Arrhythmias

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Presenter Disclosure Slide

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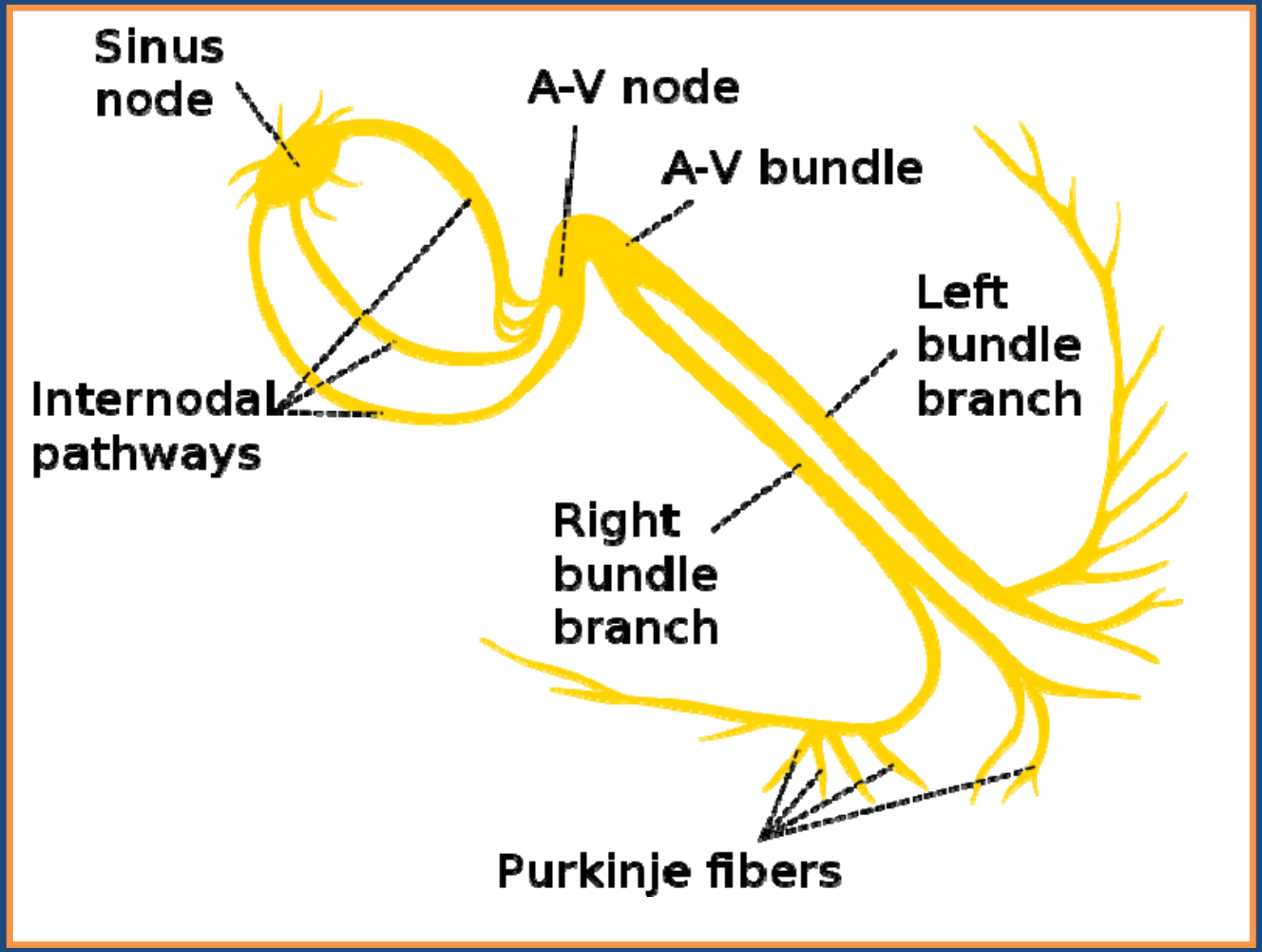
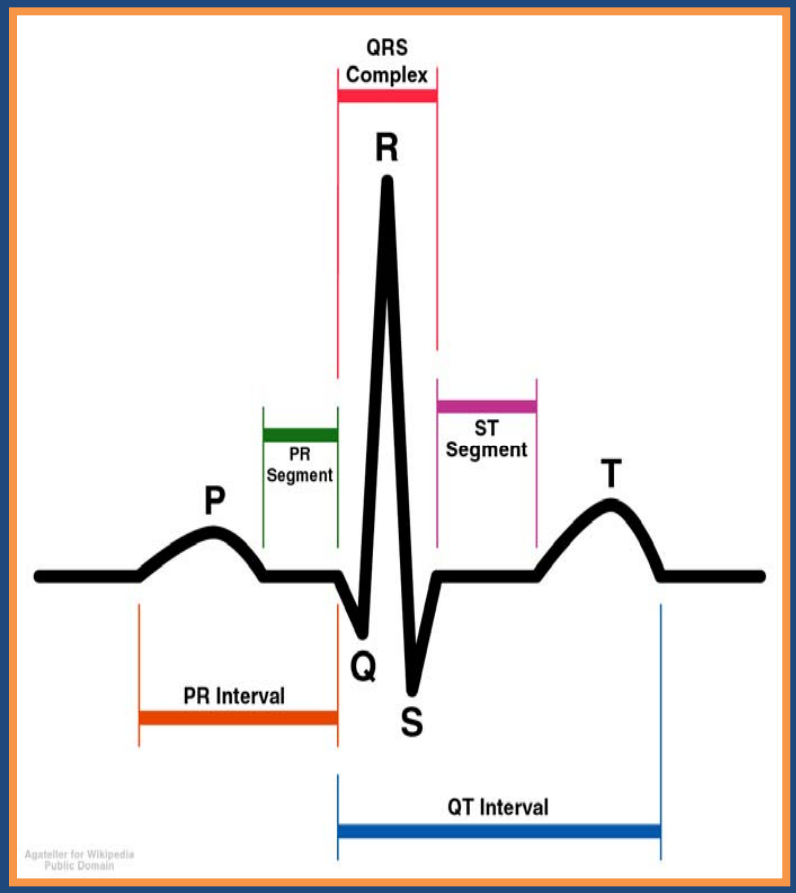
Nothing To Disclose

Overview

- Normal Conduction
- Electrocardiogram (ECG)
- Bradycardia
- Tachyarrythmias
- 2010 American Heart Association Guidelines
- ACLS

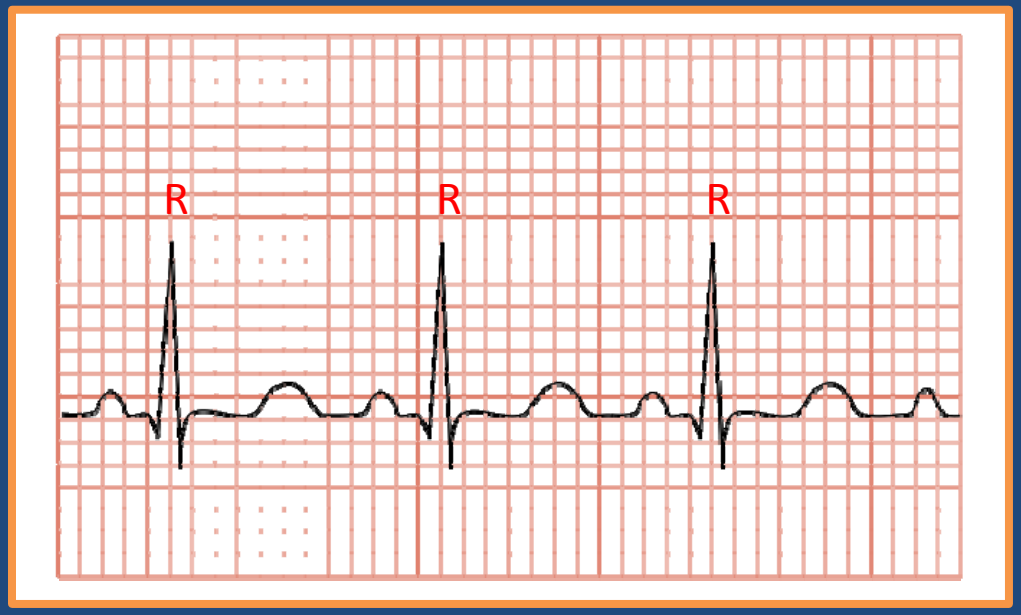

Sinus node
A-V node
A-V bundle
Left bundle branch
Internodal pathways
Right bundle branch
Purkinje fibers

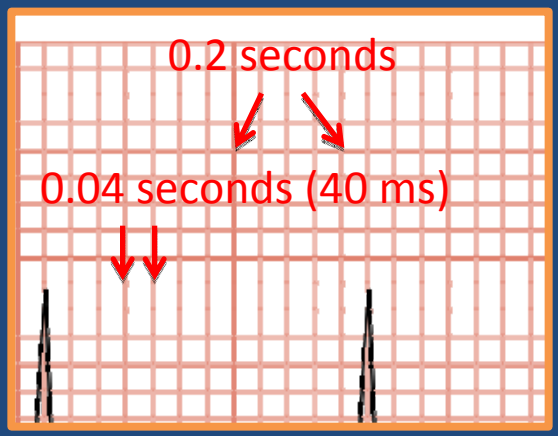
ECG

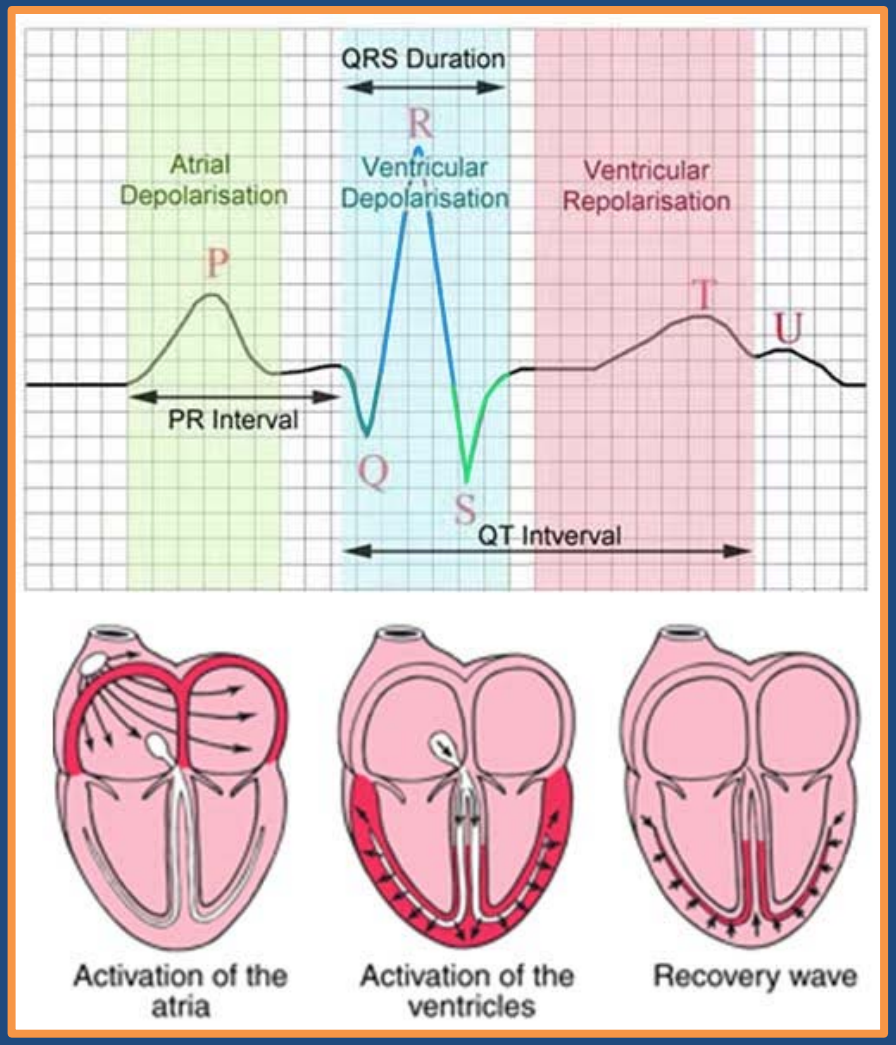


- PR onset of P to onset of QRS
- QRS
- QT interval-start of Q to end of T
- ST-end of S to start of T
- R-R is the ventricular rate
- P-P is the atrial rate

- One beat every 5 sq HR is 60 bmp
- One beat every sq HR 300 bmp/ so 150 is every other square/100 is every 3rd square
- What is the HR here ?

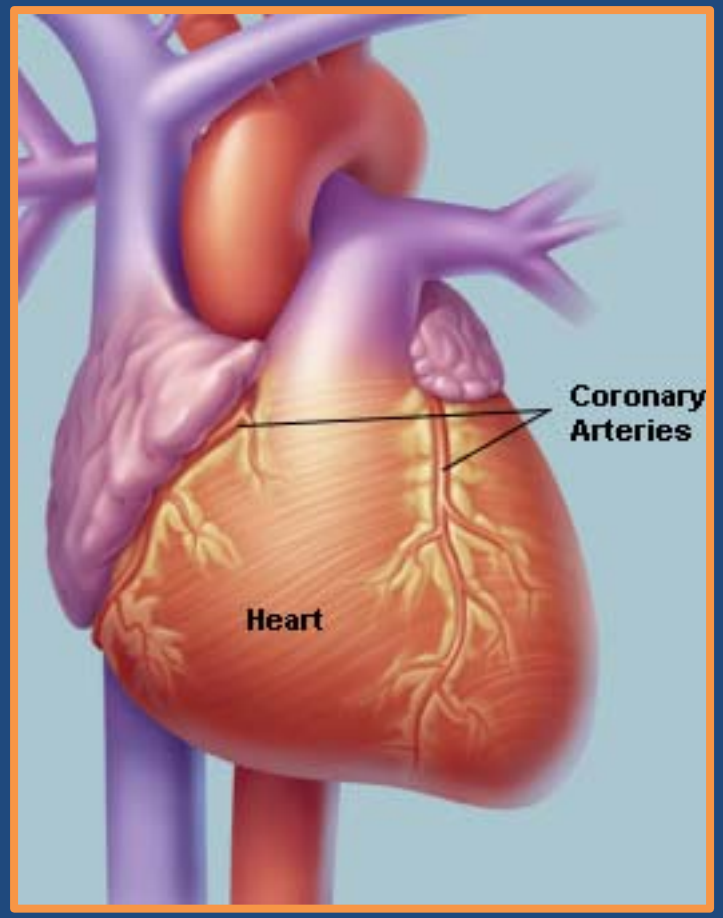




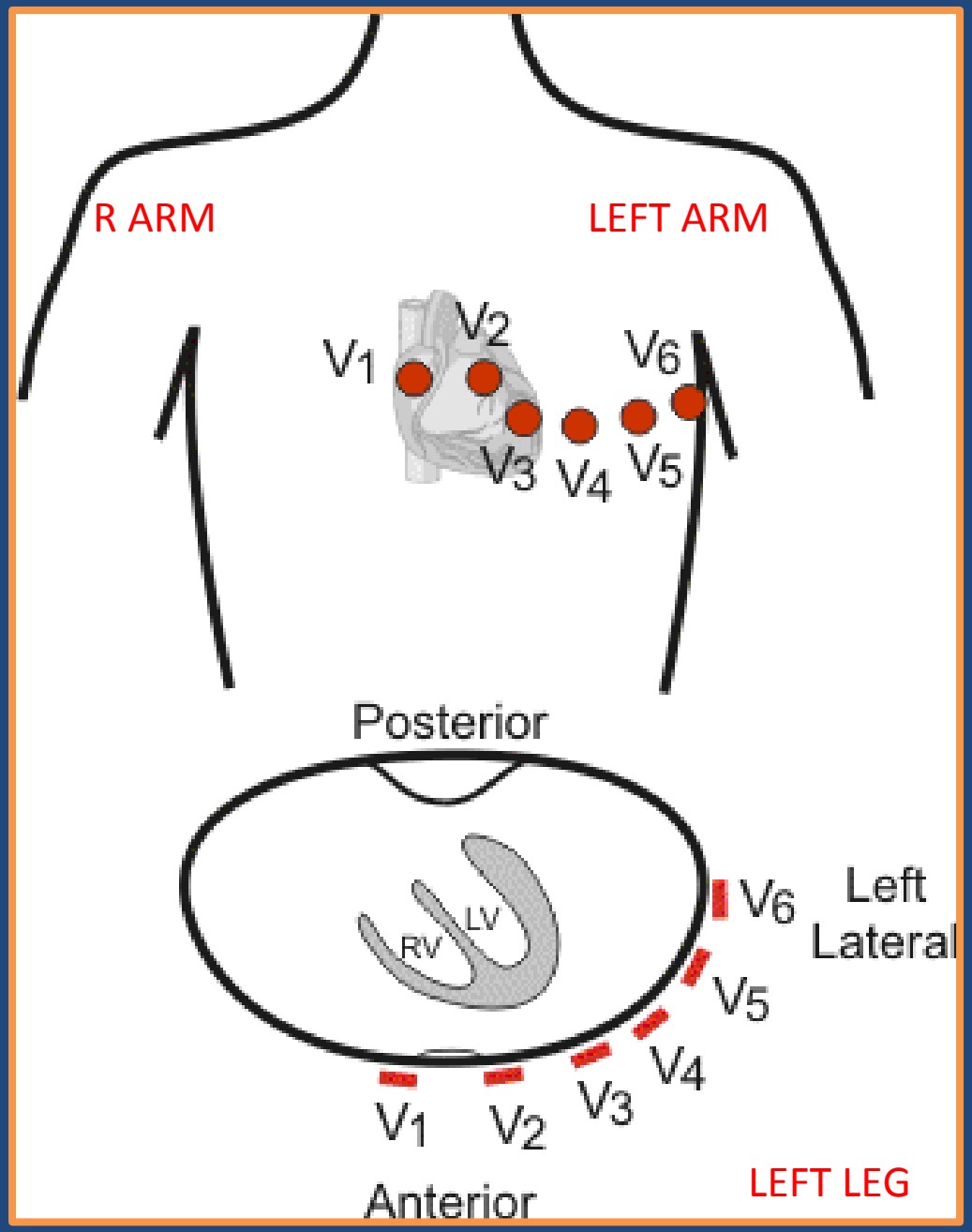


- PR interval-SA node to the venticular muscle
  - 120-200 ms (3-5 small sq)
- QRS depolarization
  - < 120 ms (3 sm sq)
- ST elevation
  - Failure or re-polarisation from ischemia

ECG

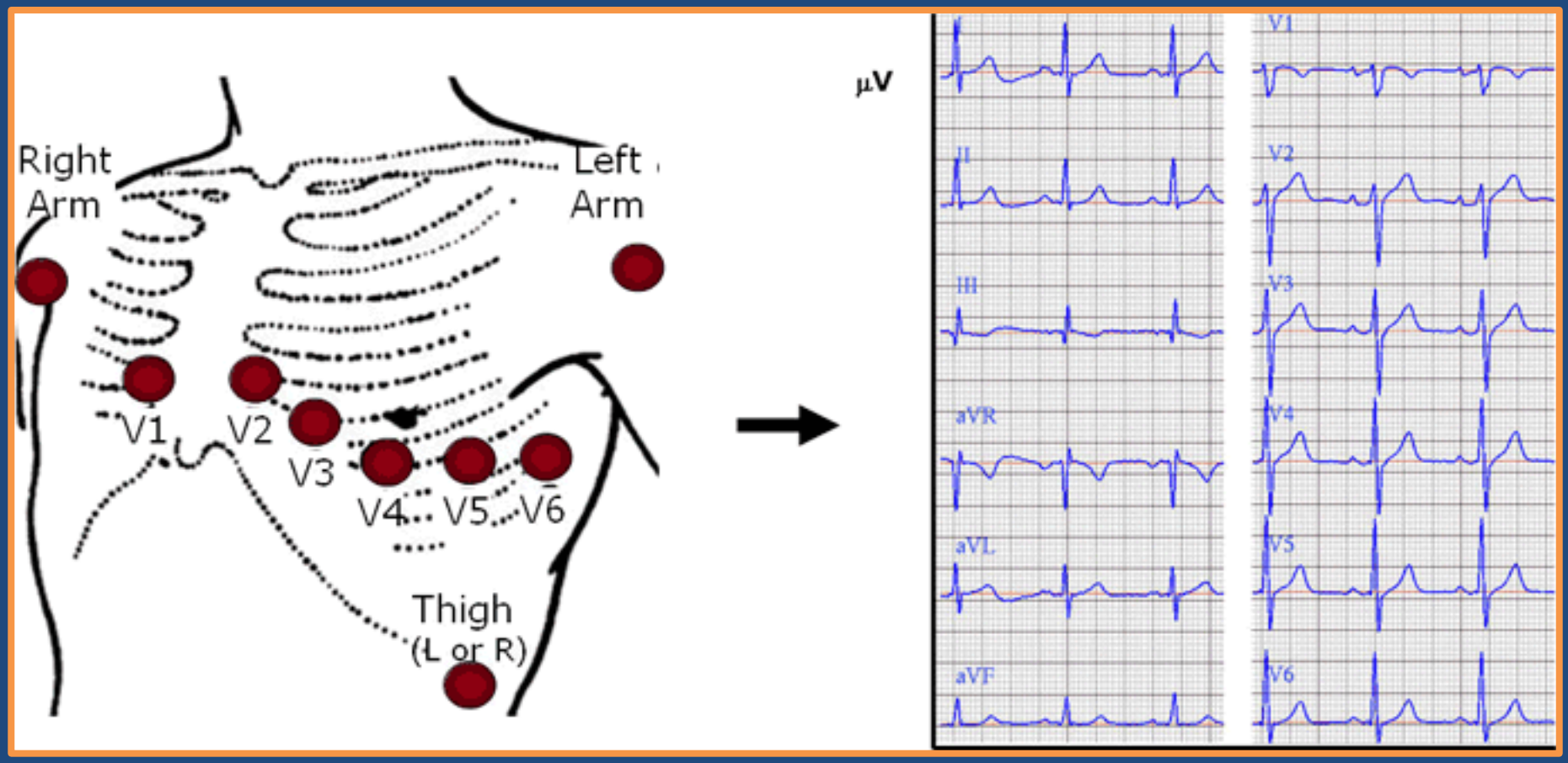


- Right to Left
- Superior to inferior
- Anterior to posterior (lateral)


R ARM
LEFT ARM
V1
V2
V3
V4
V5
V6
Posterior
RV
LV
V6
Left
Lateral
V5
V4
V3
V2
V1
Anterior
LEFT LEG

ECG

- Bipolar limb leads (I-III, Frontal plane)
  - I RA-LA (right to left)
  - II RA-LL (sup/inf)
  - III LA-LL (sup/inf)
- Augmented unipolar leads (aVR-AVF)
  - aVR RA to LA & LL (rightward)
  - aVL LA to RA & LA (leftward)
  - aVF LL to RA & LA (Inferior)



LEADS I, II, aVL: LATERAL SURFACE of the heart
LEADS II, III and aVF: INFERIOR SURFACE
LEAD aVR: Right atrium

Sinus Bradycardia

- Normal PR (120-200, 3-5 small squares)
- HR <60 (< 1 every 5 squares)
- Often normal and asymptotic
- Medications (Precedex)
- Vaso-vagal

AV nodal block

- Hyperkalemia, hypermagnesmia, digoxin, b-blockers
- 1st degree > (0.2 seconds-one large box)
- Monitor

AV nodal block, 2nd degree

- Type 1-progressive prolongation of the PR interval, until a beat is dropped
  - Stable, usually asymptomatic, stop medication
- Type 2-stable PR, beat is randomly dropped
  - Often P:QRS 3-4:1
  - Infranodal conduction disturbance
  - Unstable (Anterior wall MI)
  - Can progress to third degree block

3rd Degree Block

- Complete dissociation of p-wave and QRS
  - P-wave is regular and marches through
  - Q waves can be narrow or complex
  - Anterior and inferior wall MI
  - Often requires permanent pacemaker

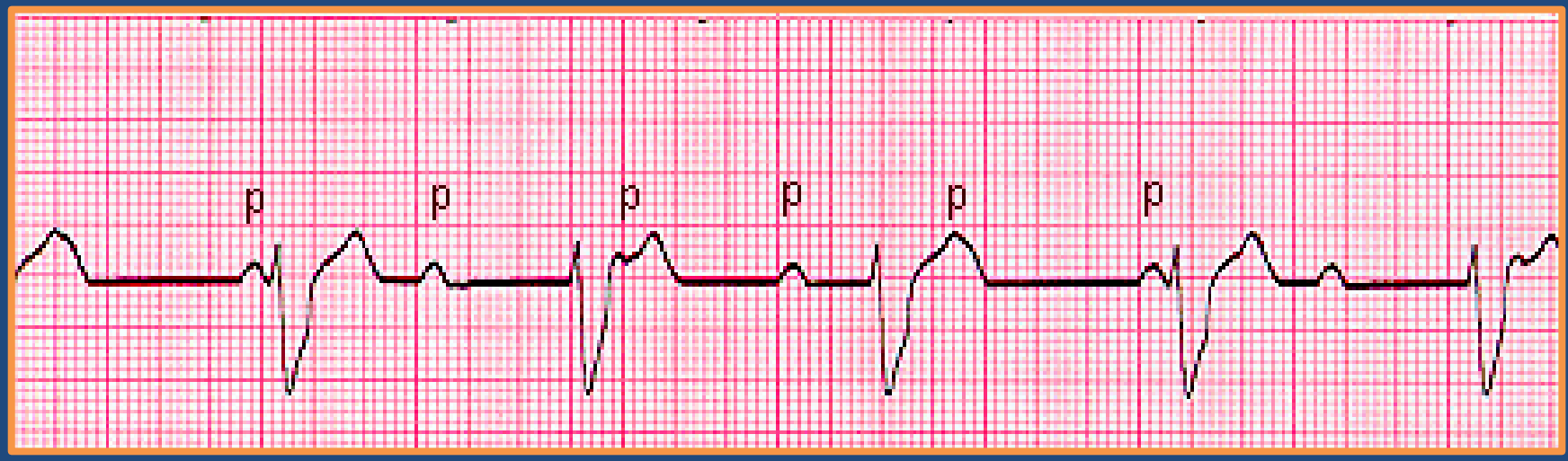
Summary and Key Points Bradycardia

- Sinus Bradycardia (HR <60, <1 every 5 lg sqs,)
  - Lg sq = 0.2 seconds (5=1 second)
- 1st degree block (stable, PR > 0.2 sec-1 lg sq)
- 2nd Degree Type 1 (p-waves at regular intervals, progressive prolongation until missed QRS)
- 2nd Degree Type 2 (regular p-waves sudden dropped QRS, 3-4:1)

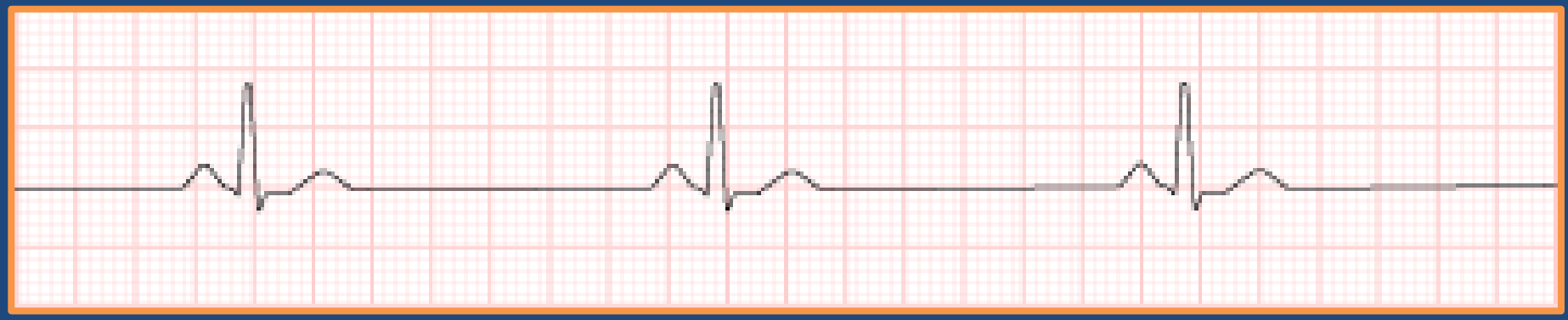
Summary and Key Points Bradycardia

- 3rd Degree: Complete dissociation of the P and QRS waves
- Second Degree Type 2 and 3rd degree, more unstable and can be the presentation of anterior and inferior wall MI


I
aVR
V4R
V2
V5
NO DATA
II
aVL
V3R
V3
V6
NO DATA
III
aVF
V1
V4
V7
NO DATA
V7


p
p
p
p
p
p

What is this?



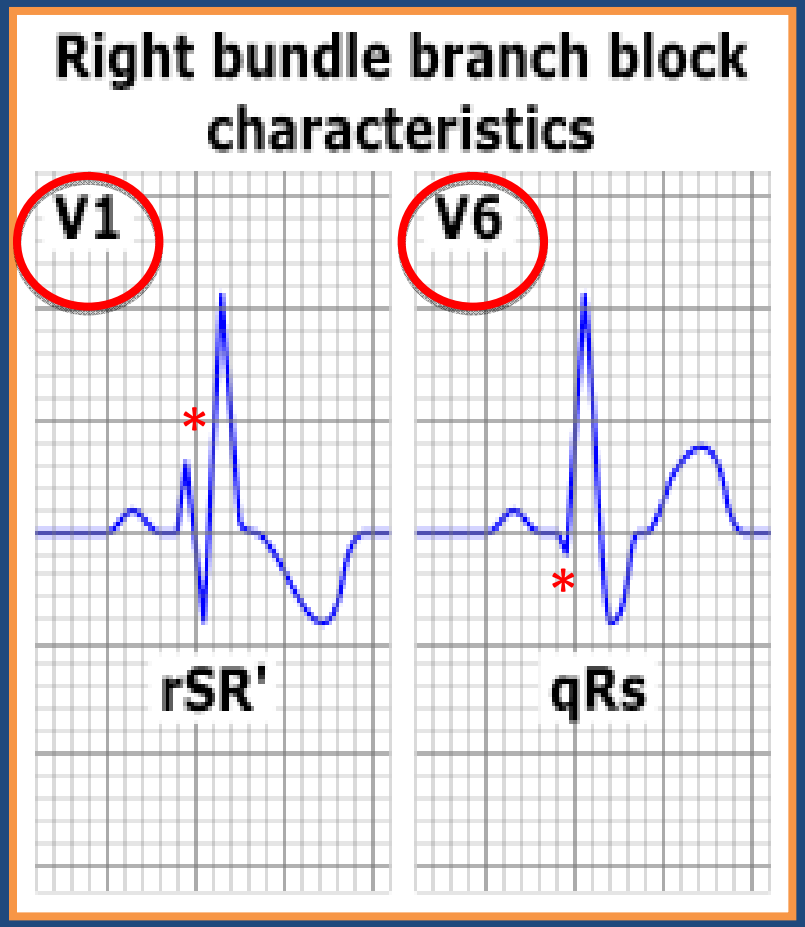
Treatment of Bradycardia

- Stable
  - Observation, treatment of cause, pacemaker
- Unstable
  - Atropine (0.5 mg bolus, repeat every 3-5 mins)
  - Transcutaneous pacemaker
  - Dopamine/epinepherine
  - Transvenous pacemaker

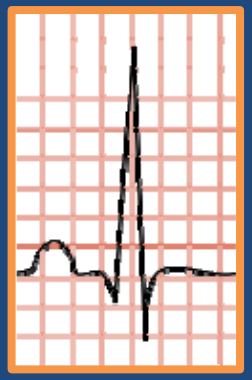
Bundle Branch Block

- BBB can be an indication of ischemic disease
- If tachycardic they can be confused with malignant rhythms and ischemia

Right Bundle Branch Block

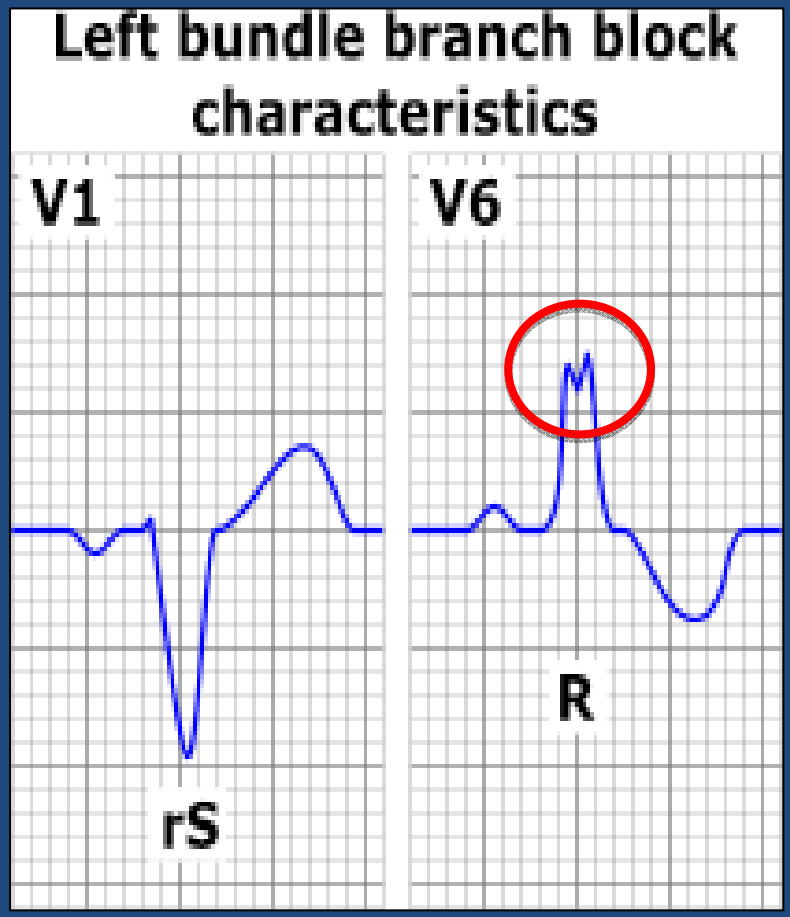


- No RB depolarization
- Right dplz from left
- r-wave before the QRS in V1 (rSR in V1)
- Smaller q wave in V6



QRS

Left Bundle Branch Block



- No LB conduction, depolarizes from the right
- R dplz small Q wave in V1
- Second R wave in V6
- W-wave in V6

Tachycardia
Sinus Tachycardia

- HR >100 bpm
- Sinus (narrow regular QRS)
- Re-entry tachycardia, nodal tachycardia
  - HR 120-200, regular rate
  - Younger healthy patients
  - 2 x more common in women
  - Can be wide complex (if conducted back through ventricular tissue)
  - Often stopped with Valsalva

Tachycardia

- Atrial fibrillation
  - Irregular, no p-waves, HR variable
- Atrial Flutter
  - Regular, saw-tooth pattern of p-waves
- Fib and flutter
  - 1-2 % of the population, can be associated with slow conduction, often unstable
- MAT
  - P-waves present and irregular, stable

Treatment

- Correction of electrolyte abnormalities
  - K >4.5 Mg >2.5 in patients at high risk
- B-blocker, amiodarone, digoxin (in heart failure patients)
- Calcium channel blockers
- Burst pacing in patients with a pacemaker

Treatment

- Unstable-synchronized cardioversion
  - Consider amiodarone load while/before cardioversion
  - Afib/flutter
    - 120-200 J
  - Narrow and regular (re-entry)
    - consider adenosine 1st
    - 50-100 J

Amiodarone

- Effective in converting both atrial fibrillation and flutter
- Low Tordsades risk
- Not a negative inotropic agent
- Safe in critical illness

Adensoine

- Terminates AV nodal re-entry tachycardia
- Will not terminate afib/flutter, but can slow enough to make diagnosis
- 1st dose 6 mg IV given rapidly
- 2nd dose 12 mg IV

Question

- In a patient with stable, new onset afib, HR (100-110), after correction of electrolytes, is it your practice to:

a) Monitor the patient

b) Rate control with B-blocker

c) Rate control with Calcium Channel Blocker

d) Give amiodarone to convert the patient

e) Synchronized cardioversion with sedation

Question

- What percentage of your patients who develop afib end-up getting amiodarone

a)<15%

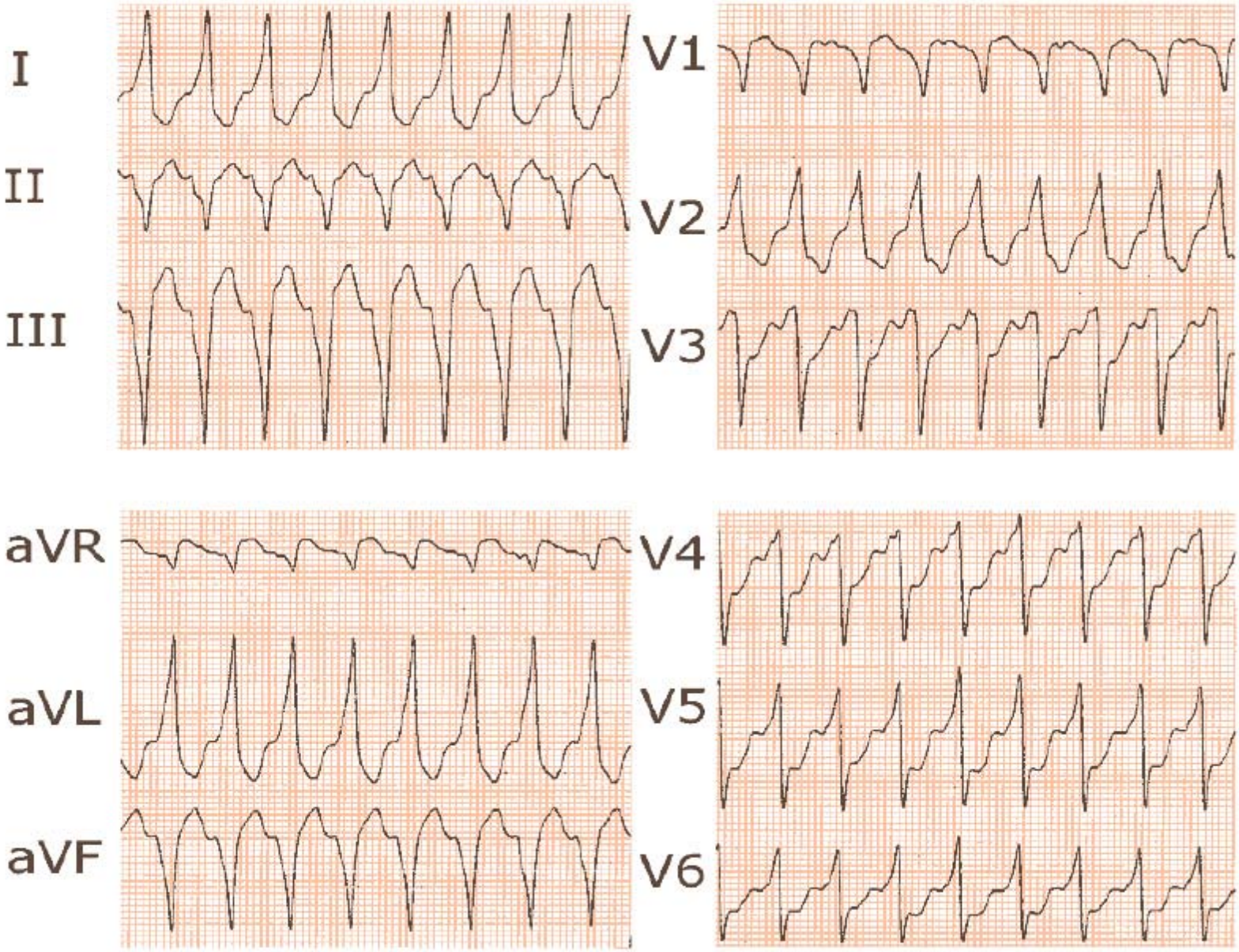
b)25-50%

c)> 50%

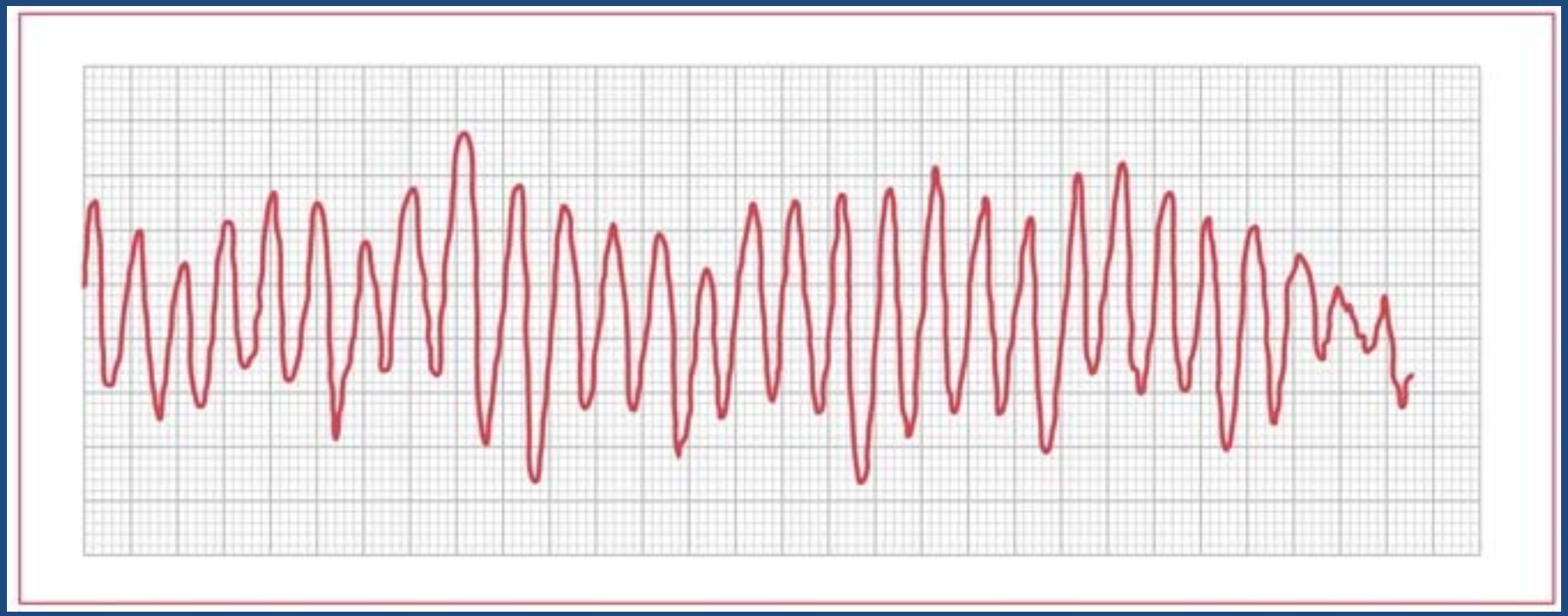
d)>75%

Ventricular Arrhythmias
Ventricular Tachycardia

- Wide complex (120 ms (3 small boxes))
- >3 beats, can be stable or unstable
- Morphology different then prior ECG
- Abnormal T-waves
- Usually regular
- Causes: ischemic disease, hypothermia, electrolyte abnormalities


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6


18:54
18:58
19:06
19:06
19:06
19:06



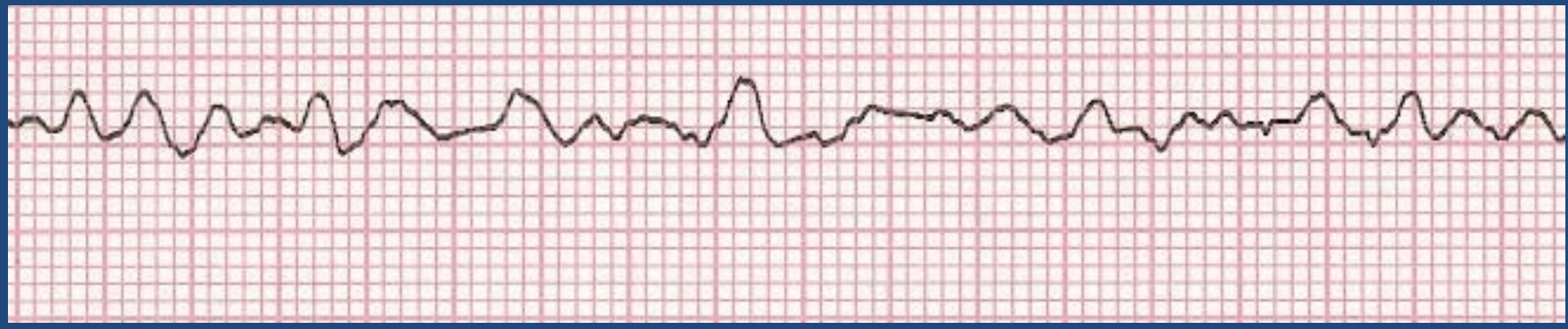
Torsades de Points

- Evolves from an increasingly prolonged QT interval
- Often caused by medications
- Rapid VT, varies in amplitude, twists around a baseline
- Treatment: oxygen, remove inciting medication

Treatment of Ventricular Tachycardia

- Unstable: Synchronized cardioversion , if loss of vital signs ACLS
- Procainimide, amiodarone, sotalol

Ventricular Fibrillation



ACLS Protocol

- Shock Bi-phasic maximum dose (120-200 J)
- 2 full minutes of CPR
- Epi, advanced airway, capnopgraphy, check pulse and rhythm
- Shock
- 2 full minutes of CPR
- Amiodarone