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"Poor Man's EPS and CAG"

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Routine ECG of 60yr old hypertensive on amlodipine and Telmisartan.

1. Describe all ECG changes
2. Why is this clue?
3. What are practical implications?

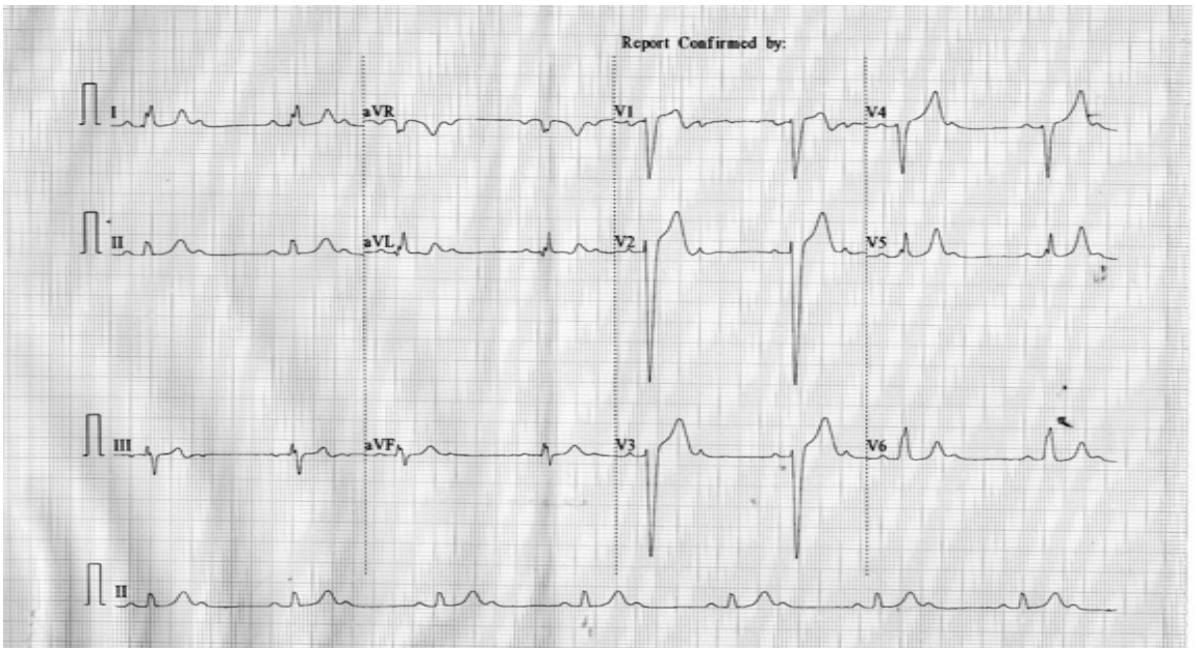

Figure 1

ECG Findings

ECG shows basic bradycardia with a complete Left Bundle Branch Block (LBBB). A small wave after each T wave can be an 'u' wave or a blocked 'p' wave. The configuration of this wave in V1, as well as the distance of this wave from the T wave, are suggestive of the 'p' wave. So the blocked 'p' wave can be blocked atrial Premature beat (APD) or the sinus 'p 'wave, which is blocked. As there is no significant prematurity and change in this blocked 'p' wave configuration, it is likely to be blocked sinus beat. So, this ECG shows a 2:1 AV block. When some 'p' waves are conducted, and some 'p' waves are blocked, this is a second-degree AV Block. However, it cannot come under type 1 or type 2 second-degree AV block. There are no two successive PR intervals before the blocked 'p' to decide whether the PR interval is constant or gradually prolonging. This makes the 2:1 block a separate entity of the second-degree AV Block. Once the second-degree AV block is diagnosed, the site of the block is to be determined. For example, in type 1 second degree in AV Block, the block is in supra His level (AV node), and in type 2 second degree AV block, it is in Infra His level (Bundle branches, fascicles). For the 2:1 block, the site of the block is decided by PR interval and QRS

width. There can be three sites of the block. (Table 1)

Tab: 1 – 2:1 AV block - localisation

Site	PR Interval	QRS
AV Node (Supra HIS level)	Prolonged	Normal
HIS bundle	Normal	Normal
Infra HIS level	Normal	Wide (BBB)

This ECG shows a 2:1 AV Block with wide QRS (LBBB);the block is at Infra His Level of bundle branches and or fascicles. Because of LBBB, all the sinus 'p' waves have to be conducted through Right Bundle Branch (RBB) only. But this RBB is conducting only alternate 'p' waves, indicating partial disease in itself. Hence, this is Bilateral Bundle Branch Block (BBBB). In addition, LBBB shows homophasic ST T changes (ST and T in the same direction of QRS) in anterolateral and high lateral leads. These signs represent a subtle sign of CAD.

The P-P intervals, which include the QRS complex, are slightly shorter than the P-P intervals, which do not include the QRS complex. This change is due to Ventriculophasic Sinus Arrhythmia.

To sum up all the ECG changes:

1. Bradycardia
2. 2:1 AV block
3. LBBB
4. Block at infra His Level (Complete LBBB, Partial block in RBBB)
5. BBBB
6. Homophasic ST T changes (CAD)
7. Venticulophasic sinus arrhythmia

Clue

As this 2:1 AV block is with wide QRS, the site of block can be diagnosed as infra His AV block from the surface ECG itself without the requirement of electrophysiological studies (EPS). In the presence of LBBB, diagnosis of CAD is difficult as simple tests like exercise ECG may be misleading. So, most often, MSCT CAG or regular CAG may be required to diagnose or exclude CAD. The homophasic ST T changes in this ECG in anterolateral and high lateral leads indicate the presence of CAD without more advanced tests, as previously mentioned. Because of these reasons, the clue of **"Poorman's EPS and CAG"** is given.

Practical Implications

Advanced AV Block in infra His level manifests as BBBB will require Permanent Pacemaker Implantation after appropriate evaluation and treatment for CAD.