Cardiology Flash Cards

EKG in a nut shell

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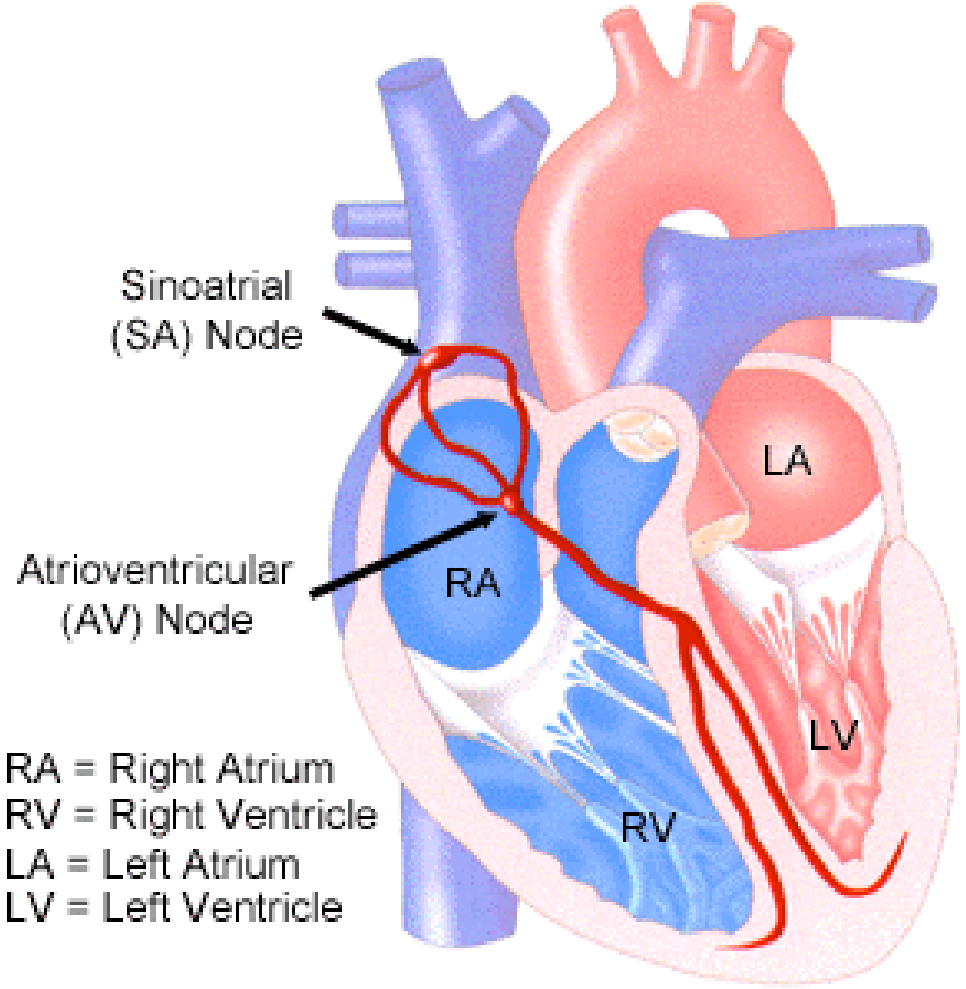
Conduction System



Analyzing EKG

Step by step

Steps in Analyzing ECG'S

1. Rhythm:

- Regular _ “Sinus, Junctional or Ventricular”.
- Irregular _ “Regular irregularity, or irregular irregularity”

2. Rate:

- Normal _ (60-100 BPM)
- Bradycardia _ (less than 50)
- Tachycardia _ (More than 100)

Steps in Analyzing ECG'S

3. P-Wave:

- normally “well rounded, followed by QRS.
- +ve in leads “I, II, V4 & V6”, -ve in “avF”
- Biphasic in “V1”.
- Should not exceed 2-3 mm.
- Its duration “.11 sec”
- Abnormality: “Notched, wide, _ amplitude”
- Best lead to evaluate is “II”.

Steps in Analyzing ECG'S

4. PR-interval:

- Normally: “Isoelectric” (0.12-0.20 sec)
- Abnormality:

  a. Short _ WPW “Delta Wave”

  b. Prolonged _ 1° AV block

Steps in Analyzing ECG'S

5. QRS complex:

i. Duration _ “0.06-0.10” sec. [2 boxes]

ii. Amplitude _ standard LL > 5 mm

_ CL V1, V6 = 5 mm

_ CL V2 V5 = 7 mm

_ CL V3 V4 = 9 mm

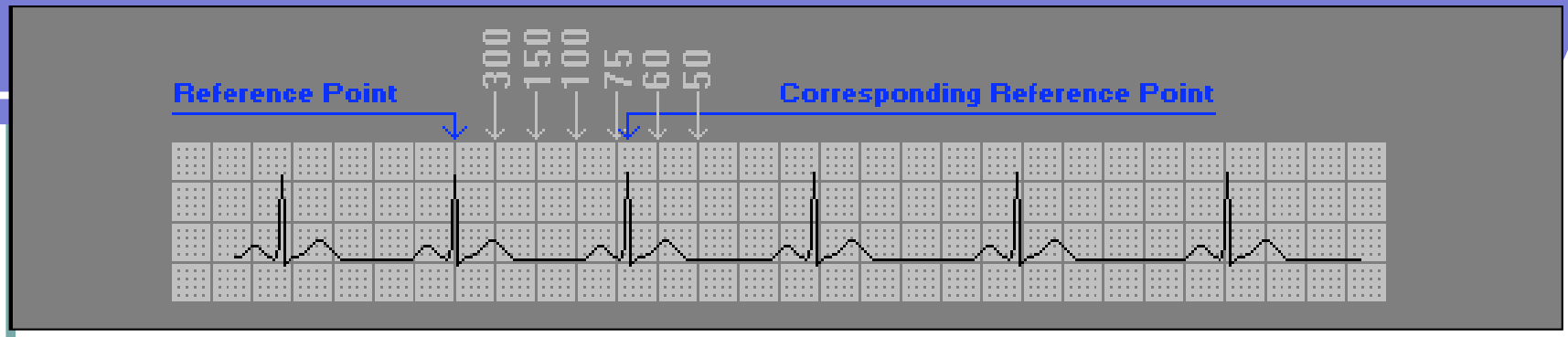
iii. Timing of intrinsicoid deflection “the length of time that allow the impluse to travel from endo -> epicardium.

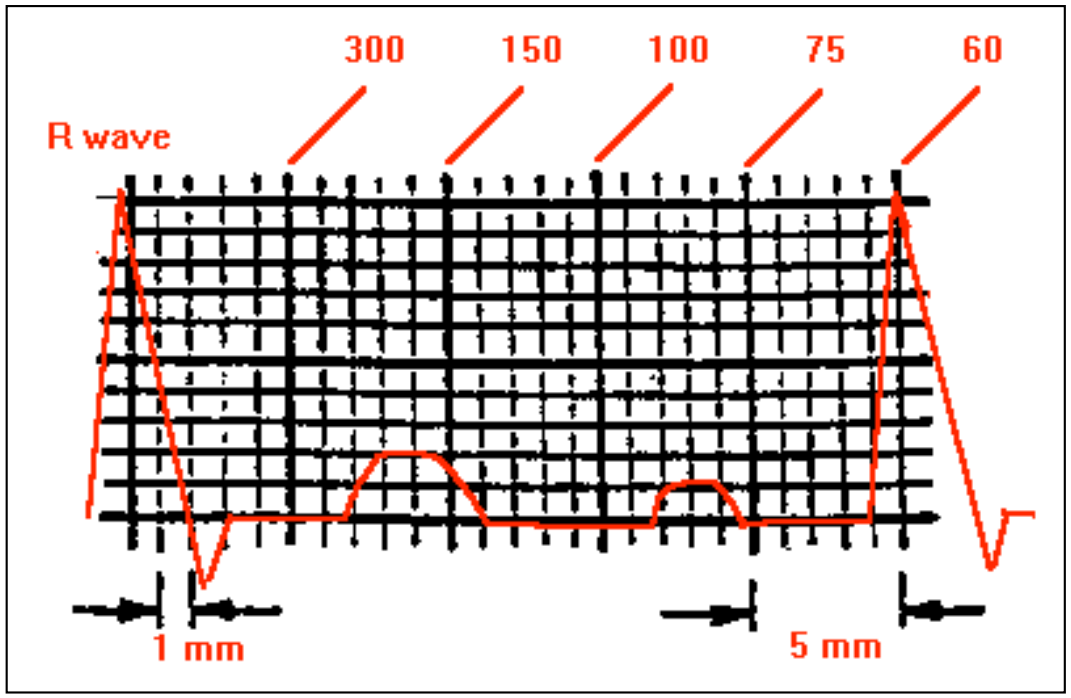
iv. R-wave progression in the chest leads.

Analysis of Rhythm

- Prolongation over 0.2 seconds suggests a delay in the conduction system between the SA node and the AV node indicating a first degree heart block. When it takes two or three P-waves to initiate a QRS complex this is termed a 2:1 or 3:1 type second degree heart block. When the P-R interval becomes progressively longer until a QRS complex is dropped and then the process repeats, this is called a Wenckebach phenomenon, (a type of second degree Mobitz I block). If the QRS complex is periodically blocked without lengthening of the P-R interval this is called a Mobitz II block.

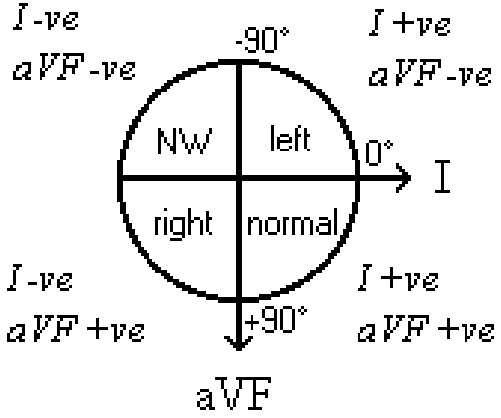
- A third degree block exists when the P and the QRS waves are entirely disassociated. These blocks often result from interference along some part of the His-Purkinje system which can usually be located by examining the chest leads such as VI-V6 to determine if it is a right or left bundle branch block as well as its type.

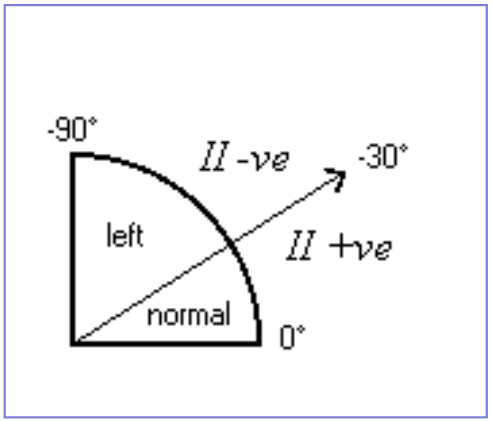

300
150
100
75
60
50
Reference Point
Corresponding Reference Point


300
150
100
75
60
R wave
1 mm
5 mm

EKG Axis in a Glance

- Using leads I and aVF the axis can be calculated to within one of the four quadrants at a glance.
- If the axis is in the "left" quadrant take your second glance at lead II.



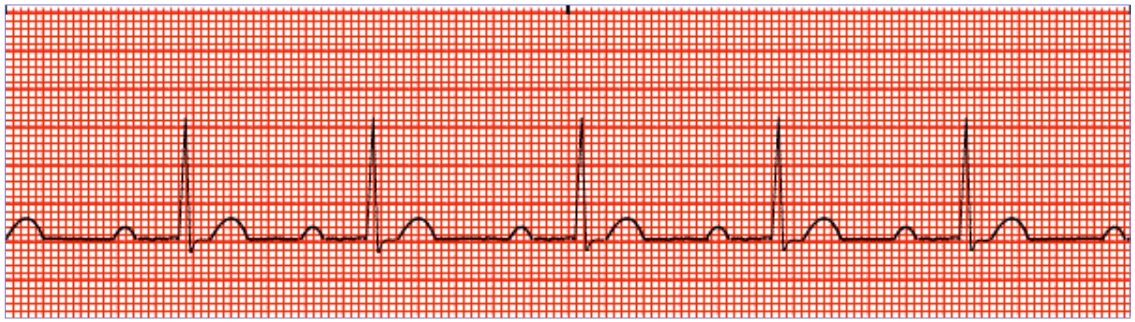


AXIS IN A GLANCE

- both I and aVF +ve = normal axis
- both I and aVF -ve = axis in the Northwest Territory
- lead I -ve and aVF +ve = right axis deviation
- lead I +ve and aVF -ve
  - lead II +ve = normal axis
  - lead II -ve = left axis deviation

Criteria of 1º A-V Block

- Prolongation of A-V conduction time (P-R) interval to 0.21 or more.
- P-R interval usually represents delay in the AVN, but at times it may reflect delays either above “Intra-atrial” or below “HIS – Purkinje” the node



First degree AV block can be due to:

- Inferior MI,
- Digitalis toxicity
- Hyperkalemia
- Increased vagal tone
- Acute rheumatic fever
- Myocarditis.

2º A-V Block

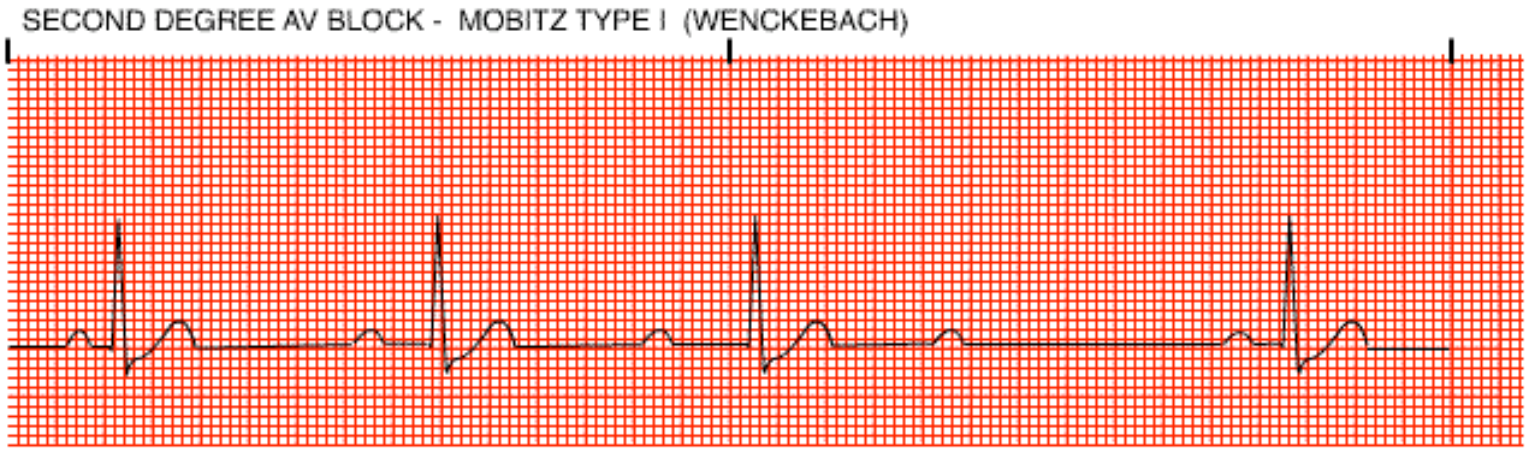
- When some of the atrial impulses fail to reach the ventricle because of impaired caonduction.
- Types:
  - Type I “Wenckeback”
  - Type II “Mobitz”

Type I “Mobitz I” “Wenckebach”

- Prolonged P-R interval prior the drop {P} wave
- Associated with:
  - Rheumatic HD
  - Acute inferior MI
  - Digitalis or Propranolol effect.
- Chronic 2º type (I) associated with:
  - Chronic Ischemic HD
  - Aortic Valve disease.
  - Mitral Valve Prolapse.
  - ASD “Atrial Septal Defect”
  - Amyloidosis.

Type I “Mobitz I” “Wenckebach”

- Second degree AV block type I occurs in the AV node above the Bundle of His.
- Treatment is usually not indicated as this rhythm usually produces no symptoms

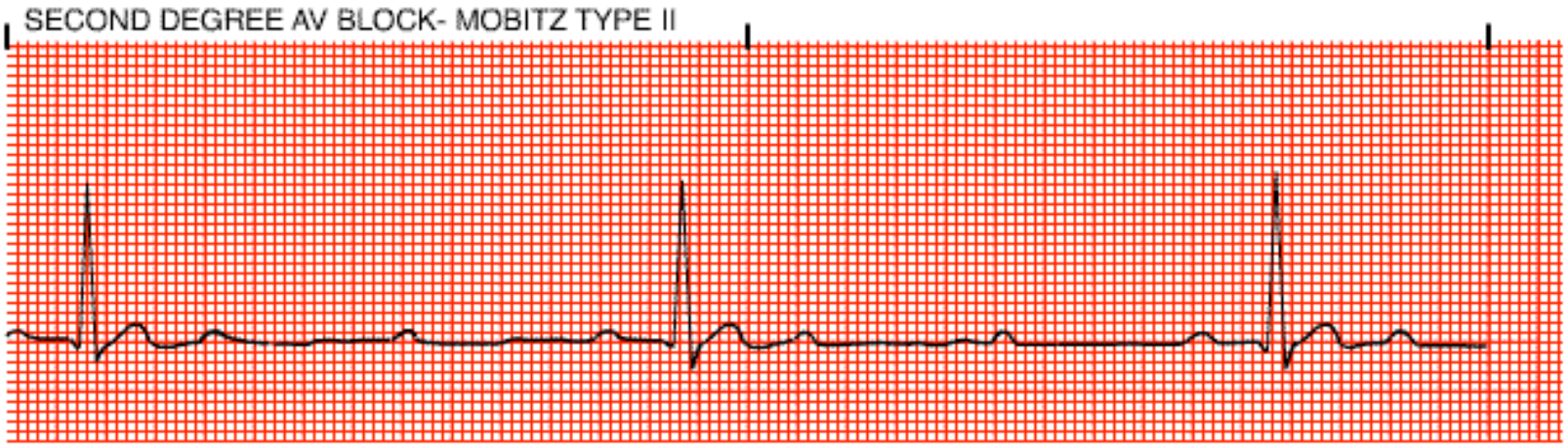


Type II “Mobitz II”

- Its is usually associated with constant prolonged PR interval followed by one P wave is not conducted to the ventricles.
- QRS usually widened because this is usually associated with a bundle branch block.
- This block usually occurs below the Bundle of His and may progress into a higher degree block.

Type II “Mobitz II”

- It can occur after an acute anterior MI due to damage in the bifurcation or the bundle branches.
- It is more serious than the type I block.
- Treatment is usually artificial pacing.



Third Degree Heart Blocks (Complete AV Dissociation)

- Third degree blocks are characterized by a complete AV nodal block resulting in no depolarization of the ventricles (i.e. no ventricular contraction takes place).
- The electrical signal from the SA node is blocked between the atria and ventricles of the heart. This conduction dysfunction generally occurs between the AV junction and the bundle of His.
- Therefore, the ventricles must create their own impulse in order for contraction to occur. Both the atria and ventricles function as two separate units each with its own rate (atria, 60 bpm and ventricles, 20-40 bpm).
- This is a lethal dysrhythmia due to the fact that it can evolve into ventricular standstill or asystole. Since the independent firing rate of the ventricles is 20-40 bpm, perfusion of the entire system will not be adequate enough to sustain life. Causes of third degree heart block include Digitalis toxicity, MI and massive heart disease. Patients with third degree heart block usually need a pacemaker.

Hemi-Block

Anterior Hemi-Block

1. LAD (-60º)
2. Small Q Lead (I)
   Small R Lead (III)
   Deep S Lead (III)
3. Normal QRS
4. Delayed internsicoid in aVL

Posterior Hemi-Block

1. RAD (+120º)
2. Small R Lead (I)
   Small S Lead (III)
   Small Q Lead (III)
3. Normal QRS
4. No evidence of RVH

HINTS:

LEAD	L I	L aVL	L II	L III	L aVF
Anterior AHB	+	+	-	-	-
Posterior PHB	-	-	+	+	+

Bundle Branch Block

LBBB

V1 QS or rS

V6 Late intrinscoid &
No (Q) wave

L1 Morophasic ® wave,
No (Q) wave

RBBB

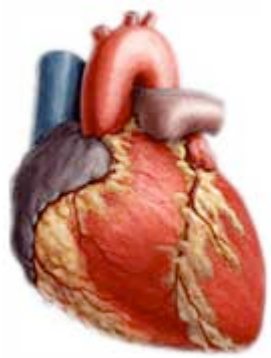
V1 late intrinscoid, M shaped QRS (RSR') sometimes wide (R)

V6 Early intrinscoid, wide (S) wave

L1 Wide (S) wave

In Both (QRS) is 0.12 Secs. Or more

Incomplete Bundle Branch Block



- Same criteria for LBBB & RBBB, But the QRS is (0.09 – 0.11) Secs

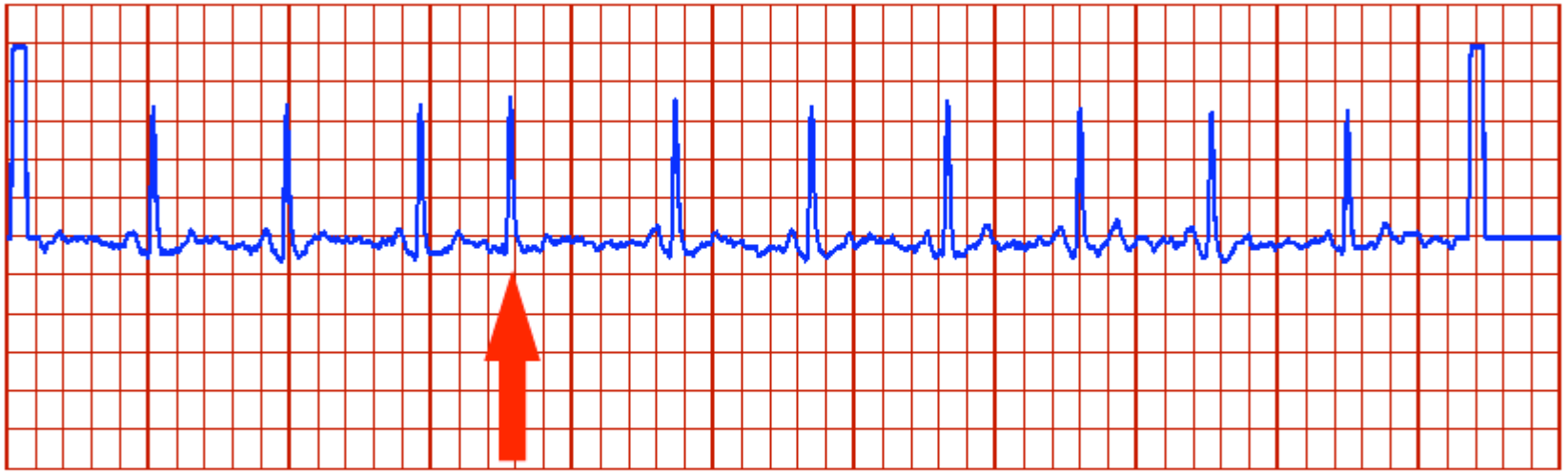
Intraventricular Conduction Defect "Delay" (IVCD)

- Wide QRS > 0.10 Secs
  - A lesion in the ventricular conduction, slower spread of activation through out the ventricle.
  - "Always check (P) wave & (PR) preceeding each abnormal QRS, to differentiate between Supraventricular & Ventricular rhythm.
- Prolonged QT Interval

Atrial premature Beats (APB)

- Ectopic focus discharges an early impulse other than SAN
- Criteria:
  1. Premature (early).
  2. Different looking (P) wave.
  3. Followed by long internal but **not a fully compensatory** pause.
  4. Can result in drop (P), with Non-conducting APB

Prematura Atrial Contraction (PAC)



Scale: 200ms/div. || R-R Time (min/avr/max): 638 / 940 / 1168ms || St. Dev: 135ms || Pulse (10 sec. avr.): 64bpm

Premature ventricular Beat

- Timing -» early (Premature)
- (P) wave -» absent, or retrograde.
- QRS -» wide & Bizarre
- Compensatory pause following QRS.
- Types:
  1. (R on T) malignant VPC -» Very early
  2. Interpolated VPC -» doesn't interrupt the normal rhythm manner, sandwiched between (2) sinus beat.
  3. End diastolic -» shortened PR interval & there is no relation between P & QRS

PVCs {CONT.}

- Another classification for VPCs:
  - Unifocal -» Look alike.
  - Multifocal -» Looks different.
- Timing of occurance:
  - Bigiminy (2 PVCs) Couplet.
  - Trigiminy (3 PVCs) Triplets
  - Quadgiminy (short run of VT)

Abnormal Heart Rhythm

Cardiac Arrhythmia

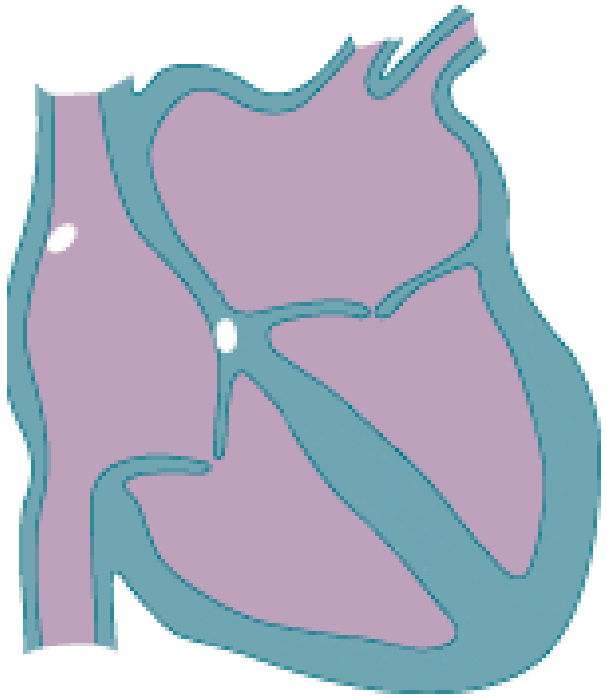
Paroxysmal atrial tachycardia (PAT)

- Rate: 150-250 / Min
- QRS: Normal in configuration.
- P wave: not visible.
- After accompanied by non-specific ST-T wave changes.

Multifocal “Chaotic” atrial rhythm

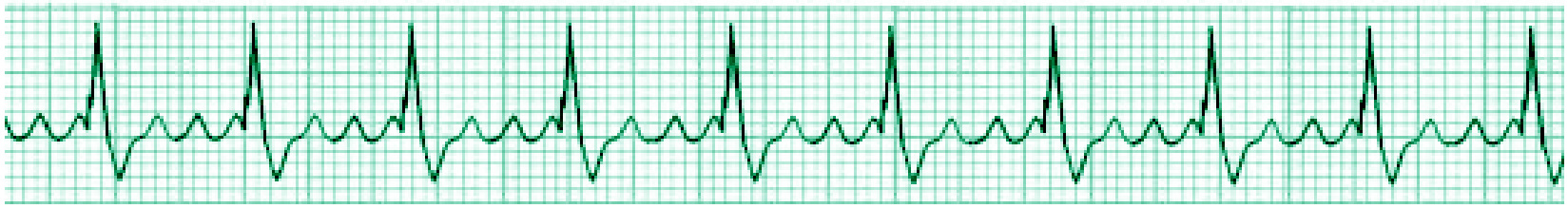
- Caused by rapid firing of two or more ectopic atrial focus.
- Rate:100-200 / Min
- (P) waves are different in configuration.
- (PR) intervals varies from one beat to another.
- (QRS) is normal.

Atrial Tachycardia



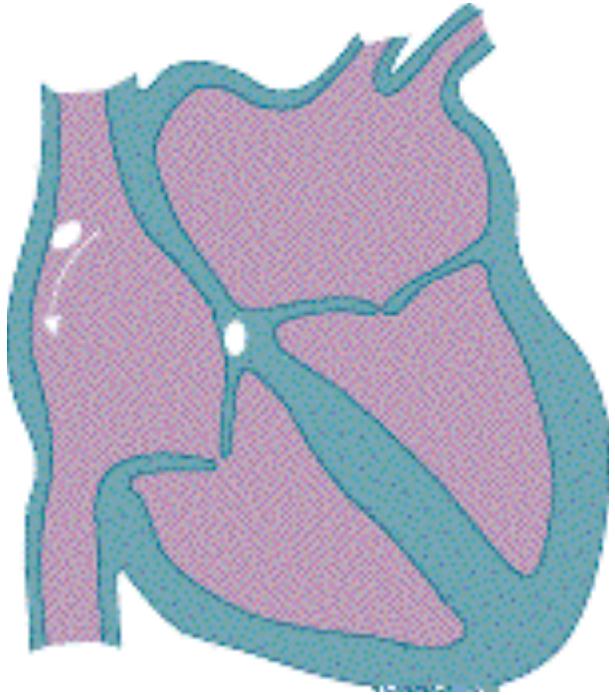
Atrial Flutter

- Atrial flutter is usually associated with mitral valve disease, pulmonary embolism, thoracic surgery, hypoxia, electrolyte disturbances and hypercalcaemia. Atrial flutter results in poor atrial pumping since some parts of the atria are relaxing while other parts are contracting. Cardiac output decreases because the ventricles do sufficiently fill (as they would normally) before ventricular contraction. Ablation of some of the heart tissue to stop impulses from travelling around can be used to treat this condition



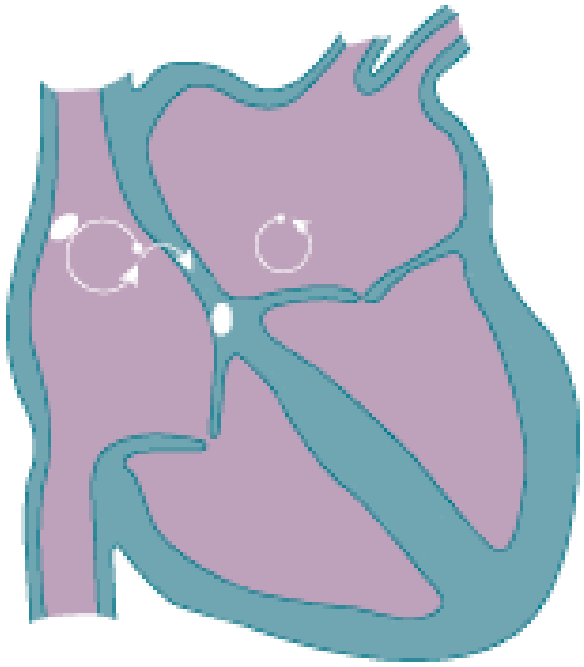
Atrial Flutter

- Atrial flutter occurs when the atria are stimulated to contract at 200-350 beats per minute
- The atrial flutter waves, known as F waves, F waves are larger than normal P waves and they have a saw-toothed waveform. Not every atrial flutter wave results in a QRS complex (ventricular depolarization) because the AV node acts as a filter.
- A whole number fixed ratio of flutter waves to QRS complexes can be observed, for instance 2:1, 3:1 or 4:1.

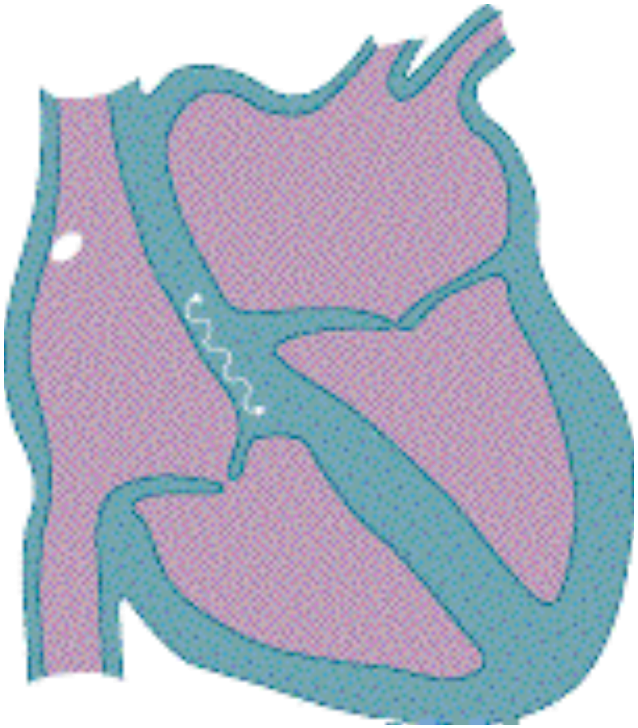


Atrial Fibrillation

- Multifocal (F) waves replacing (P) wave either coarse or fine.
- Rate (350-650) BPM
- Irregularly irregular ventricular response.
- QRS resembles QRS of dominant rhythm.



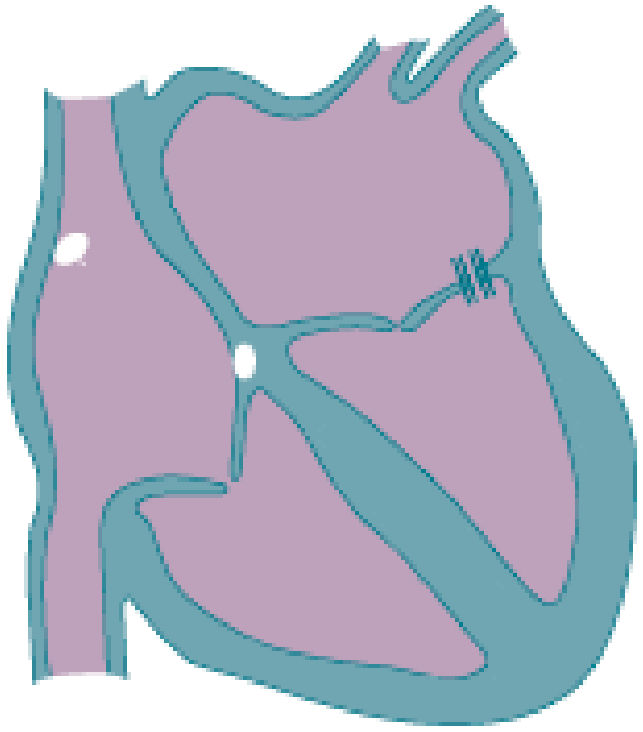
AV Nodal Re-entry Tachycardia



Abnormal circular conduction in the AV Node.

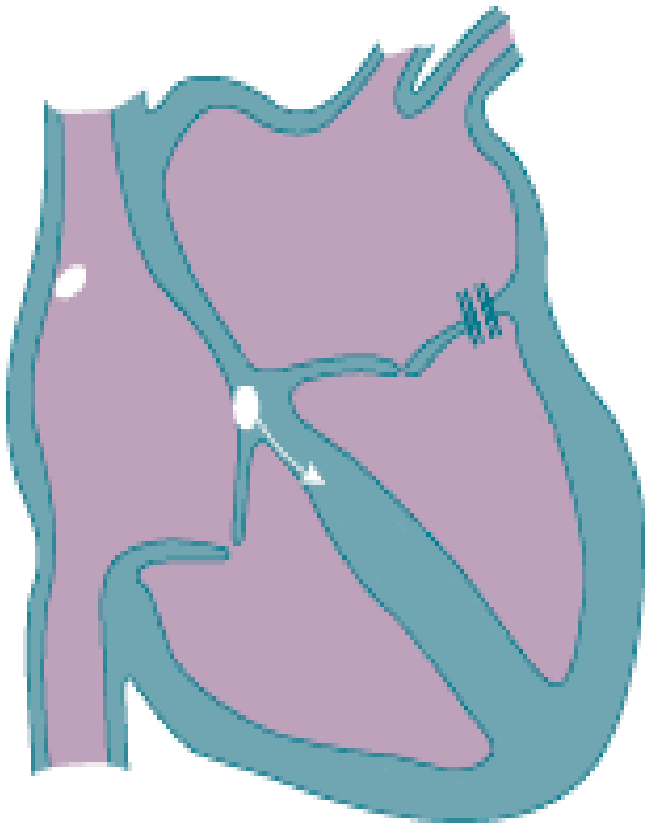
WPW “Accessory Pathway”

- An extra connection (accessory pathway) is present between the upper chamber (atrium) and lower chamber (ventricle). Patients with such a connection are said to have the Wolff-Parkinson-White syndrome (WPW). The extra connection is shown here during normal sinus rhythm.

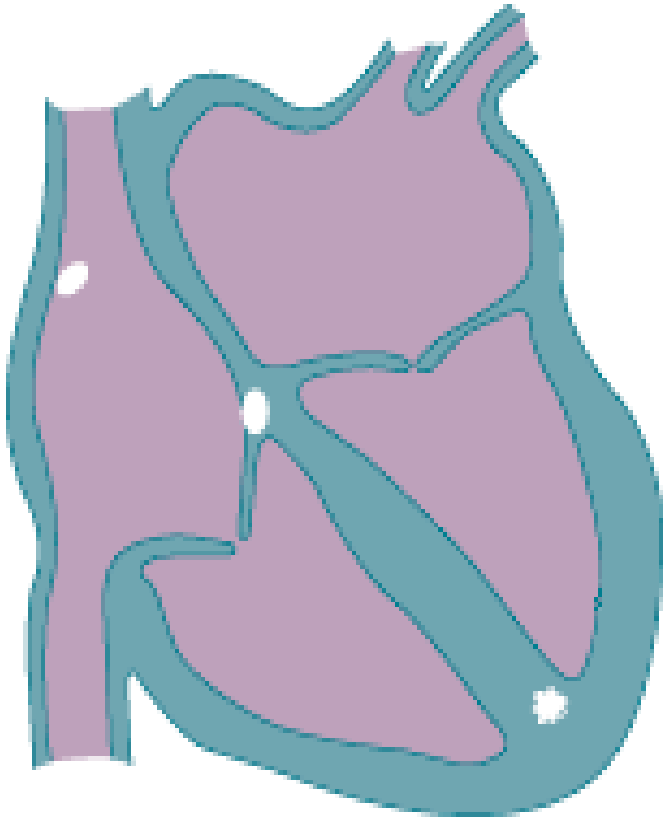


WPW-Orthodromic Reciprocating Tachycardia-Common

Here, the extra connection is seen being used to complete a circuit which causes the tachycardia. The electrical impulse flows down the normal AV node from the atrium to the ventricle, then returns back to the atrium via the accessory pathway, which acts as a "short circuit" to perpetuate the arrhythmia.

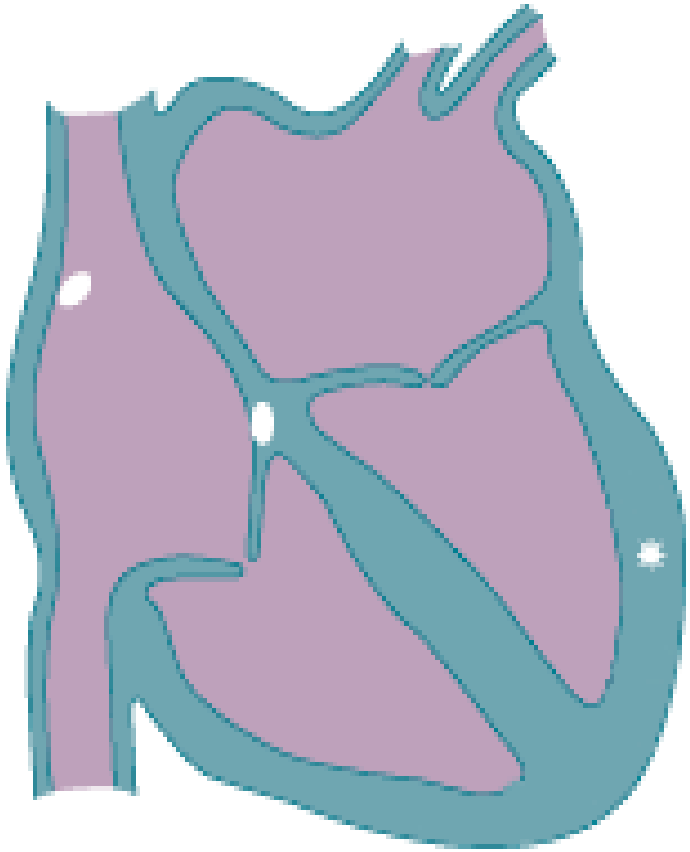


Ventricular Tachycardia



Ventricular Fibrillation

- Ventricular fibrillation occurs when parts of the ventricles depolarize repeatedly in an erratic, uncoordinated manner.
- The EKG in ventricular fibrillation shows random, apparently unrelated waves. Usually, there is no recognizable QRS complex



Atrial enlargment

- P-Pulmonale -» narrow, pointd (P) wave in limb & Rt. Chest leads.
- P-Tricuspidale -» tall & notched with 1st peak taller then 2nd.
- RAE: small QRS voltage in V1 with abrupt increase (x3) in QRS voltage in V2.
- LAE: P wave widened to 0.12 sec, notched (P) wave in limb leads + (-ve) terminal widened & deeper (P terminal force).
- P-Mitrale -» terminal (P) in V1, L3, aVF. _ duration > 0.04 sec.

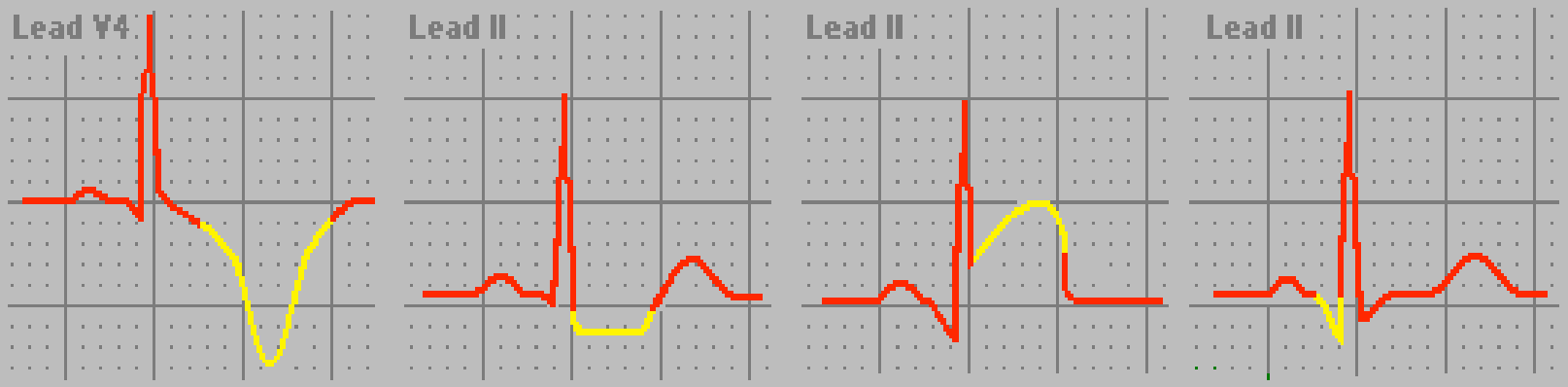
Ischemia, Injury, and Necrosis

When blood flow is compromised, the affected area of the heart is unable to conduct electrical impulses normally. This results in characteristic changes on the ECG, representing the degree of functional insult:

Ischemia — T-wave inversion,
ST-segment depression

Injury — ST-segment elevation

Necrosis (or infarction) — Q waves

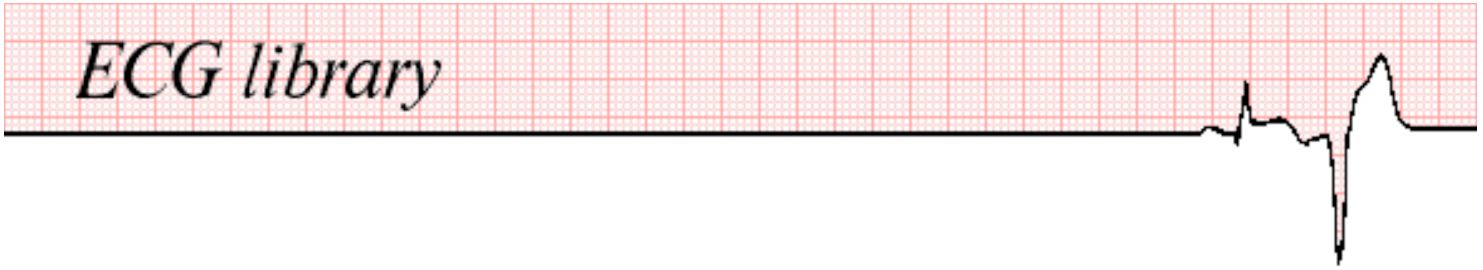


Localizing the Area of Infarction: Overview

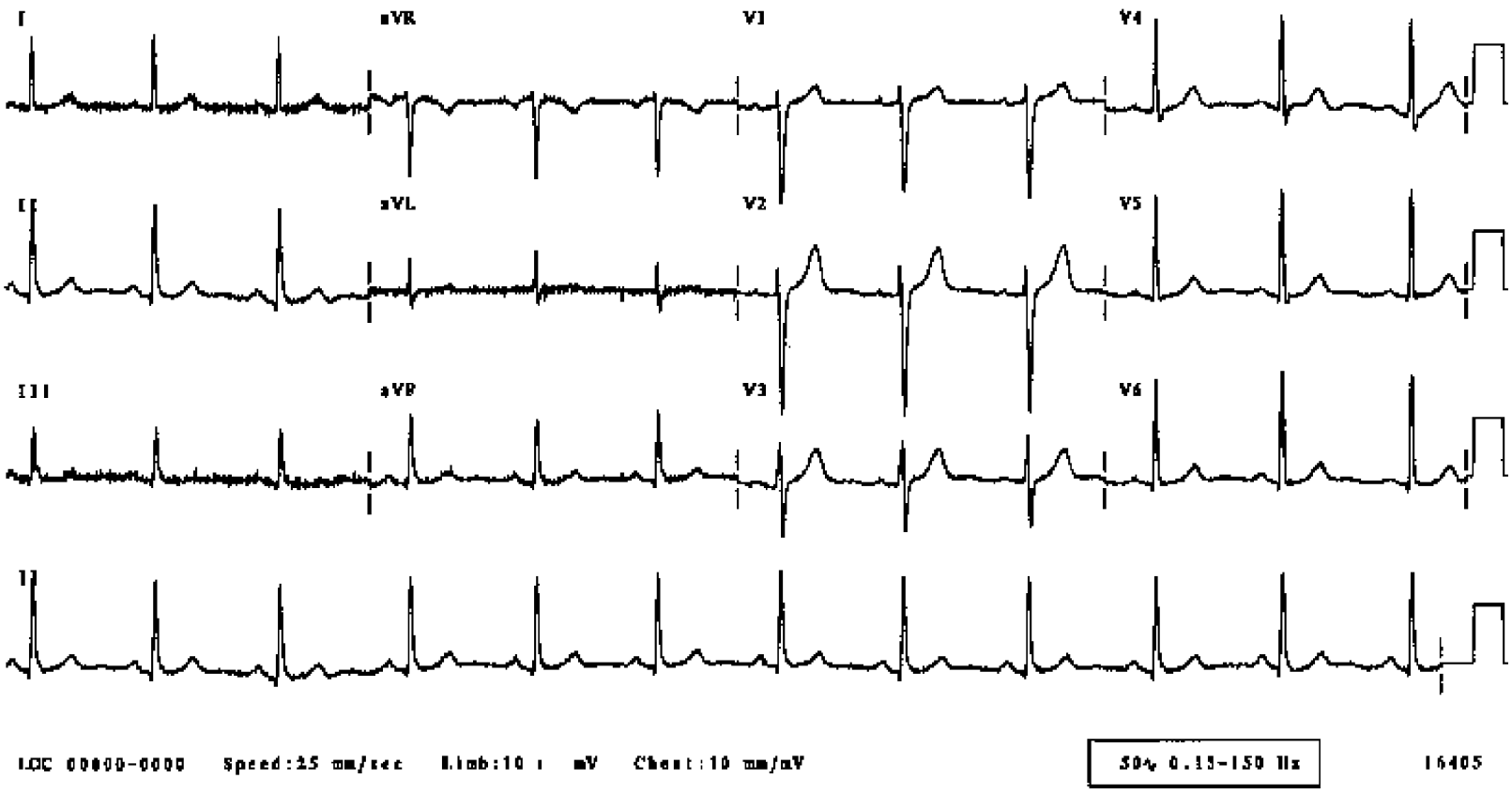
Location of Infarct	Arterial Supply	Look for: Indicative Changes in Leads	Look for: Reciprocal Changes in Leads
Anterior	LAD	V1-V4	II, III, aVF
Inferior	RCA	II, III, aVF	I, aVL
Lateral	Circumflex	I, aVL, V5, V6	V1
Posterior	Posterior Descending (RCA)	None	V1, V2
Septal	Septal perforating (LAD) Posterior descending (RCA)	Loss of R wave in V1, V2, or V3	None

Remember, ST-segment changes in V1 and V2, both elevation and depression, are always significant but not always specific (e.g., ST elevation seen with LVH).

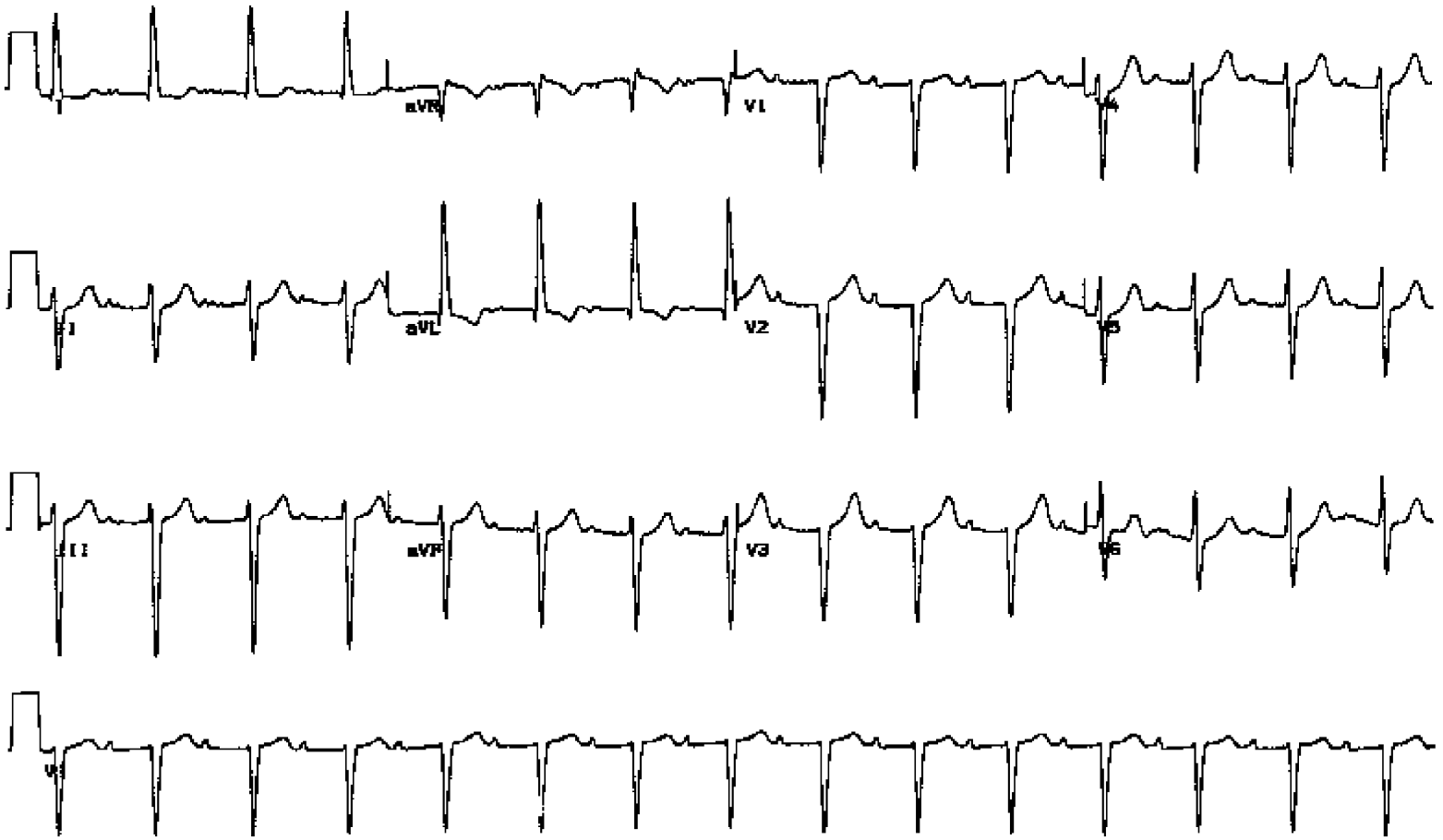
PRACTICE Makes Perfect



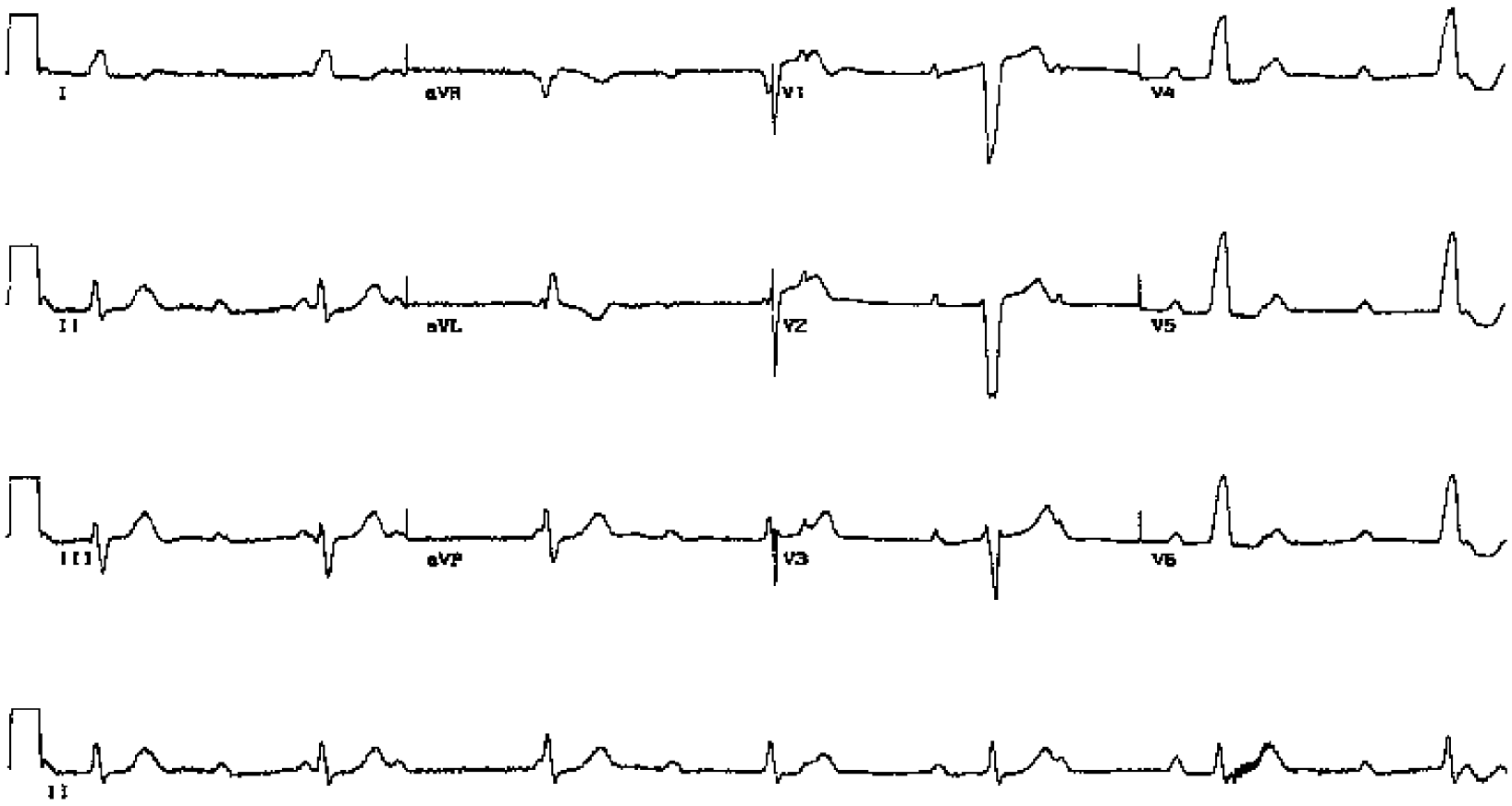
Normal EKG


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
LOC 00000-0000
Speed:25 mm/sec
Limb:10 mV
Chest:10 mm/mV
50% 0.15-150 Hz
16405

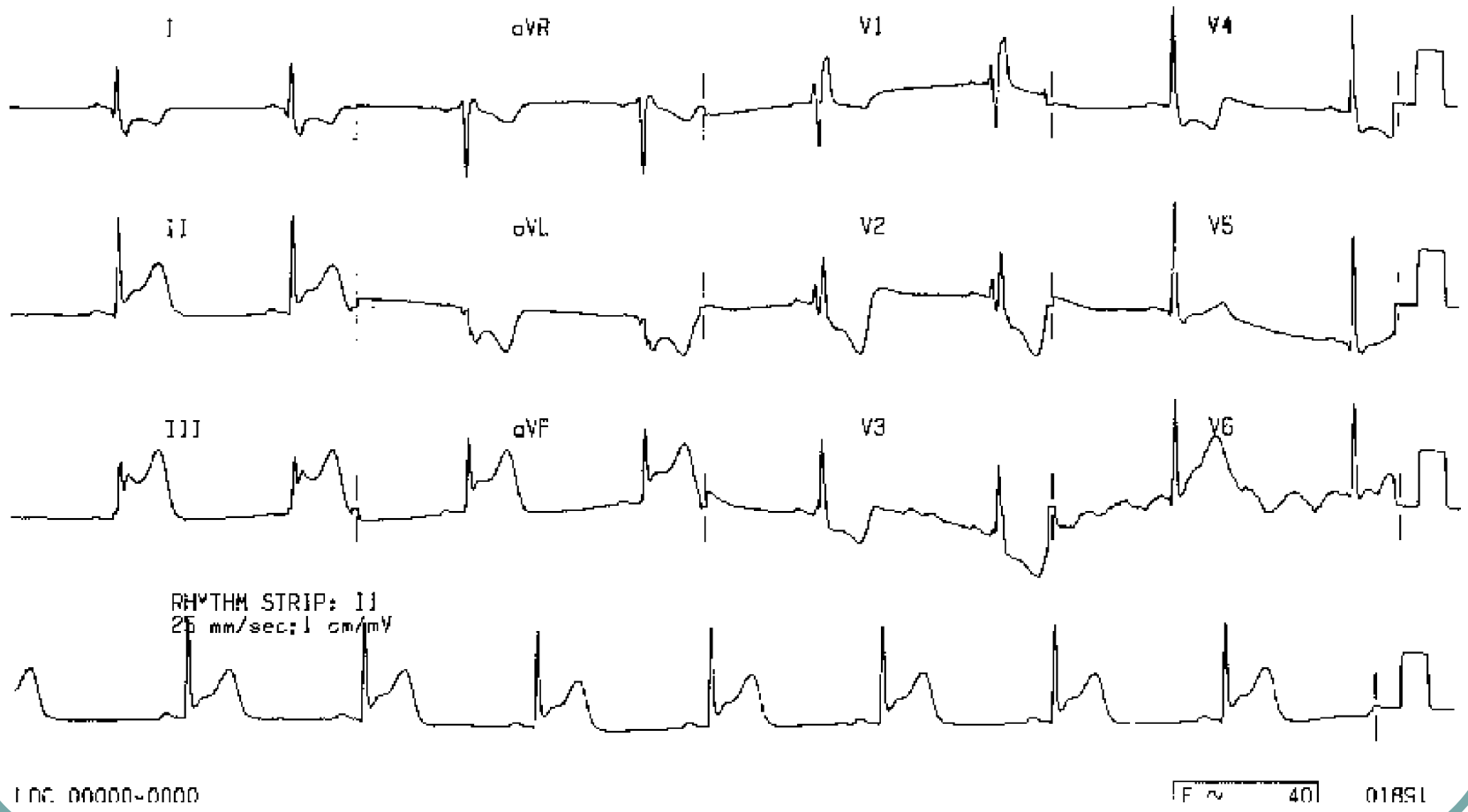
1st Degree AV Block



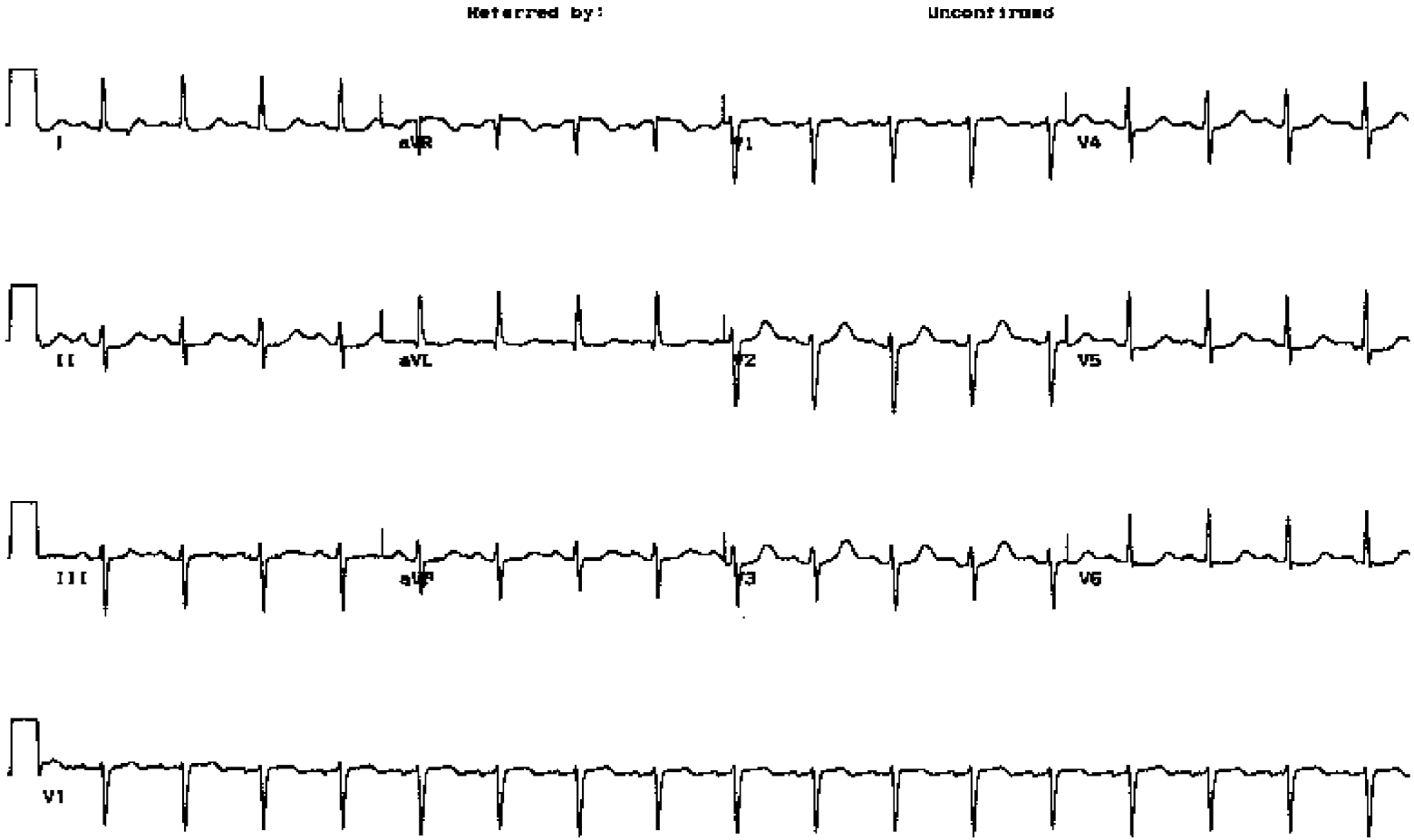
Complete Heart Block



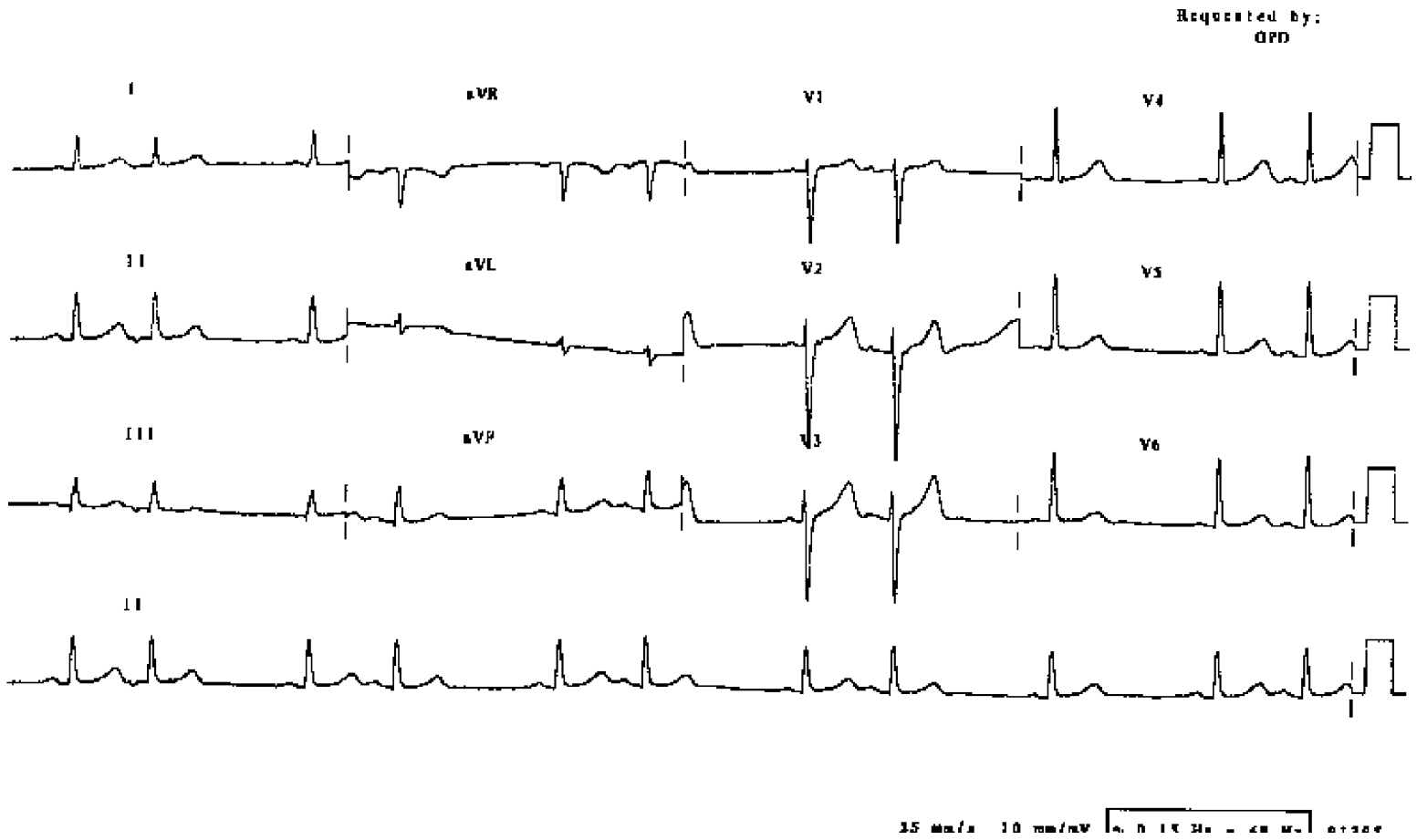
Inferior MI, Sinus Bradycardia



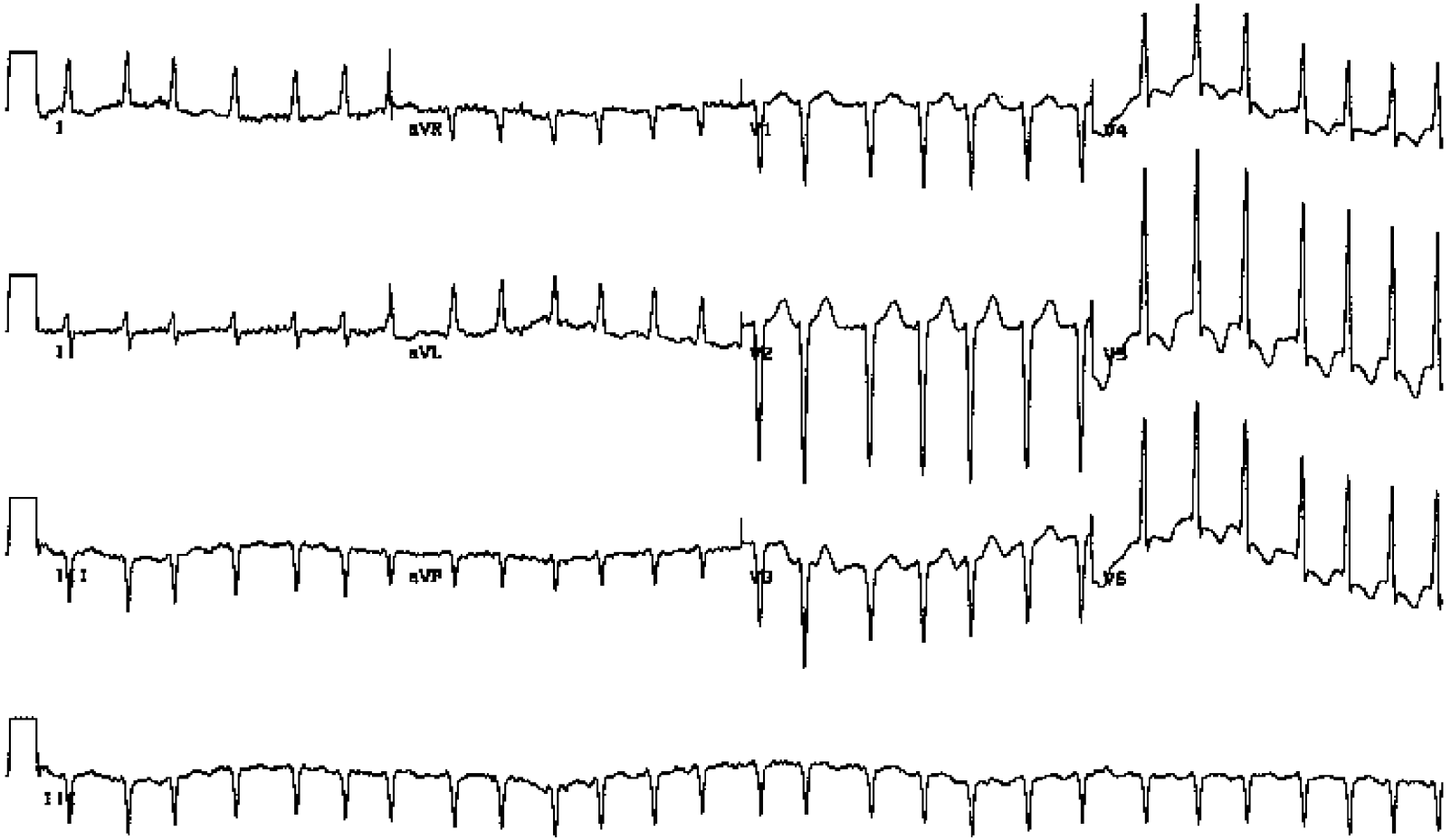
Sinus Tachycardia



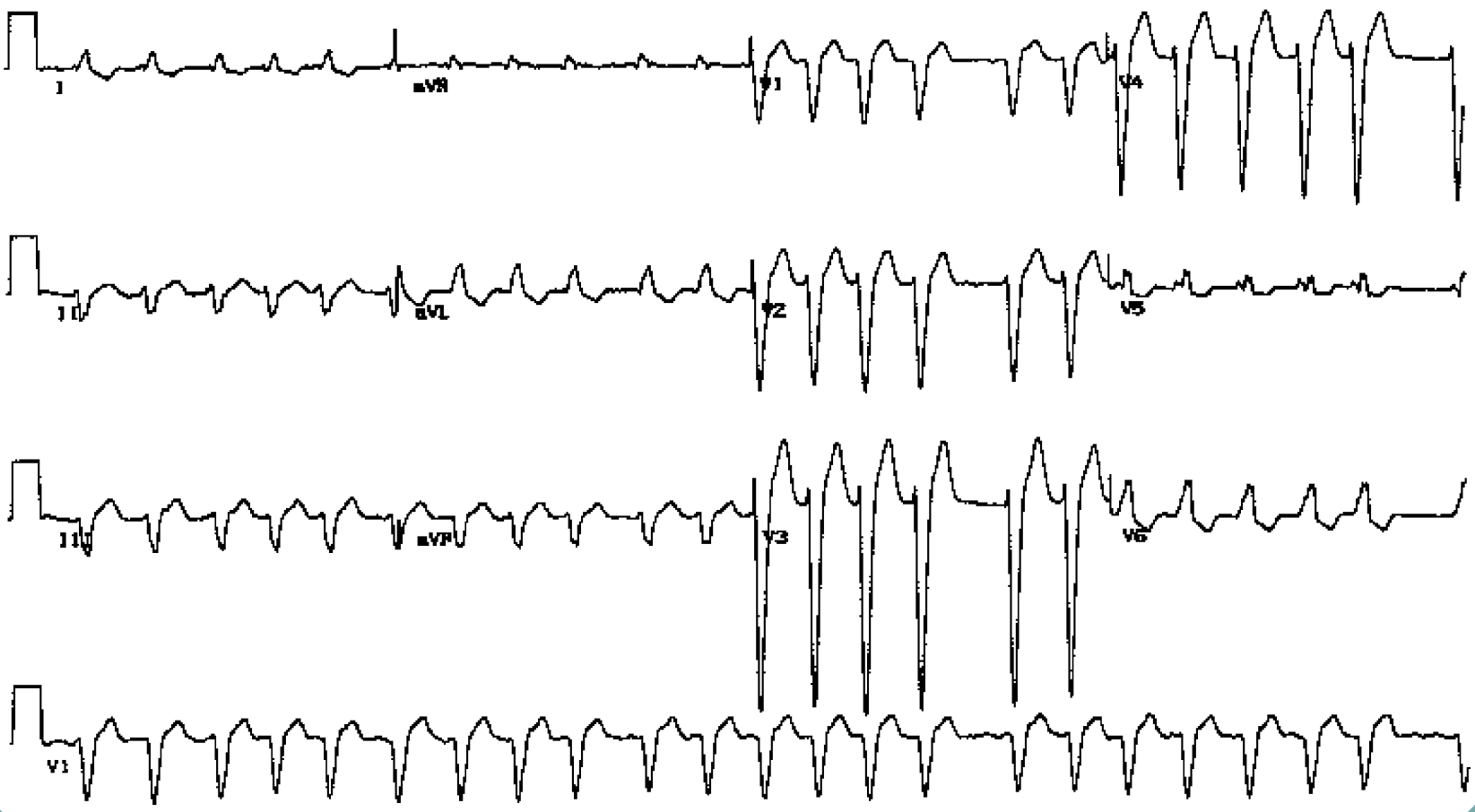
Atrial Premature Beat



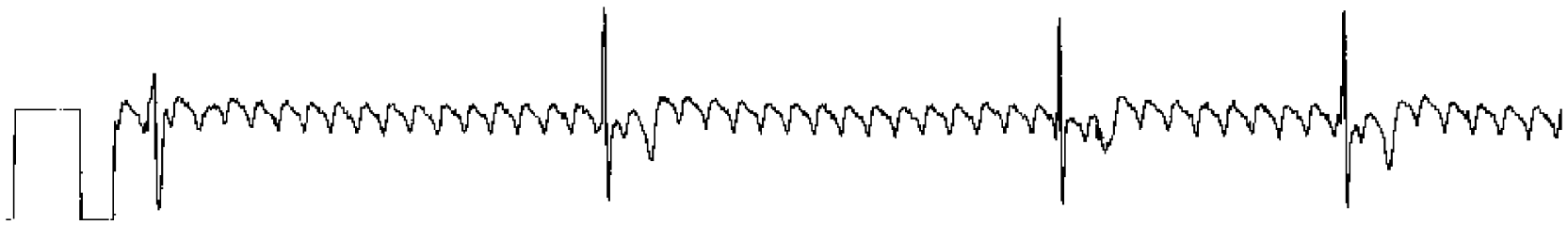
Atrial Fibrillation with ??



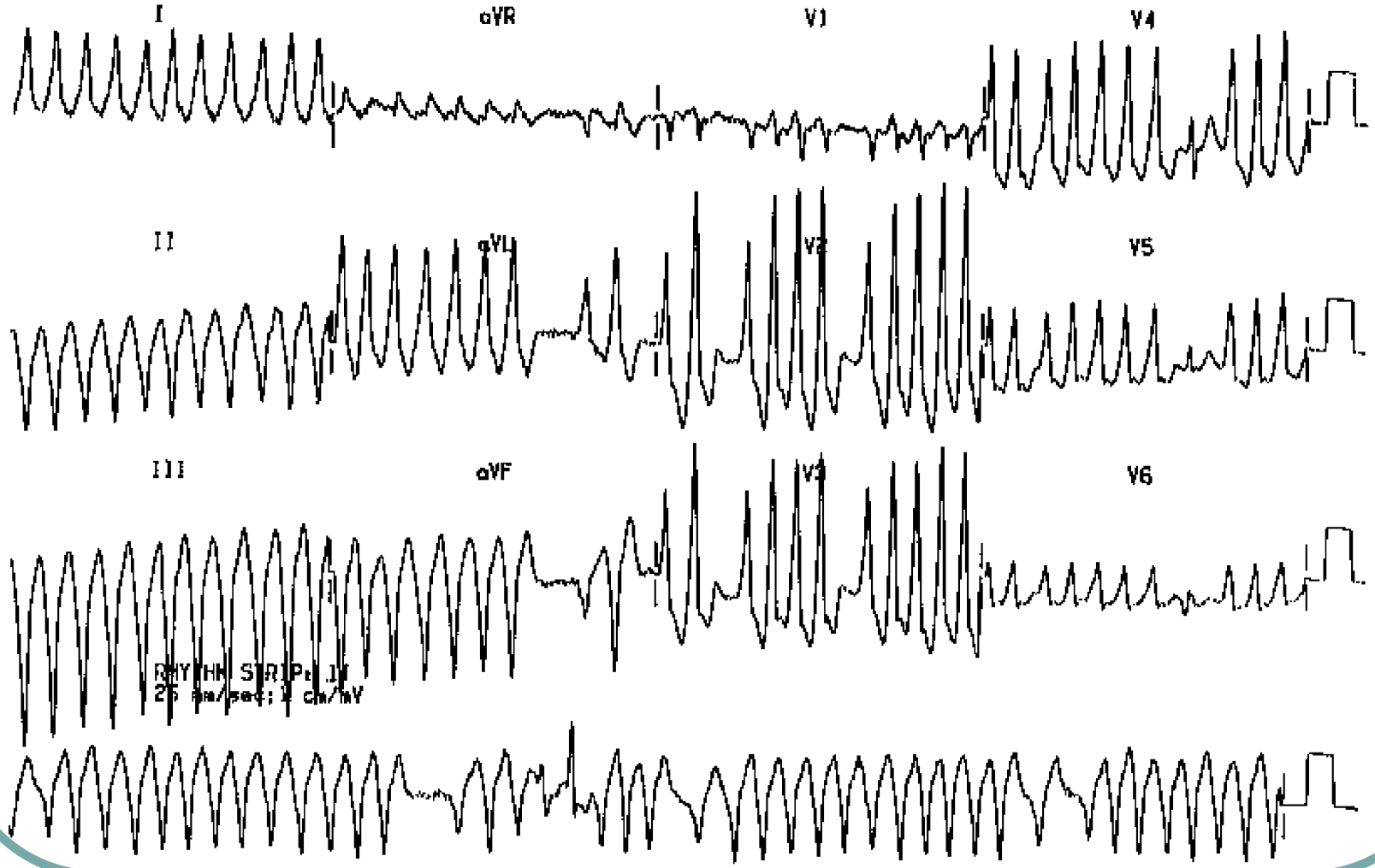
Should we call a code!?



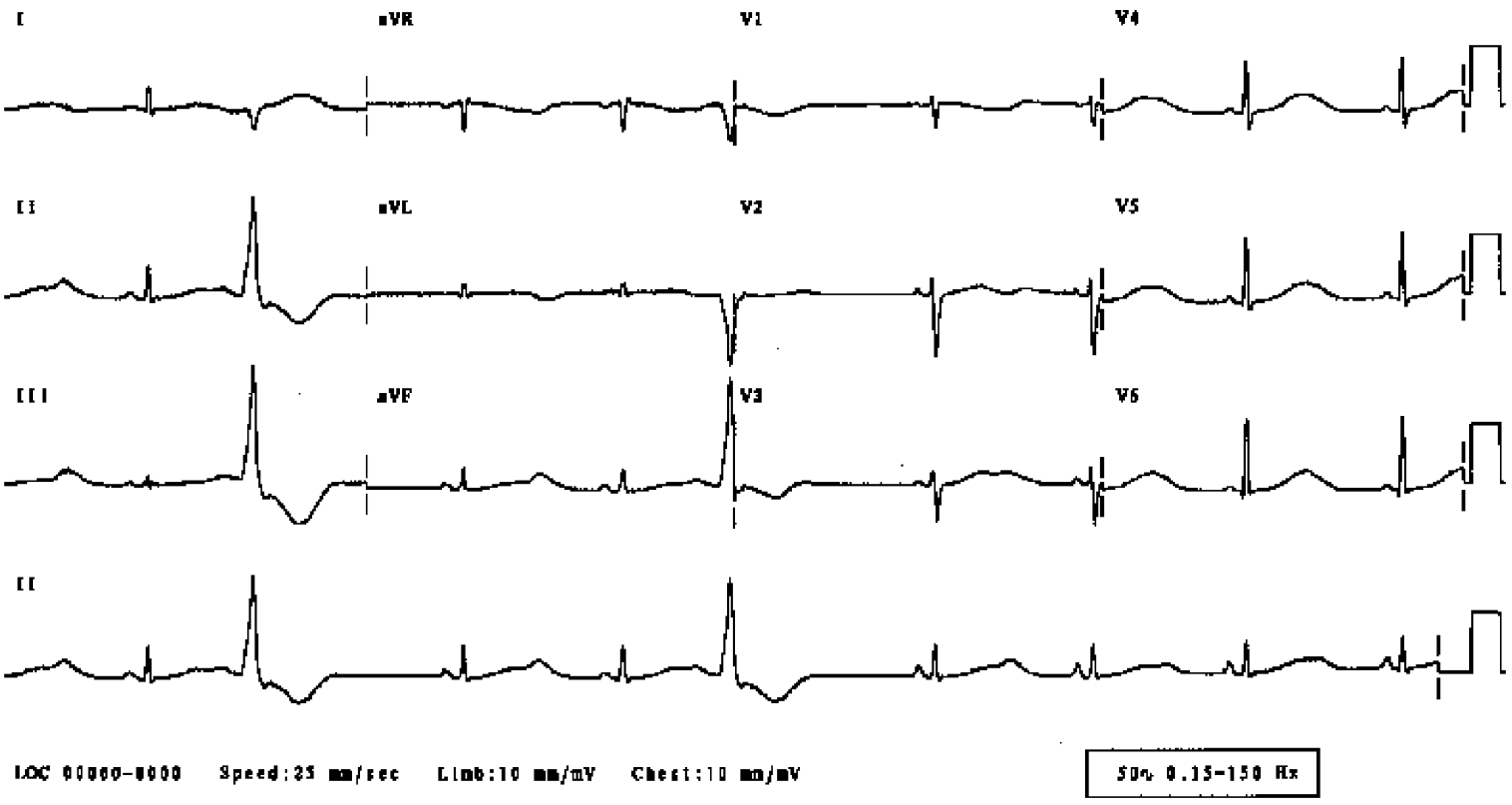
Atrial flutter with reentry circuit



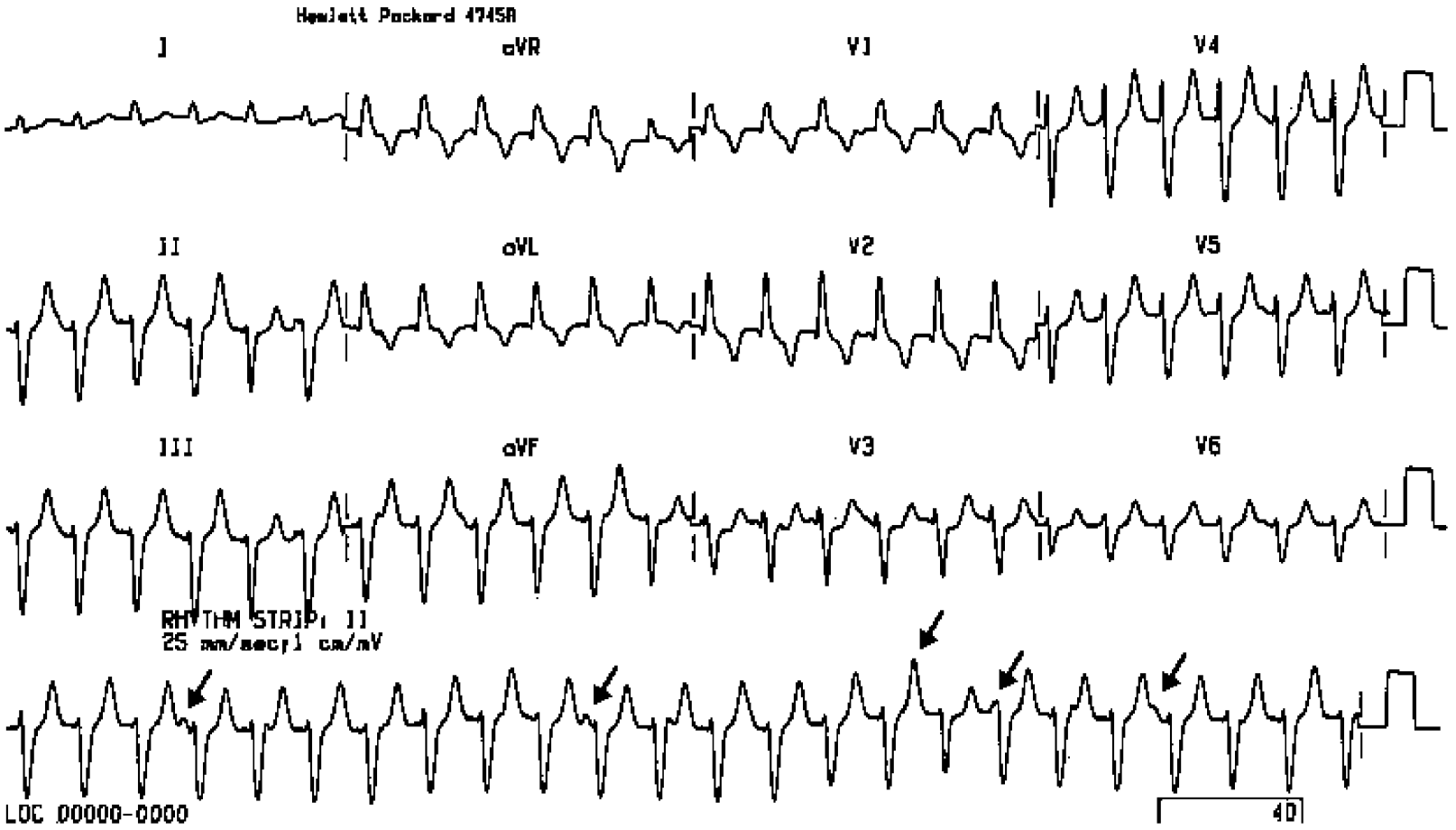
Important Mimikar



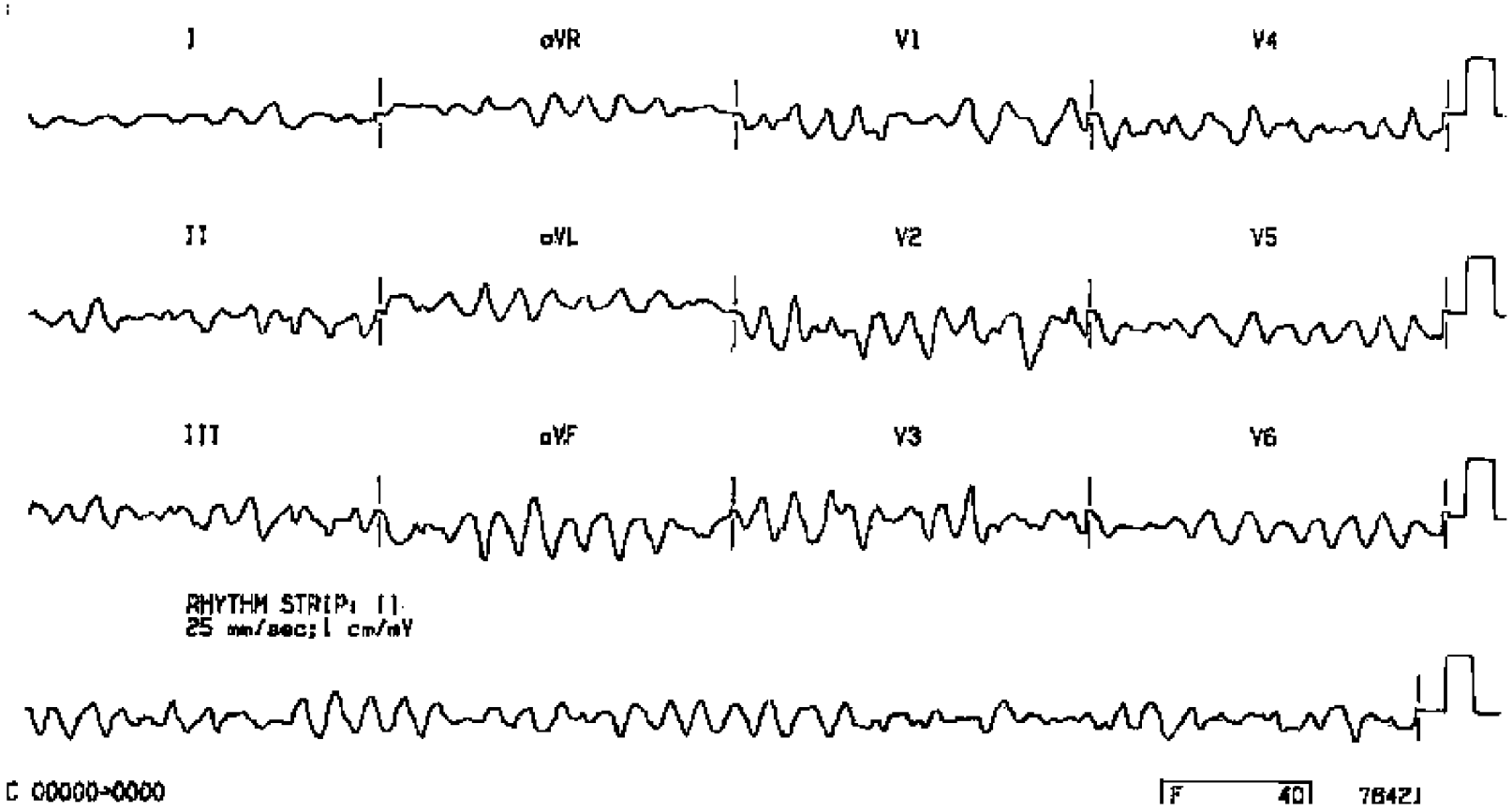
PVC & Long QT


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
LOC 00000-0000 Speed:25 mm/sec Limb:10 mm/mV Chest:10 mm/mV
50% 0.15-150 Hz

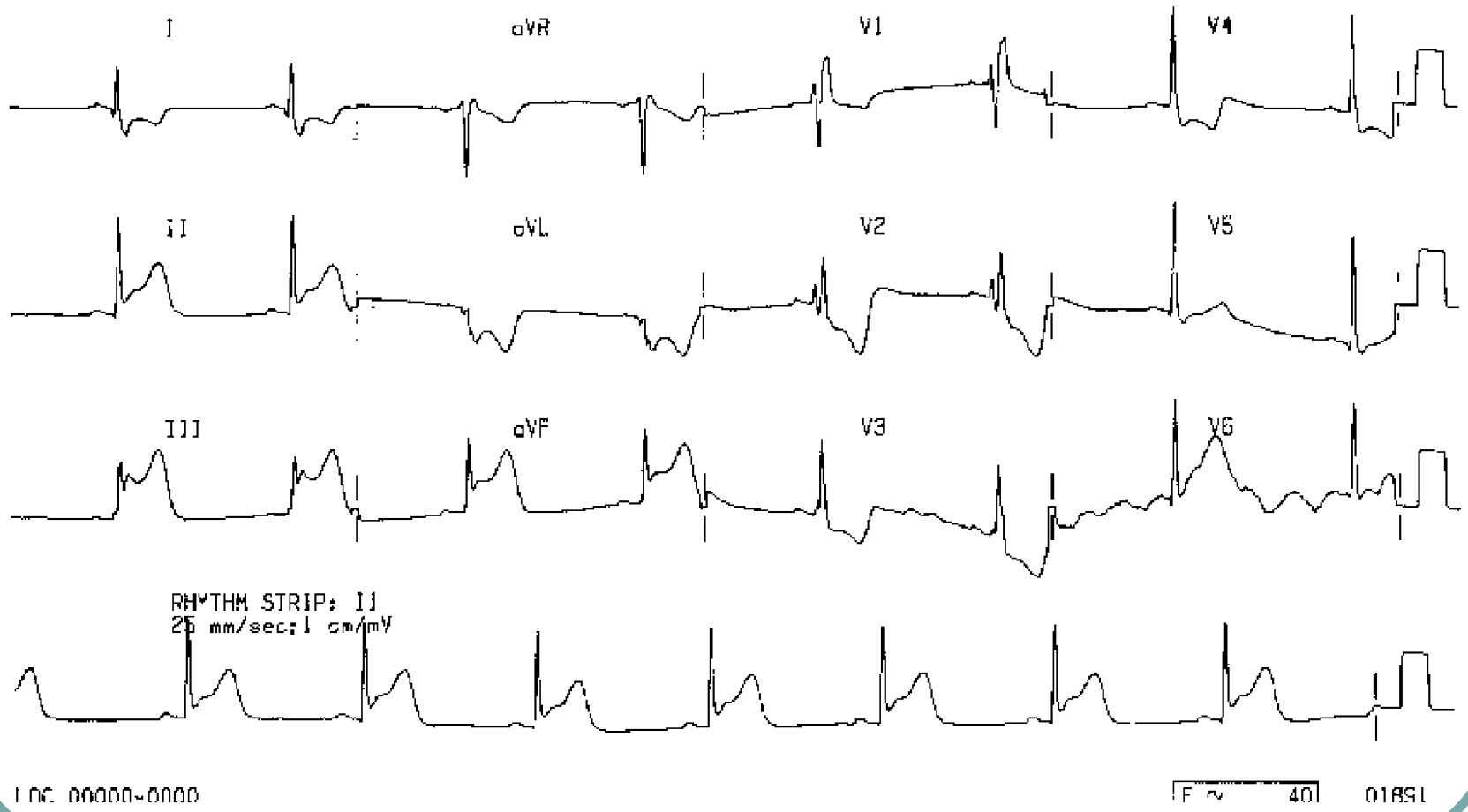
VT with clear dissociation



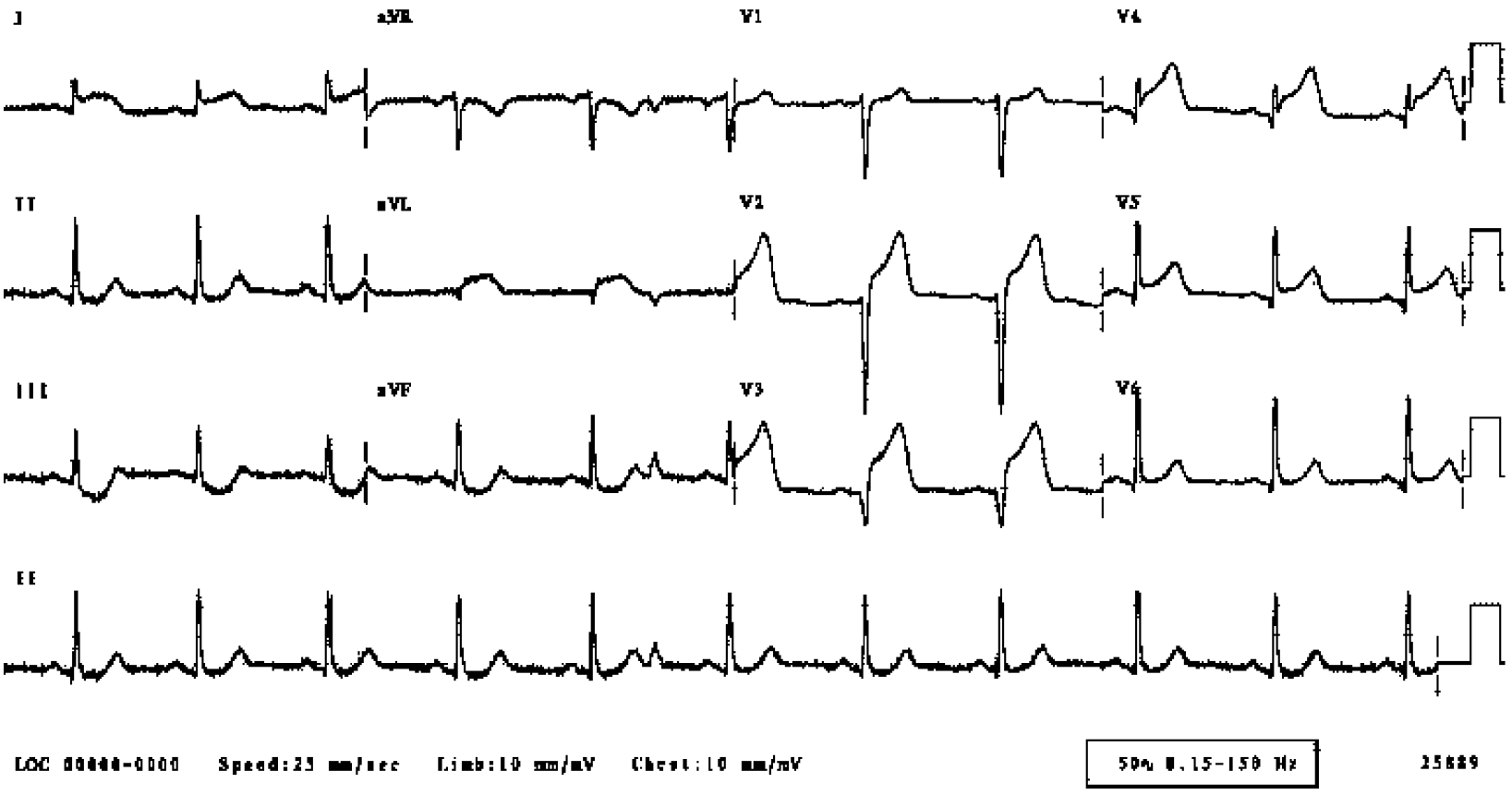
What is that?


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
RHYTHM STRIP: II
25 mm/sec; 1 cm/mV
C 00000-0000
F 40 7642J

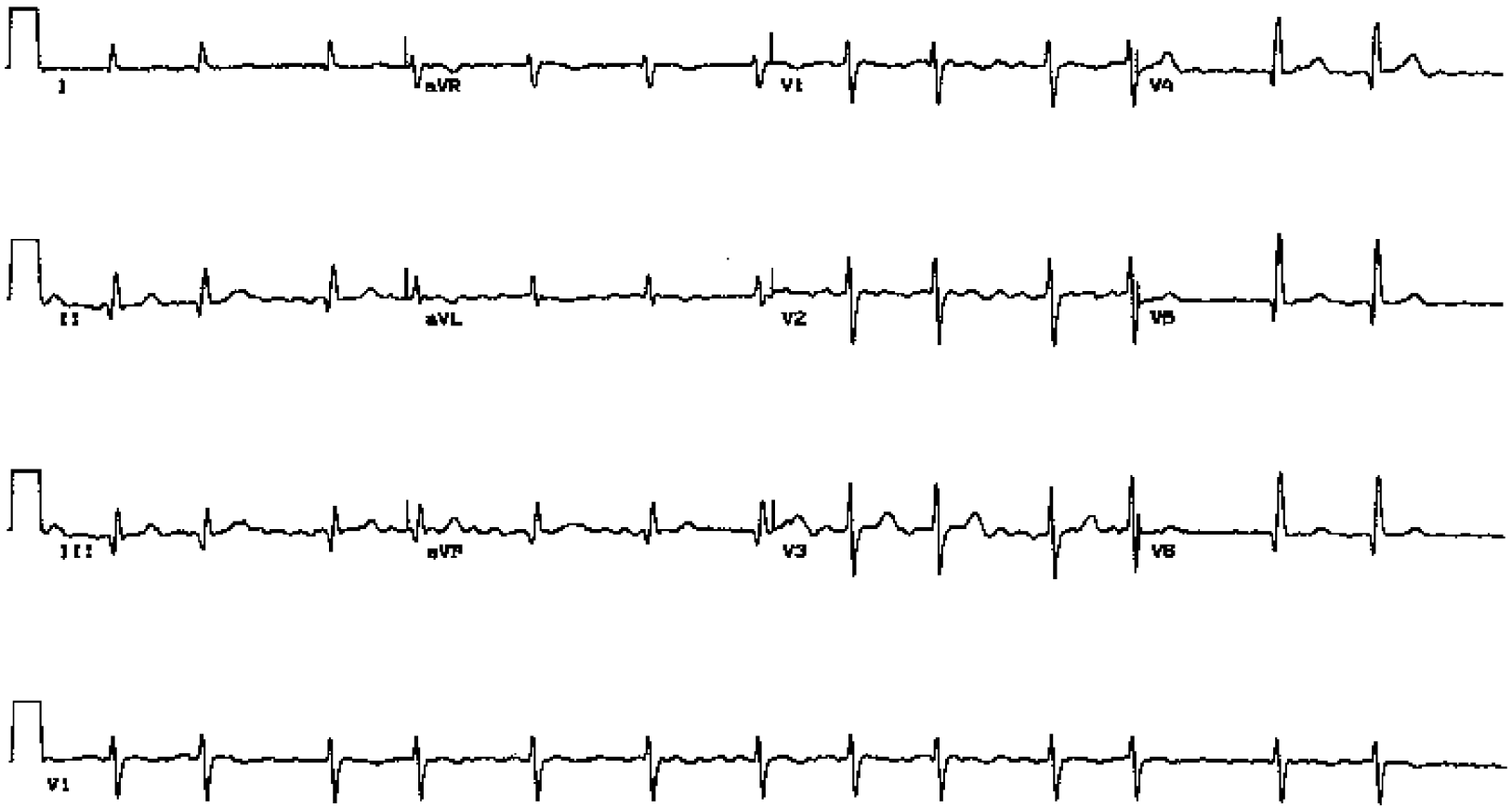
Acute Inferior MI



Acute Anterior MI



Old Inferior MI



Acute MI with LBBB

RBBB, What else!