis. We report a case of Mobitz Type 1 (Wenkebach) second degree AV block in a patient with AWMI. Angiography showed a significant lesion in LAD after first septal and diagonal branch. After the successful PCI, this second degree AV block reverted to first degree AV block.

Case report

50 year old, nondiabetic, nonhypertensive, female admitted in our hospital with acute onset of chest pain at rest, associated with sweating since 9 hours. She denies any addictions. She denies taking any medicines. On examination, pulse was 76 per minute; blood pressure was 130/82 mm Hg. Cardiovascular and respiratory system examination was normal. Electrocardiogram on admission showed Mobitz type 1 (Wenkebach) second degree AV block and ST changes of evolved AWMI (Figure 1). Echocardiography showed basal, mid, distal anteroseptal, anterior and anterolateral segments hypokinesia with an ejection fraction of 30%. Coronary angiogram showed a significant lesion in LAD after first septal and diagonal branch(Figure 2). RCA and LCX were normal with balanced circulation(Figure 3, 4).Lesion was stented with 3.5 x 24 mm drug-eluting stent after pre-dilatation. Post stent dilatation was done with 3.5 x 13 mm noncompliant balloon. Check angiogram showed good result (Figure 5). The procedure was uneventful. Post-procedure ECG showed first degree AV block with PR interval of 220 msec(Figure 6). Patient was discharged on the 5th day of the procedure on dual anti-platelets, rosuvastatin, ramipril andeplerenone.

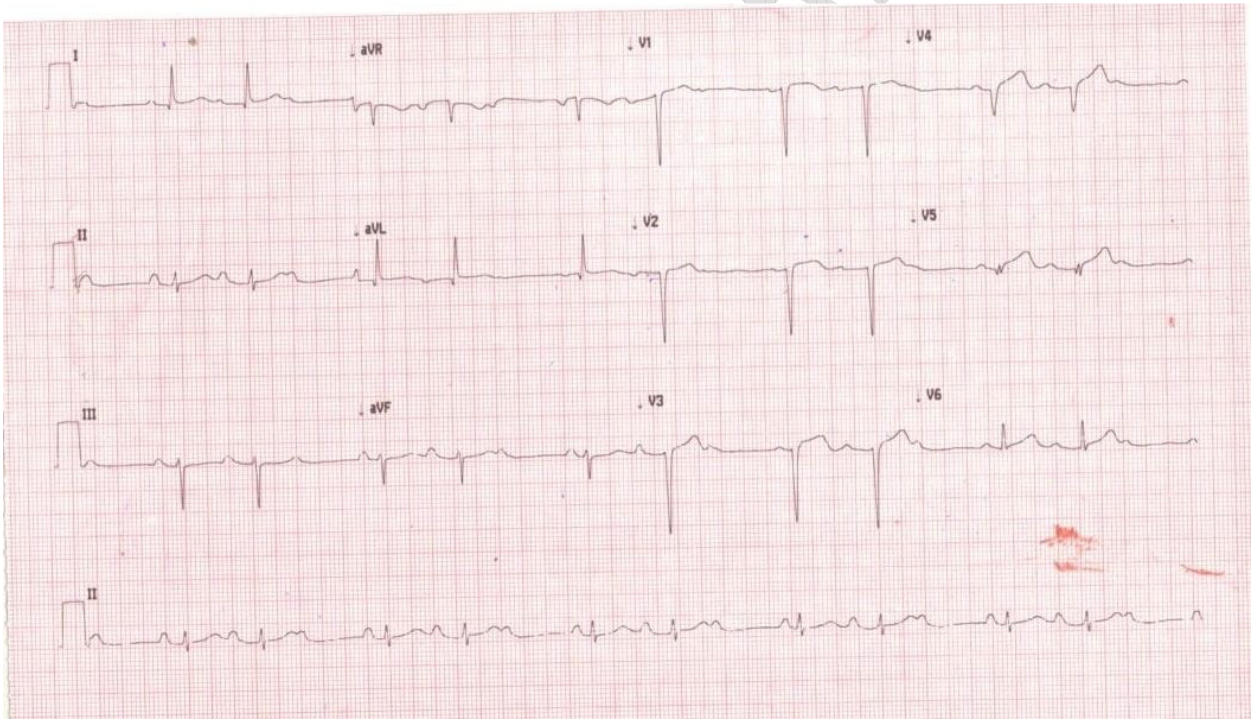

Figure 1: ECG showing Mobitz Type 1 second degree AV block with ST elevation in V2-V5

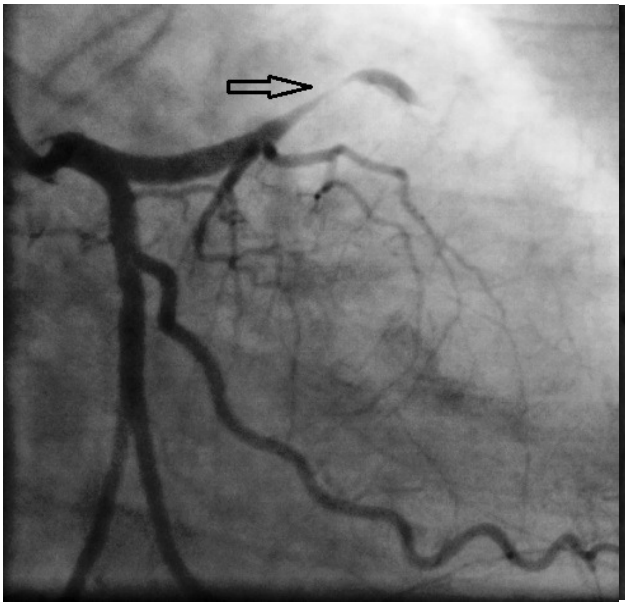

Figure 2: Coronary angiogram in RAO caudal view showing significant lesion in LAD after first septal and diagonal branch. (RAO- Right anterior oblique)

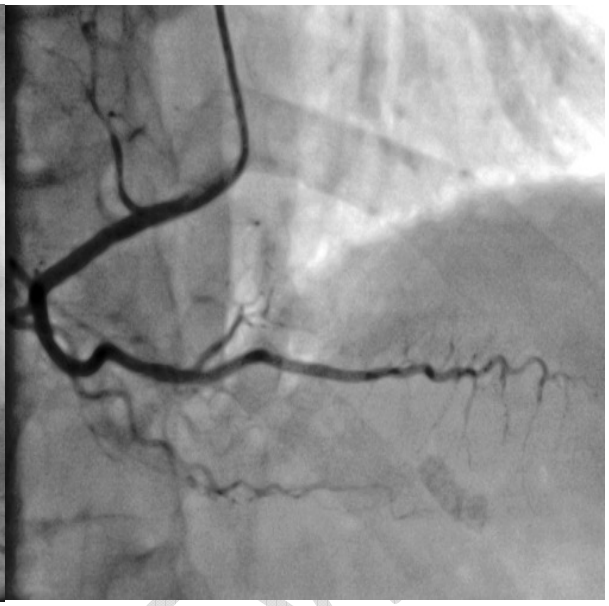

Figure 3 Coronary Angiogram in PA cranial view showing normal RCA. (PA- Posteroanterior).

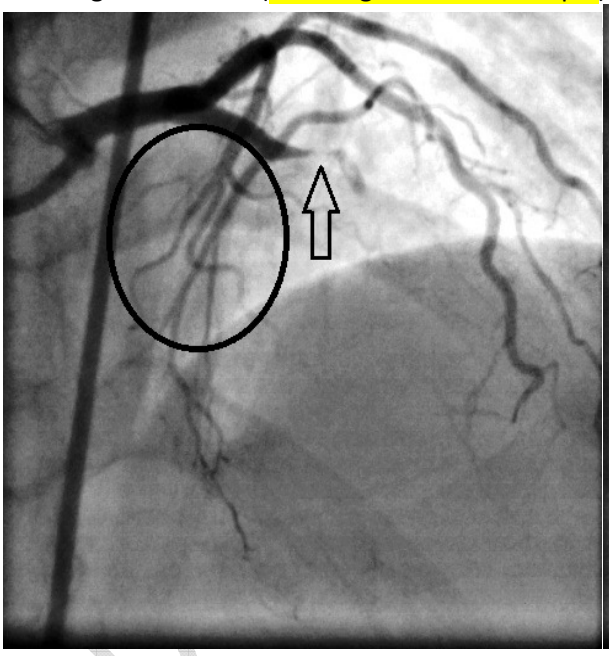

Figure 4: Angiogram in PA cranial view
Arrow shows the lesion in LAD and circle shows Normal distal LCX artery

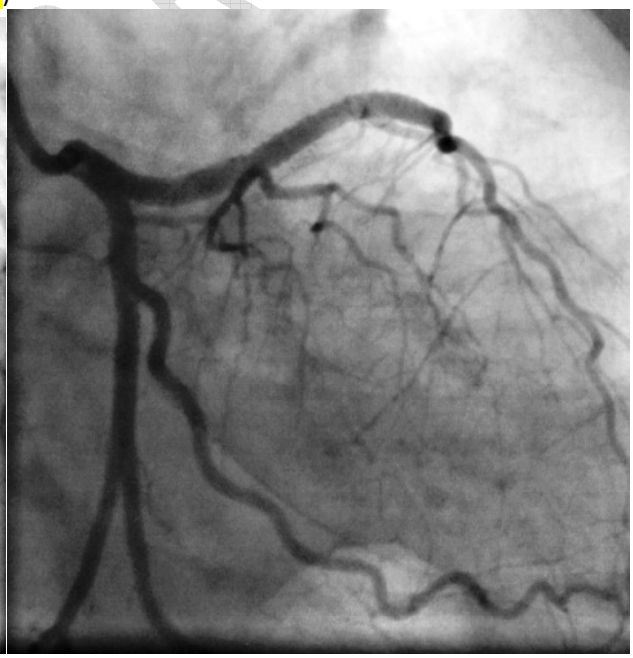

Figure 5: Check angiogram after stenting showing good result.

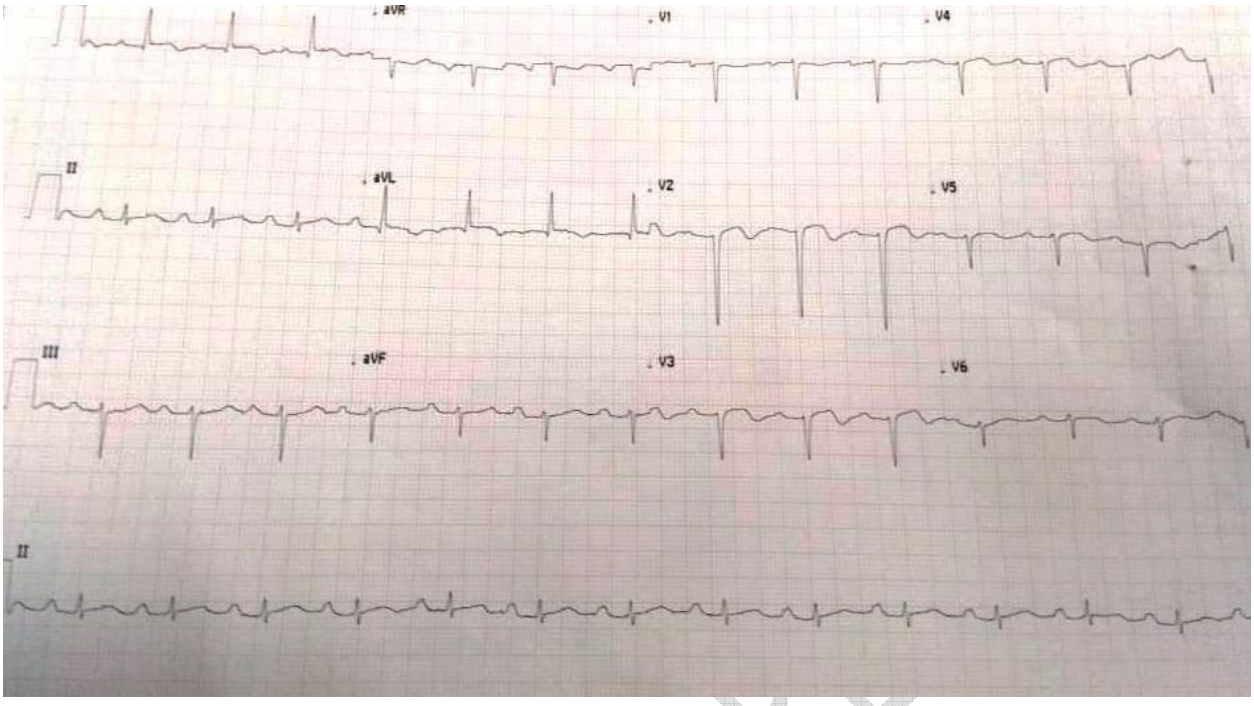

Figure 6: ECG after the procedure showing First degree AV block with PR interval of 220 msec. QT interval – 420 msec, Corrected QT interval – 436 msec, QRS duration – 100msec.

Discussion

Atrioventricular (AV) block is a common complication of acute myocardial infarction (MI). The frequency of AV blocks associated with acute myocardial infarction is 16% in the study by Archboldet al (1) and 18.7 % in the study by Dar et al (2).In pre-thrombolytic era, high (second or third degree) AV block was seen in patients presenting with acute MI. Although, the advent of thrombolysis and angioplasty therapy has substantially decreased the mortality associated with acute MI, the incidence of AV block persists (3).Ischemic injury can produce conduction block at any level of the atrioventricular conduction system. Such blocks can occur in the AV node and the bundle of His and produce various grades of AV block. The AV node blood supply is provided by the AV nodal branch, which most commonly arises from the RCA, although it can rarely be a branch of the circumflex artery in patients with left coronary artery dominance (4). The infranodal conduction system structures are supplied almost entirely by the septal perforator branches of the LAD artery, with variable dual supply provided by either the RCA or LCX artery (5). Decreased flow to the septal branches or RCA is therefore associated with a variety of conduction disturbances (6, 7). In addition to the ischemia-driven conduction delay, other mechanism of AV blocks is vagally mediated heart block. Ischemic-mediated

mechanical stretch and chemical substances stimulate receptors located in the inferior and posterior left ventricular walls. These receptors lead to activation of non-myelinated afferent C-fibers from the vagus nerve, which in turn result in increased vagal tone and bradyarrhythmia. This mechanism is known as the Bezold-Jarisch reflex (8).

First-degree and type I second-degree AV blocks do not appear to affect survival, are most commonly associated with occlusion of the right coronary artery, and are caused by ischemia of the AV node. Specific therapy is not required in these patients. Type II second-degree AV block associated with anterior infarction usually originates from a lesion in the conduction system below the bundle of His. Type II second-degree AV block in the setting of inferior/posterior STEMI is usually temporary, can be managed conservatively. Type II second-degree AV block associated with anterior infarction has a potential for progression to complete heart block. Complete AV block can occur in patients with either inferior or anterior infarction, although it is more common in the inferior than in the anterior location.Complete heart block in patients with inferior infarction usually develops gradually, often progressing from a first degree or type I second-degree block.In patients with anterior infarction, AV block generally develops as a result of extensive septal necrosis involving the bundle branches (9). This group has a high mortality rate due to associated severe left ventricular failure and frequently shock as a consequence of extensive myocardial necrosis.

Our case is unique, in which Type I second degree (Wenkebach type) AV block is associated with AWMI. To the best of our knowledge, there is no case report describing this association separately. Studies in the past have mentioned the association of second degree AV block with Acute MI in general, but have not described the association of type I second degree AV block with AWMI. Coronary angiogram of our patient showed lesion only in LAD after first septal and diagonal branch. Right coronary artery and LCX were normal with balanced circulation. After the successful stenting of LAD, this second degree AV block reverted into first degree AV block. As the RCA, LCX and first septal branch was normal in our patient, ischemic cause was less likely. This AV block in our patient is more likely due to vagus nerve stimulation. It doesn't require a specific therapy.

Conclusion

Atrioventricular (AV) block is a common complication of acute myocardial infarction. Ischemic injury and the vagal hypothesis are the two major mechanisms. Type I second degree (Wenkebach type) is more commonly associated with IWMI. The association of this AV block is not reported in patients with AWMI. Although it does not require any specific therapy but it is considered as a contraindication for starting Beta blockers.

Informed Consent

Written informed consent was obtained from thepatient for publication of this report and any accompanyingimages.

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