

## Case Report

# Importance of atropine challenge test in the current era of electrophysiology

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### ABSTRACT

Mobitz II block is misunderstood more than any other abnormality of rhythm or conduction". The concept of 2:1 AV block remains poorly understood by many physicians even after so many years of advancement in the field of electrophysiology. It cannot be classified into type I or type II second-degree AV block because there is only one PR interval to examine before the blocked P wave

A 46 year male admitted with chief complaints of effort intolerance and non anginal chest pain of fifteen days duration. His resting ECG revealed 2:1 conduction of P wave, before and after non conducted P wave PR interval was constant and of normal duration. So in order to define the site of block we performed the atropine challenge test as the patient was not able to walk. On administration of atropine ECG revealed worsening of AV block in a 3:1 to 4:1 conduction of P wave with narrow complex QRS. This finding suggesting the block is in bundle of his or branches. This patient underwent Electrophysiological study. Electro physiological tracings showed normal PR interval, QRS duration, with 2:1 AV block. The non conducted P wave was blocked at the level of distal His bundle.

This case illustrated the importance of localisation of site of block in 2:1 AV block in order to manage the case appropriately. Both vagal manoeuvres and exercise can help in localising the site of block, which will be confirmed by electrophysiology study.

**Keywords:** AV block, Atropine challenge test, Electrophysiological tests

### INTRODUCTION

"Mobitz II block is misunderstood more than any other abnormality of rhythm or conduction". In 1924 Mobitz,<sup>1</sup> using an ECG, classified the well-known Wenckebach form of second degree AV block as type I and characterized type II second degree AV block as "the occasional block of one or more P waves with no change in the PR interval before and after the non-conducted P waves. A common and very important form of second degree AV block is 2:1 atrio-ventricular (AV) block. The concept of 2:1 AV block remains poorly understood by many physicians even after so many years of advancement in the field of

electrophysiology. It cannot be classified into type I or type II second-degree AV block because there is only one PR interval to examine before the blocked P wave. Logically it is essential to have two consecutive conducted P waves to characterize second-degree AV block in terms of type I or type II block. 2:1 AV block can occur in either the AV node or the His-Purkinje system. The site of 2:1 AV block can be determined by non-invasive or invasive methods. The non invasive methods are:

1. PR interval of conducted P wave is > 300 ms then the block is AV node, if <160 ms then the block is at bundle of his or bundle branches.

2. If atropine or exercise improves conduction the block is in the AV node, if worsens then it is at His or bundle branches.
3. on carotid sinus massage in AV nodal block conduction worsens and block in His or branches conduction improves.

When 2:1 conduction is present, it is difficult to distinguish between Mobitz type I and II blocks and the QRS pattern is often a major criteria to differentiate the two types.<sup>2</sup>

### CASE REPORT

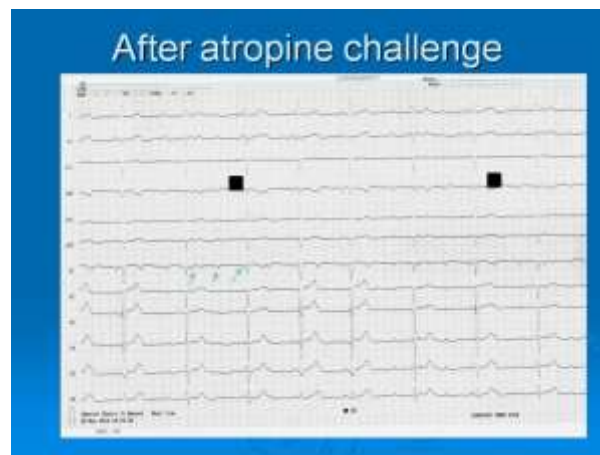
A 46 year male admitted with chief complaints of effort intolerance and non angular chest pain of fifteen days duration. He was not a hypertensive or diabetic. Patient had left lower limb weakness because of poliomyelitis since childhood. There was no history of syncope or dyspnea. On examination his pulse rate was 68 per minute regular, blood pressure of 130/70 mmHg. Cardiovascular examination was unremarkable. His resting ECG revealed 2:1 conduction of P wave, before and after non conducted P wave PR interval was constant and of normal duration. Ventricular rate of 50 bpm with fixed P-P interval and normal QRS duration (Figure 1). The site of block in 2:1 AV block may be in either AV node or infranodal, making this distinction is very important for the management of this condition.



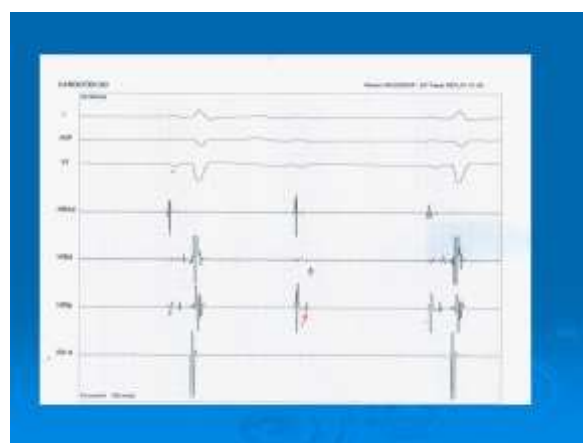
**Figure 1: Baseline ECG showing 2:1 AV block. Arrows showing p waves.**

So in order to define the site of block we performed the atropine challenge test as the patient was not able to walk. On administration of atropine ECG revealed worsening of AV block in a 3:1 to 4:1 conduction of P wave with narrow complex QRS (Figure 2). This finding suggesting the block is in bundle of his or branches. Knowledge of the strict but logical definitions will facilitate understanding of second-degree AV block and its management. Though the response to vagal block is less reliable locator of the block but it may be still good test for bedside diagnosis of level of block. The level of block can be confirmed by electrophysiological study.

This patient underwent Electrophysiological study. Electro physiological tracings showed normal PR interval, QRS duration, with 2:1 AV block. The non conducted P wave was blocked at the level of distal His bundle (Figure 3). In view of his symptoms patient underwent permanent pacemaker implantation.



**Figure 2: After atropine injection ECG shows worsening of AV conduction, arrows showing p waves.**



**Figure 3: Electrophysiological tracings showing sinus rhythm with 2 to 1 AV block, second P wave is followed by proximal HIS spike but without any deflection in distal HIS bundle suggesting block within the distal bundle. HRAd=high right atrial, HISp=His bundle proximal, HISd= His bundle distal, RVd= right ventricle. [PR =108 msec, AH=60 msec, HV= 68msec & QRS= 108 msec].**

### DISCUSSION

His bundle recordings allow delineation of three anatomic sites of AV block<sup>3</sup>: (1) Proximal (above the His bundle), representing delay or block in the AV node; (2) Intra-Hisian. representing delay or block within the His bundle; and (3) Infra-Hisian or distal to the His bundle, representing block or delay distal to the His bundle recording site either in the distal His bundle or in the

bundle branches. In type 1 second degree AV block with wide QRS complexes (bundle branch block) the block may be in the AV node or within or below the His bundle. Type II second degree AV block is usually within or below the His bundle and is most often seen with bundle branch block. Rarely, the block can be in the AV node.

Prognosis of patients with AV block depends on the site of block. The prognosis of patients with second degree AV block within the His bundle is uncertain. Patients frequently manifest congestive heart failure and syncope. Untreated chronic second degree block below the His bundle has a poor prognosis; patients frequently proceed to higher degrees of block and become symptomatic with syncope.<sup>4</sup>

### CONCLUSIONS

This case illustrated the importance of localisation of site of block in 2:1 AV block in order to manage the case appropriately. Both vagal manoeuvres and exercise can help in localising the site of block, which will be confirmed by electrophysiology study.

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