

# Day 2

# Homework

## Bundle Branch & Fascicular Blocks

Reading Assignment (p53-58 in 'Outline')

### Objectives

1. QRS analysis of Right and Left BBB
2. Uncomplicated vs 'complicated' BBB
3. Diagnosis of RBBB with LAFB and LPFB
  4. Rate related BBB's
  5. Who needs a pacemaker ?

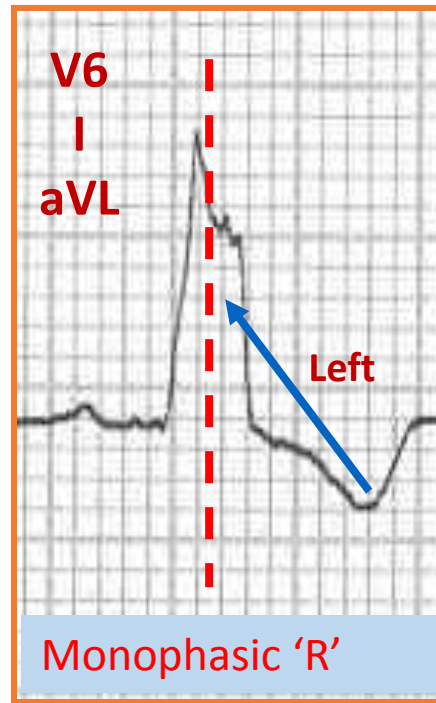
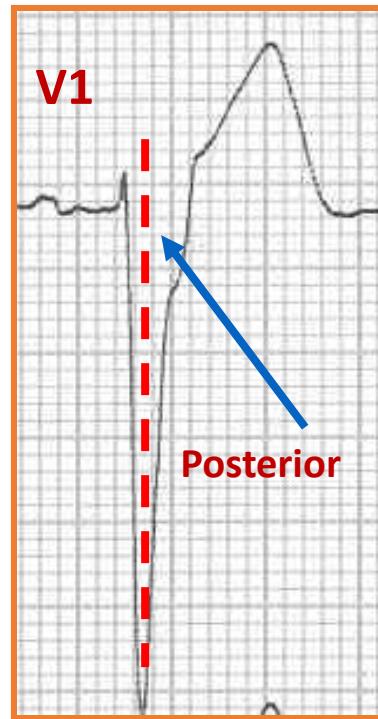
# Welcome to the “5-Step Method”

ECG #:

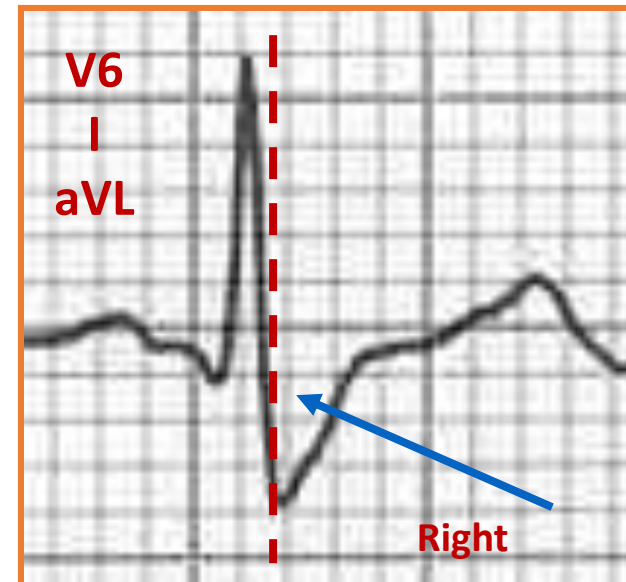
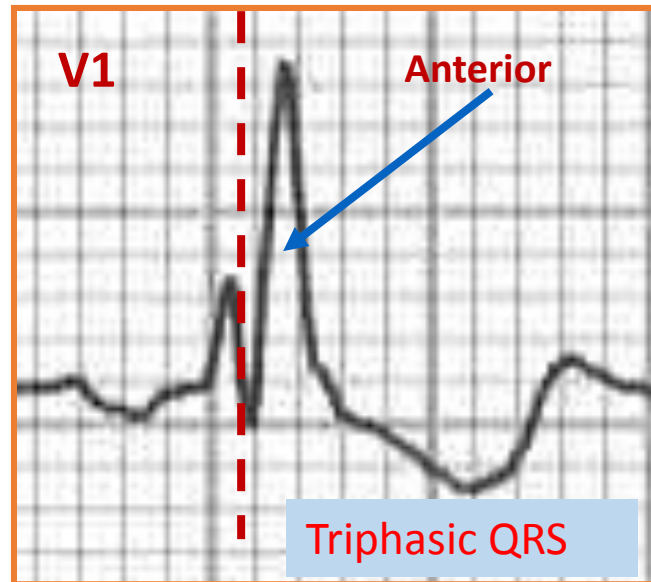
Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= V=				
PR=				
QRS=				
QT=				
Axis=				

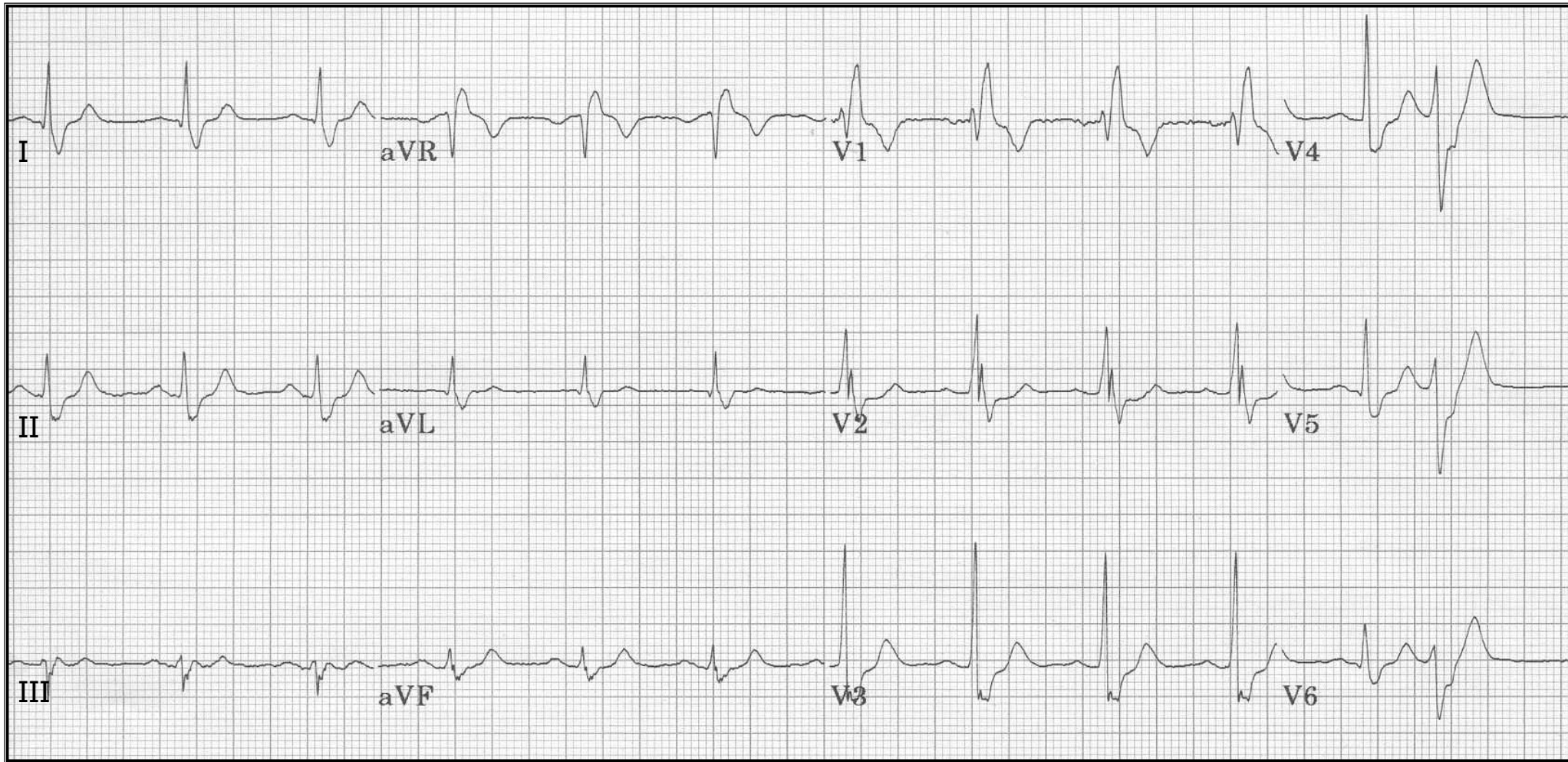
1. Compute the 5 basic measurements: HR, PR interval, QRS duration, QT interval, Axis
2. What's the basic rhythm and other rhythm statements (e.g., PACs and PVC's)
3. Any conduction abnormalities (SA blocks, AV blocks (Types I or II), and IV blocks)
4. Waveform abnormalities beginning with P waves, QRS complexes, ST-T, and U waves
5. Final interpretations: Normal ECG or Borderline or Abnormal ECG (list final conclusions)

LBBB

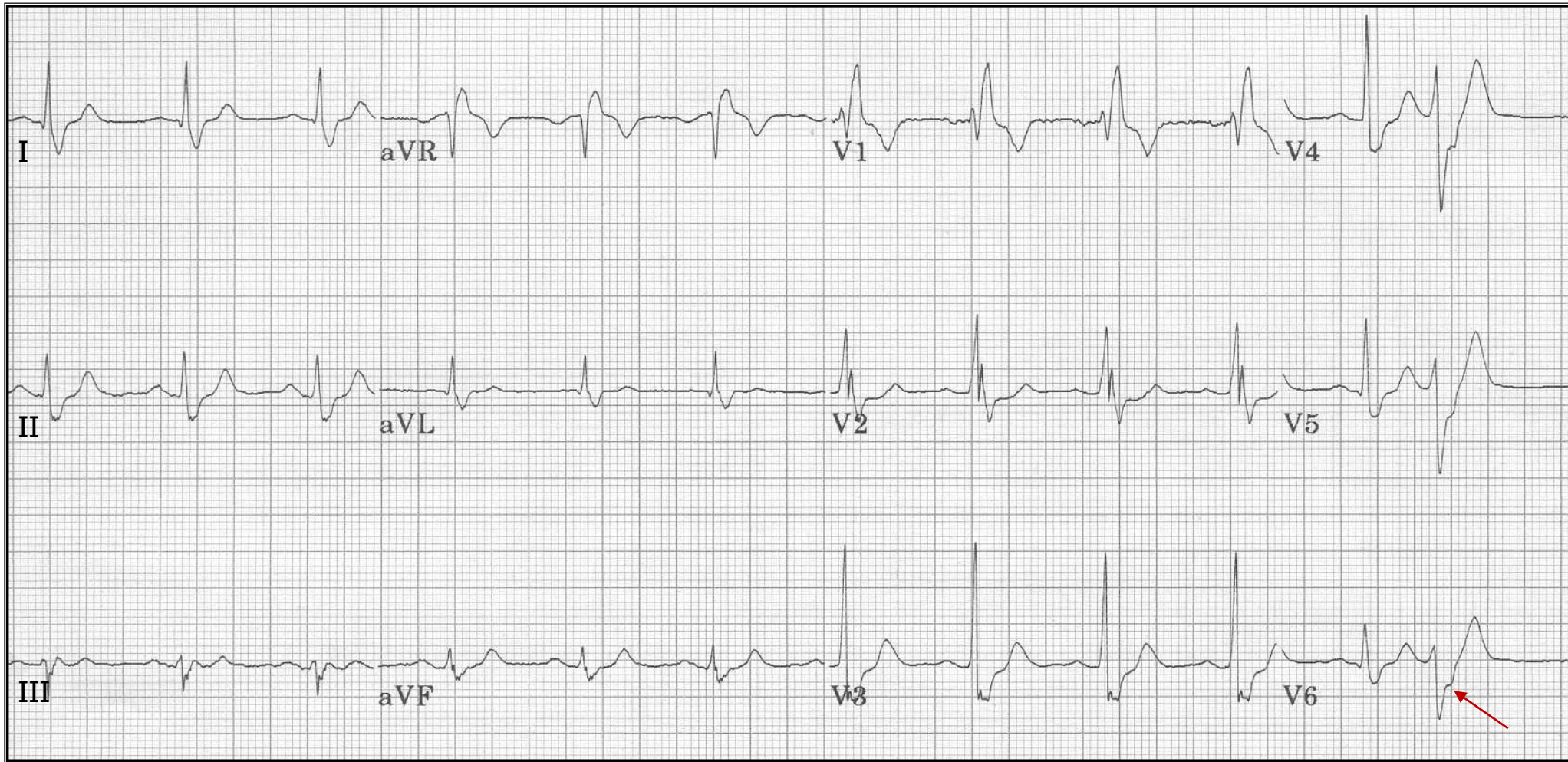


RBBB

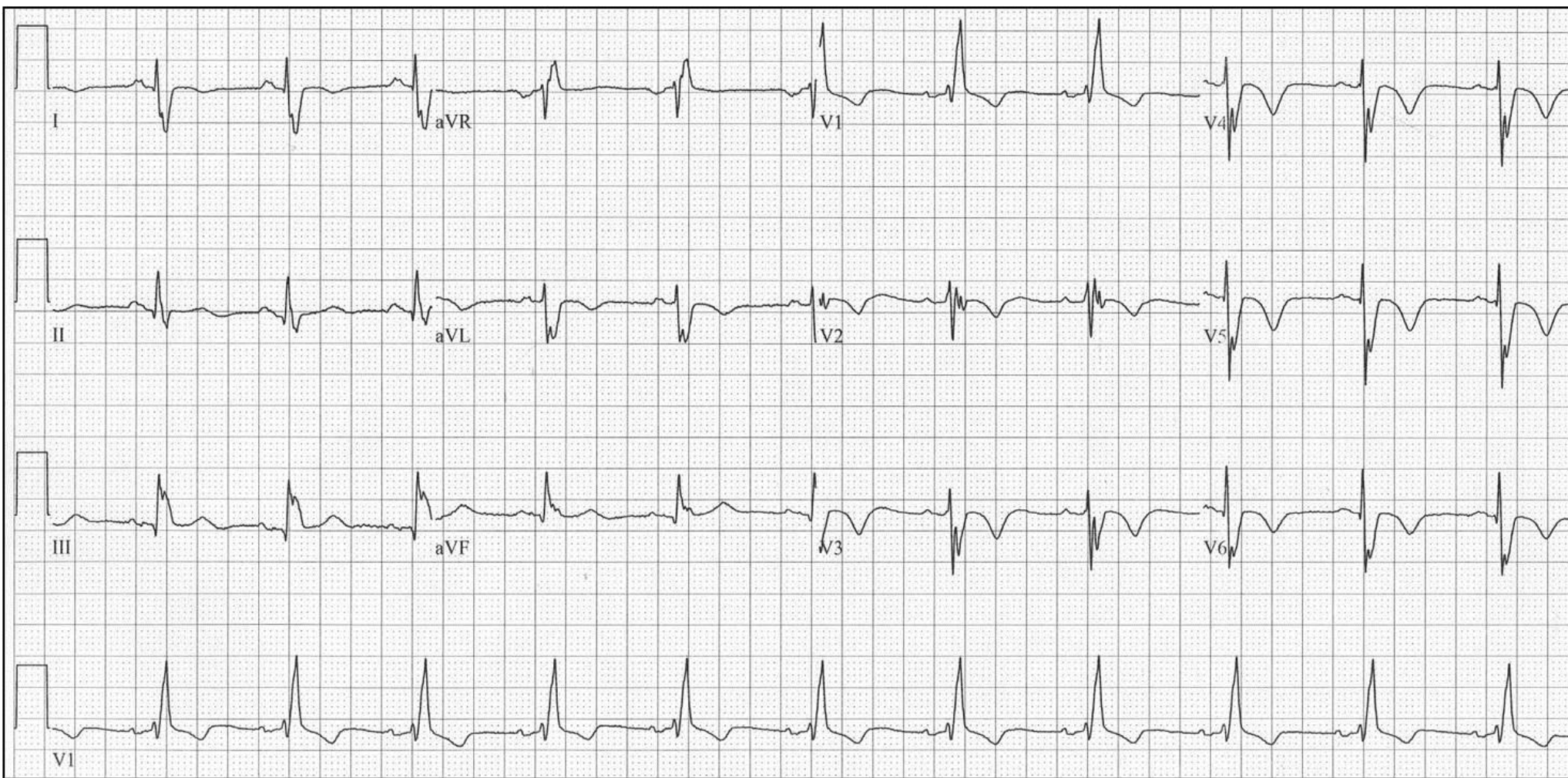




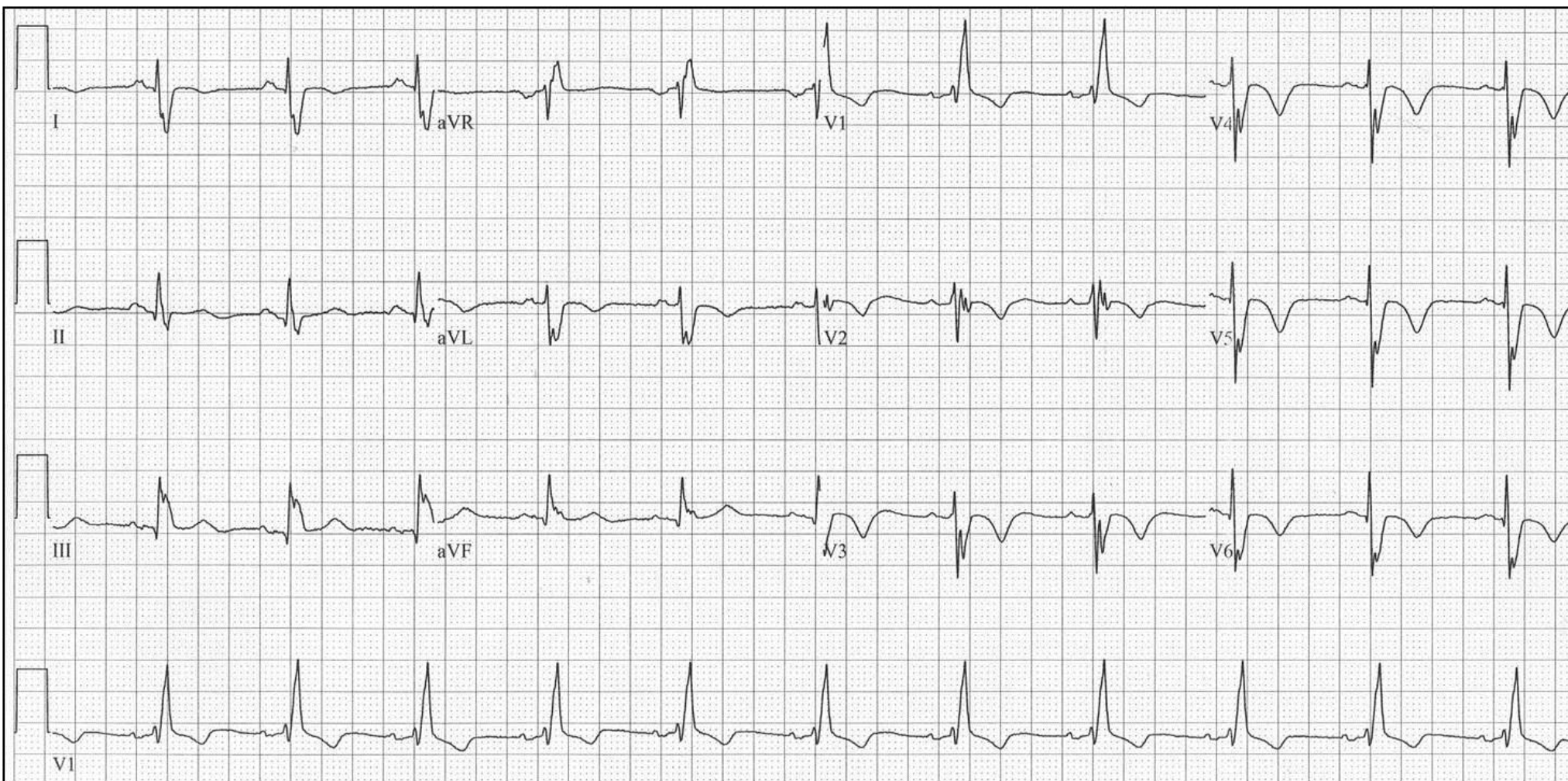
69 year old man; routine clinic visit



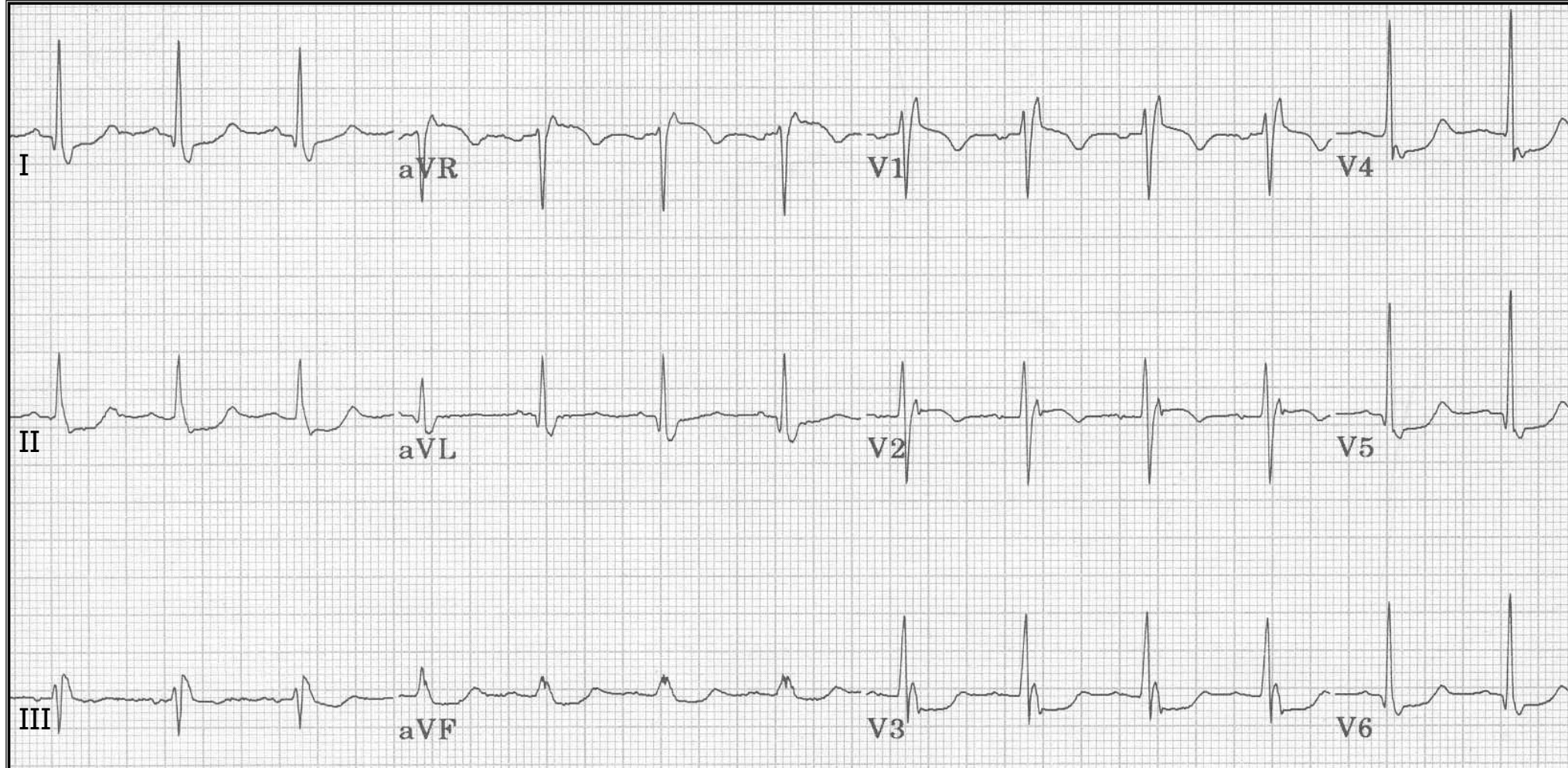
Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 80    V=80	Sinus rhythm; one PVC (from the LV.....why the LV?)	<ul style="list-style-type: none"> <li>• Normal SA, AV</li> <li>• IVCD</li> </ul>	<ul style="list-style-type: none"> <li>• late wide S in I, aVL, V5,6 (i.e., at end of the QRS ventricular activation is moving into the RV)</li> <li>• rsR' in lead V1 (prominent anterior forces; late activation of the RV)</li> </ul>	Abnormal ECG: <ol style="list-style-type: none"> <li>1. RBBB</li> <li>2. Rhythm (PVC with late, wide S wave in V6 indicating LV origin and late rightward activation towards the RV)</li> </ol>
PR=160				
QRS=140				
QT=320				
Axis=0				



62 year old man; ER visit for vague chest discomfort

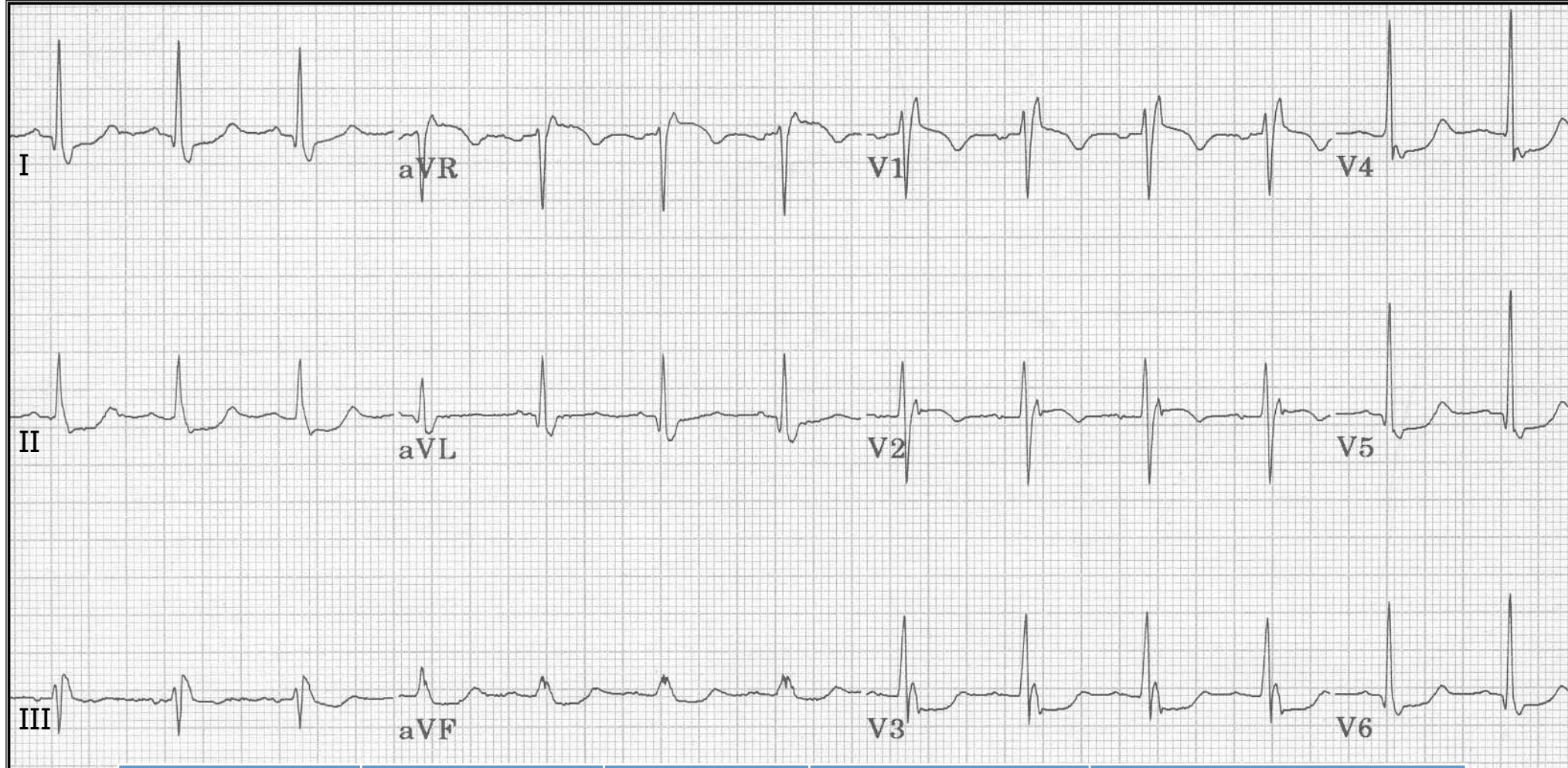


Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=70    V=70	Sinus rhythm	<ol style="list-style-type: none"> <li>Normal SA, AV</li> <li>IVCD</li> </ol>	<ul style="list-style-type: none"> <li>Late S in I, aVL, V5-6</li> <li>rsR' in V1 with prominent anterior forces (PAF) due to RBBB.</li> <li>T wave inversion V2-6 (primary T wave abnormality)</li> </ul>	<b>Abnormal ECG:</b> <ol style="list-style-type: none"> <li>RBBB + LPFB (bifascicular block)</li> <li>Primary T wave abnormality (consider differential diagnoses – including ischemia and myocardial infarction and other heart diseases, drugs, CNS insults, etc.)</li> </ol>
PR=160				
QRS=130				
QT=400				
Axis= +120				

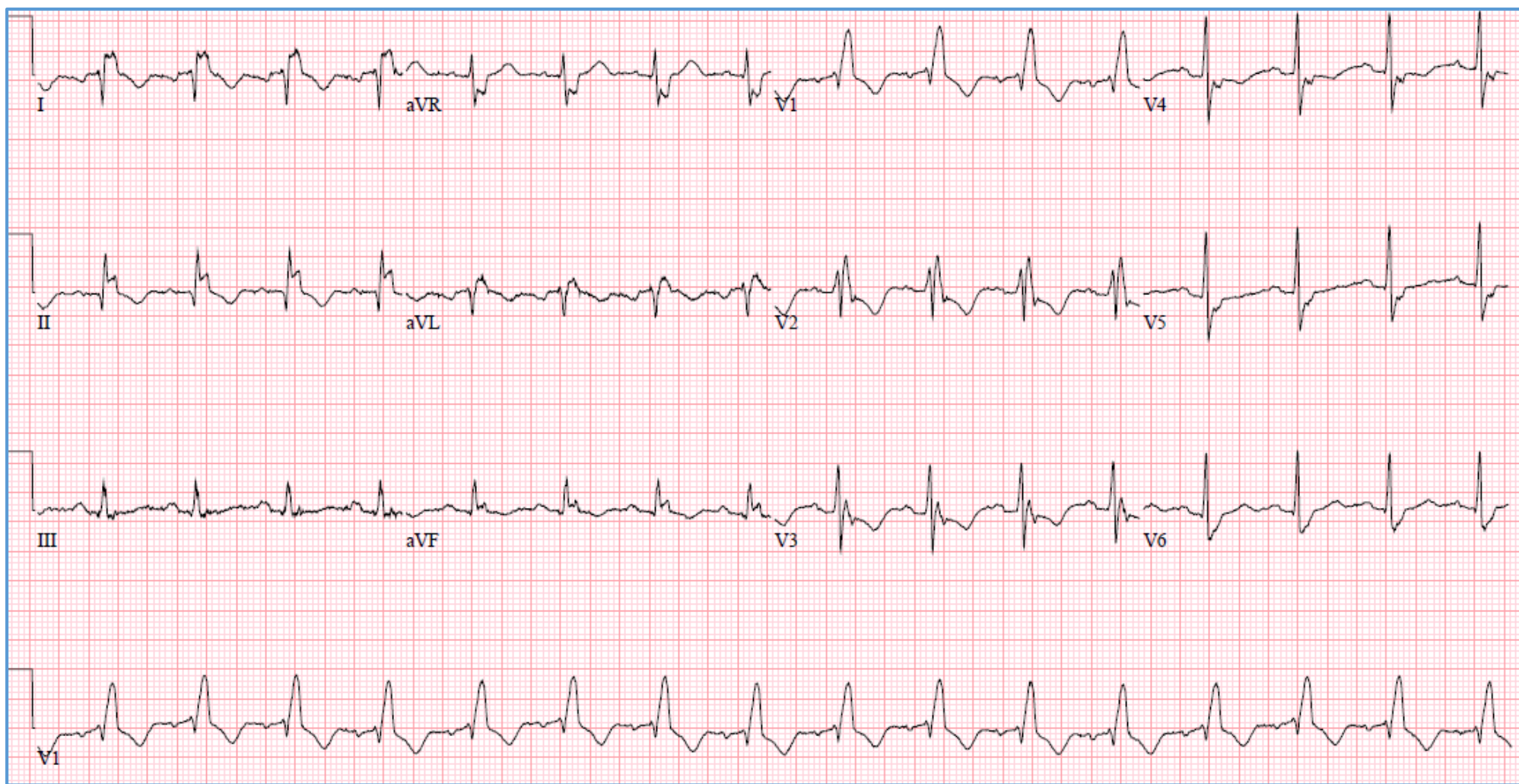


41 year old man; ER visit for vague chest discomfort

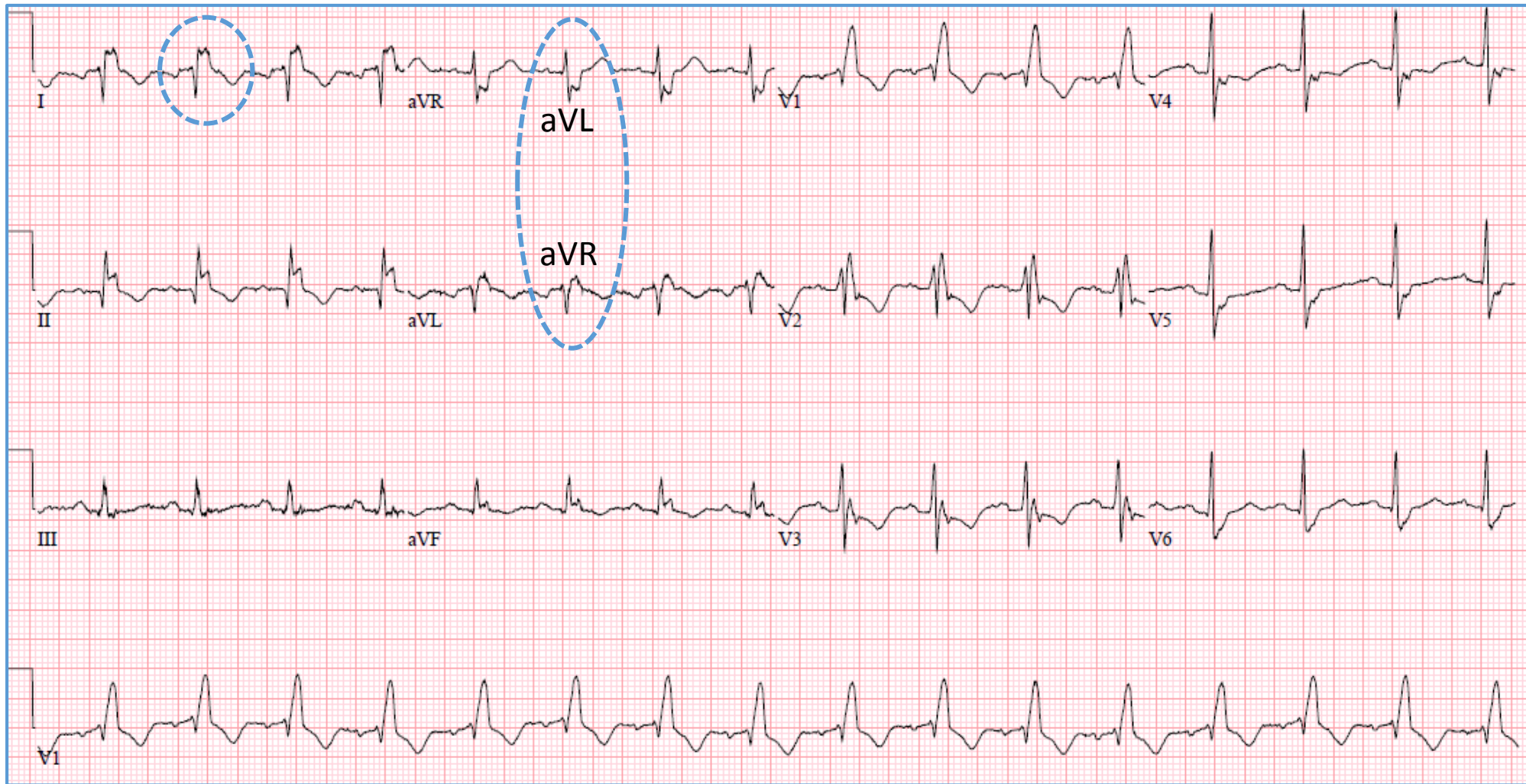




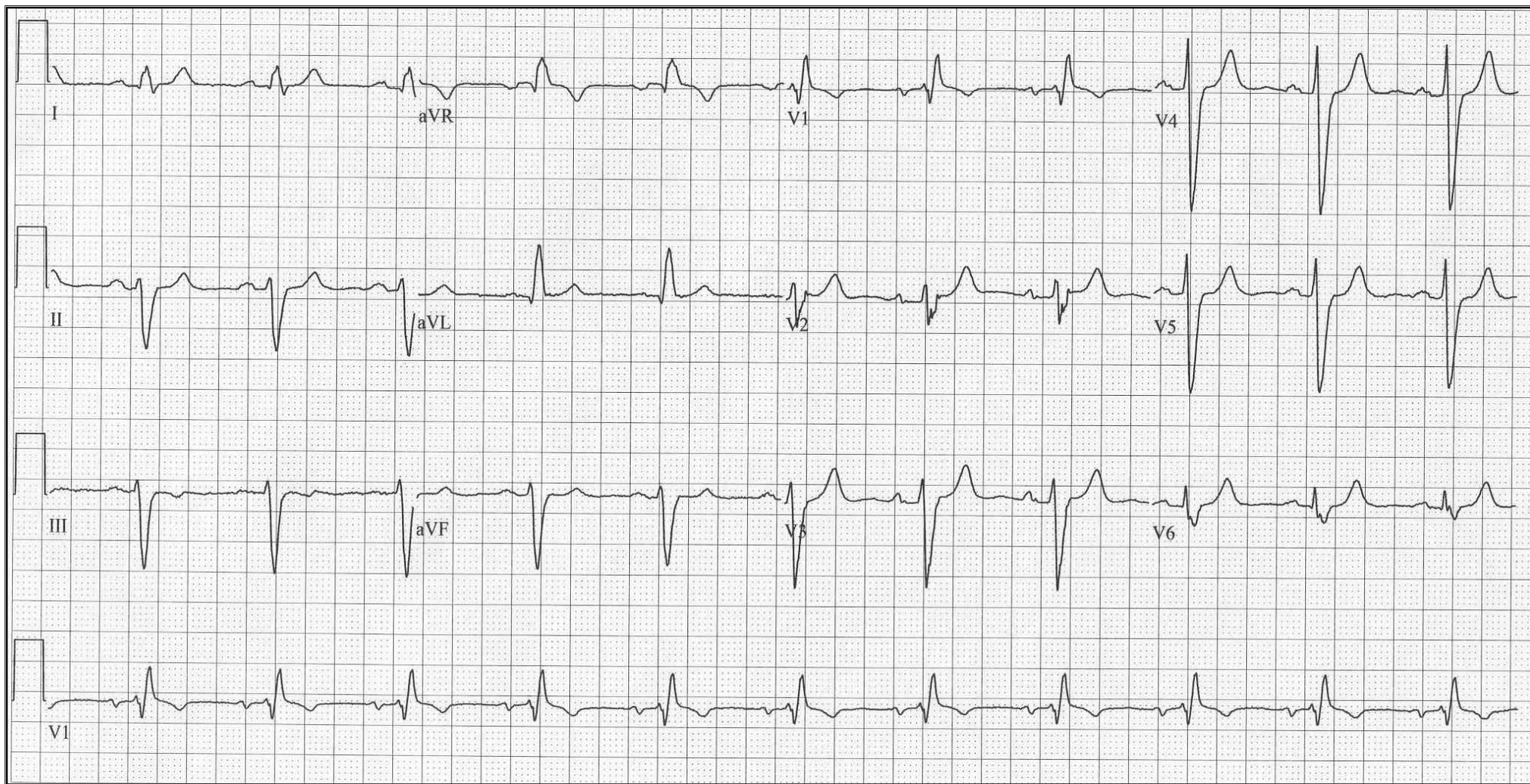
Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 90 V=90	Sinus rhythm	<ul style="list-style-type: none"> <li>• Normal SA, AV</li> <li>• IVCD</li> </ul>	<ul style="list-style-type: none"> <li>• Late S in I, aVL, V6</li> <li>• rSR' in V1</li> <li>• Slight ST elevation in V2</li> <li>• ST depression I, II, V3-6</li> </ul>	<p>Abnormal ECG:</p> <ol style="list-style-type: none"> <li>1. RBBB</li> <li>2. Primary ST-T abnormalities (consider ischemia and myocardial infarction)</li> </ol> <p>In bundle branch block it is important to differentiate primary repolarization abnormalities from the ST-T changes that normally accompany the bundle branch block)</p>
PR=130				
QRS=120				
QT=360				
Axis= +30				



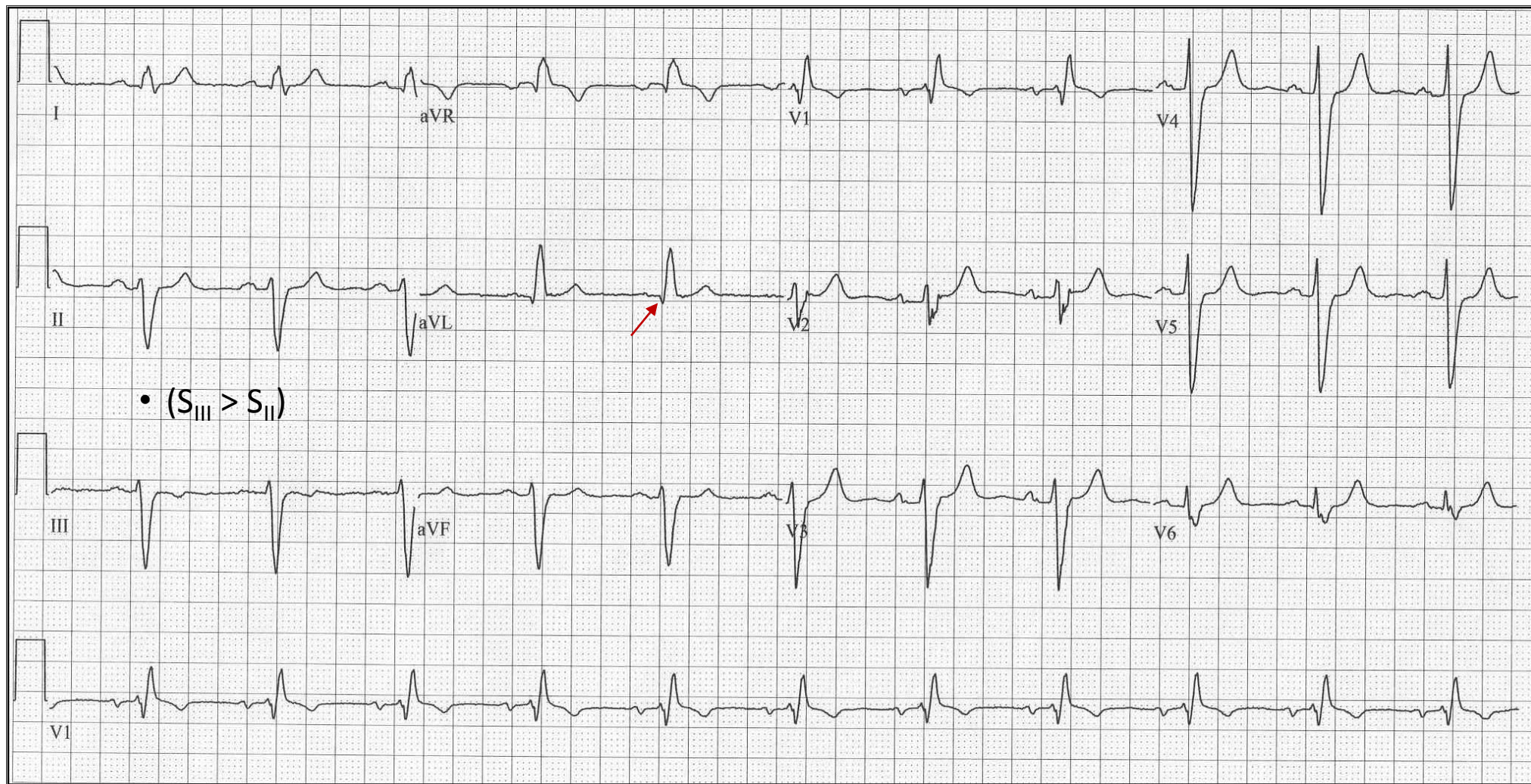
58 year old man; what's wrong?



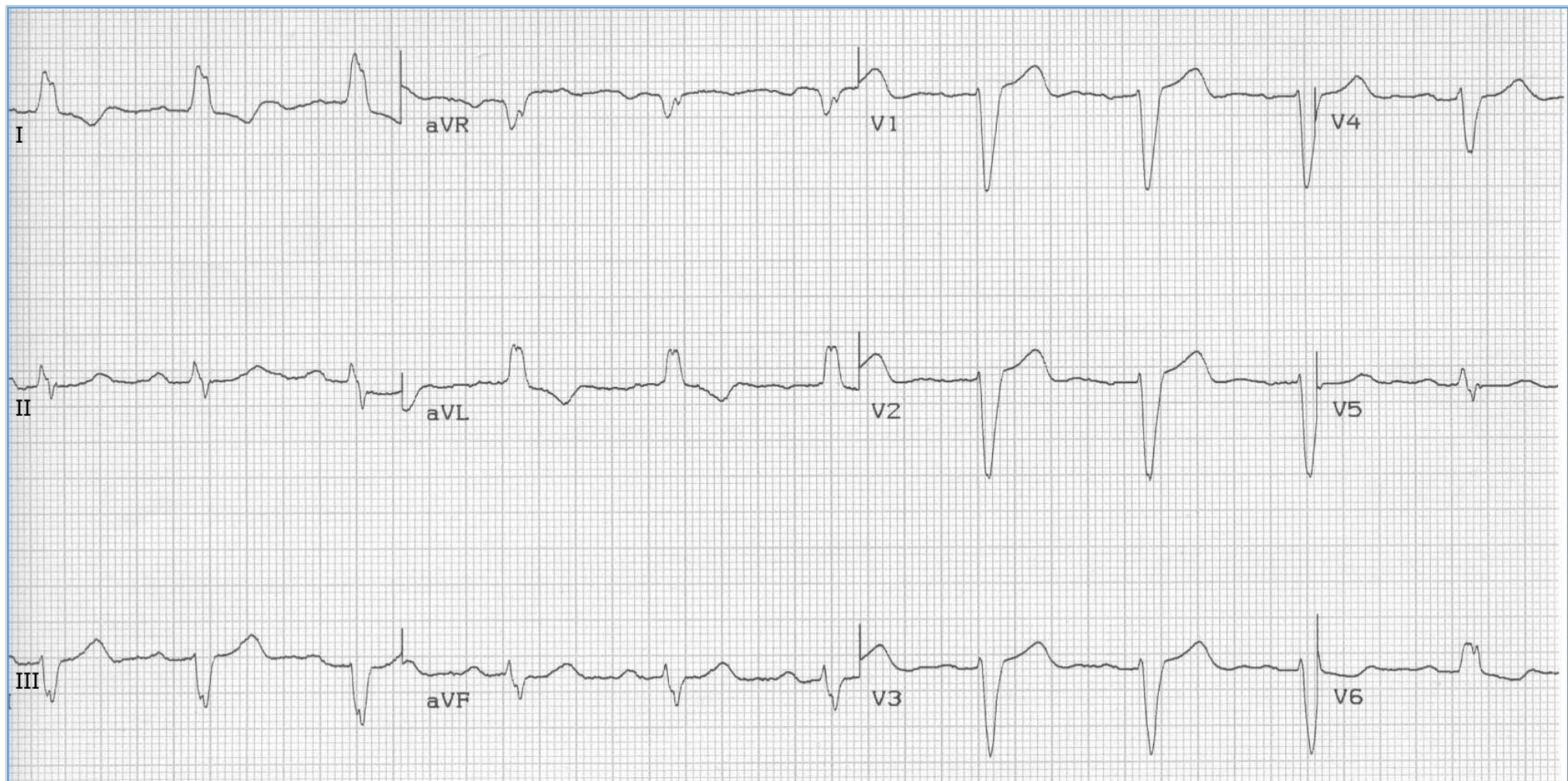
Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=90 V=90	Sinus rhythm	<ul style="list-style-type: none"> <li>Normal SA, AV</li> <li>IVCD</li> </ul>	<ul style="list-style-type: none"> <li>rsR' in V1</li> <li>Late S in V5-6</li> <li>Late R in I and aVL (this is a <b>clue to what went wrong!</b>)</li> </ul> <p>In RBBB we expect late S (rightward forces) in leads I and aVL; and late R in aVR (i.e. Late rightward forces)</p>	Abnormal ECG: 1. RBBB 2. Inverted P in lead I due to: Lead error (RA/LA); this accounts for late R in I and aVL (lead aVR is really aVL, and aVL is really aVR; aVF doesn't change when RA and LA are switched.)
PR=160				
QRS=130				
QT=360				
Axis= ~95				



66 year old man with known heart disease

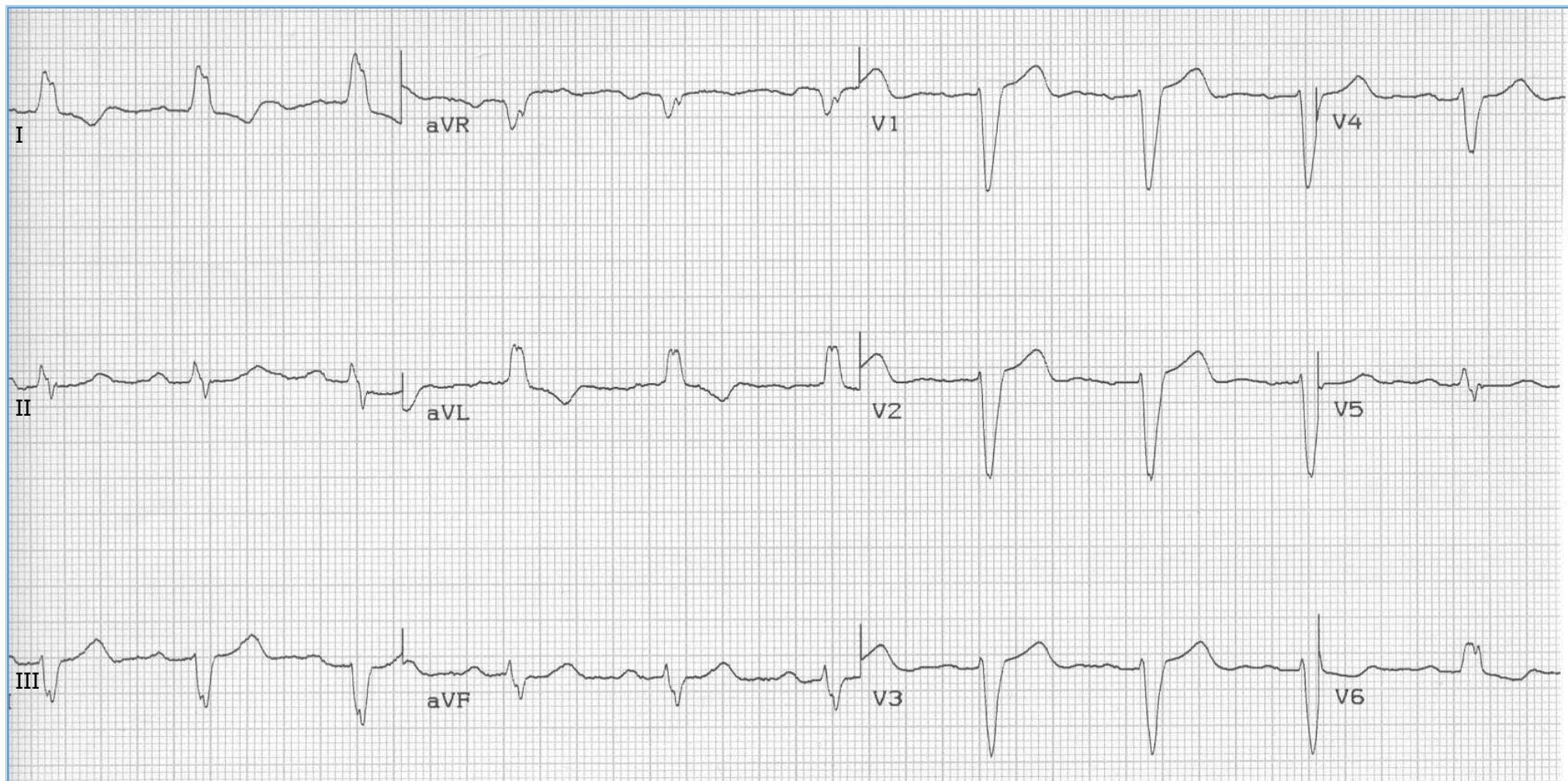


Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 70 V=70	Sinus rhythm	<ul style="list-style-type: none"> <li>• Normal SA, AV</li> <li>• IVCD</li> </ul>	<ul style="list-style-type: none"> <li>• rsR' in V1; late S in V6</li> <li>• rS II, III, aVF (<math>S_{III} &gt; S_{II}</math>)</li> <li>• Small q in I, aVL</li> </ul>	<p>Abnormal ECG:</p> <ol style="list-style-type: none"> <li>1. RBBB + LAFB (bifascicular block)</li> </ol> <p><u>Note:</u> Always consider the QRS axis in patients with RBBB, to look for the bifascicular blocks; if LAD, consider criteria for LAFB; if RAD, consider criteria for LPFB <u>but</u> R/O isolated right heart disease (another reason for RAD).</p>
PR=180				
QRS=140				
QT=380				
Axis= -75				

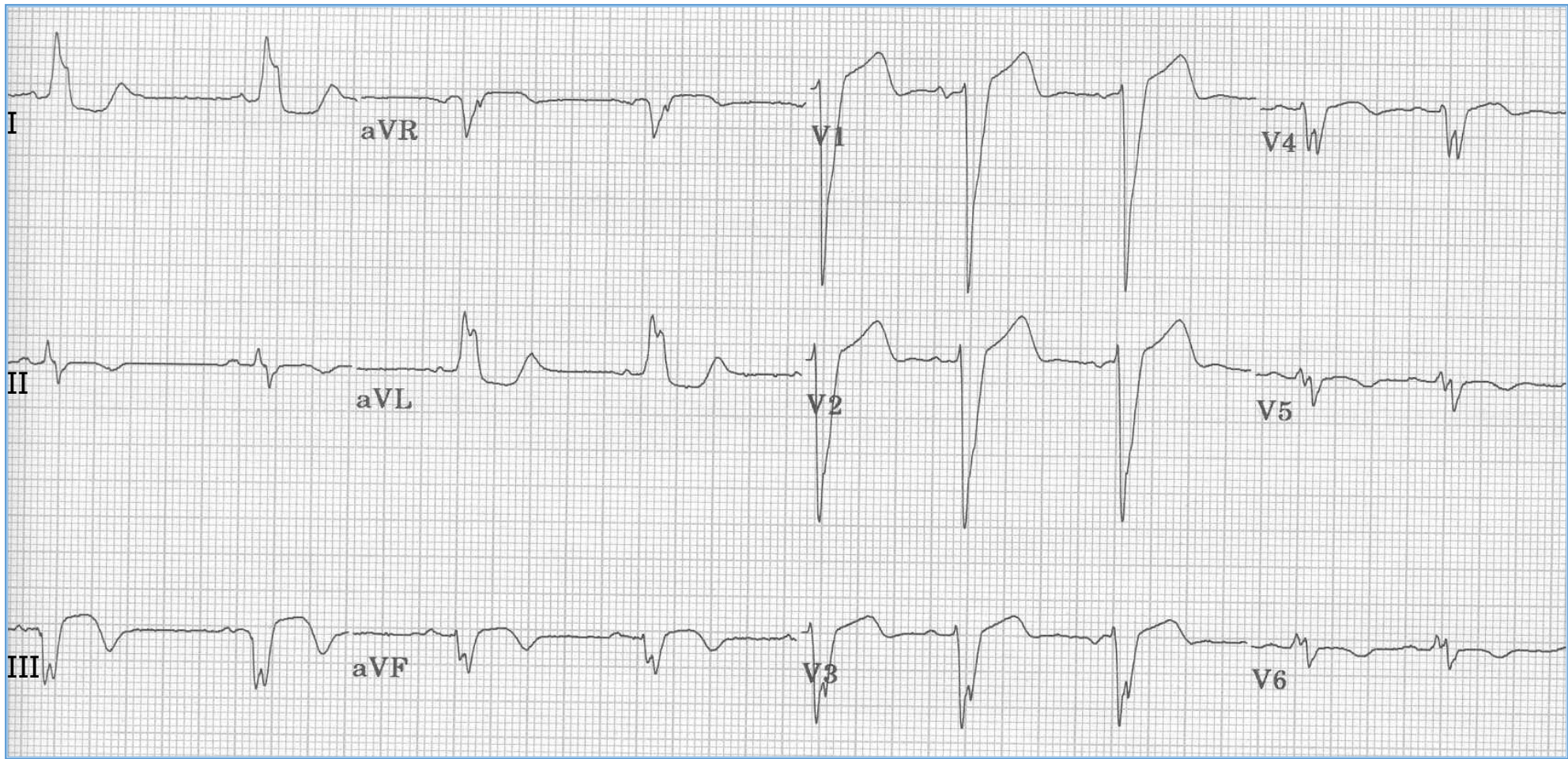


88 year old woman; asymptomatic clinic visit

What is meant by a “monophasic R” ?

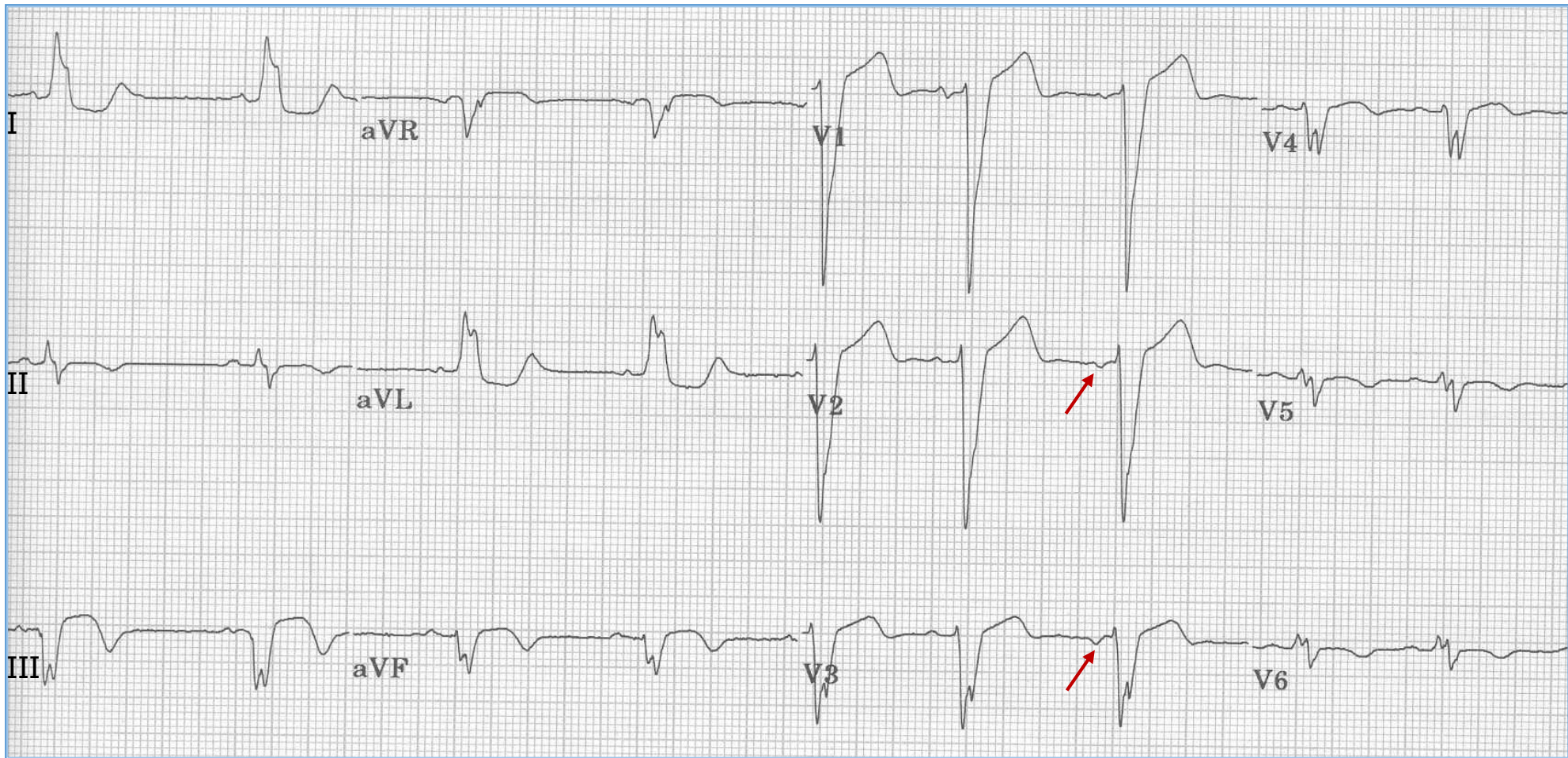


Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 70 V=70	Sinus rhythm	<ul style="list-style-type: none"> <li>• Normal SA</li> <li>• 1st degree AVB</li> <li>• IVCD</li> </ul>	<ul style="list-style-type: none"> <li>• Monophasic R in I, aVL, V6 (with mid QRS notching)</li> <li>• Poor r-wave progression V1-4 (common in LBBB)</li> </ul>	<p>Abnormal ECG:</p> <p>1. Complete LBBB</p> <p>Monophasic R in I, aVL, V6 is expected in LBBB; i.e., there should be no initial q-wave and no late S-wave in those leads unless it's not LBBB or the LBBB is complicated by previous myocardial scar.</p>
PR=220				
QRS=140				
QT=400				
Axis= -20				

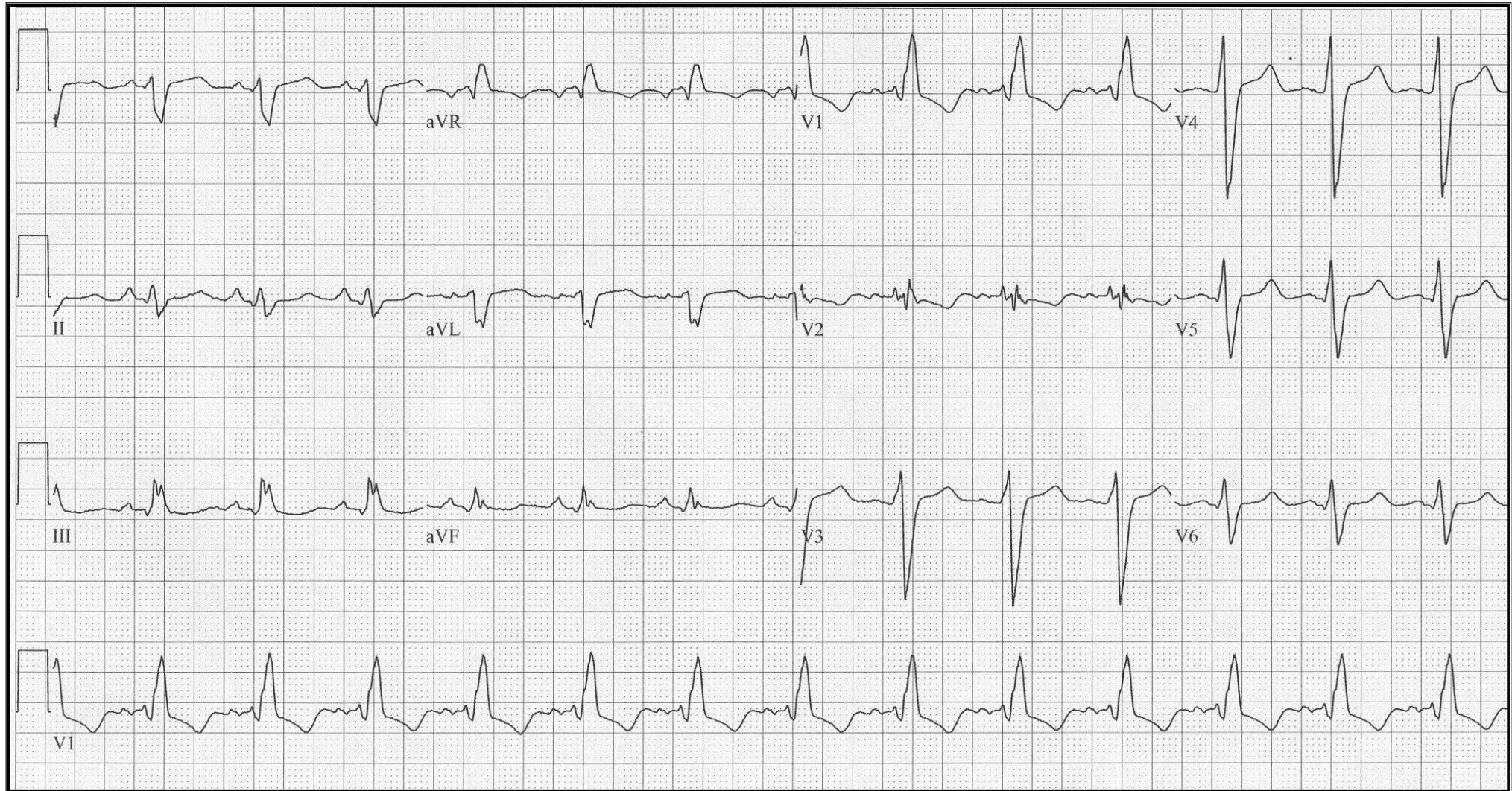


75 year old man; history of MI

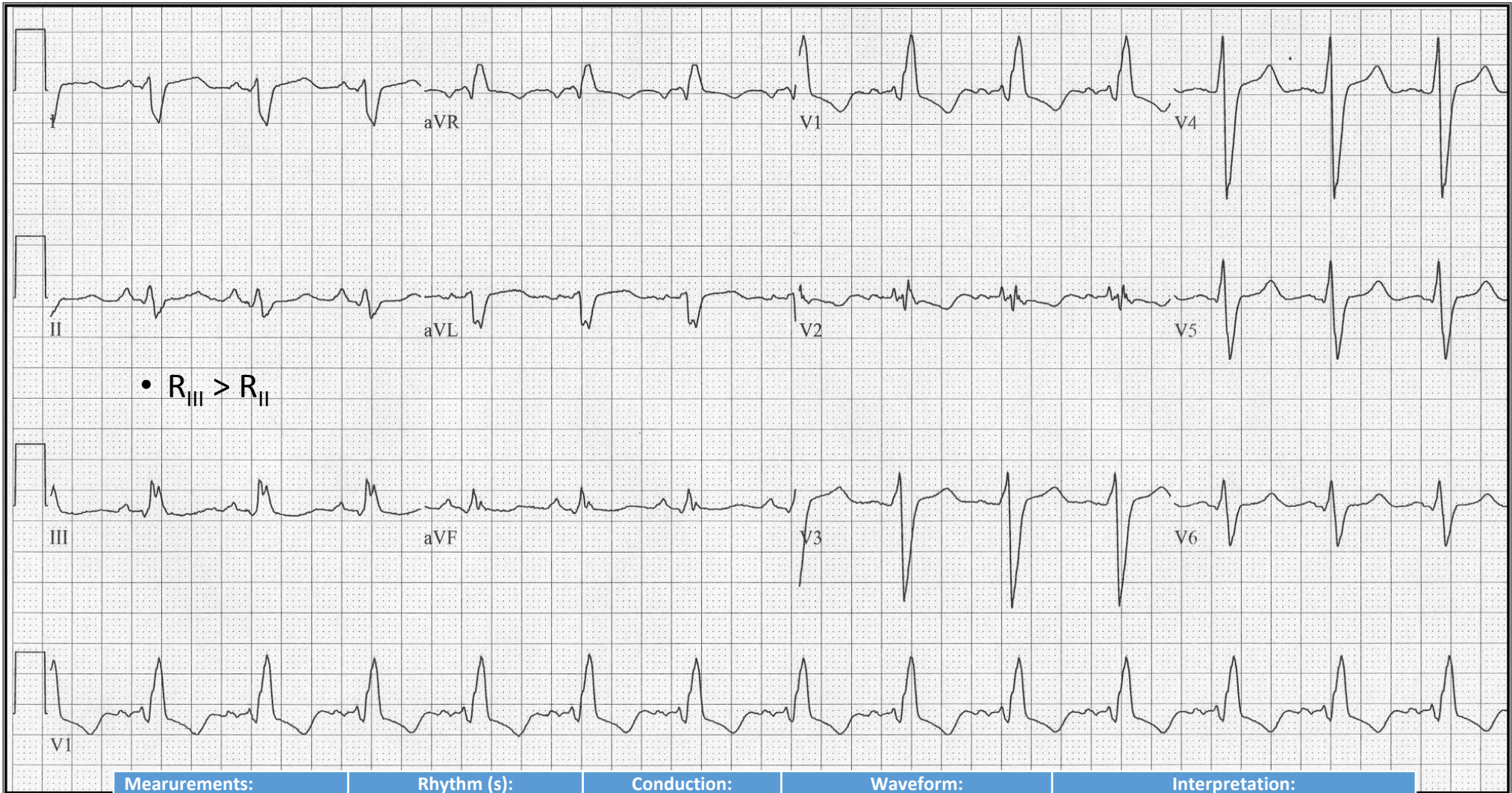




Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 60 V=60	Sinus rhythm with some wandering atrial pacemaker; note varying P wave morphology (arrows)	<ul style="list-style-type: none"> <li>• Normal SA, AV</li> <li>• IVCD</li> </ul>	<ul style="list-style-type: none"> <li>• Monophasic R in I, aVL</li> <li>• Primary T wave abnormalities in many leads (II, aVF, V5-6, I, aVL)</li> <li>• Late S in V6 (? Q-wave equivalent of lateral wall MI)</li> </ul>	Abnormal ECG: <ol style="list-style-type: none"> <li>1) Complete LBBB</li> <li>2) Primary T abnormalities</li> <li>3) Possible old lateral wall MI (late S-wave in V5-6; this could be a q-wave equivalent; i.e., electrically <i>silent</i> lateral LV wall)</li> </ol>
PR=140				
QRS=150				
QT=460				
Axis= -40				

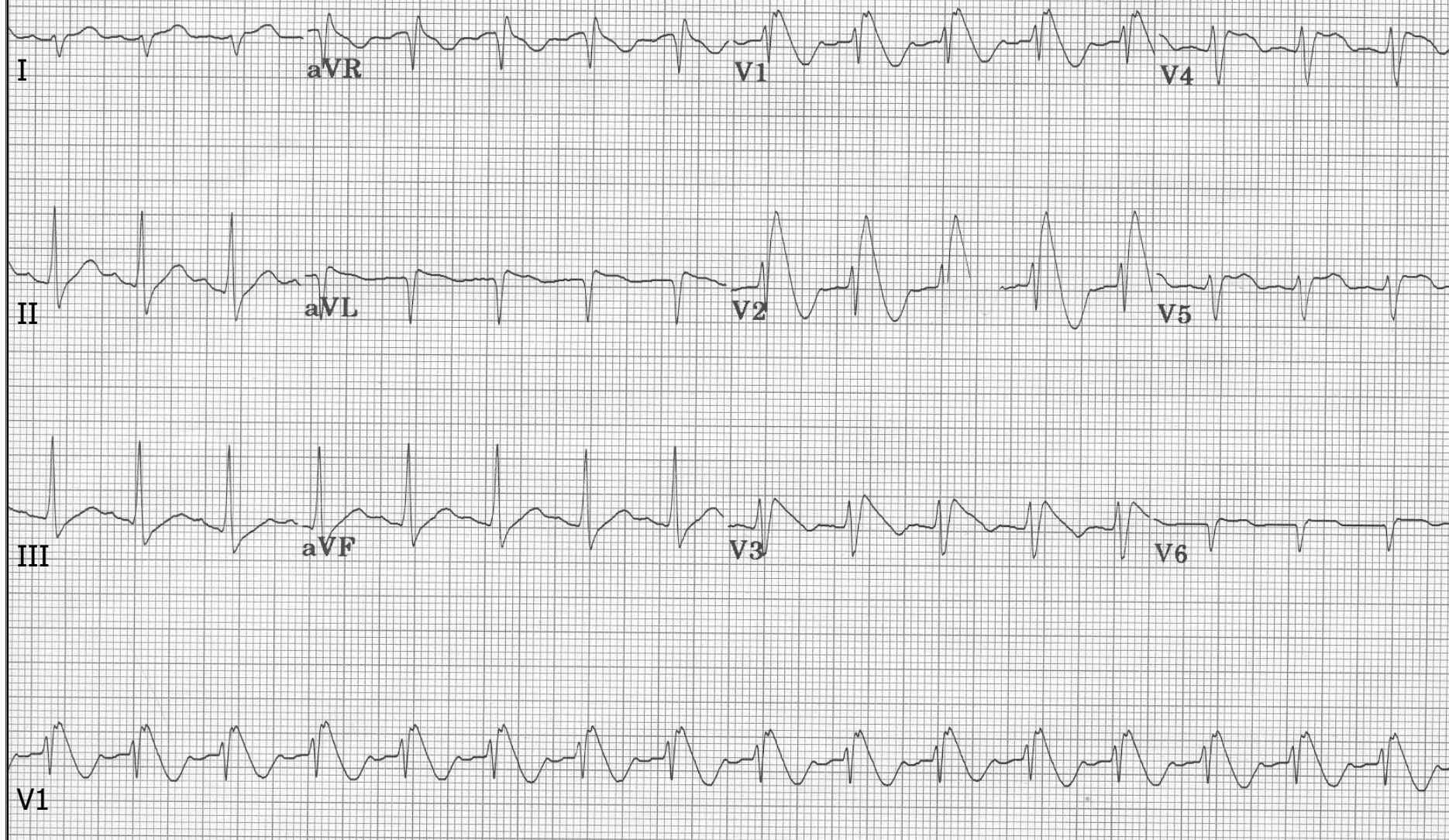


GN: 63 y.o. man (severe CHD, biventricular failure)



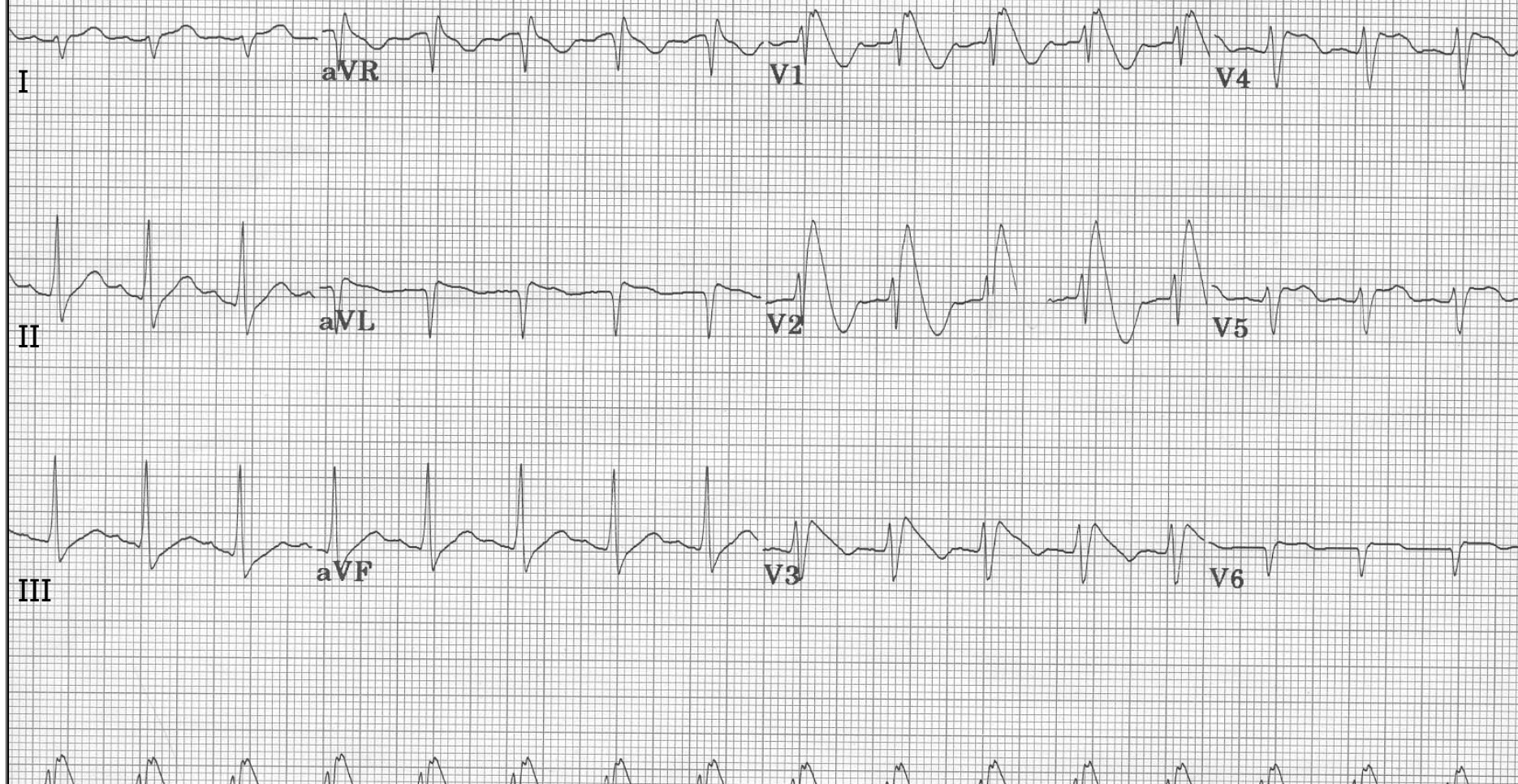
Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 85    V= 85	Sinus rhythm	<ul style="list-style-type: none"> <li>• Normal SA, AV</li> <li>• IVCD</li> </ul>	<ul style="list-style-type: none"> <li>• rsR' in V1</li> <li>• rS in I, qR in II, III</li> <li>• <math>R_{III} &gt; R_{II}</math></li> </ul>	Abnormal ECG 1. RBBB + LPFB (bifascicular block)
PR=140				
QRS=160				
QT= 440				
Axis= +150				

F, Age 17

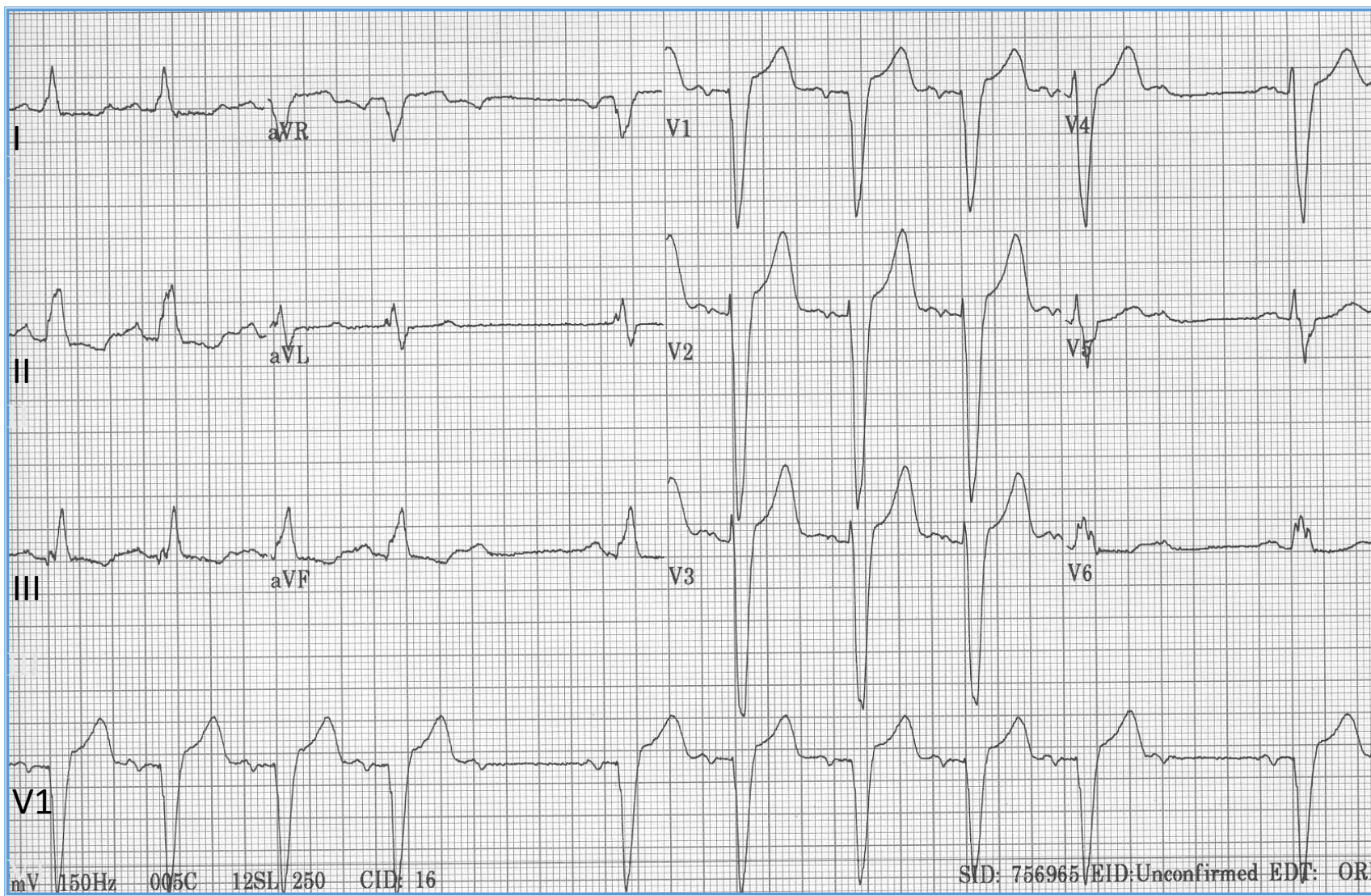


17 y old girl with history of syncope

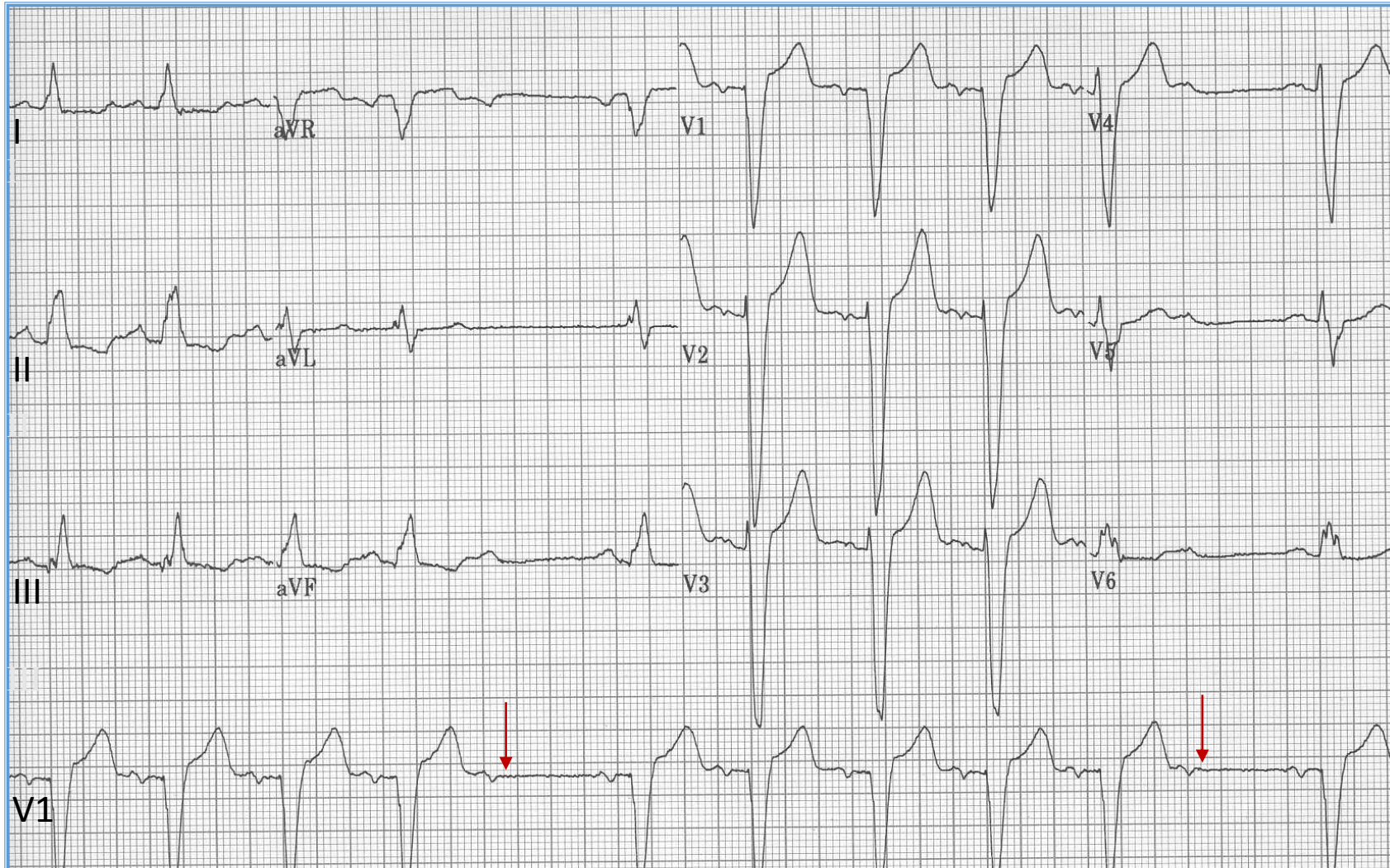
F, Age 17



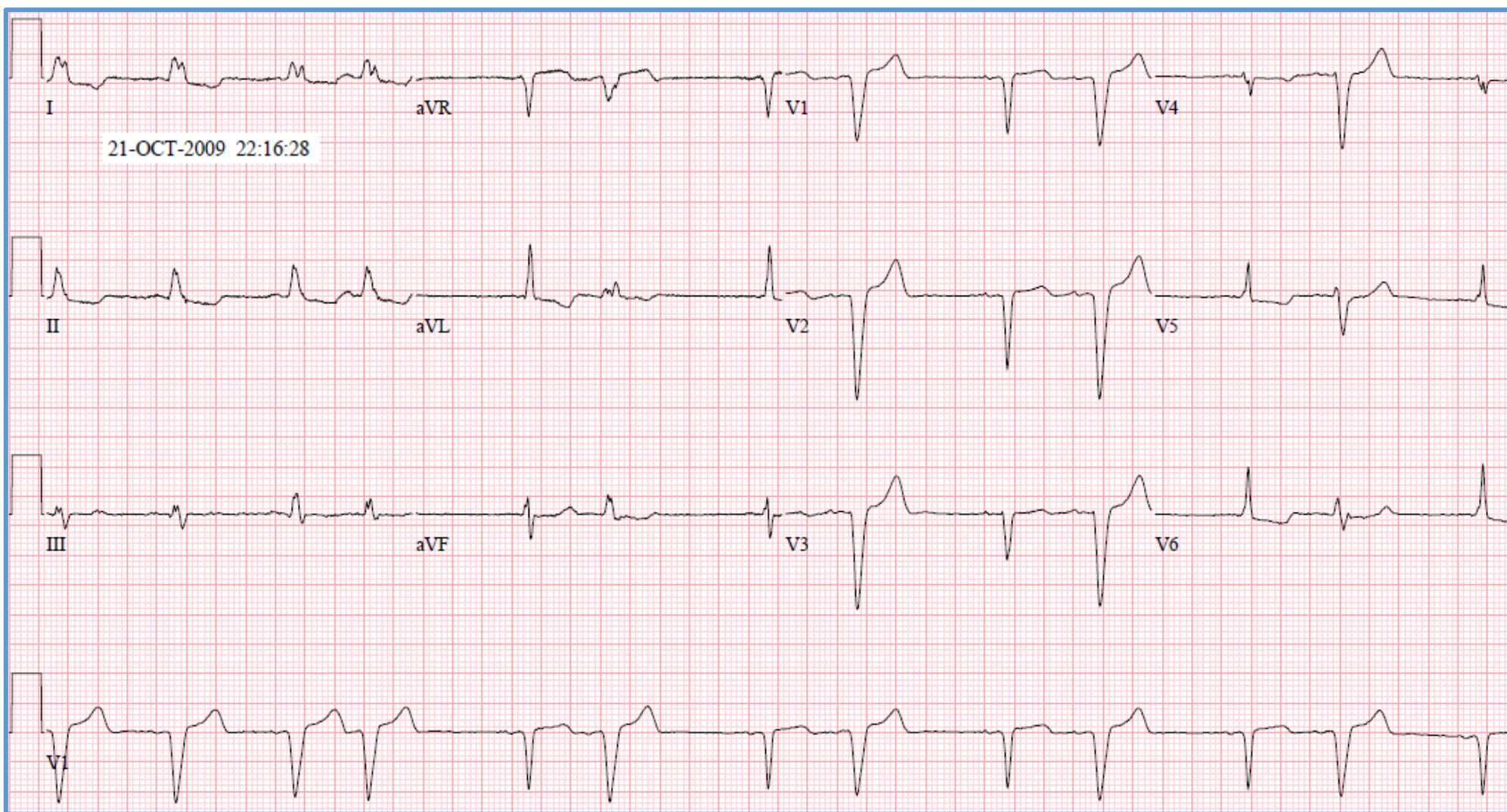
V1	Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
	A= 120 V=120	Sinus tachycardia	Normal SA, AV and borderline IVCD	<ul style="list-style-type: none"> <li>• High take-off ST V1-4 with coved ST elevation with T wave inversion (V1-3)</li> <li>• Poor R wave progression</li> </ul>	Abnormal ECG: 1. Type I Brugada pattern and Brugada syndrome (with history of syncope)  (This diagnosis mimics RBBB in the right precordial leads)
	PR=160				
	QRS=110				
	QT=320				
	Axis= +100				



A funny thing happened on the way through..... what?

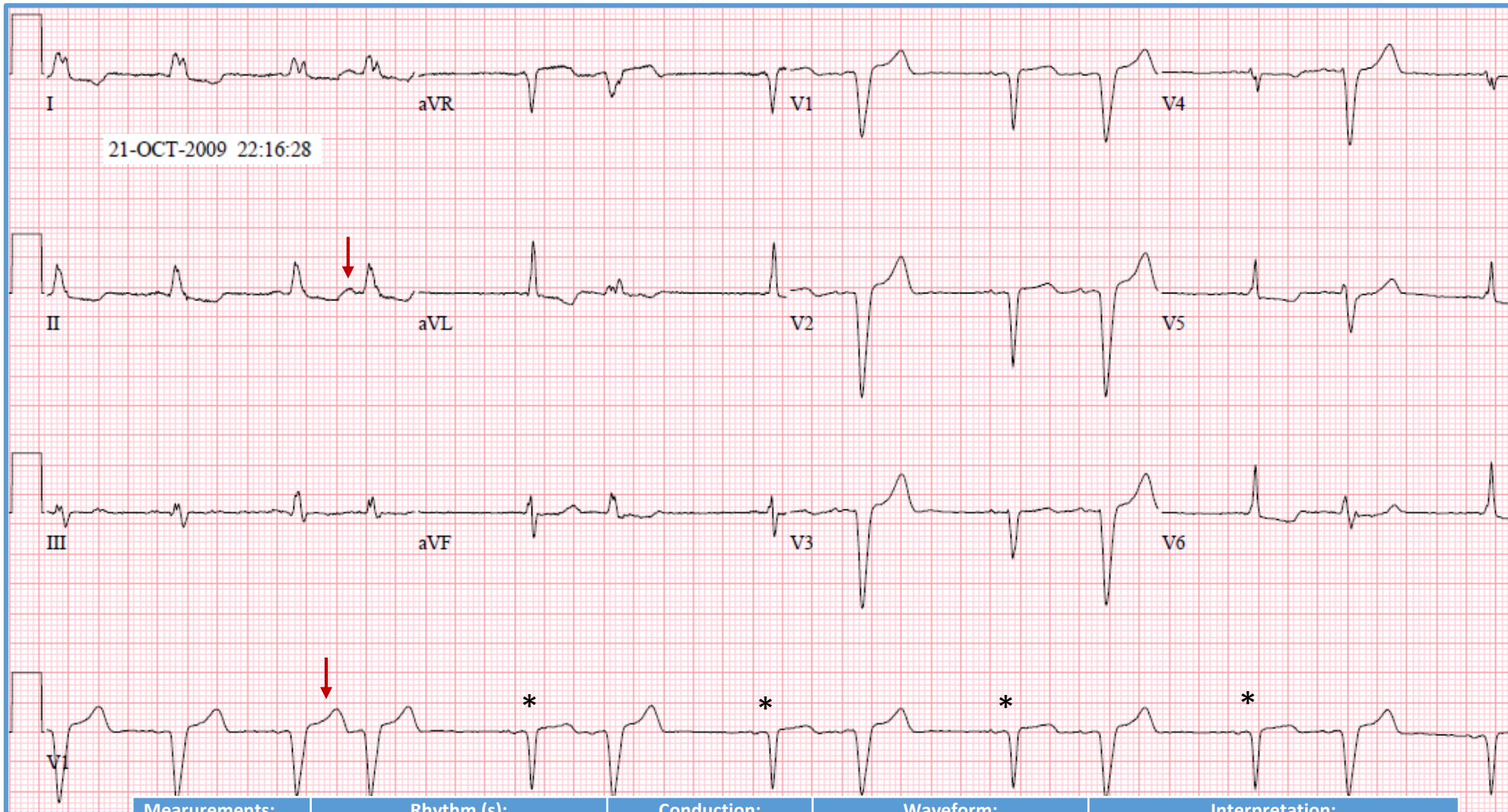


Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=85 V=85	Sinus rhythm	<ul style="list-style-type: none"> <li>• Normal SA</li> <li>• 2nd degree AVB (type II)</li> <li>• IVCD</li> </ul>	<ul style="list-style-type: none"> <li>• Monophasic R in I and V6</li> <li>• Poor R wave progression V1-5</li> </ul>	<b>Abnormal ECG:</b> <ol style="list-style-type: none"> <li>1. Complete LBBB</li> <li>2. Type II 2nd degree AVB (suggestive of intermittent block in the RBB and a precursor to complete AVB; i.e. complete block in the left bundle and 2nd degree block in the right bundle; it's also possible the block is in the HIS bundle; type II block is <u>not</u> in the AV node)</li> </ol>
PR=180				
QRS=160				
QT=420				
Axis= +60				

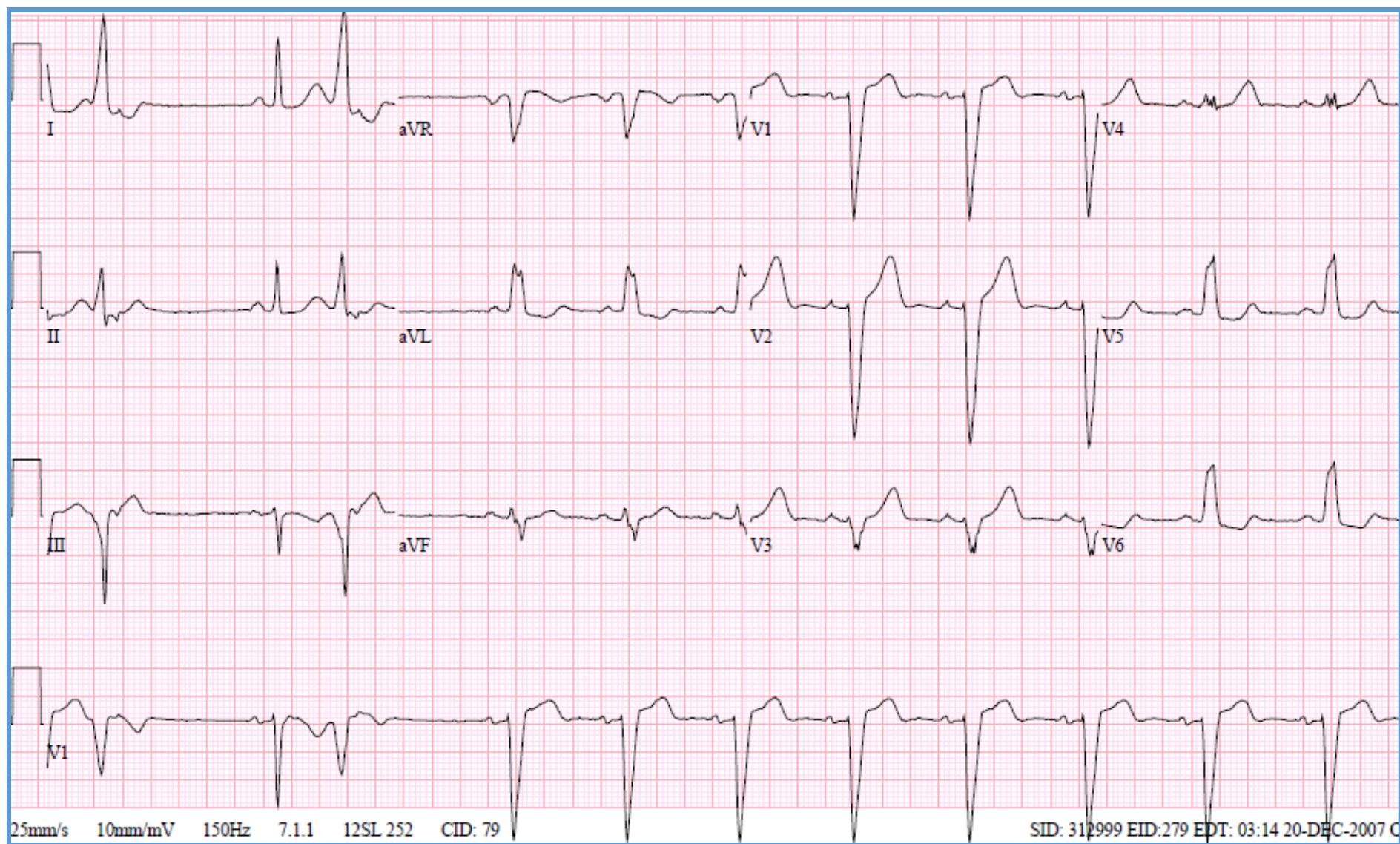


75 year old woman with palpitations

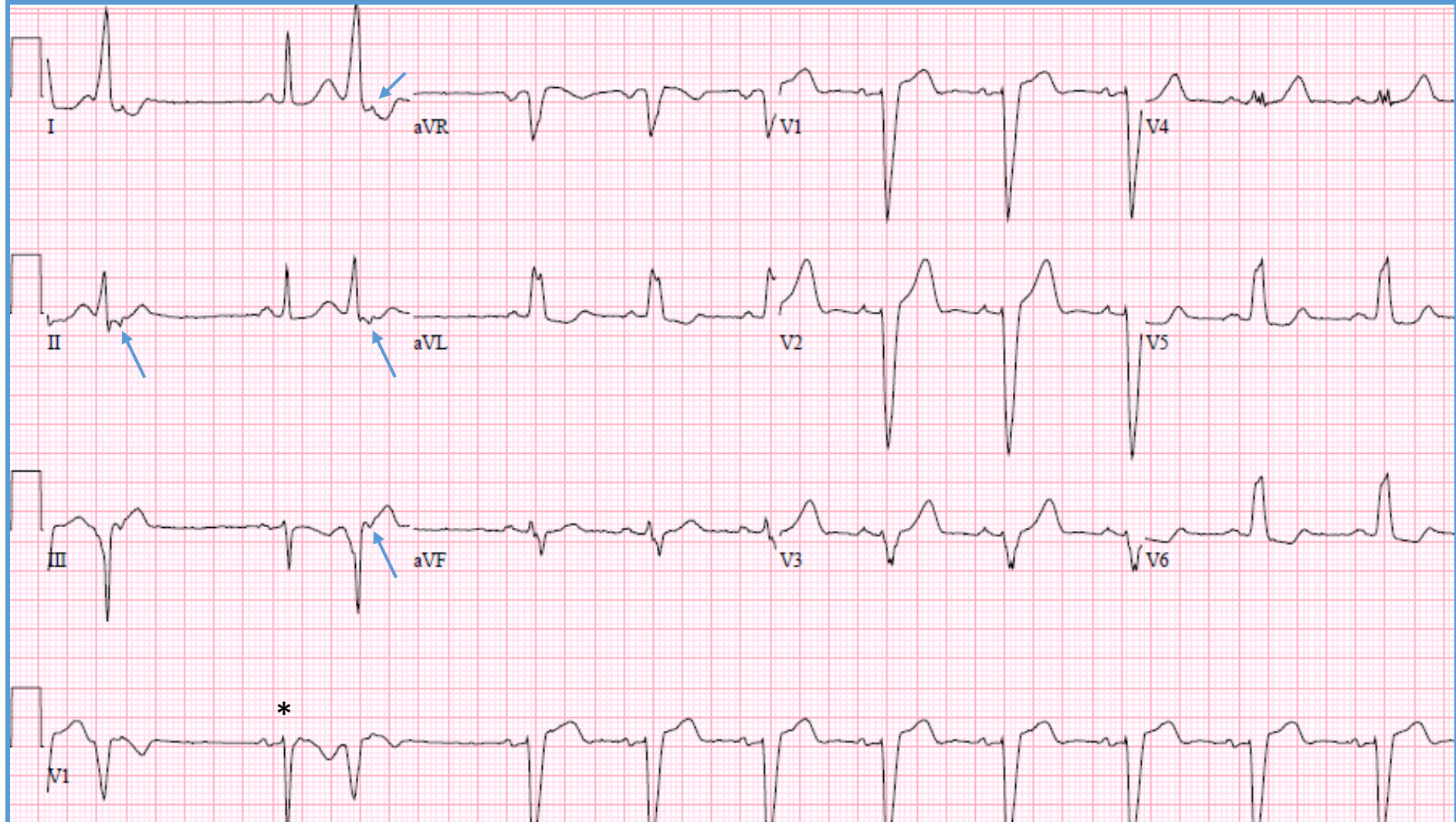




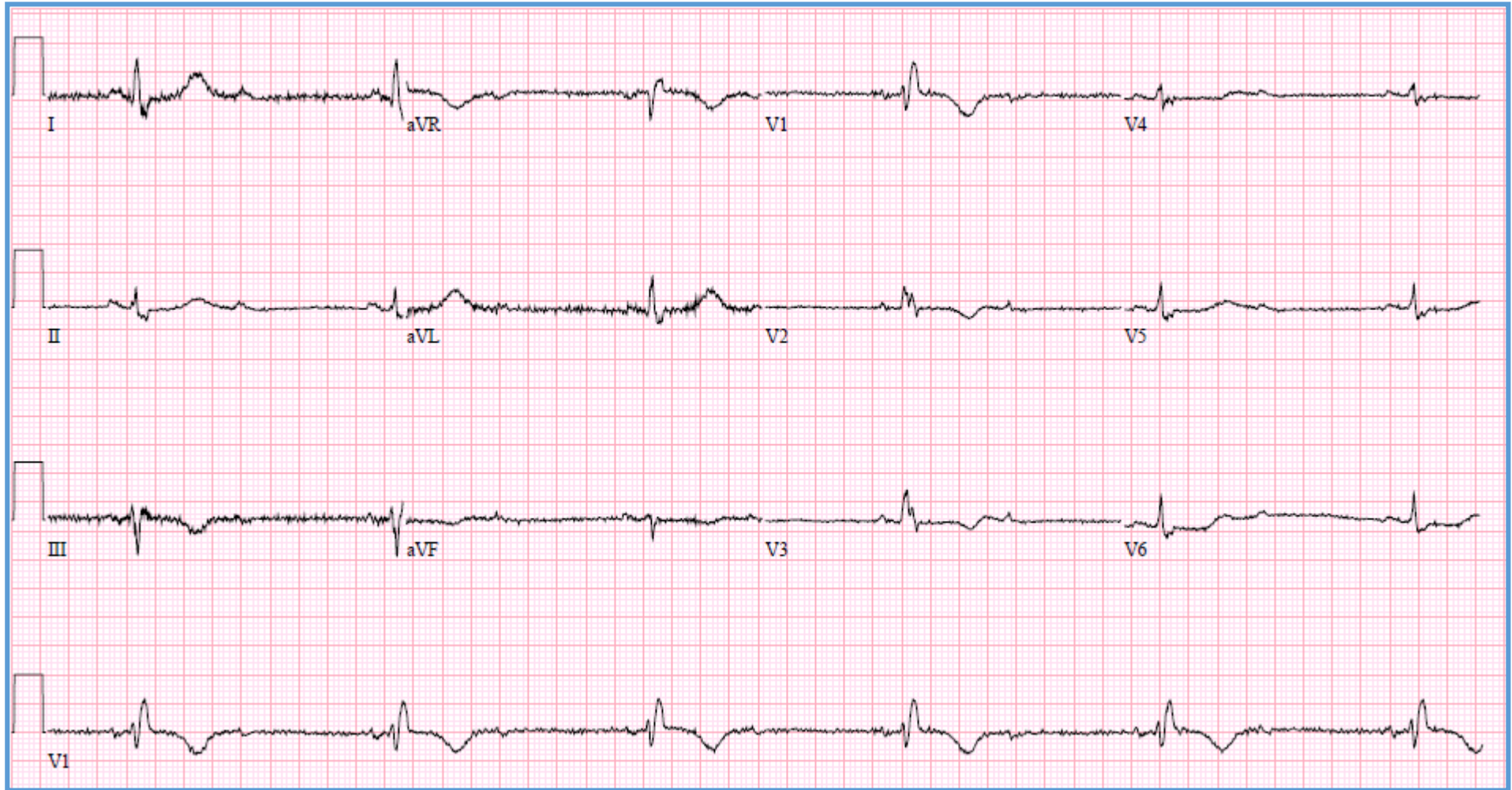
Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A= 75 V= ~75	Sinus rhythm with 5 PAC's	<ul style="list-style-type: none"> <li>• Normal SA, AV</li> <li>• intermittent IVCD</li> </ul>	<ul style="list-style-type: none"> <li>• Monophasic notched R in I</li> <li>• ST depression, slight T wave inversion aVL, V5-6 (in beats with narrow QRS's)</li> <li>• Poor R wave progression V1-4</li> </ul>	Abnormal ECG: <ol style="list-style-type: none"> <li>1. Rhythm (frequent PAC's)</li> <li>2. LBBB, rate related (note normal QRS duration after the PACs due to longer preceding RR intervals)</li> <li>3. ST-T wave abnormalities in beats with narrow QRS duration (maybe related to cardiac <i>memory</i> – Google it!)</li> </ol>
QRS= 80 and 130	The first PAC (arrow) follows 3 sinus beats with LBBB @75 bpm. Following that PAC and subsequent PACs there is a pause (longer RR interval) and the LBBB is no longer present (*)			
QT=370				
Axis= ~0				



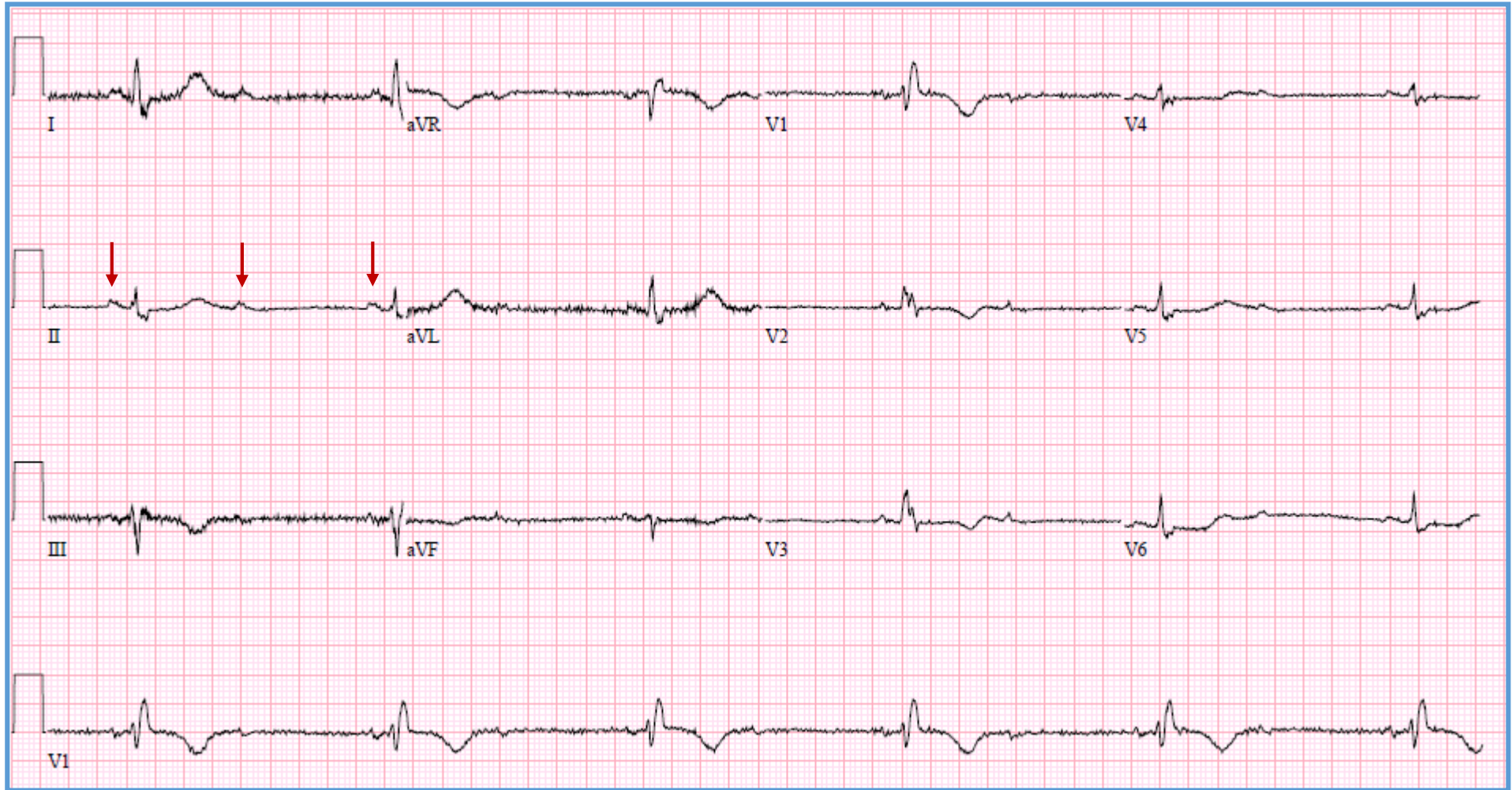
17-Dec-2007: PL: 66 y.o. woman



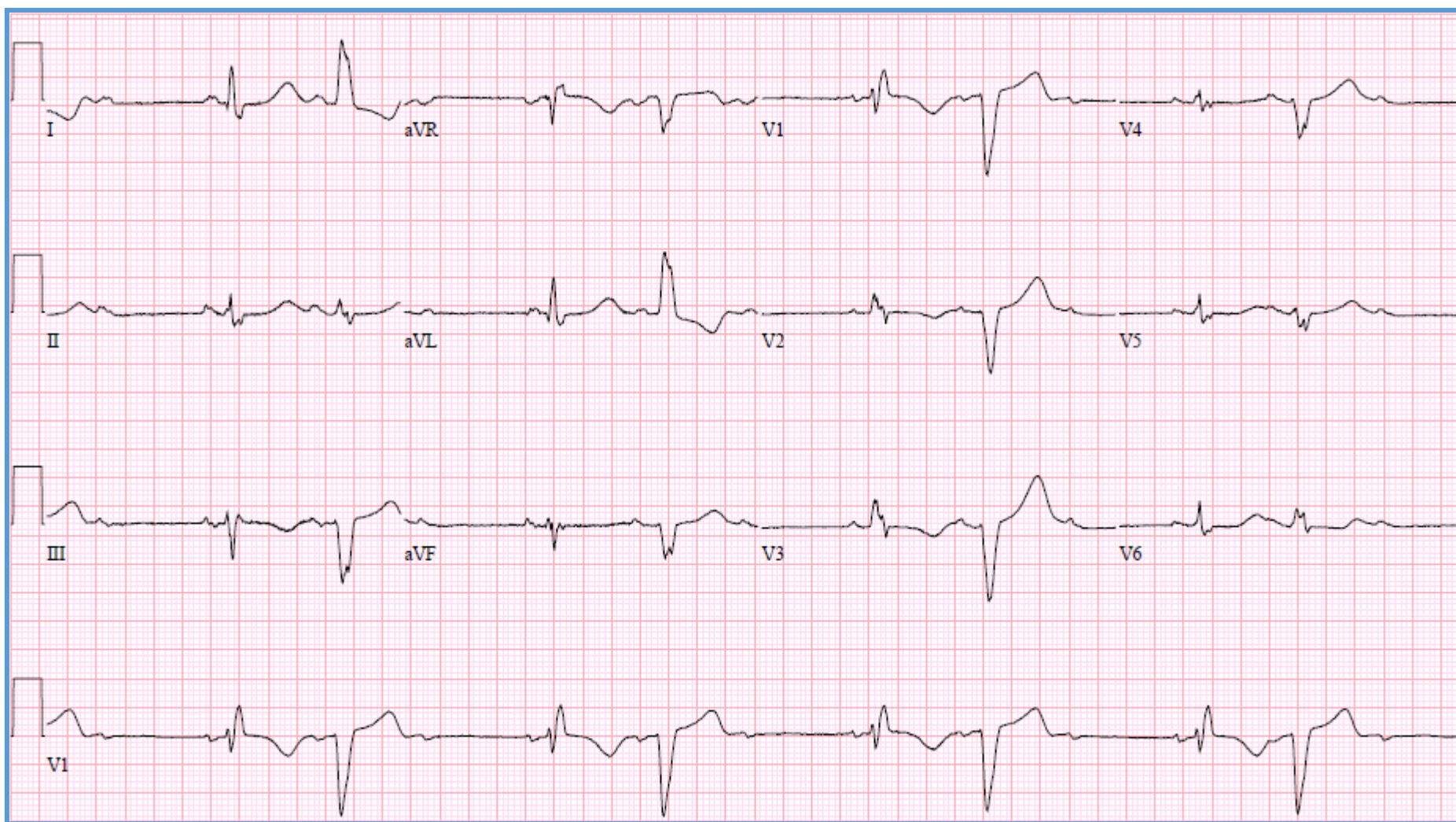
Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=75 V=75	Sinus rhythm with 2 PVCs: note retrograde P waves after the PVCs (arrows)	<ul style="list-style-type: none"> <li>• Normal SA, AV</li> <li>• IVCD</li> </ul>	Monophasic R (aVL, V5-6)	Abnormal ECG 1. Rhythm (PVCs) 2. LBBB; rate related; note the narrow QRS after 1st PVC (*) due to longer preceding RR interval  Essentially, the left bundle is in trouble; it fails if the heart rate exceeds ~50 bpm; it probably conducts at rates <50 bpm
PR=140				
QRS=150				
QT=430				
Axis= -15				



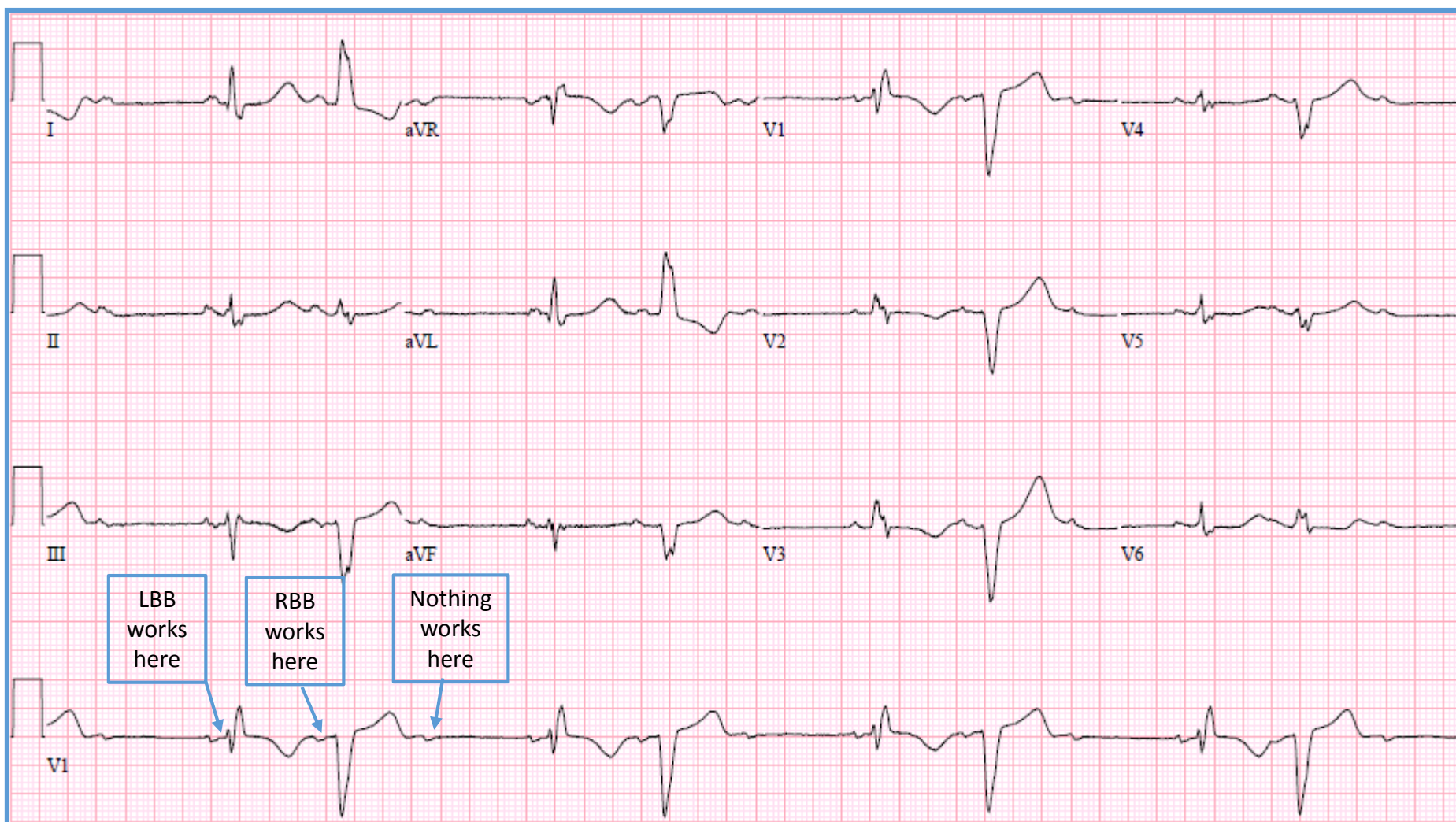
**19-June-2013: PL: 71 y.o. woman who is lightheaded (same patient as 2-21a)**



Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=70 V=35	Sinus rhythm	<ul style="list-style-type: none"> <li>Normal SA</li> <li>2:1 2°AVB (probably type II because of the normal PR and underlying bundle branch disease)</li> <li>IVCD (RBBB)</li> </ul>	<ul style="list-style-type: none"> <li>rSR' in lead V1</li> <li>ST depression V6</li> </ul> (Sorry for the poor quality ECG data)	Abnormal ECG: <ol style="list-style-type: none"> <li>RBBB</li> <li>Probable type II 2°AVB (indicates bilateral bundle branch disease; note also that the left bundle must still be working @ 35 bpm)</li> </ol>
PR=170				
QRS=150				
QT=600				
Axis= -30				



19-June-2013: PL: 71 y.o. woman (what Rx did she finally get?)



Measurements:	Rhythm (s):	Conduction:	Waveform:	Interpretation:
A=85 V= ~70	Sinus rhythm	<ul style="list-style-type: none"> <li>• Normal SA</li> <li>• 3:2 2°AVB (type II)</li> <li>• Intermittent RBBB</li> <li>• Intermittent LBBB</li> </ul>	<ul style="list-style-type: none"> <li>• rsR' in V1</li> <li>• Monophasic R in I, aVL</li> </ul>	Abnormal ECG: 1. Advanced bifascicular block: <ul style="list-style-type: none"> <li>• Tachycardia dependent LBBB</li> <li>• Bradycardia dependent RBBB</li> <li>• Type II 2°AVB</li> </ul> <b>Needs a pacemaker!</b>
PR=140				
QRS=150				
QT=500				
Axis= ~-30				