
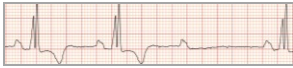


## 2<sup>nd</sup>-degree AV block

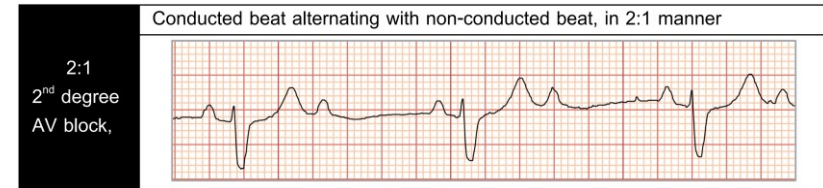
### Introduction

- By definition, 2<sup>nd</sup>-degree AV block is when some - but not all - atrial impulses fail to conduct the ventricles. This results in a “drop-beat” - a P wave which is not followed by a QRS complex.
  - If all atrial impulses conduct the ventricles but slower than usual, it is 1<sup>st</sup>-degree AV block.
  - If none of atrial impulses conduct the ventricles, it is 3<sup>rd</sup>-degree AV block (complete heart block).
- The 2<sup>nd</sup>-degree AV block usually happens at a fixed interval and gives a pattern of “group beating” QRS complexes.
  - Type I and type II 2<sup>nd</sup>-degree of AV block are electrographic patterns that refer to the behavior of the PR interval, not the anatomical site of block (The definitive anatomic site of block should not be described as type I or type II).
  - Symptoms can be from asymptomatic, light headedness, dizziness palpitation to syncope.

	Type I	Type II
<b>Physiologic description</b>	Decremental AV conduction (incremental AV conduction time)	All or none AV conduction (constant AV conduction time)
<b>Behavior of PR interval on ECG</b>	Inconsistent, usually progressively prolong PR interval until a drop-beat happens.	Consistent, constant PR interval until a drop-beat happens.
<b>ECG sample</b>		
<b>PR interval after the block</b>	Shorter than the last conducted beat	The same as the last conducted beat
<b>Other findings (assume stable sinus rhythm)</b>	In classic Wenckebach <ul style="list-style-type: none"> <li>- Decrease incremental of PR prolongation</li> <li>- Progressive shortening of RR</li> <li>- During block beat, the RR interval is shorter than 2 PP interval.</li> </ul>	
<b>Site of block</b>	Mostly at the node (nodal level), rarely infra-nodal.	Almost always Infra-nodal i.e. His, Purkinje, or bundle branches
<b>QRS pattern</b>	Usually narrow (70%)	Usually wide QRS complex (70%)
<b>Causes</b>	<ul style="list-style-type: none"> <li>- Inferior MI</li> <li>- AV nodal injury</li> <li>- Increased vagal tone e.g. trained athletes, pain, carotid massage, sleep)</li> <li>- drugs e.g. BB, CCB, dig</li> </ul>	<ul style="list-style-type: none"> <li>- Septal-anterior MI</li> <li>- Large area of injury</li> <li>- Degenerative changes of conduction system</li> <li>- Drugs e.g. BB, CCB, dig</li> </ul>
<b>Treatment</b>	<ul style="list-style-type: none"> <li>- Good prognosis</li> <li>- If wide QRS or suspect infra-nodal type I 2<sup>nd</sup>-degree AV block, consider EP study or PPM.</li> </ul>	<ul style="list-style-type: none"> <li>- Bad prognosis</li> <li>- High risk to progress to 3<sup>rd</sup>-degree AV block</li> <li>- Consider PPM</li> </ul>

### 2:1 AV block

- When there is a conducted atrial impulse alternating with a non-conducted atrial impulse.
- Since we need at least 2 consecutive conducted P waves to exam the behavior of PR interval, this form of AV block cannot be diagnosed as type I or type II 2<sup>nd</sup>-degree AV block.
- On ECG, every other P waves are followed by QRS complex.



- A PP interval between 2 P waves that have a QRS complex is occasionally shorter than a PP interval that does not have QRS. This sinus arrhythmia is called ventriculophasic phenomenon.
  - If P waves are not identical, a non-conducted, bigeminy PAC should be considered.
- If there are non-conducted beats more than conducted beats i.e. 3:1, 4:1, the block is considered high grade or advanced AV block.
- Prognosis depends on the anatomical site of block. Definitive dx of site of block is by an electrophysiological study but there are some clues.

2:1 AV block	Nodal	Infra-nodal
Incidence	20%	80%
Finding	<ul style="list-style-type: none"> <li>- Associate with type I 2<sup>nd</sup>-degree AV block</li> <li>- Narrow QRS complex</li> </ul>	<ul style="list-style-type: none"> <li>- Associate with type II 2<sup>nd</sup>-degree or 3<sup>rd</sup> degree AV block</li> <li>- Wide QRS complex</li> </ul>
Dynamic changes <ul style="list-style-type: none"> <li>• Exercise</li> <li>• Atropine</li> <li>• Beta agonist</li> <li>• Faster AV node</li> <li>• Carotid massage</li> </ul>	Improve Improve Improve Improve Worsen	Worsen Worsen Worsen or unchanged Worsen Improve

### Suggested Readings

- Woldemar Mobitz and His 1924 classification of second-degree atrioventricular block. (Circ 2004;110:1162-7).
- Second-degree atrioventricular block revisited. (Herzschr Elektrophys 2012;23:296–304).
- Second-degree atrioventricular block: A aeappraisal. (Mayo Clin Proc 2001;76:44-57)
- ACC/AHA/HRS 2008 Guidelines for device-based therapy of cardiac rhythm abnormalities. (JACC 2008;51:e1–62).