

Blocks, Blocks, Blocks – What's the Difference?

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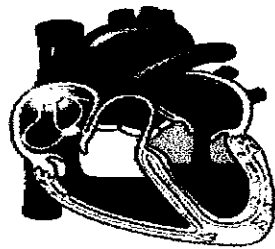
When is it a block?

◆ Definition:

- "A heart block is a disease in the electrical system of the heart causing a delay or complete blockage of conduction."
 - wikipedia.org/wiki/Heart_block



Types of Heart Block

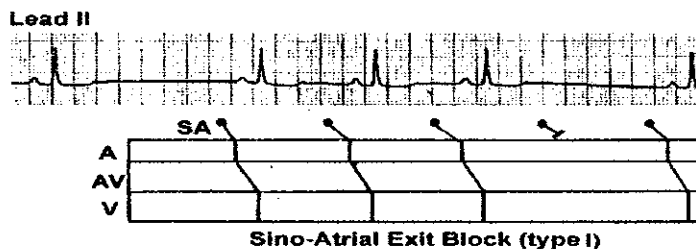


- ◆ Blockage at any level of the electrical system
 - Within the SA node = SA blocks
 - Within the AV node and His Bundle = AV blocks
 - Within the left or right bundle branches
 - Within the fascicles of the left bundle = hemiblocks

SA Exit Blocks

- ◆ SA node exit block-type 1
 - Wenckebach phenomenon
 - The P-P cycle is progressively shortened until there is a pause and the cycle is repeated
 - Pause is not a multiple of the P-P cycle
- ◆ SA node exit block-type II
 - Sudden drop of the P wave and the resultant pause is a multiple of the P-P cycle
- ◆ SA node exit block- third degree
 - Complete failure to conduct
 - Pause is not a multiple of the P-P cycle
 - Ends with a sinus beat

SA node exit block – type I

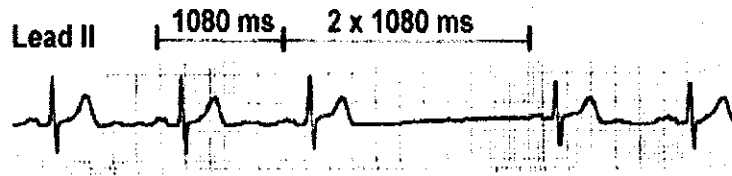


Pause is not a multiple of P-P interval

P – P intervals in sinus rhythm progressively shorten until there is a pause

<http://library.med.utah.edu/kw/ecg/mm/ecg>

SA node exit block - type II



Sino-Atrial Exit Block (Type II)

Sudden drop of the P wave

Pause is a multiple of the P-P interval

SA node exit block – third degree

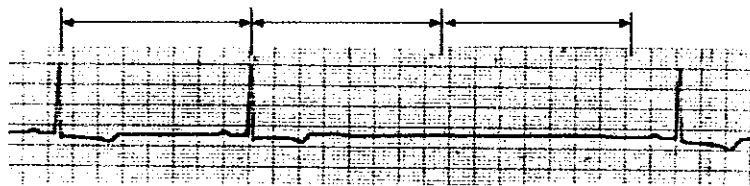


Figure 8-2

Pause is not a multiple of the P-P interval

Ends with a sinus beat

AV Blocks

- ◆ Delay or complete blockage at the AV junction
- ◆ Described in degrees of delay
 - First degree is a delay in conduction of impulse to the ventricles
 - Second degree is delays and blockage of conduction to the ventricles
 - Third degree is complete blockage of all impulses to the ventricles

First Degree AV Block

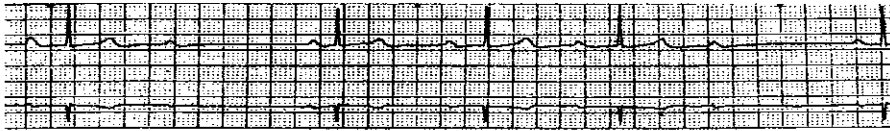
- ◆ Most common cause of this arrhythmia is excessive vagal tone



Prolonged PR interval greater than .20 seconds in an otherwise sinus rhythm

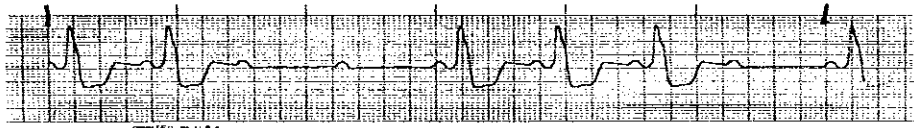
Second Degree AV Block – Type I

- ◆ Wenckebach phenomenon
 - PR interval progressively prolongs until QRS complex is not conducted
 - PR interval returns to “normal” after the dropped QRS complex
 - The amount of prolongation of the PR interval becomes less with each successive beat
 - The R – R interval progressively shortens



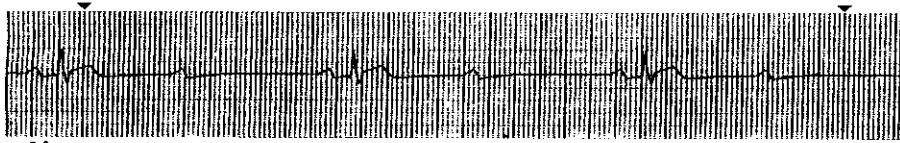
Second Degree AV Block – Type II

- ◆ Sudden blockage of conduction through the AV junction to the ventricles
- ◆ Conduction impairment is most often due to a degenerative process, with possible progressive failure of conduction leading to cardiac arrest

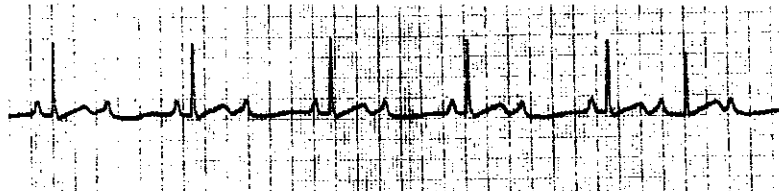


Advanced AV Block

- ◆ By itself, 2:1 AV block can not be called Type 1 (Wenckbach) or Type II block since only one P-R interval can be determined before the non-conducted QRS complex.



Can you name this Second Degree AV block?



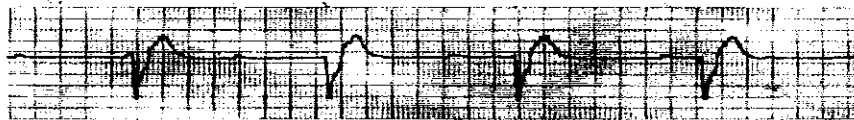
Third Degree AV Block

- ◆ There is total failure of conduction between atrium and ventricle. The p waves are normal and the QRS may or may not be normal depending on the site of origin of the ventricular impulse.
- ◆ The p waves and the QRS are completely independent of each other,
- ◆ This rhythm can be fatal if a subsidiary pacemaker below the AV junction does not begin driving the ventricle

Third Degree AV Block



QRS impulse originating high in the bundle of His



Third Degree (Complete) Heart Block

QRS impulse originating in the ventricles

So What Arrhythmias Look Like a Block?

◆ SA node arrest

- The SA node does not generate an impulse
- Pause is not a multiple of the P-P cycle
- Ends with an atrial or junctional escape beat

◆ Non-Conducted PAC

- Early different shaped P wave
- QRS is not conducted because bundle branches not repolarized

SA node arrest



Figure 4-5

Pause is not a multiple of the P-P cycle

Ends with junctional escape beat

Non-Conducted PAC

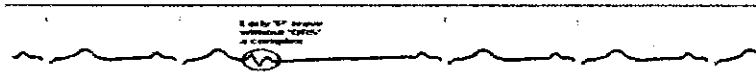


Figure 3-4

www.mededsys-nurse.com/courses

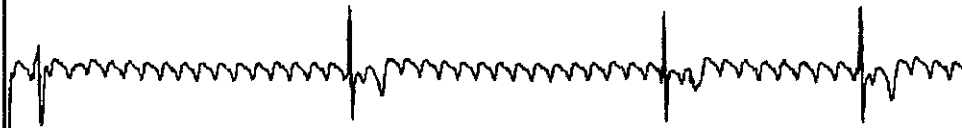
Summary: the P waves

	SA Exit Blocks	Sinus Arrest	Non-conducted PACs	First degree AVB	Second degree AVB - I	Second degree AVB - II	Third degree AVB
Is there a regular P wave?				Yes	Yes	Yes	Yes
Is there a missing P wave?	Yes	Yes					
Are there hidden P waves?			Yes, it comes in early				Yes

Blocking of impulses in other dysrhythmias

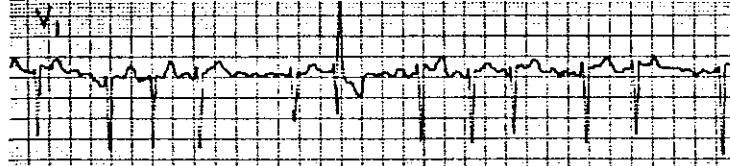
- ◆ Atrial flutter
- ◆ Atrial fibrillation
- ◆ Atrial tachycardia

Atrial Flutter

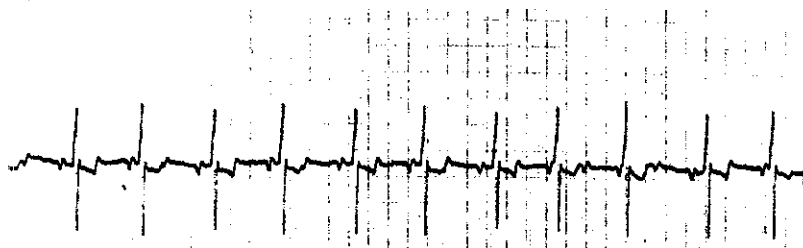


Flutter waves fire at a rate of 250 – 350 beats per minute
AV junction “blocks” impulses every other to multiple atrial
beats to protect the ventricles

Atrial Fibrillation



Atrial Tachycardia with Block



Atrial rate 150 to 250 beats per minute “blocked” every other atrial stimulation to decrease the ventricular rate to 75 to 120 beats per minute.

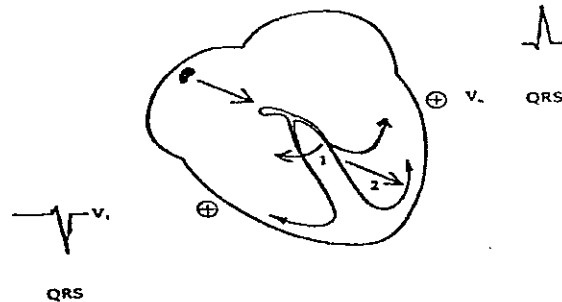
Bundle Branch Blocks

Normal Ventricular Conduction

- ◆ Normal Ventricular Depolarization
 - Begins down the intraventricular septum depolarizing from left to right
 - Depolarizes the left and right ventricular free walls
- ◆ Normal Ventricular Repolarization
 - Rate of repolarization directly relates to the rate of the previous depolarization beat
 - Right bundle repolarizes slower than the left bundle

Normal Ventricular Activation

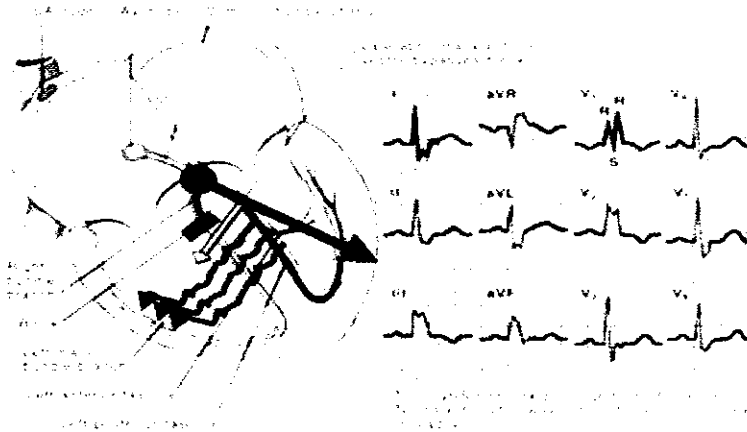
Normal Ventricular Activation



Right Bundle Branch Block

- ◆ Right bundle vulnerable since it is short and has blood supply from the right coronary artery
- ◆ Causes
 - Normal variant
 - Aberrant conduction
 - Congenital disease
 - Coronary artery disease
 - Degenerative disease of conduction system
 - Acute dilatation of the right ventricle

Right Bundle Branch Block



Left Bundle Branch Anatomy

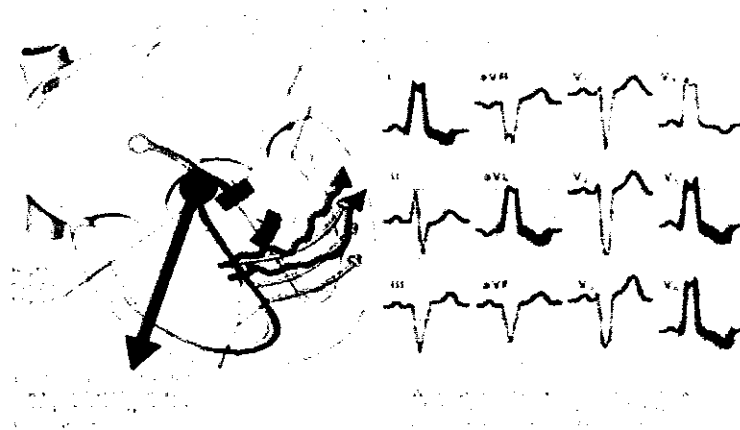
- ◆ The main left bundle is supplied by both the left and right coronary arteries.
- ◆ Divides almost immediately into two (more or less) distinct fascicles or divisions
 - Posterior (inferior) fascicle
 - Short, thick fascicle receives blood supply from right and left coronary arteries
 - Anterior (superior) fascicle
 - Long and thin fascicle dependent on left anterior descending coronary artery for its blood supply

Left Bundle Branch Block

- ◆ QRS measures 0.12 or greater
- ◆ QRS is wide and negative in V1
- ◆ Wide, notched R wave in V5 and V6 and usually in leads I and aVL

- ◆ Causes
 - Organic heart disease such as hypertension
 - Congenital lesions (rare)

Left Bundle Branch Block



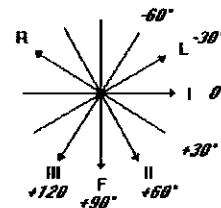
Left Anterior Fascicular (Hemiblock)

◆Criteria

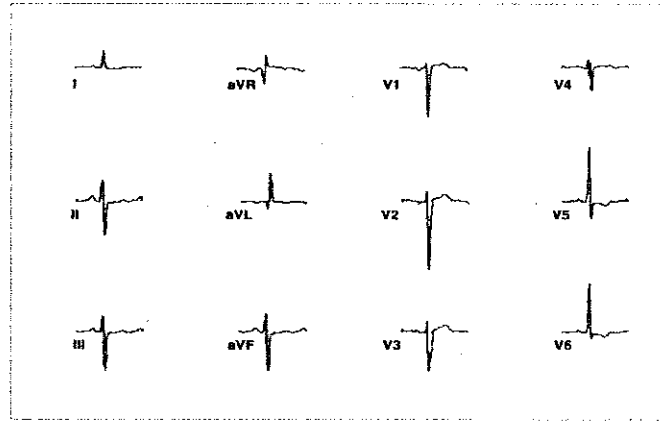
- Small Q and tall R waves in leads I and aVL
- Small initial R wave followed by deep S wave in leads II, III, and aVF
- QRS generally not significantly widened
- Relatively deep S wave usually in V5 and V6
- Left axis of -45 degrees in frontal plane

Determining Axis

	Lead I	Lead aVF
Normal axis (-30 to $+120^\circ$)	Up	Up
Left axis (-30 to -90°)	Up	Down
Right axis ($+120$ to $+180^\circ$)	Down	Up
No man's land ($+180$ to -90°)	Down	Down



Left Anterior Hemiblock



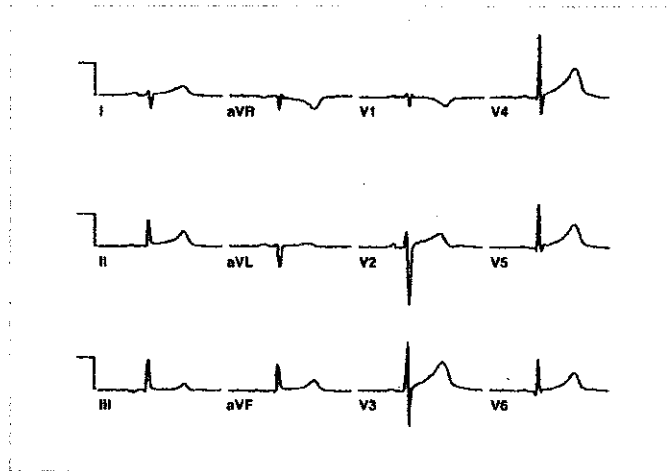
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Left Posterior Fascicular Hemiblock

◆Criteria

- Leads I and aVL showing small initial R wave followed by deep S wave
- Leads II, III, and aVF show small initial Q wave followed by tall R wave
- No septal Q wave in leads V5 and V6
- QRS complex may be slightly wider than normal
- Right axis deviation of about +120 degrees

Left Posterior Hemiblock



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Questions?