



Bradycardia

MATT BEECROFT, MD

Goals

- Beyond atropine and pacing
- Don't let them DIE
- Systematic approach
 - Fast or slow?*
 - Narrow or wide?
 - Regular or irregular?

Case #1 – What you see matters

- 65 yo old male with exertional near-syncope and palpitations
- Otherwise quite healthy
- Former paramedic
- No chest pain, but was out of breath
- He's fine at rest

ID:000237664

06-JAN-2019 12:26:16

Providence Reg Med Cnt Everett

Vent. rate	56	BPM
PR interval	*	ms
QRS duration	150	ms
QT/QTc	454/438	ms
P-R-T axes	67 -33	74

Sinus rhythm with 2nd degree A-V block (Mobitz I)

Left axis deviation

Left bundle branch block

Abnormal ECG

When compared with ECG of 06-JAN-2019 10:25, (unconfirmed)

Sinus rhythm is now with 2nd degree A-V block (Mobitz I)

Sinus rhythm is no longer with 2nd degree A-V block (Mobitz II)

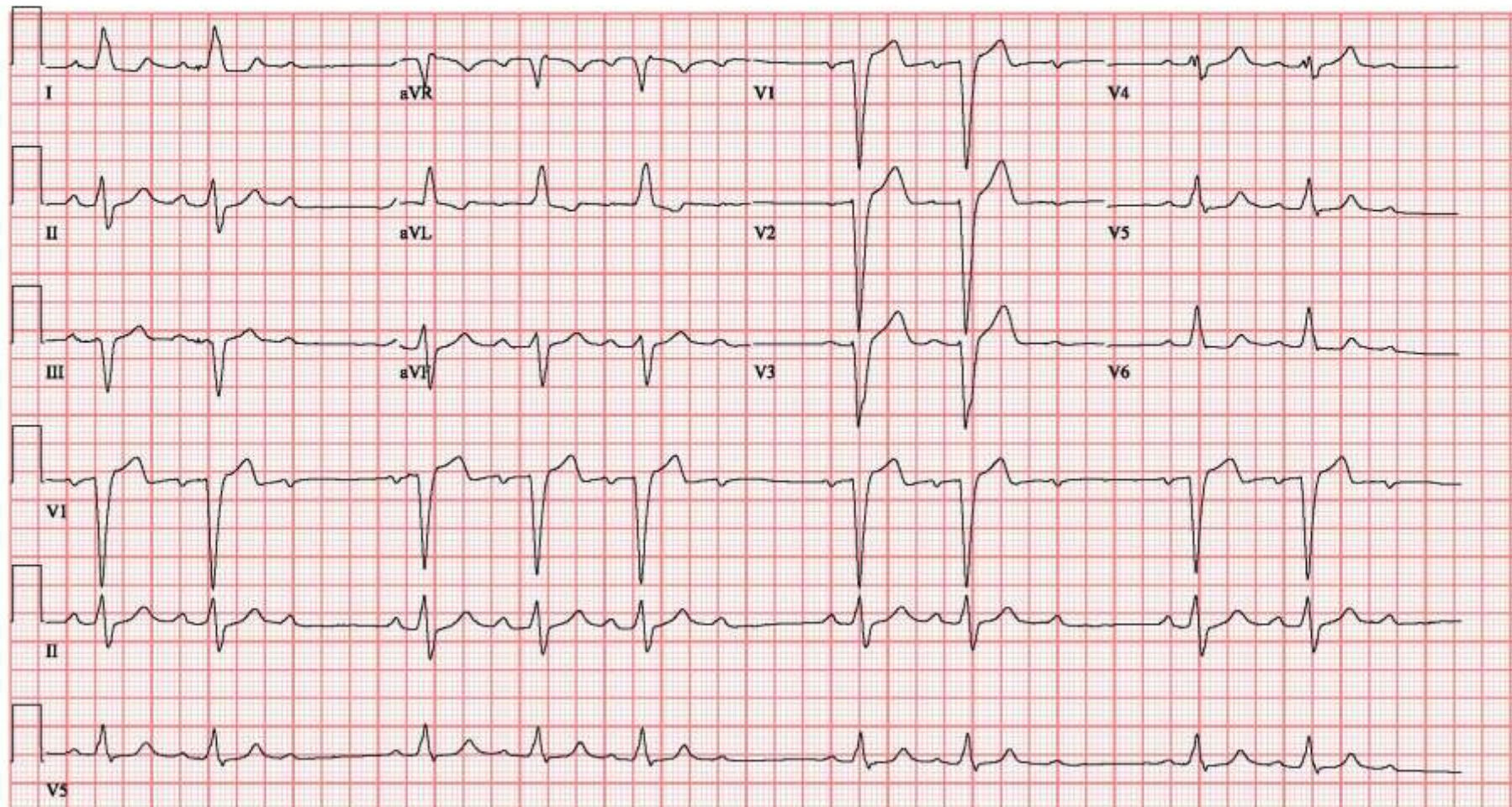
Confirmed by JOHNSON MD, ASHLEY B (4270), editor AKOPOVA, MARINA (2188) on 1/7/2019 7:02:28 AM

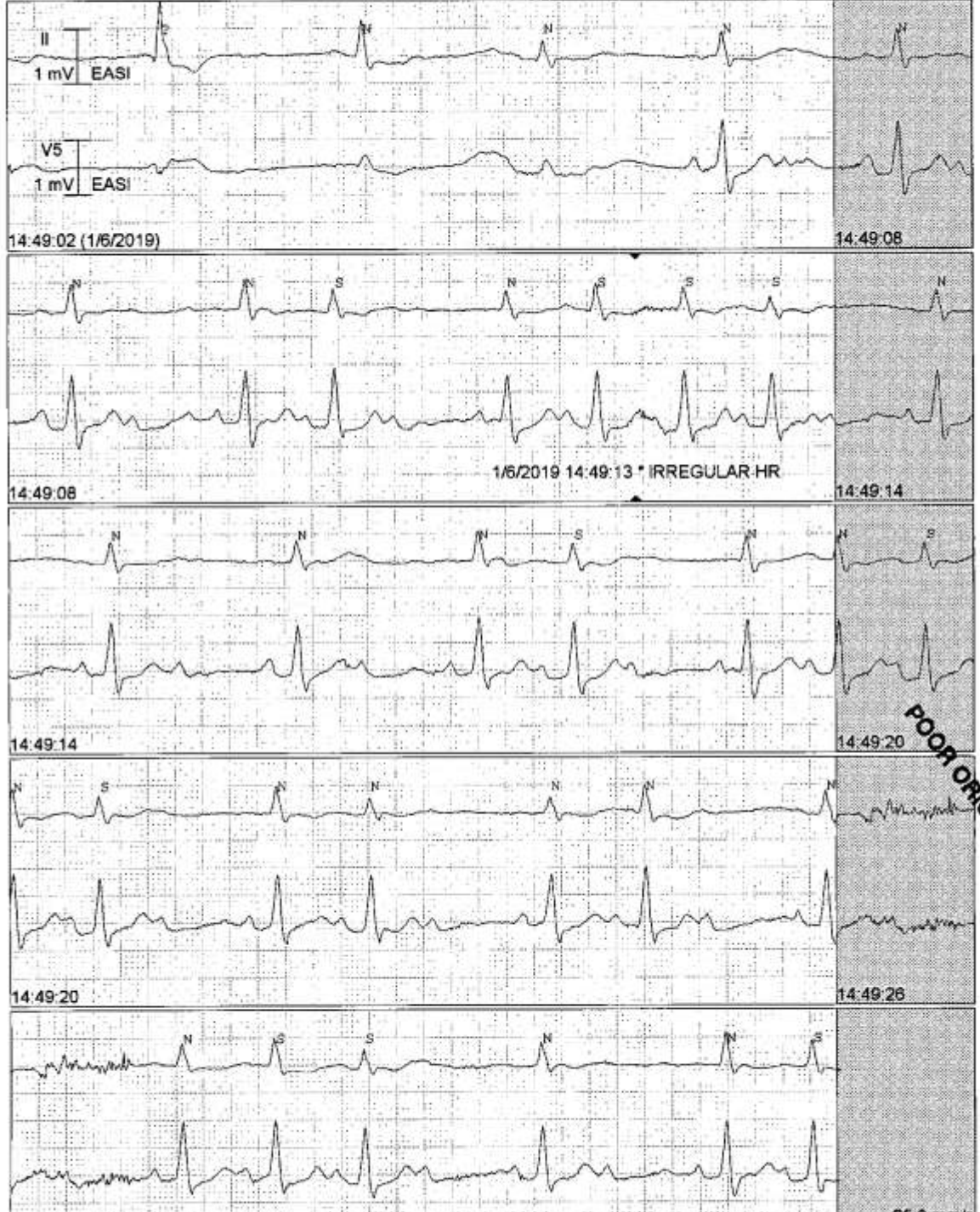
Technician: SG

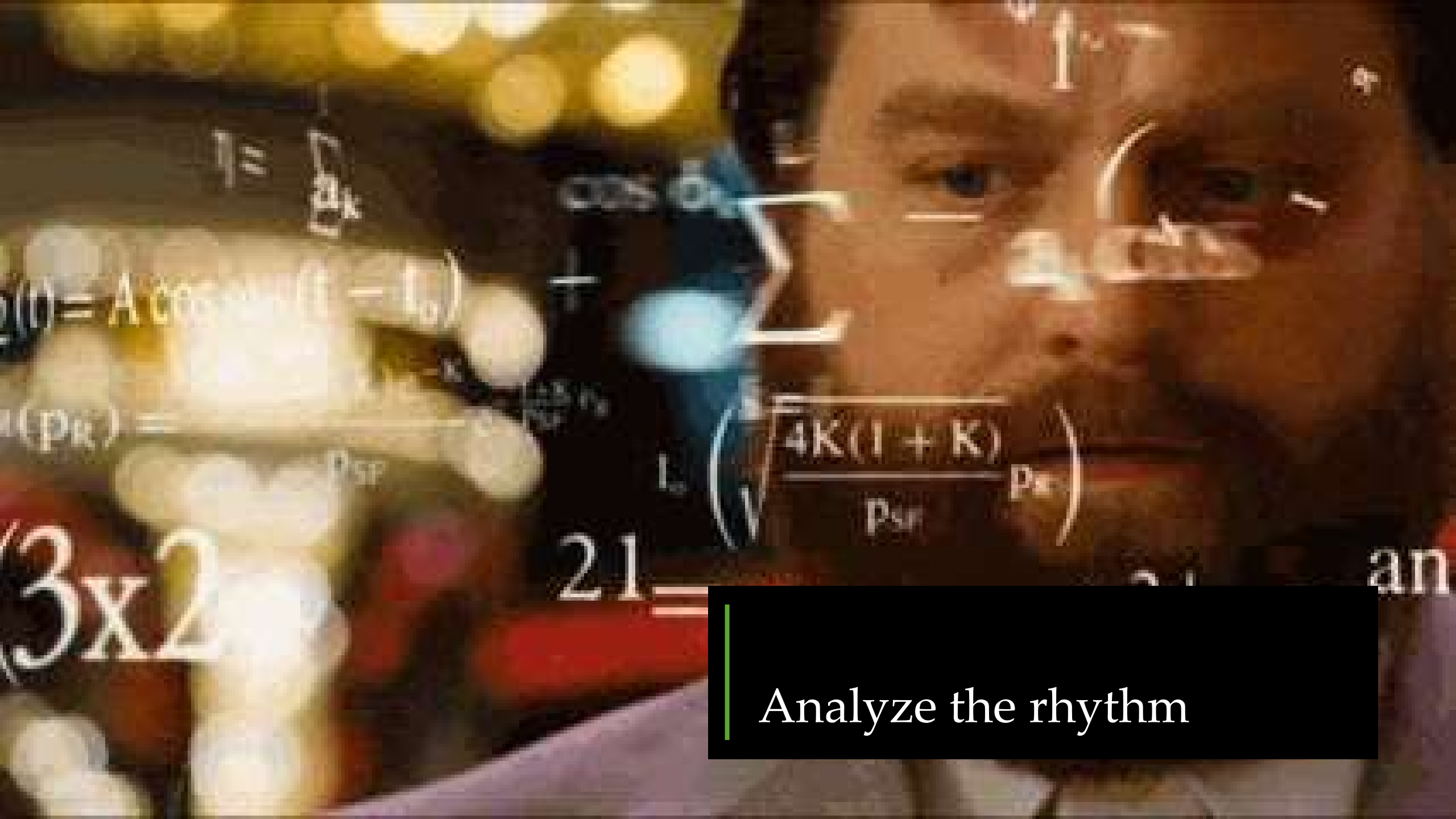
Test ind:IRREGULAR HR

Referred by: JOHNSON

Electronically signed by: ASHLEY B JOHNSON MD

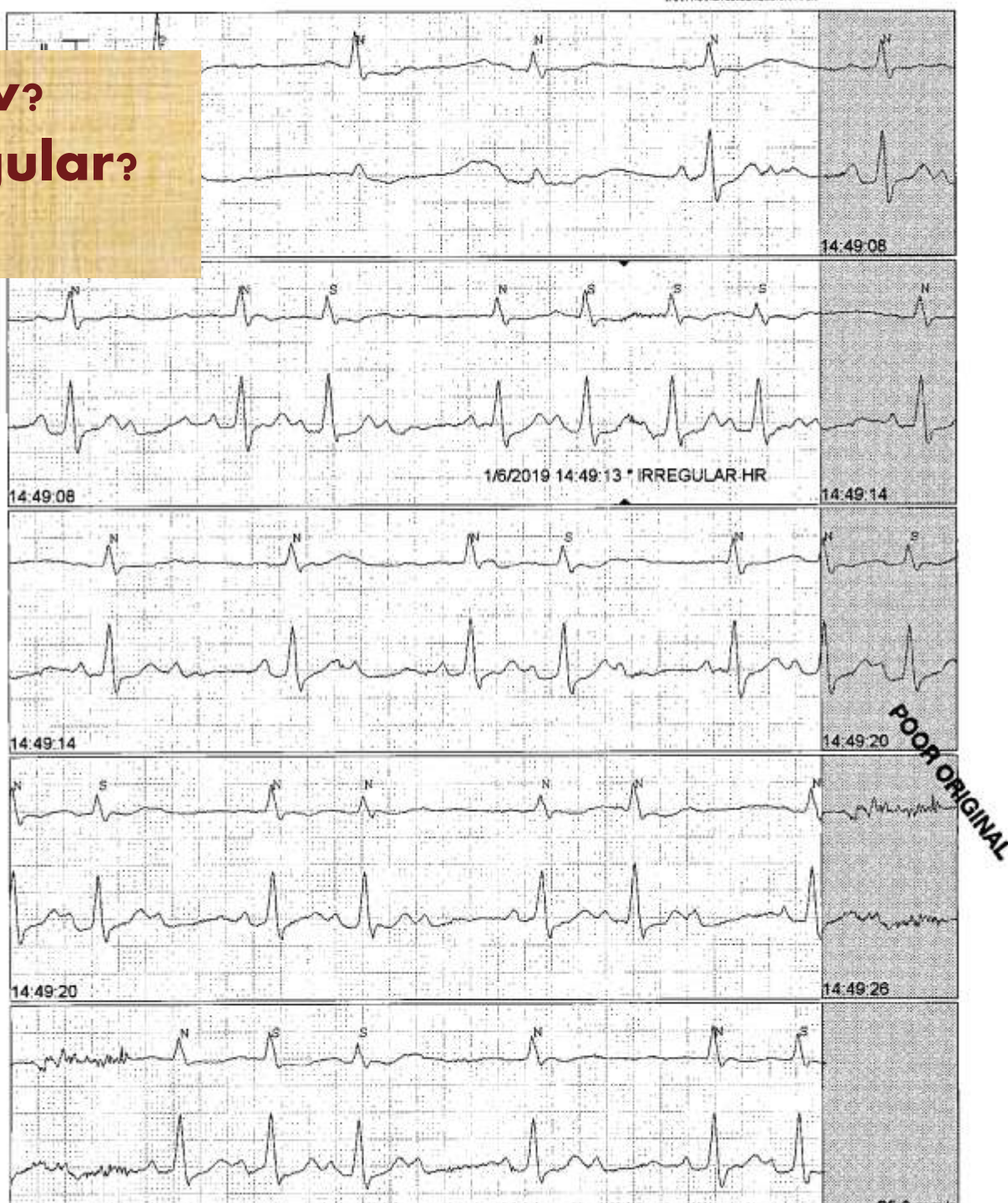






Analyze the rhythm

Wide or Narrow?
Regular or irregular?
Fast or Slow?





ID:000237664

06-JAN-2019 10:25:17

Providence Reg Med Cnt Everett

Vent. rate	69	BPM
PR interval	218	ms
QRS duration	146	ms
QT/QTc	426/456	ms
P-R-T axes	68 11	85

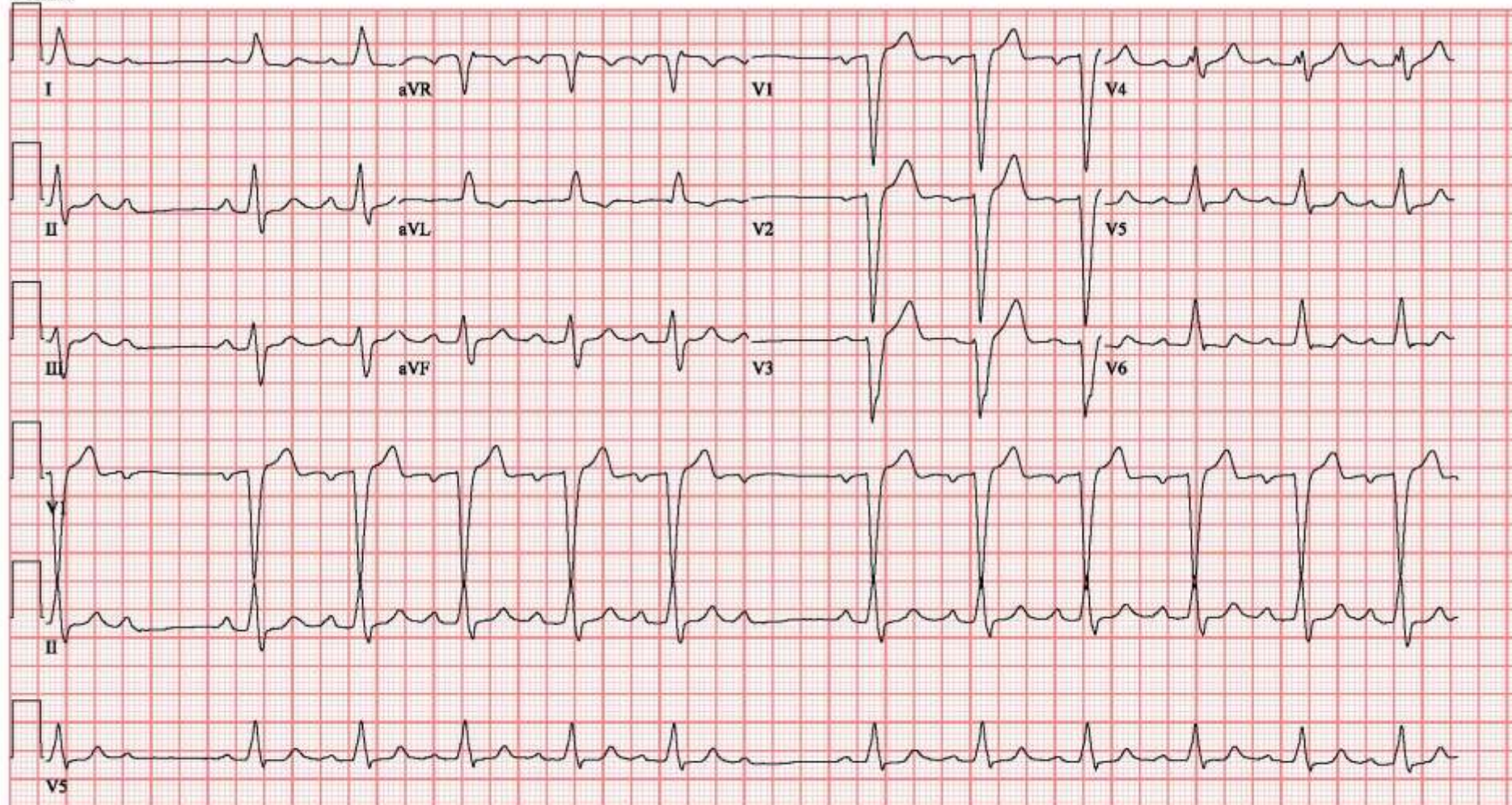
Sinus rhythm with 2nd degree A-V block (Mobitz II)
Left bundle branch block
Abnormal ECG
No previous ECGs available
Confirmed by BROWN MD, ELIZABETH (8045), editor AKOPOVA, MARINA (2188) on 1/7/2019 7:23:18 AM

Technician: GH
Test ind:IRREG HEART BEAT

Referred by: E BROWN

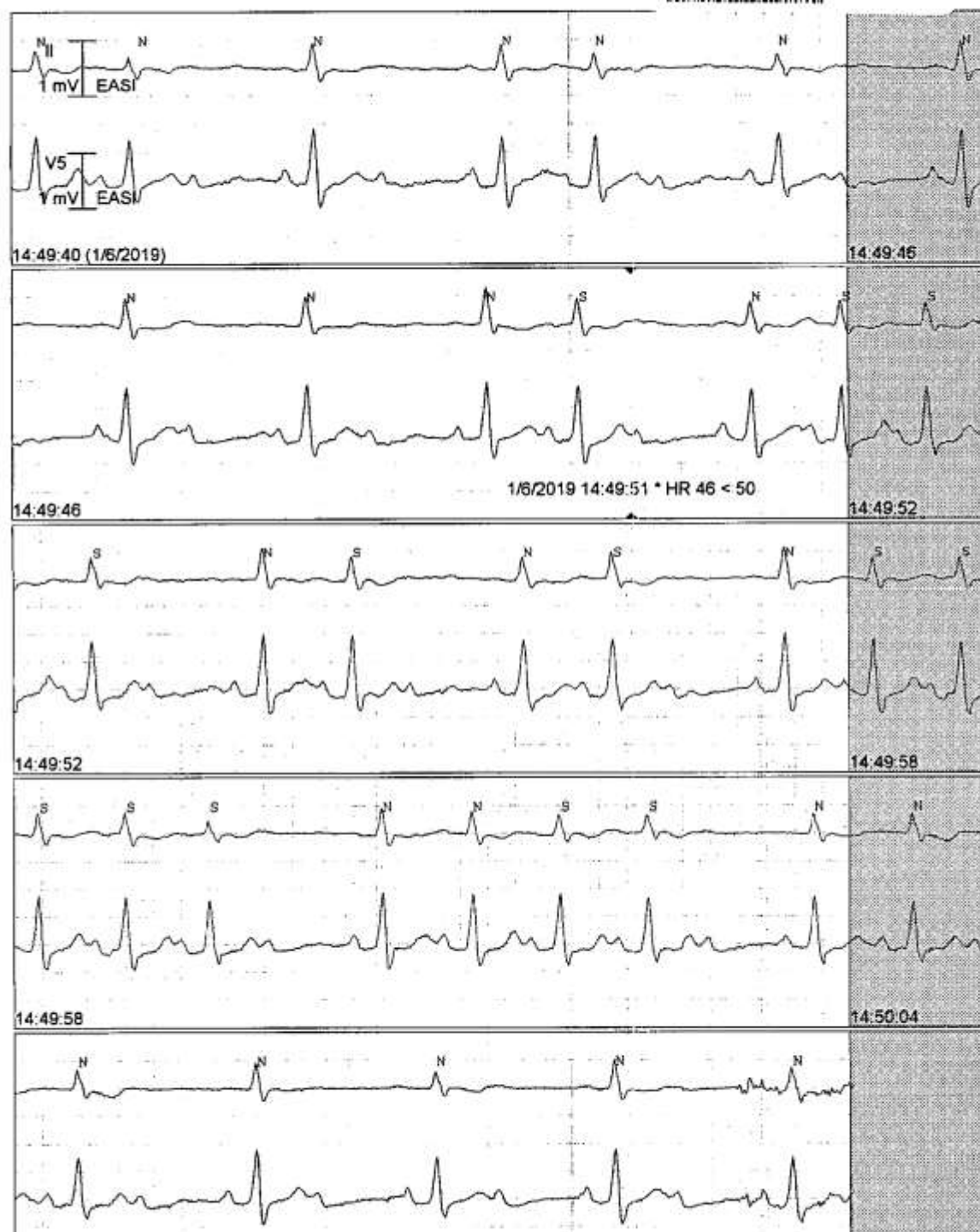
Electronically signed by: ELIZABETH BROWN MD

OTHER:





POOR ORIGINAL



POOR ORIGINAL

EPORT

4:53

PRMC EVERETT CEU

rd M

116559

348608

Observation



I

II

DECHOFF, MATTHEW

09/2019

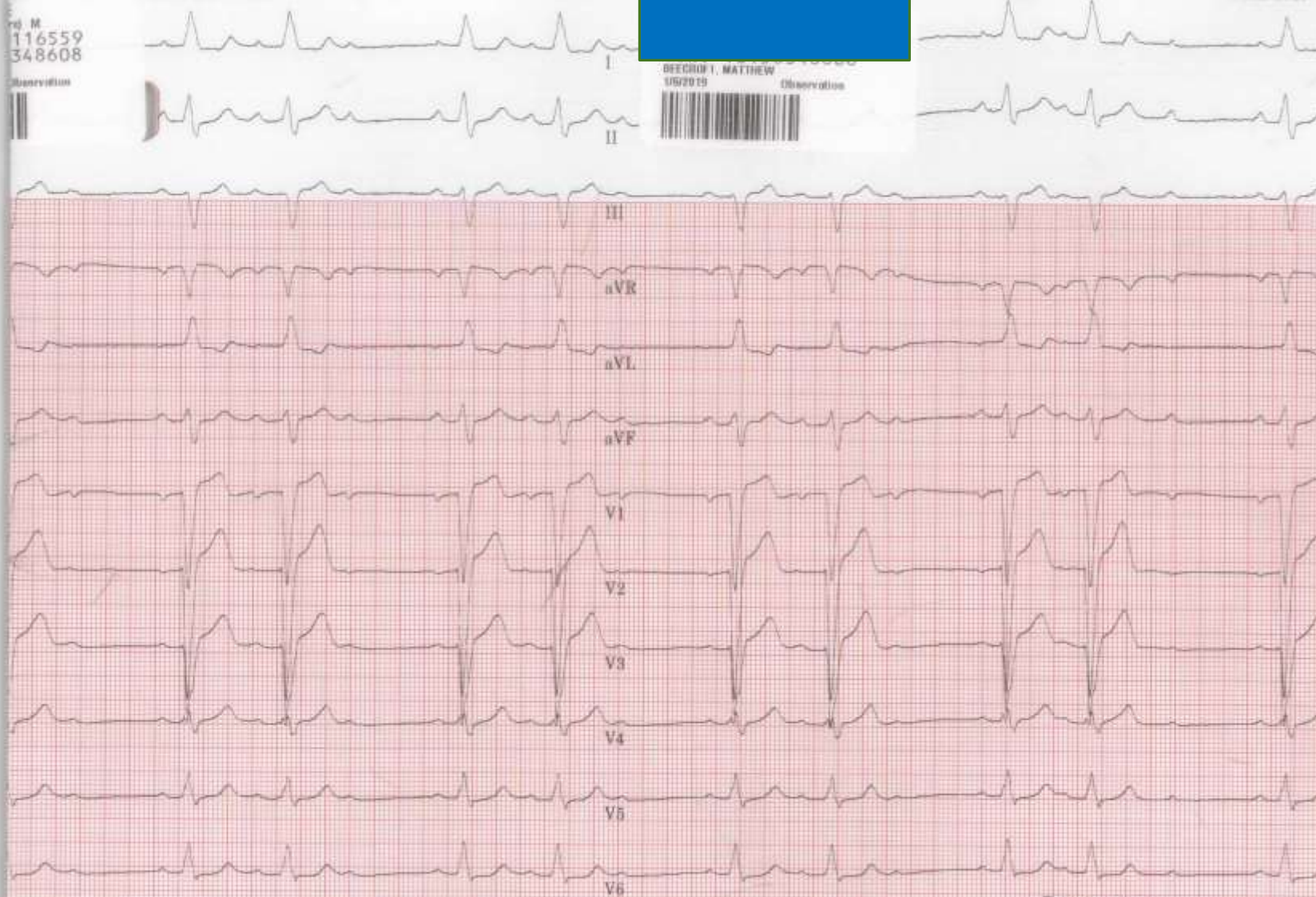
Observation



ID:

RHYT

6-Jan-2019



MAC55-0090

0.16-40 Hz

25.0 mm/s

10.0 mm/mV

POOR ORIGINAL



Graphic Controls

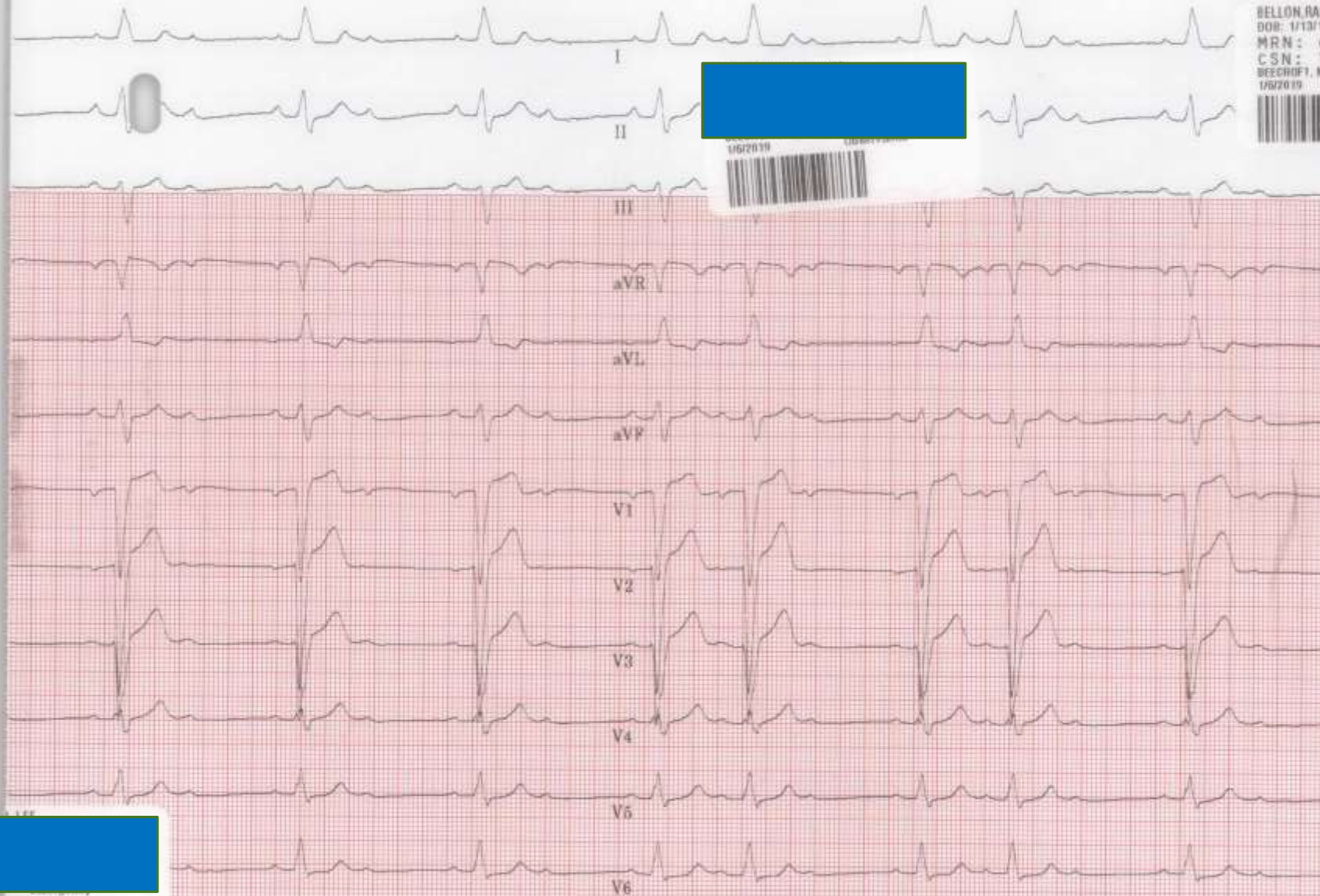
PRINTED IN U.S.A.

REPORT
15:04:43 PRMC EVERETT CEU

ID:

RHYTHM
6-Jan-2019

BELLON, RAN
DOB: 1/13/11
MRN: 6
CSN: 1
BEECHDT, M
1/6/2019



MAC55 0090
MOE 9402-024

0.16-40 Hz 25.0 mm/s 10.0 mm/mV

POOR ORIGINAL

PORT
31 PRMC EVERETT CEU

ID:

R
6-Jan-20



II

III

aVR

aVL

aVF

V1

V2

V3

V4

V5

V6

M
16559
48608

Emergency

Graphic Controls

MAC55-009C

0.16-40 Hz

25.0 mm/s

10.0 mm/mV

PRINTED IN U.S.A.

POOR ORIGINAL

BELLON,
DOB: 1/1
MRN:
CSN:
BEECROFT
1/6/2019



II

aVR

aVL

aVF

V1

V2

V3

V4

V5

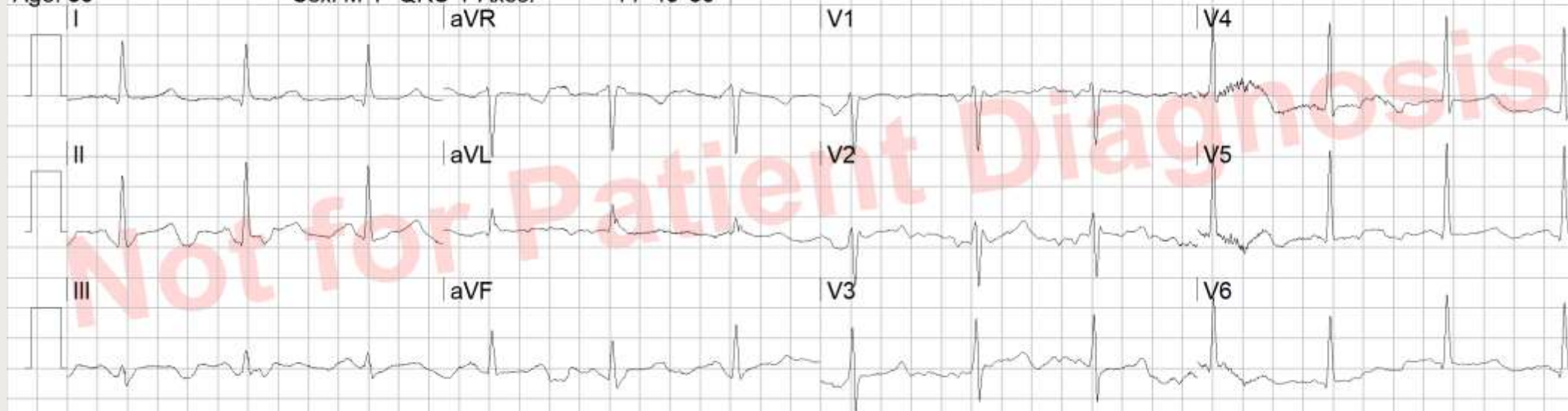
Case #2 – Picked the wrong day to stop sniffing glue

- 36 yo male
- Family drops him at fire station
- History of PTSD (soldier) and depression
- Reported taking “pills” and huffing computer cleaner
- No pill bottles
- BP 154/129, HR 23

Overdose

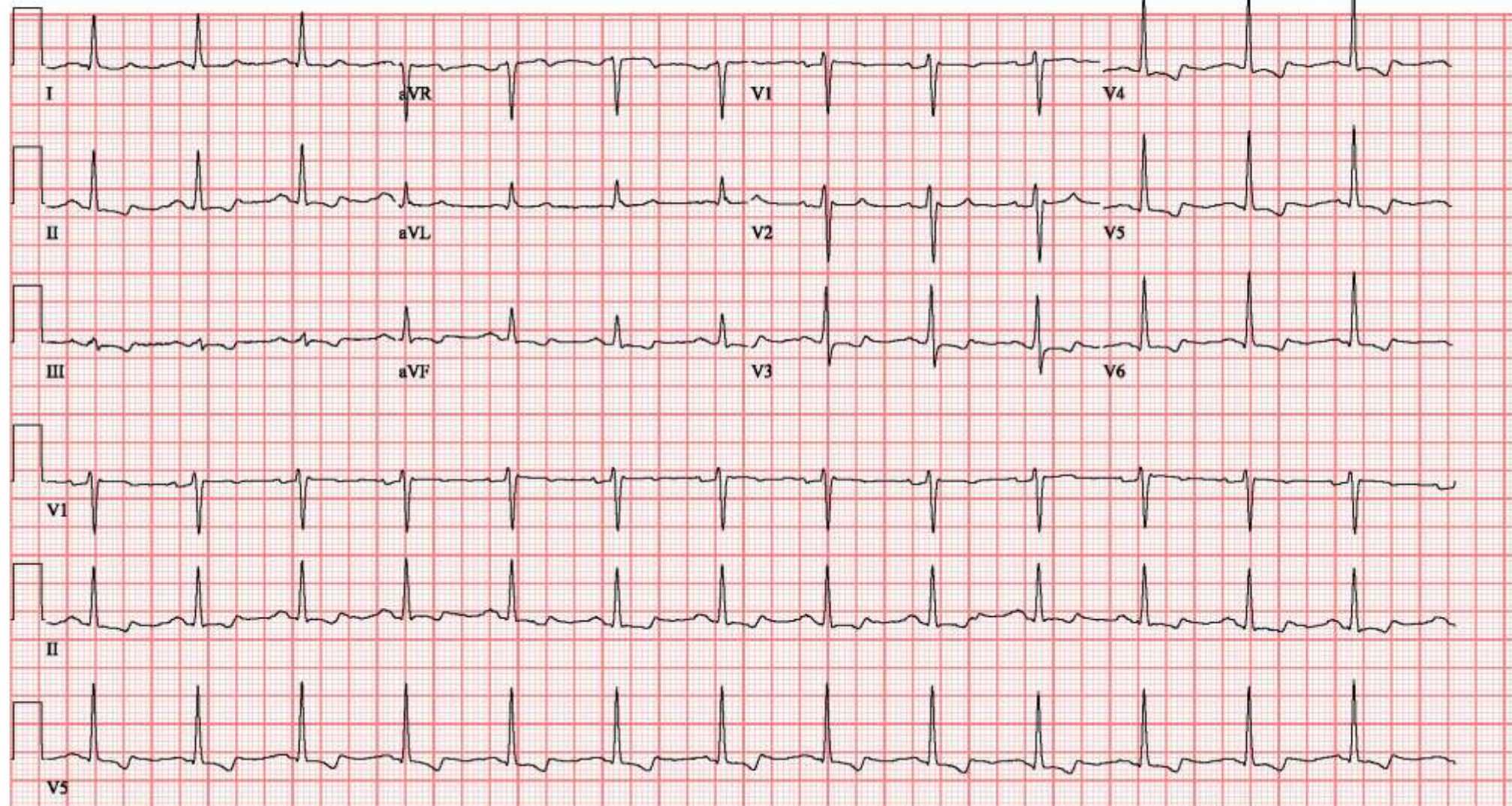
- 36 yo male
- Family drops him at fire station
- History of PTSD (soldier) and depression
- Reported taking “pills” and huffing computer cleaner
- No pill bottles
- BP 154/129, HR 23
- After atropine, HR goes up to 75, BP 215/145

Name: 12-Lead 2 HR 75bpm Borderline ECG **Unconfirmed**
ID: 011018155917 1/10/2018 4:11:07 PM Sinus rhythm
Patient ID: PR 0.120s QRS 0.092s Prolonged QT interval
Incident ID: QT/QTc: 0.446s/0.472s
Age: 36 Sex: M P-QRS-T Axes: 77°49°60°



x1.0 .05-150Hz 25mm/sec
Physio-Control, Inc. Comments:

MEDIC 41 SNO 4 3306808-006 LP1542760878



25mm/s 10mm/mV 40Hz 8.0 SP2 12SL 241 HD CID: 124

SID: 60005623888 EID:20015 EDT: 16:50 10-JAN-2018 ORDER: 387317005 ACCOUNT: 10133025039

OD Bradycardia

- WHAT'S ON THE LIST?



OD Bradycardia

- Calcium channel blockers
- Beta-blockers
- Digoxin
- Opiates
- Alpha-2 antagonists (e.g., clonidine)
- Sodium channel blockers (e.g., TCA, carbamazepine, flexeril, antipsychotics, propranolol, cocaine)

What are these?

- Metoprolol
- Amlodipine
- Verapamil
- Atenolol
- Norvasc
- Diltizem
- Digoxin

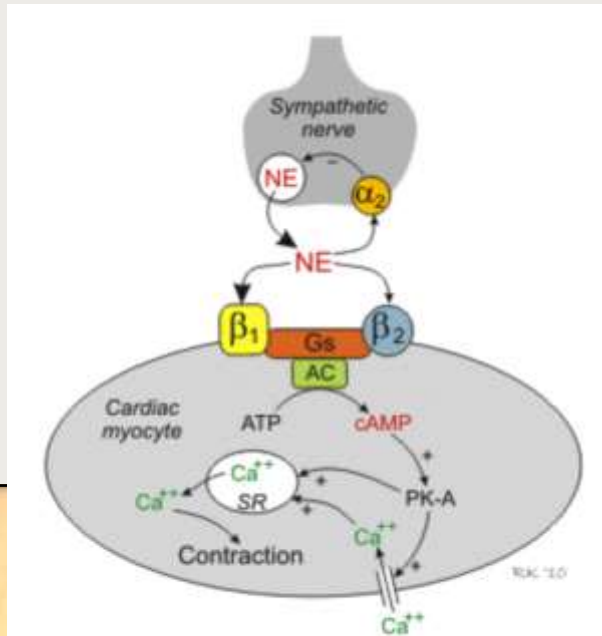
OD Bradycardia – telling them apart

BETA BLOCKER

- More likely to be hypoglycemia
- More likely depressed LOC

CCB

- More likely to be hyperglycemia
- More likely to have normal LOC



Overdose

- 36 yo male
- Family drops him at fire station
- History of PTSD (soldier) and depression
- Reported taking “pills” and huffing computer cleaner
- No pill bottles
- BP 154/129, HR 23
- After atropine, HR goes up to 75, BP 215/145

OD Bradycardia

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- Alpha-2 antagonists (e.g., clonidine)
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Clonidine

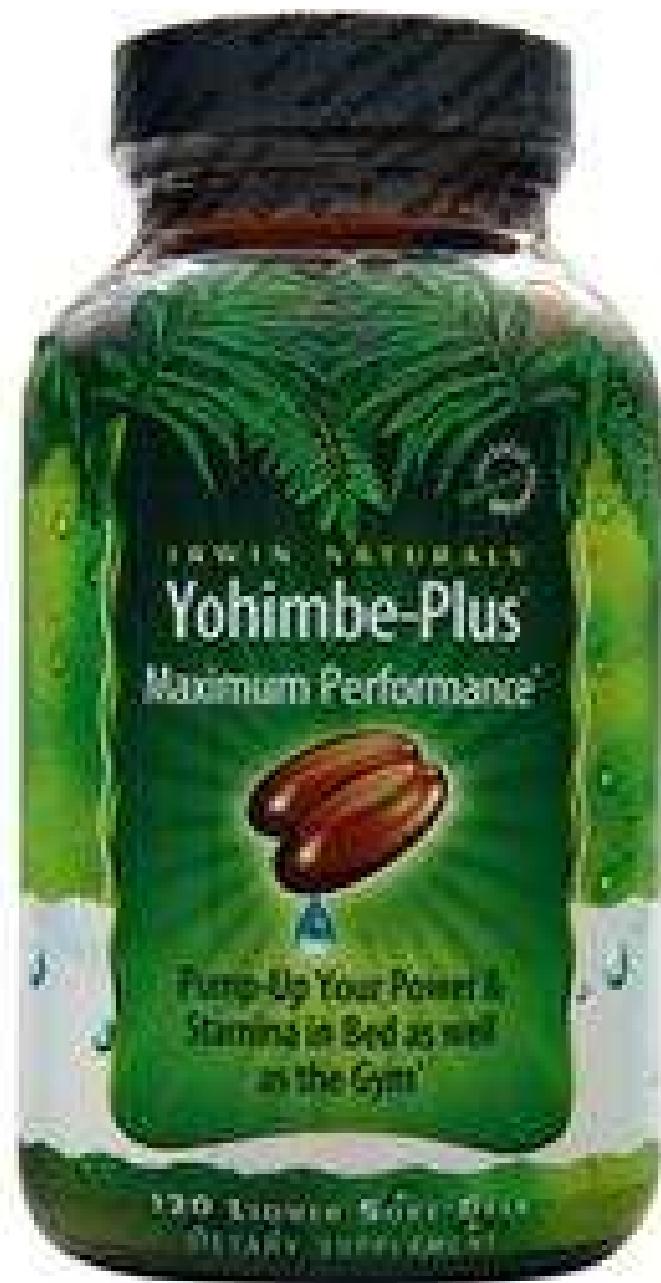
- Alpha 2 receptor agonist
- Clinically indistinguishable from opiate OD
 - bradycardia
 - hypotension
 - respiratory depression
 - miosis
 - a decreased LOC



Clonidine

- Alpha 2 receptor agonist
- Clinically indistinguishable from opiate OD
 - bradycardia
 - hypotension
 - respiratory depression
 - miosis
 - a decreased LOC
 - transient response to narcan





OD Bradycardia

- Calcium channel blockers
- Beta-blockers
- Digoxin
- Opiates
- Alpha-2 antagonists (e.g., clonidine)
- Sodium channel blockers (e.g., TCA, carbamazepine, flexeril, antipsychotics, propranolol, cocaine)

Case 2b – Can't wake a sleeping baby

- 18 mo old parent cannot arouse
- Poor respiratory effort
- HR 38
- Sleeps with parent

Clonidine

- Initial transient pressor effect
- Hypertension occurs in about one third of patients
- Usually lasts an hour or two, but can last for up to 10–12 hours, especially in renal disease



Clonidine/alpha blocker

- Initial transient pressor effect
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Clonidine/alpha blocker

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- Hypertension occurs in about one third of patients
- Usually lasts an hour or two, but can last for up to 10–12 hours, especially in renal disease



Case #3 – Something not right about grandma

- Grandma not acting right
- Complained of some visual changes earlier in the day
- H/o “Heart problems,” HTN, dementia, kidney problems
- Initially BP 101/56, HR 36



Fast or slow?*

Wide or narrow?

Regular or irregular?



Fast or slow?
Wide or narrow?
Regular or irregular?



Fast or slow?
Wide or narrow?
Regular or irregular?



Fast or slow?
Wide or narrow?
Regular or irregular?



Fast or slow?

Wide or narrow?

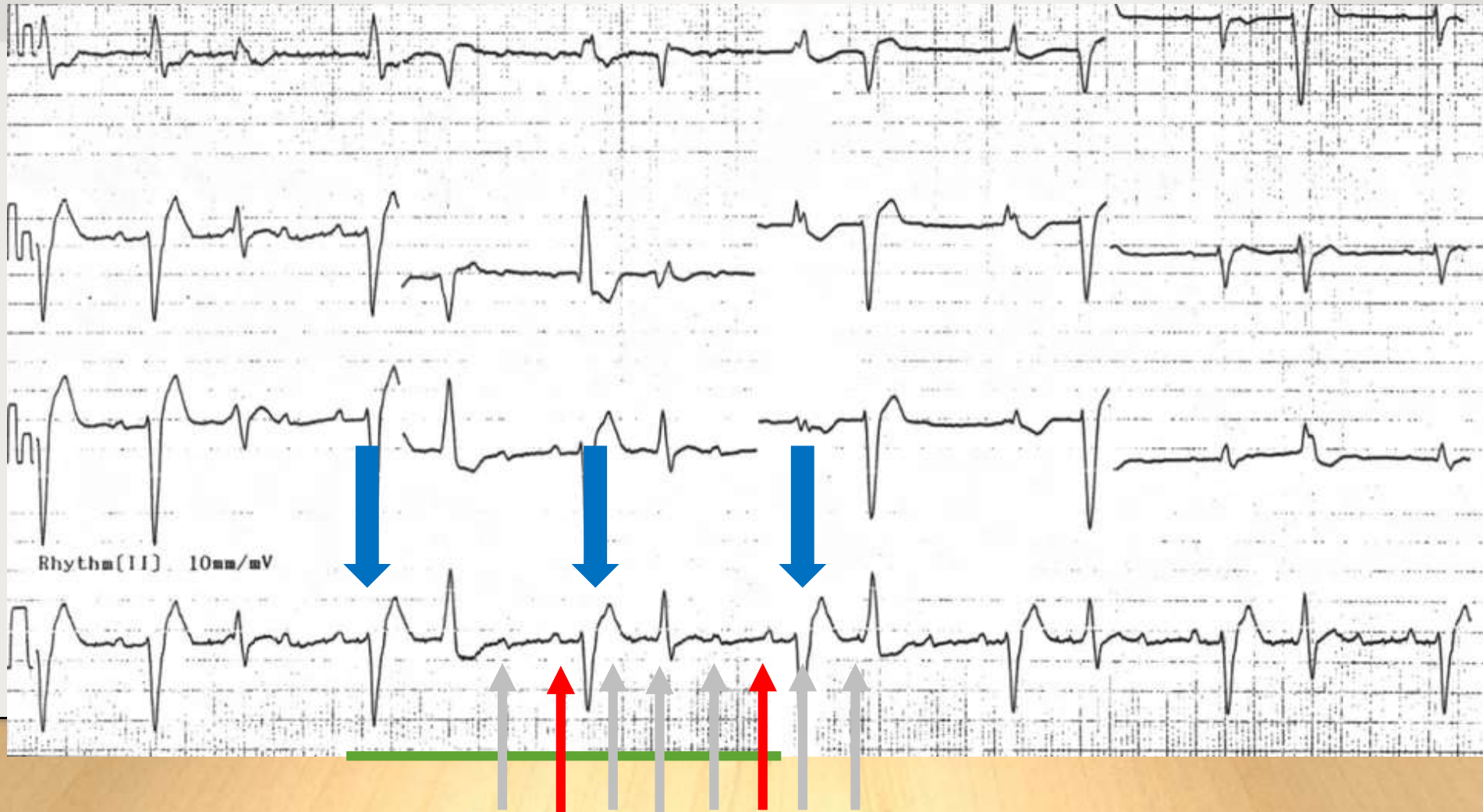
Regular or irregular?



Regular or irregular?



Atrial tachycardia
High grade AV block
Ventricular ectopy
BBB

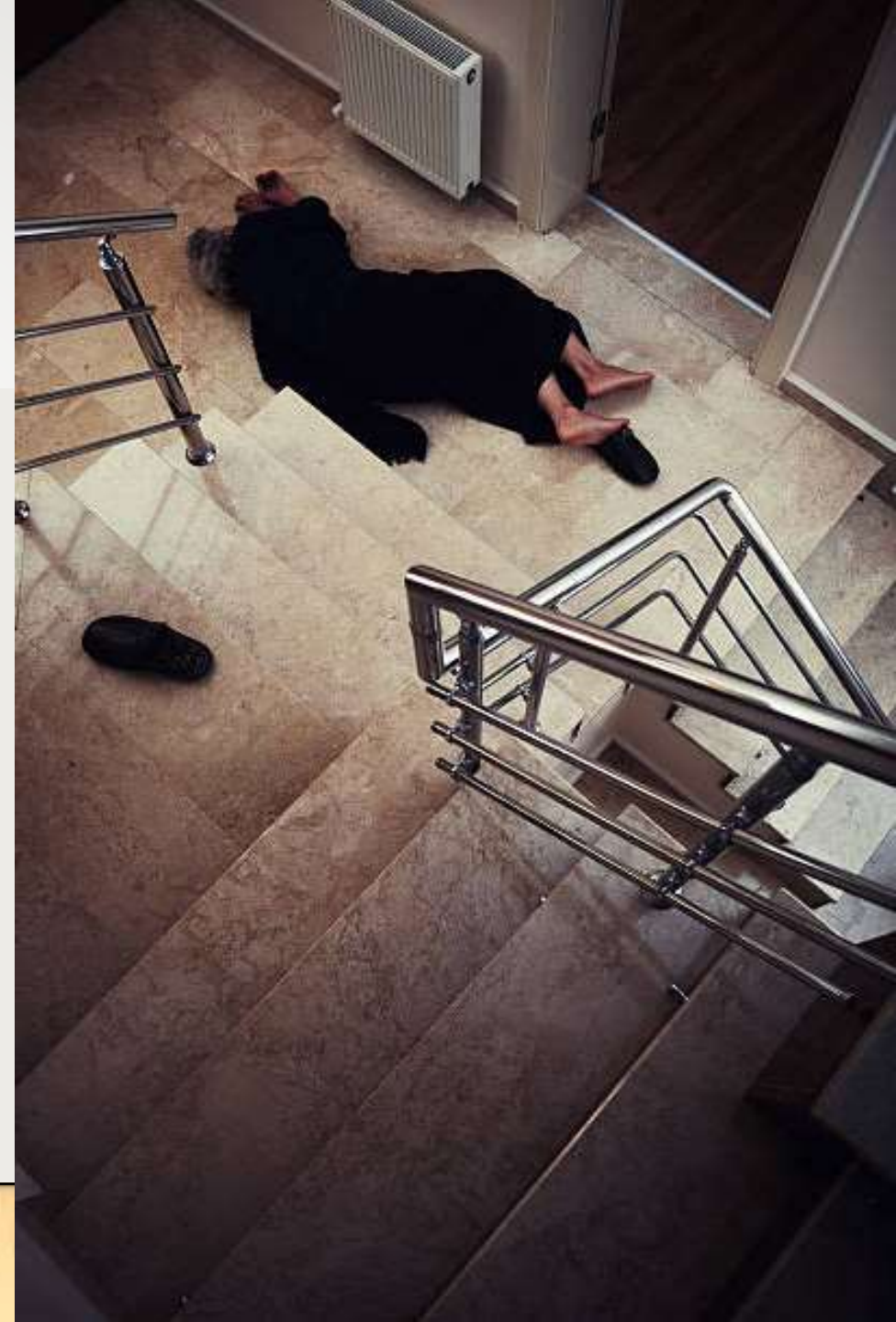


Digoxin toxicity

- **Increased automaticity** of atrial and ventricular tissues
 - Atrial fib/flutter
 - Atrial ectopic rhythms
 - Frequent PVCs
 - Polymorphic V-tach
 - Bigeminy is common
- **Decreased AV conduction** a increased vagal tone at the AV node.
 - AV blocks — including 1st, 2nd and 3rd degree AV block.

Case #4 – Fallen Grandma

- 82 yo female with recent back pain per family
- Acting “out of sorts”
- Fell down stairs



A woman with dark hair is lying on a gurney, wearing a blue hospital gown and a patterned blanket. She appears to be resting or sleeping. The background is a plain, light-colored wall.

Next steps

- Confused, follows some commands
- BP 100/62, HR 52, RR 18, Sat 96%
- H/o HTN, recent back pain, hyperlipidemia

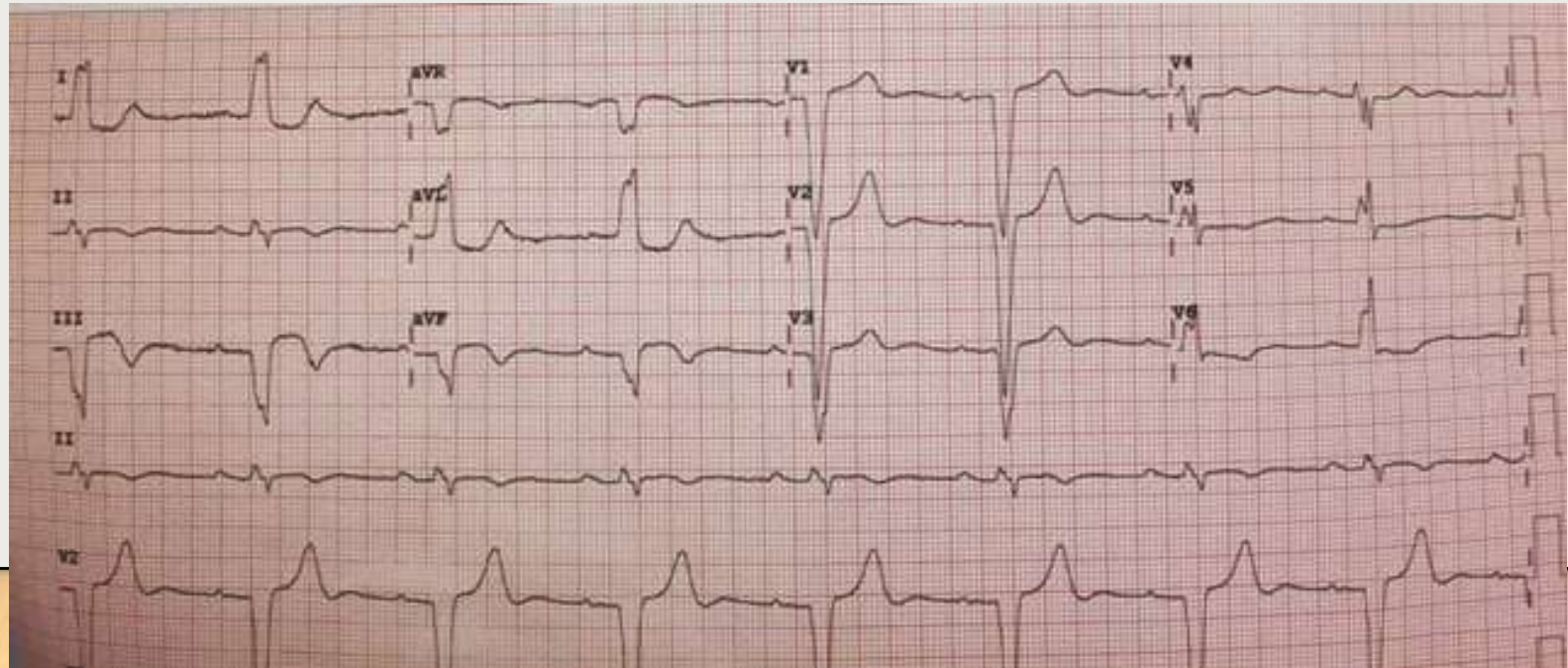
A woman with dark hair is lying on a gurney, wearing a blue hospital gown and a patterned blanket. She appears to be resting or sleeping. The background is a plain, light-colored wall.

Next steps

- Confused, follows some commands
- BP 100/62, HR 48, RR 18, Sat 96%
- H/o HTN, recent back pain, hyperlipidemia
- Flexeril, Vicodin, lisinopril, atenolol

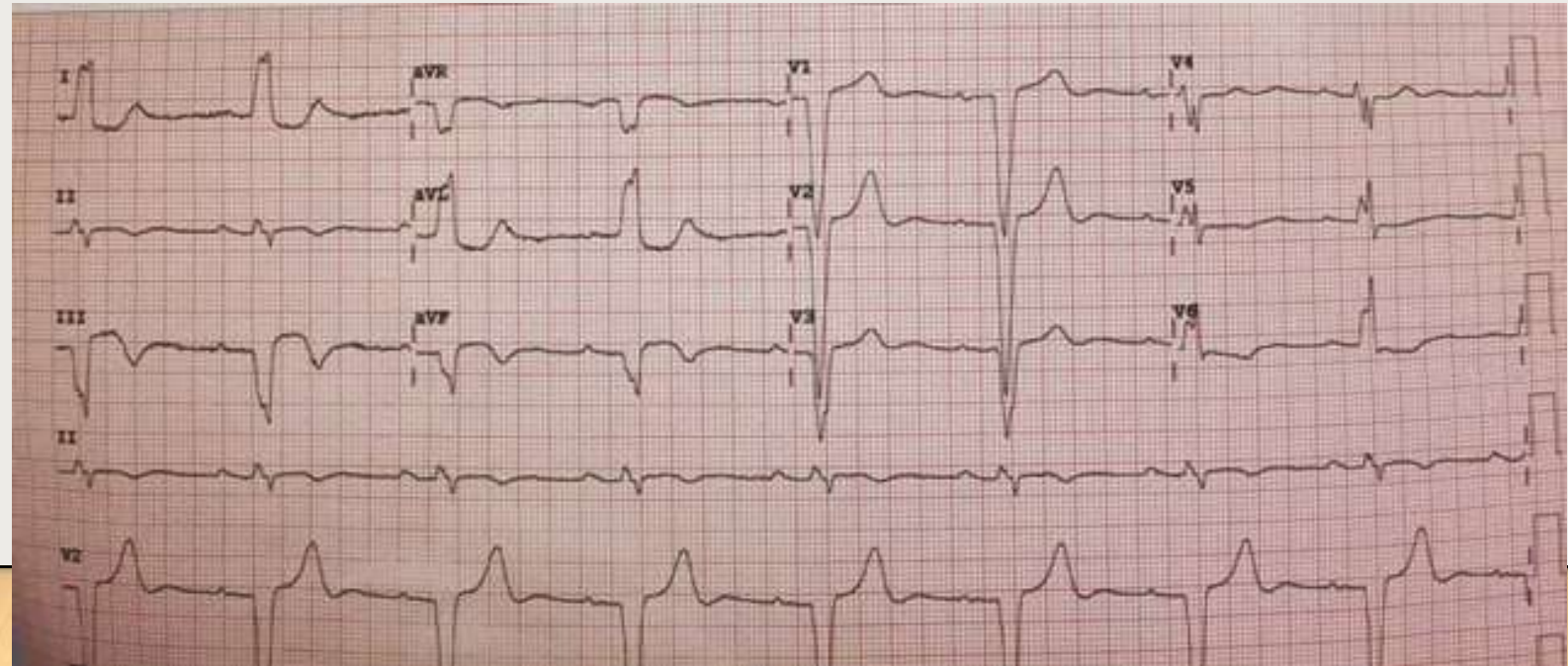
En route

- BP 95/60, HR 50
- Continues to slur words, slightly worse



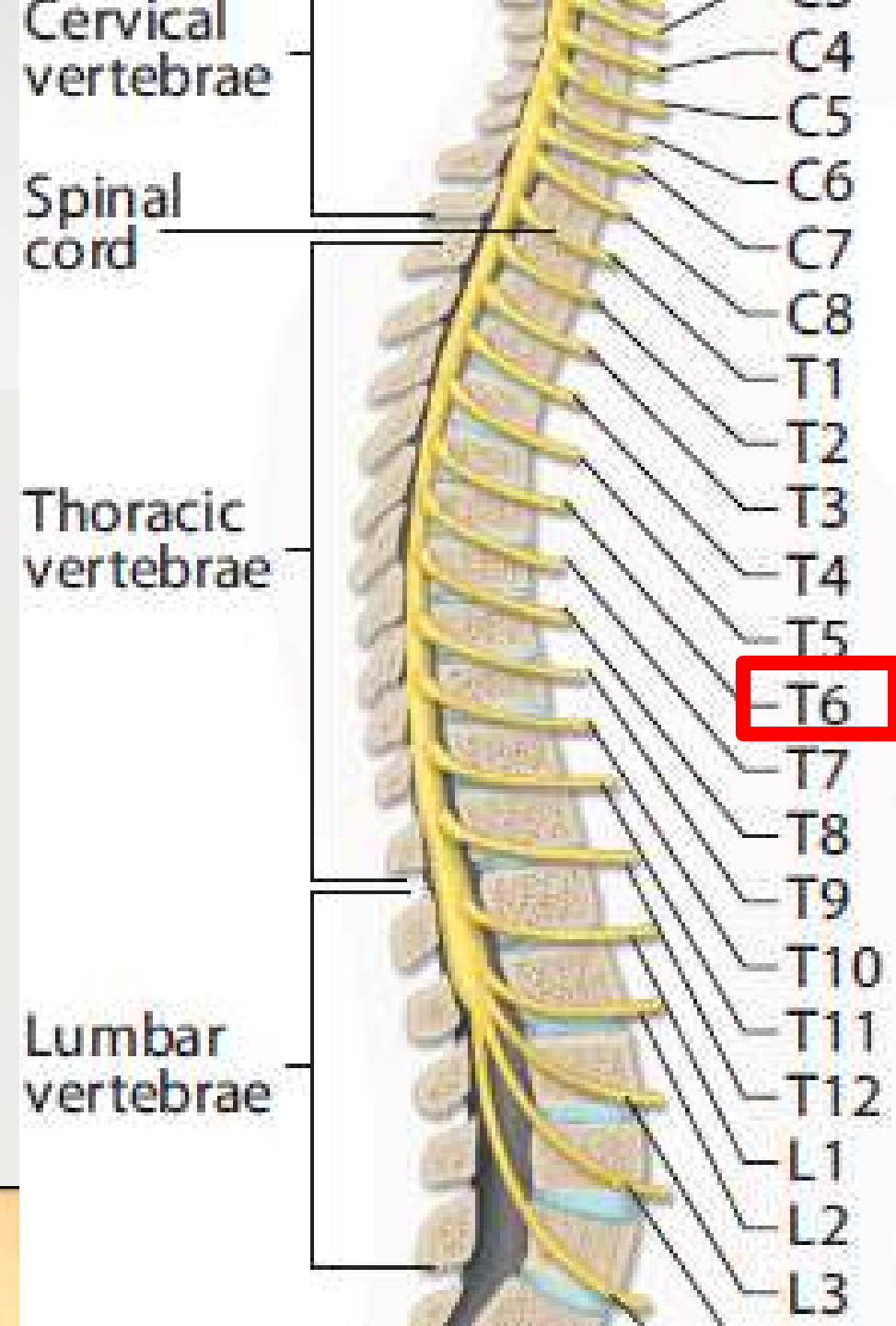
En route

- BP 95/60, HR 50
- Continues to slur words, slightly worse
- QRS >120 ms
- Dominant S wave in V1
- Broad monophasic R wave in lateral leads (I, aVL, V5-V6)



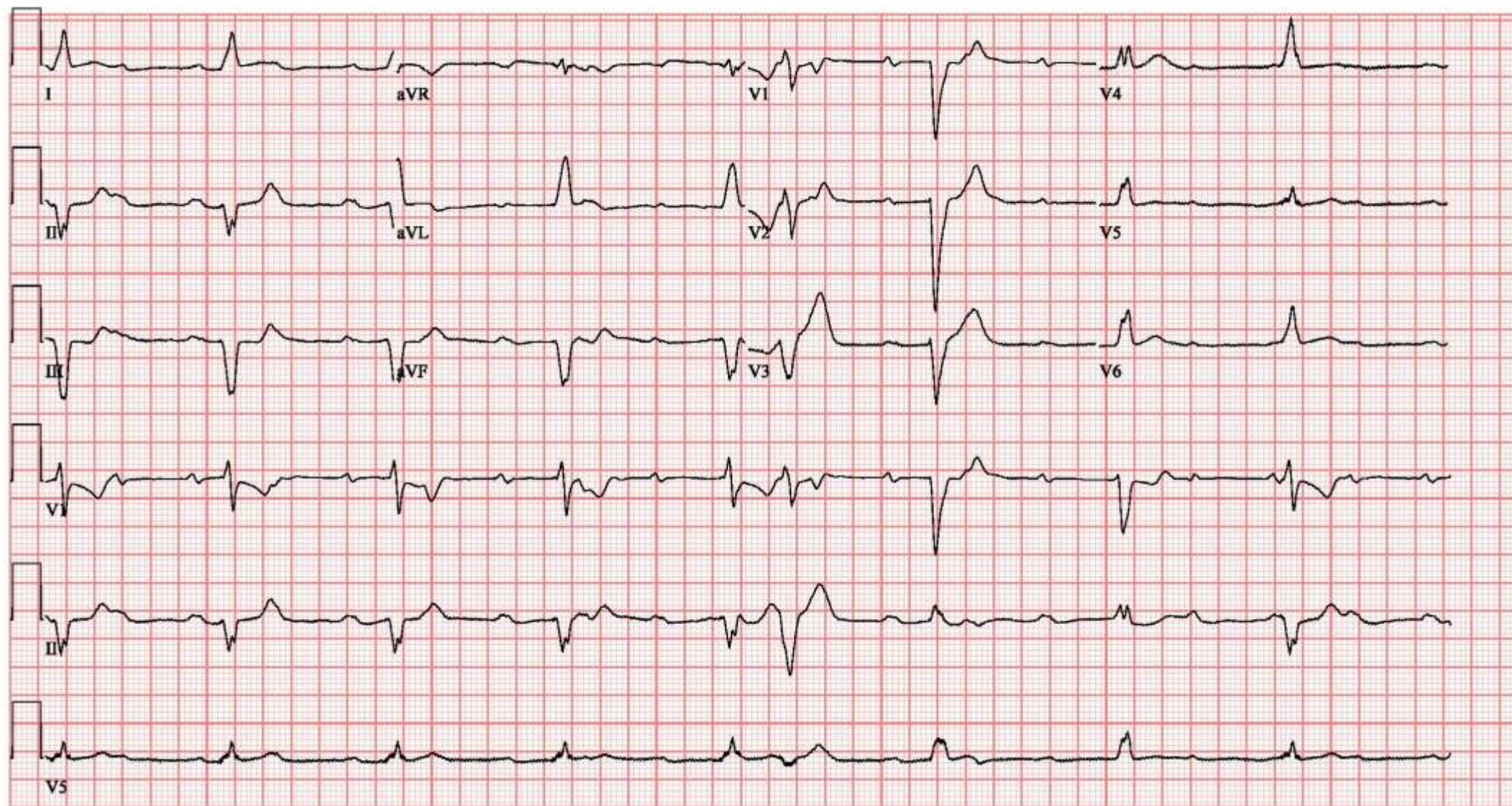
Spinal shock

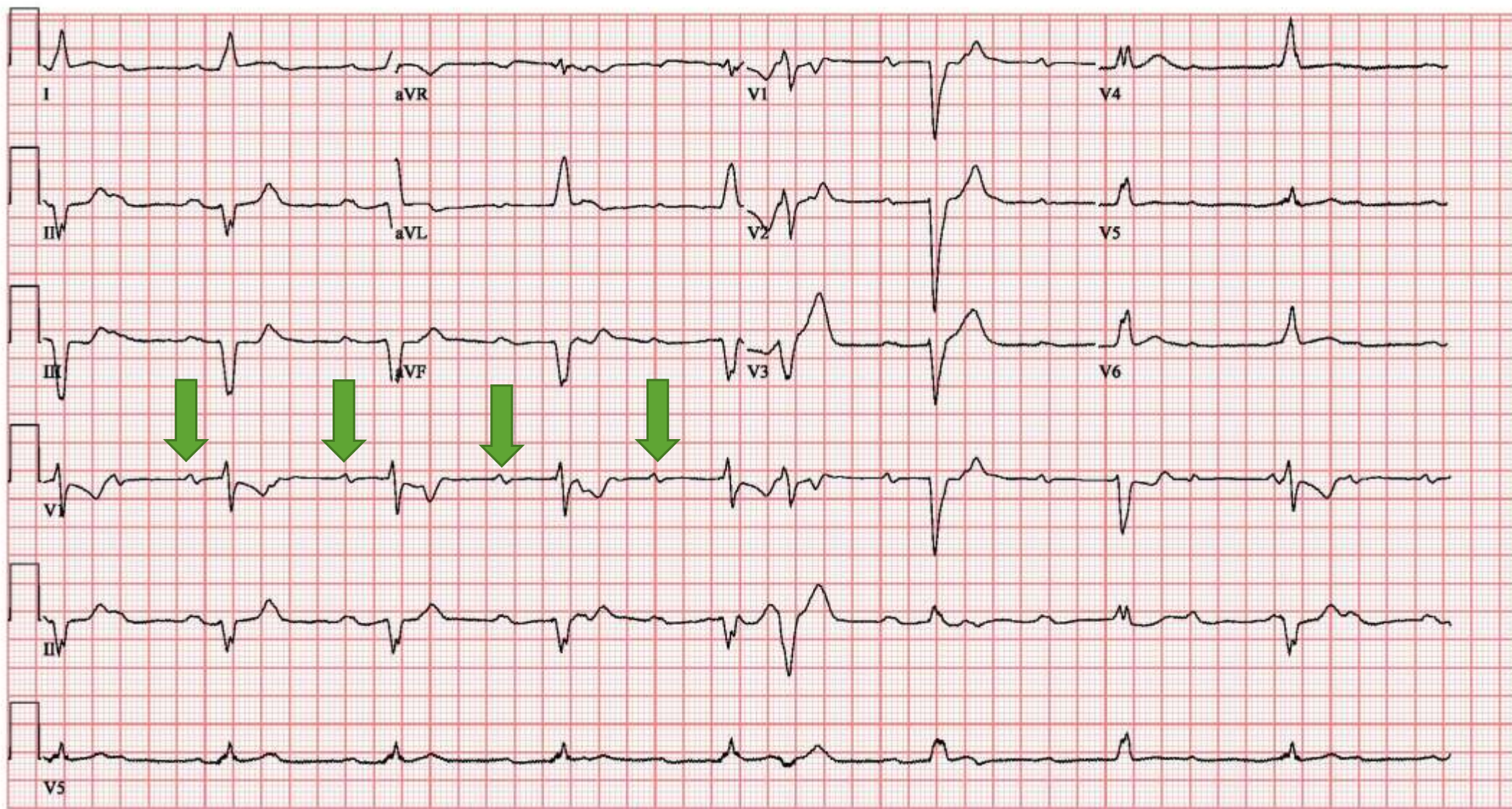
- Sympathetic nervous system – Fight or Flight
- Unopposed parasympathetic if injury above T6
- Unopposed para
 - Vasodilation
 - Unable to generate tachycardia

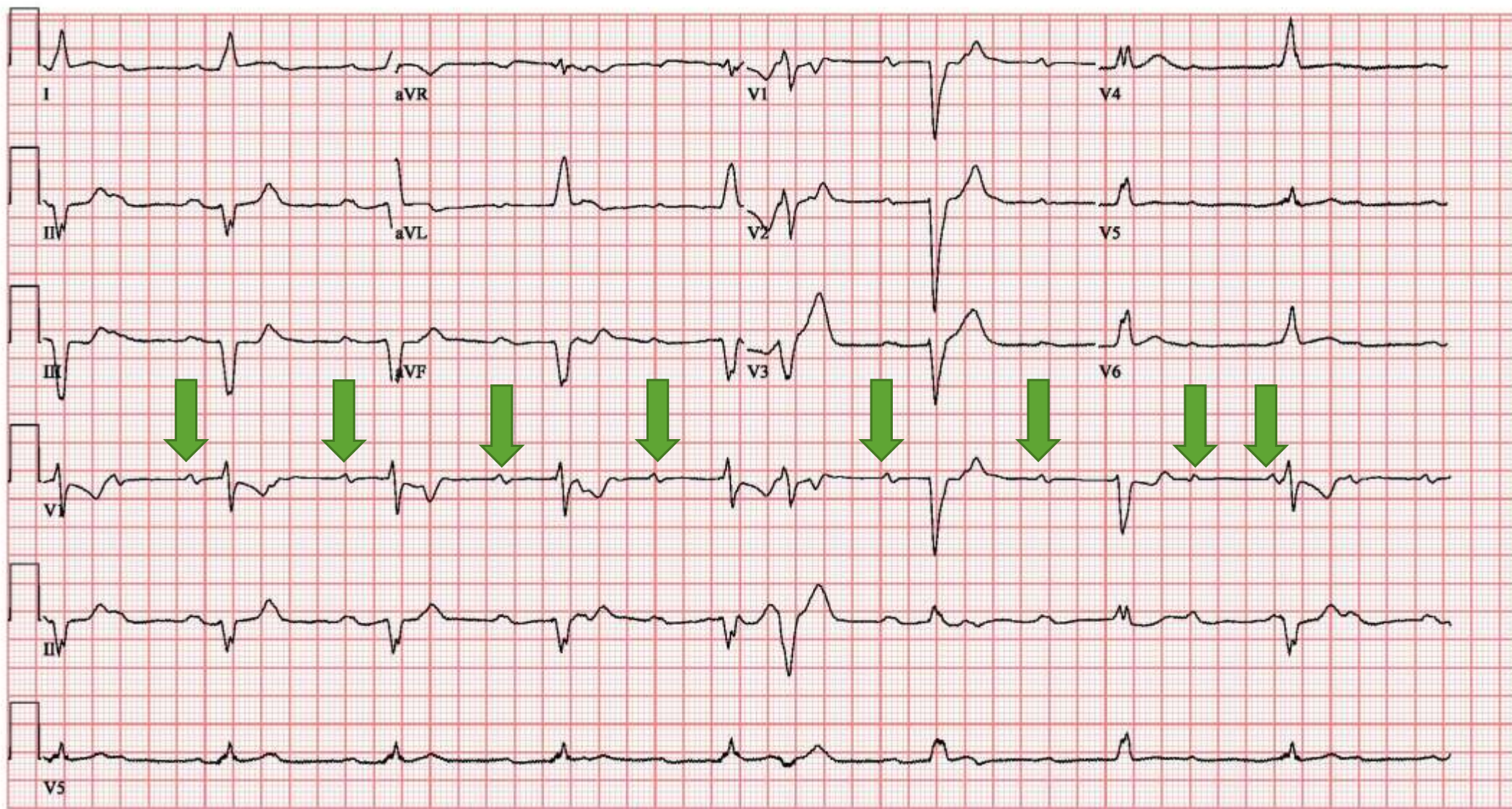


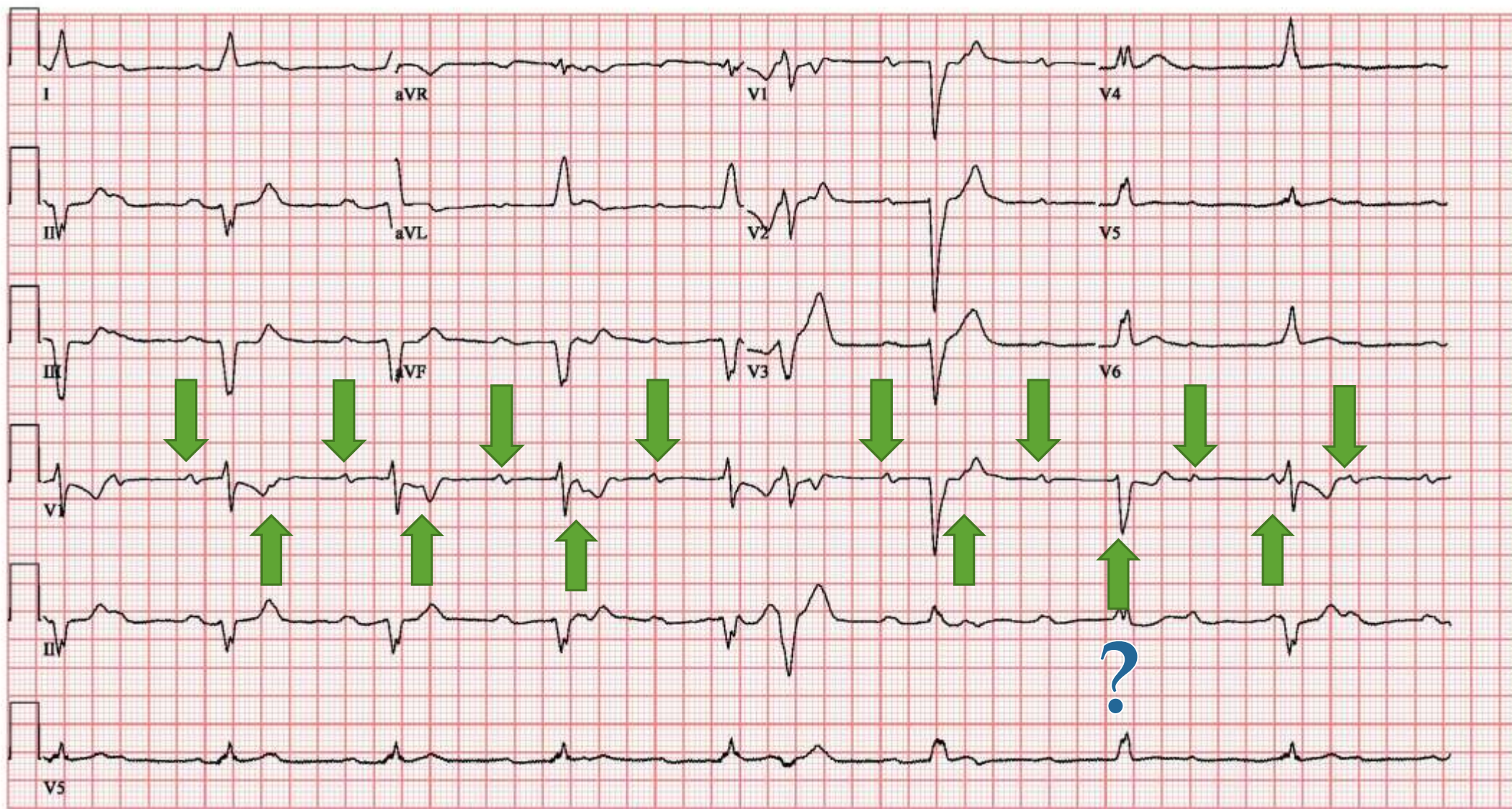
Case #5 – It isn't always obvious

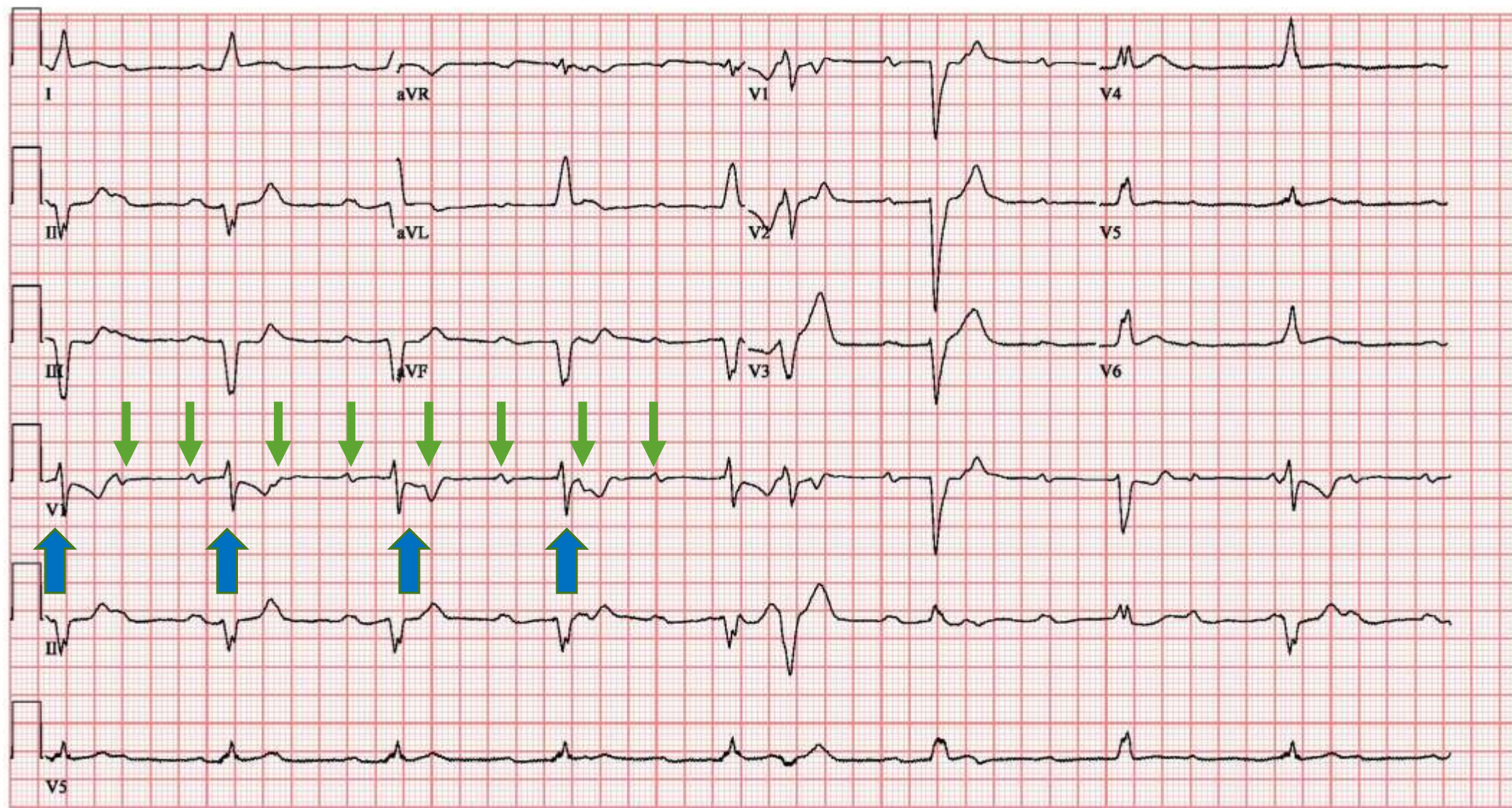
- 77 yo female with afib and CAD
- Increasing SOB for 6-8 weeks
- Currently taking steroids and nebs
 - Not helping
- Worse today when trying to walk to the car to go shopping
- Had to sit down
- 95/45, HR in the 50s

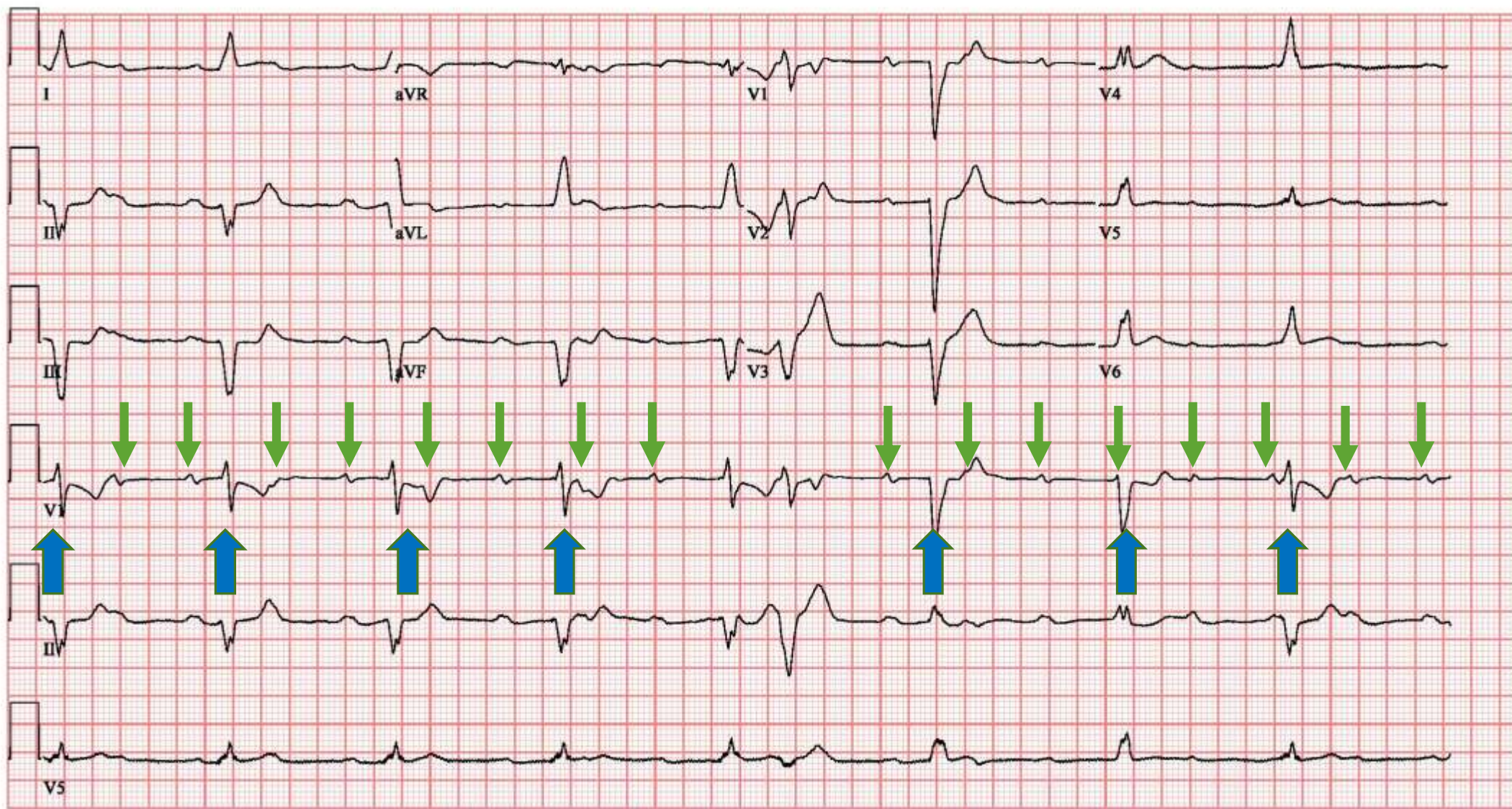






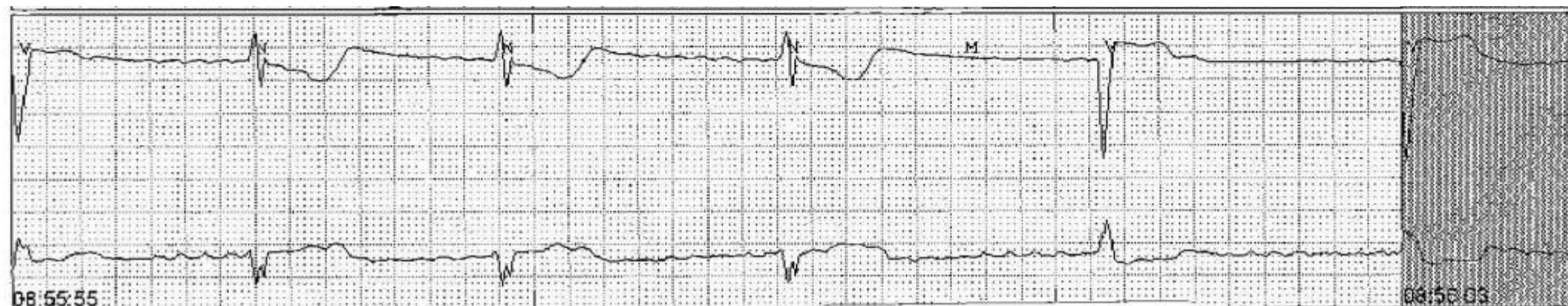
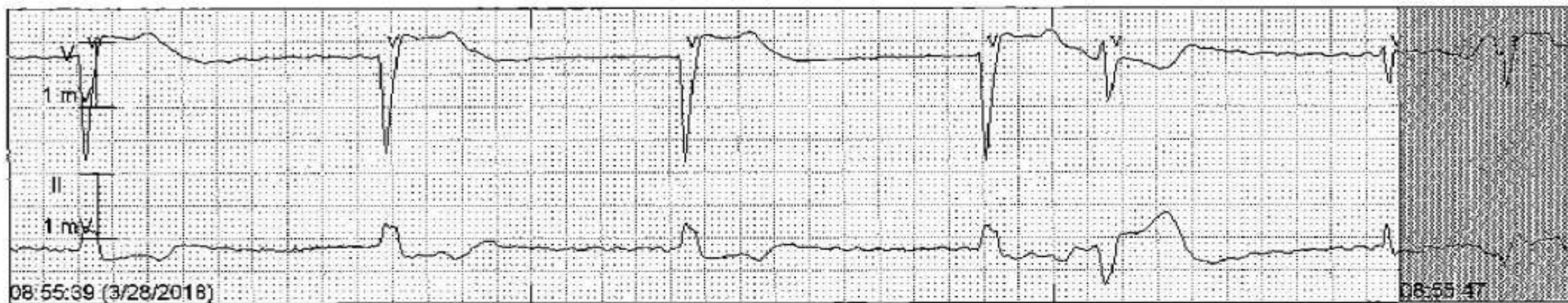






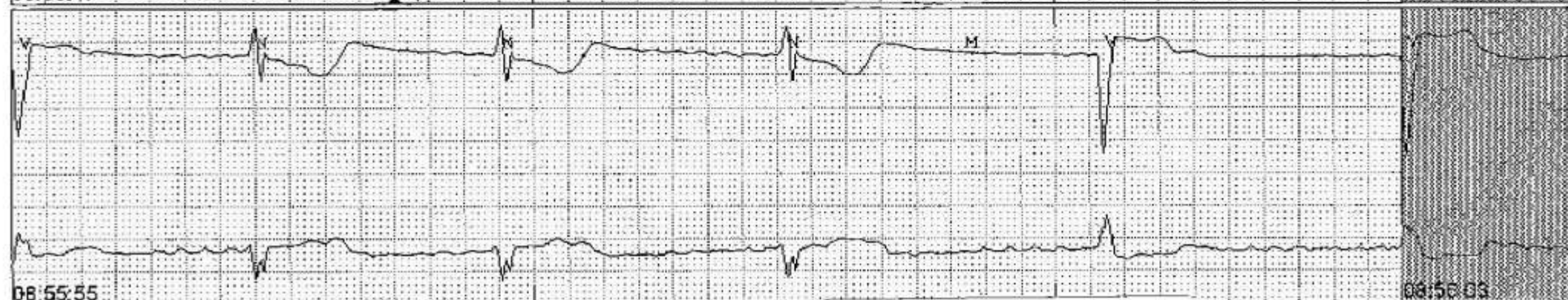
PB1001

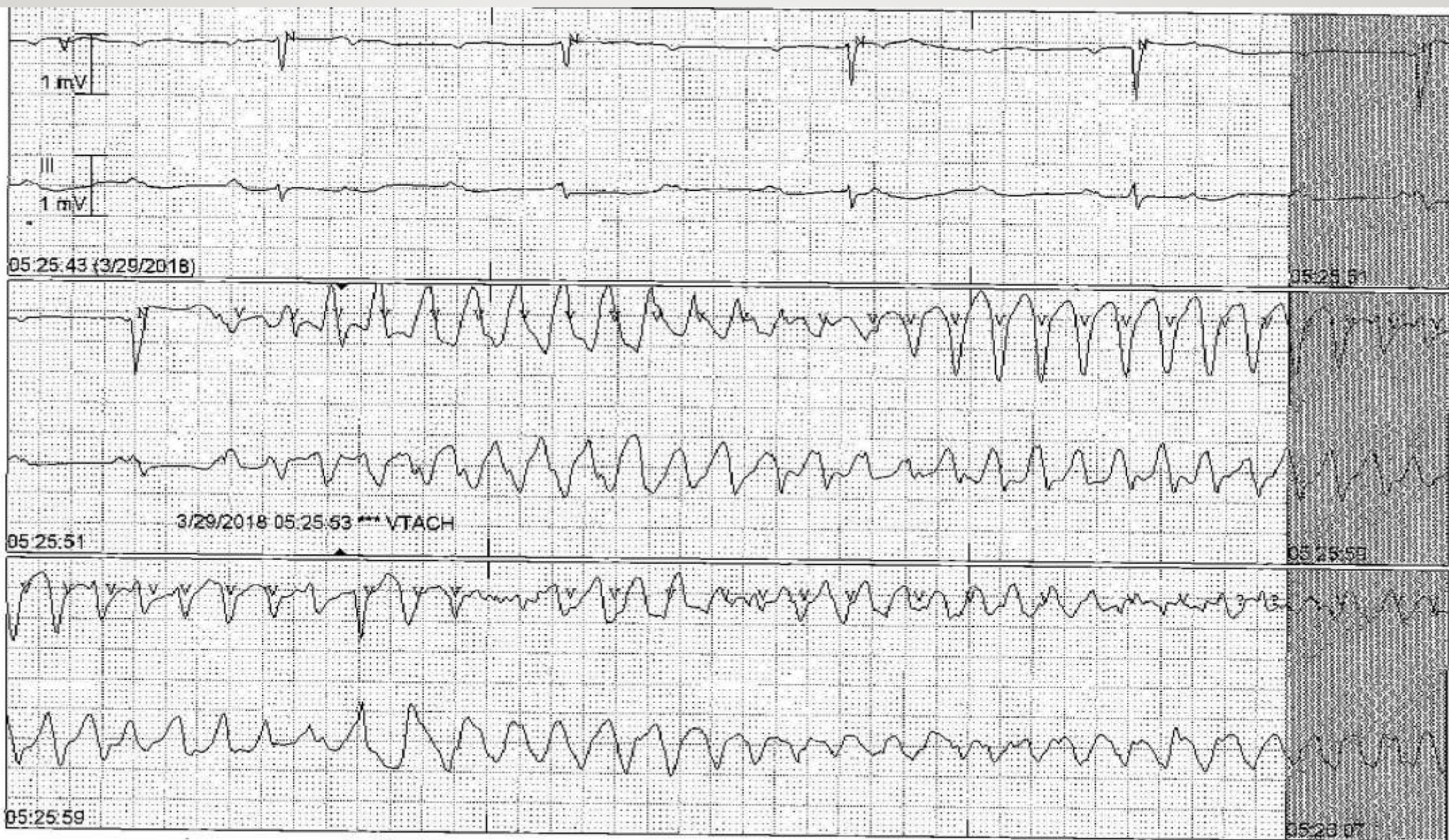
1201 17

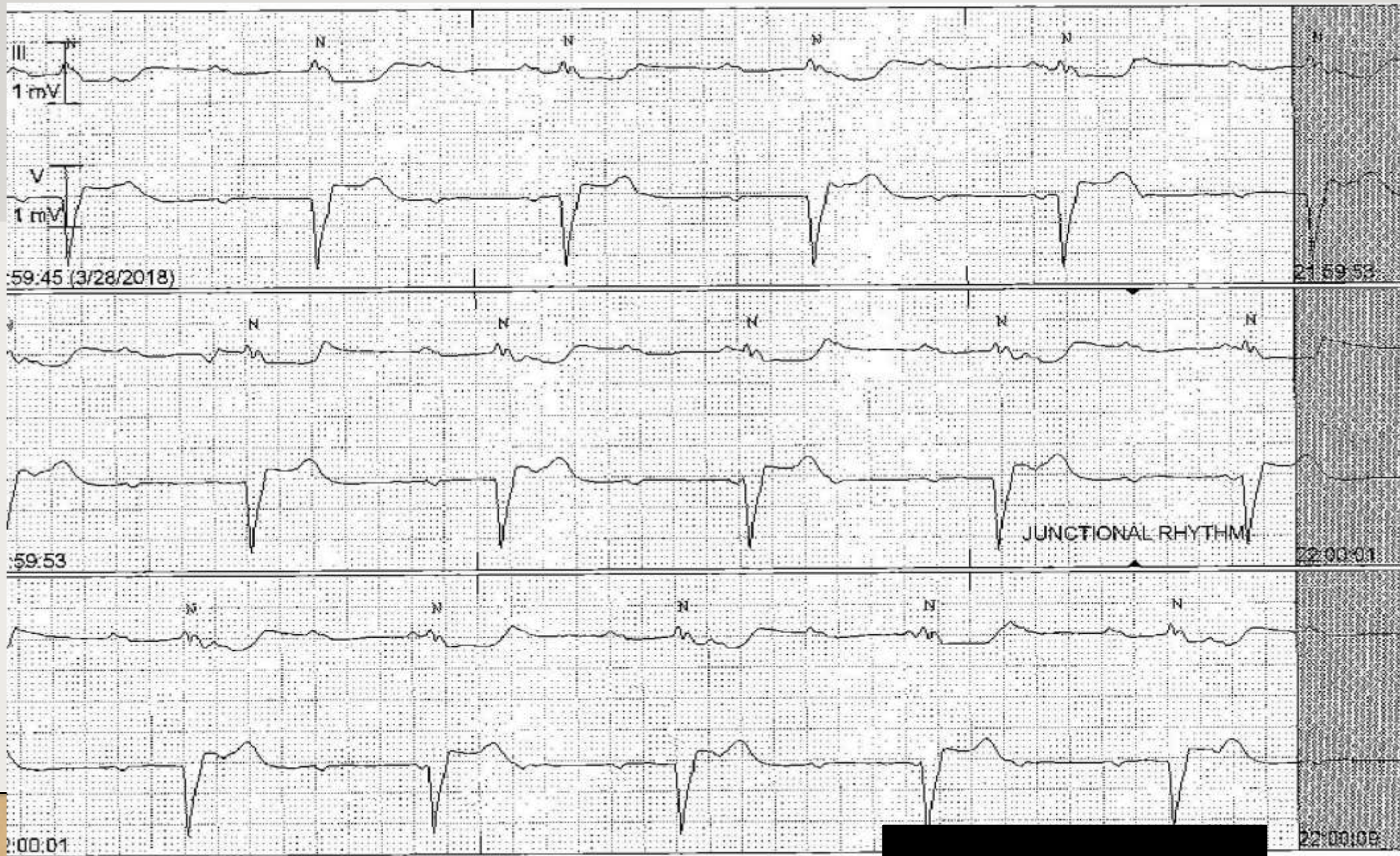


PBNDP 1

REG 17







Bradycardia and trouble

- Don't let them DIE
- D – Drugs
- I – ischemia
- E – Electrolytes

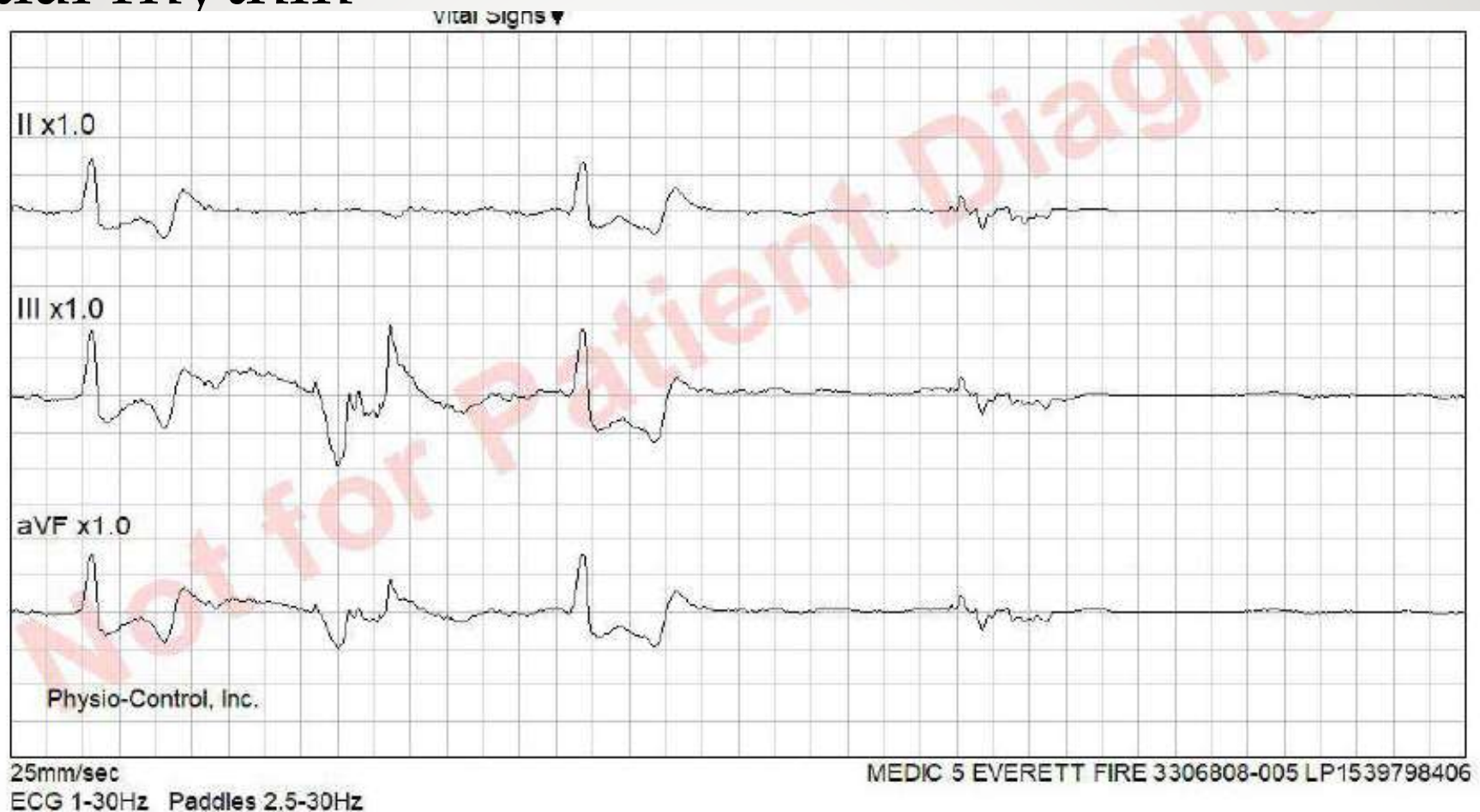
Case #6 – Fake Dementia

- 72 yo male with abnormal behavior
- 3 previous calls for the same
- “fakes dementia”
- Reported seizure, also has faked these

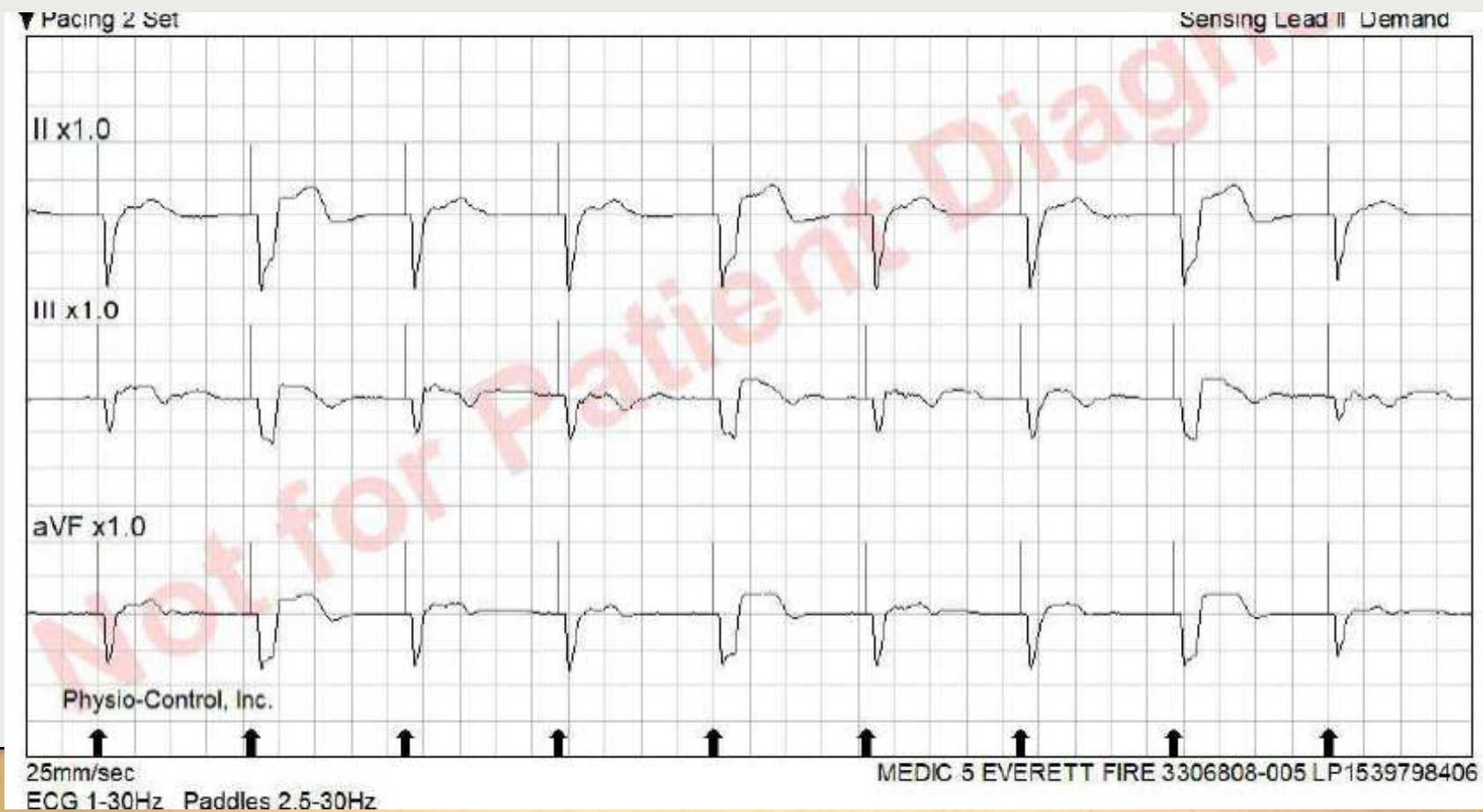
Vitals : “He’s just faking again”

- 90/62, minimally responsive, HR around 40, quickly down to 20.
- Moaning and not really responding

Initial rhythm

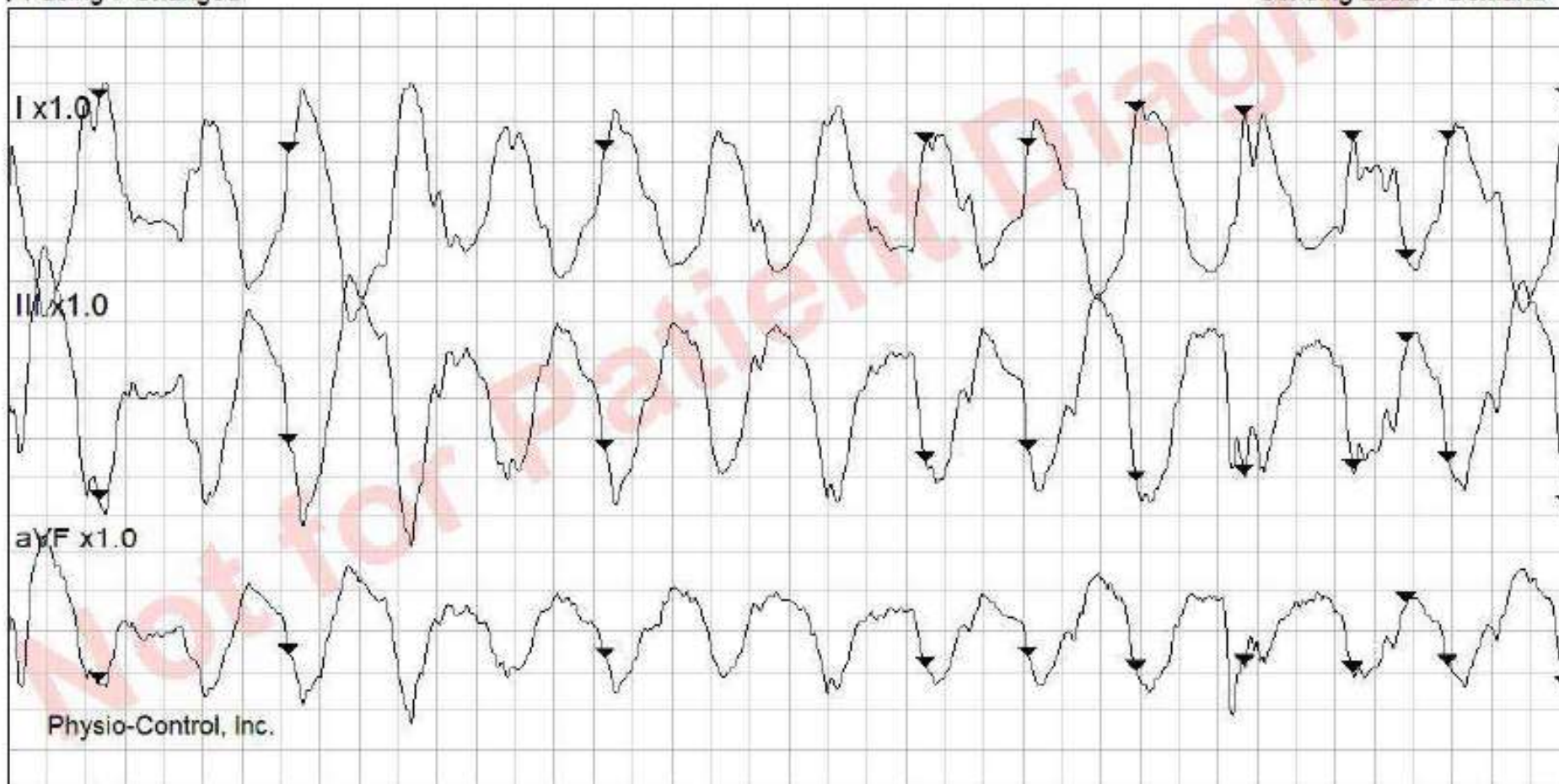


Pacing



▼ Pacing / Changed

Sensing Lead I Demand

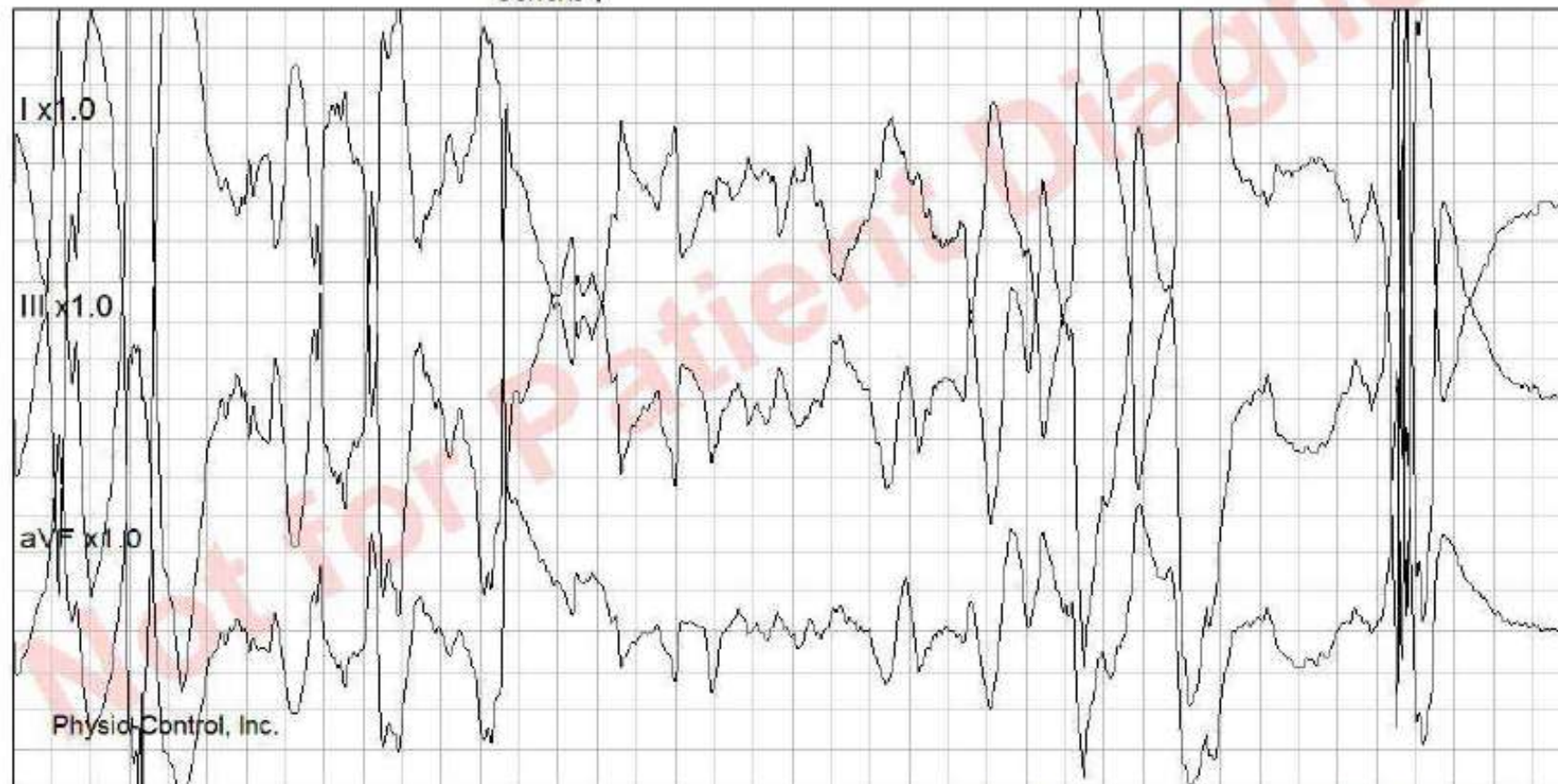


25mm/sec

ECG 1-30Hz Paddles 2.5-30Hz

MEDIC 5 EVERETT FIRE 3306808-005 LP1539798406

Generic ▼



25mm/sec
ECG 1-30Hz Paddles 2.5-30Hz

MEDIC 5 EVERETT FIRE 3306808-005 LP1539798406

Pre-shock

Shock 1, 300 J

Post-shock

I x1.0

III x1.0

aVF x1.0

Physio-Control, Inc.

25mm/sec

ECG 1-30Hz Paddles 2.5-30Hz

MEDIC 5 EVERETT FIRE 3306808-005 LP1539798406

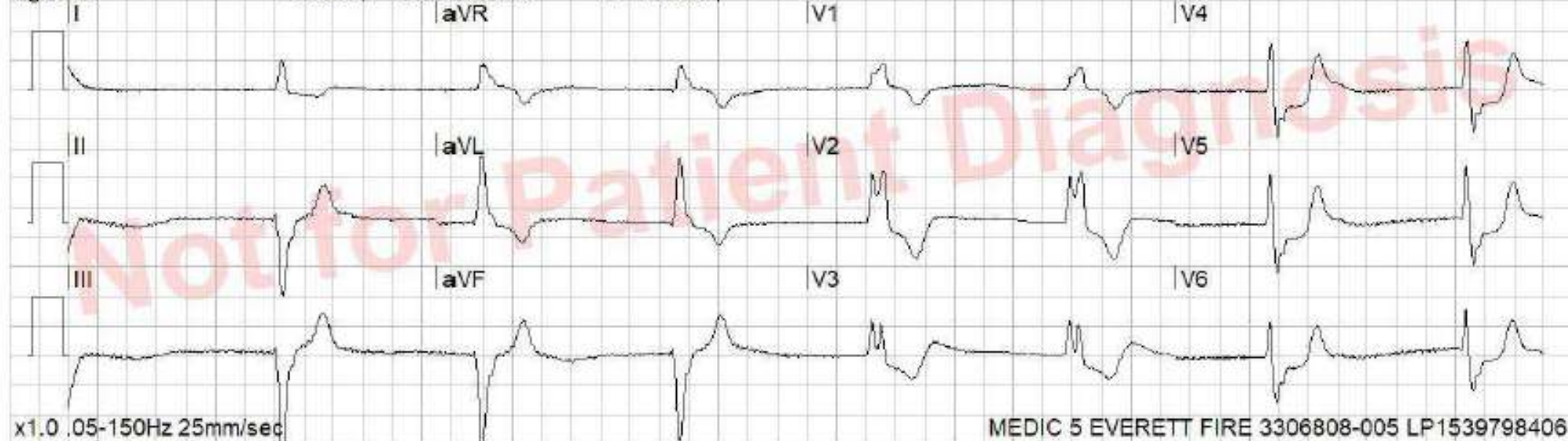
Name: ABU-EMARAH, ABDOL-KARIM

Incident #: 2017-00019911

Date: 10/31/2017

Patient 101

Name:	12-Lead 1	HR 44bpm	Abnormal ECG **Unconfirmed**
ID: 103117052259	10/31/2017	5:53:49 AM	A-V dissociation
Patient ID:	PR 0.206s	QRS 0.158s	RBBB with left anterior fascicular block
Incident ID:	QT/QTc:	0.462s/0.434s	Lateral ST-T abnormality suggests myocardial injury/ischemia
Age: 72	Sex: M	P-QRS-T Axes:	77°-73°95°



x1.0 .05-150Hz 25mm/sec

Physio-Control, Inc. Comments:

MEDIC 5 EVERETT FIRE 3306808-005 LP1539798406

Next....

- HR remains in 40s, BP remains around 100 systolic
- Intubated
- Starts gagging on tube

Vent. rate 49 BPM
PR interval * ms
QRS duration 130 ms
QT/QTc 506/457 ms
P-R-T axes * -58 -88

Undetermined rhythm
Left axis deviation
Non-specific intra-ventricular conduction block
T wave abnormality, consider inferolateral ischemia
Abnormal ECG

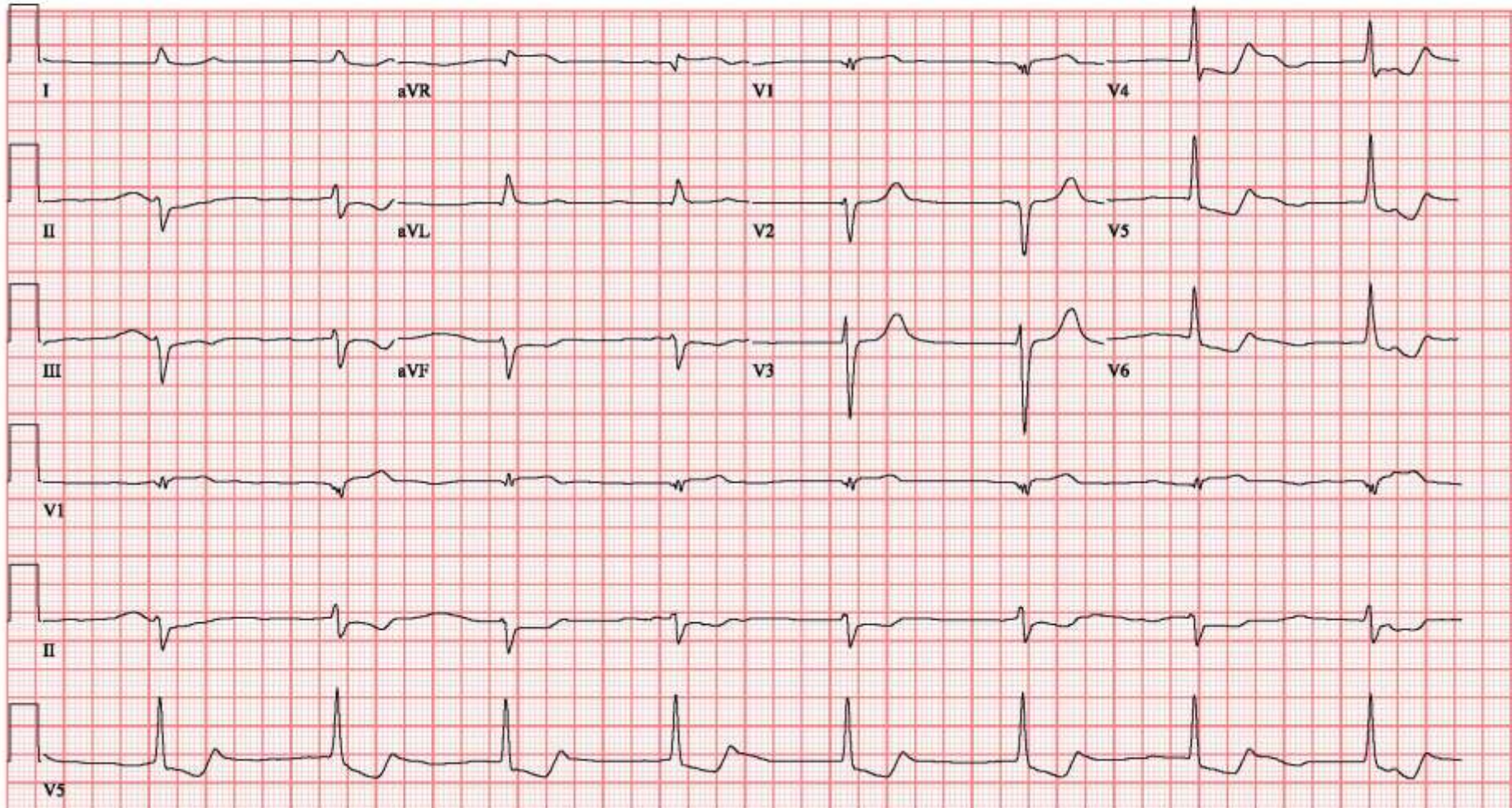
When compared with ECG of 11-SEP-2017 19:27,
Current undetermined rhythm precludes rhythm comparison, needs review
Questionable change in QRS duration

Confirmed by BEECROFT MD, MATTHEW (4245), editor PILCHARD, MIRANDA (20015) on 11/1/2017
8:20:21 AM

Technician: JS
Test ind:POST CODE

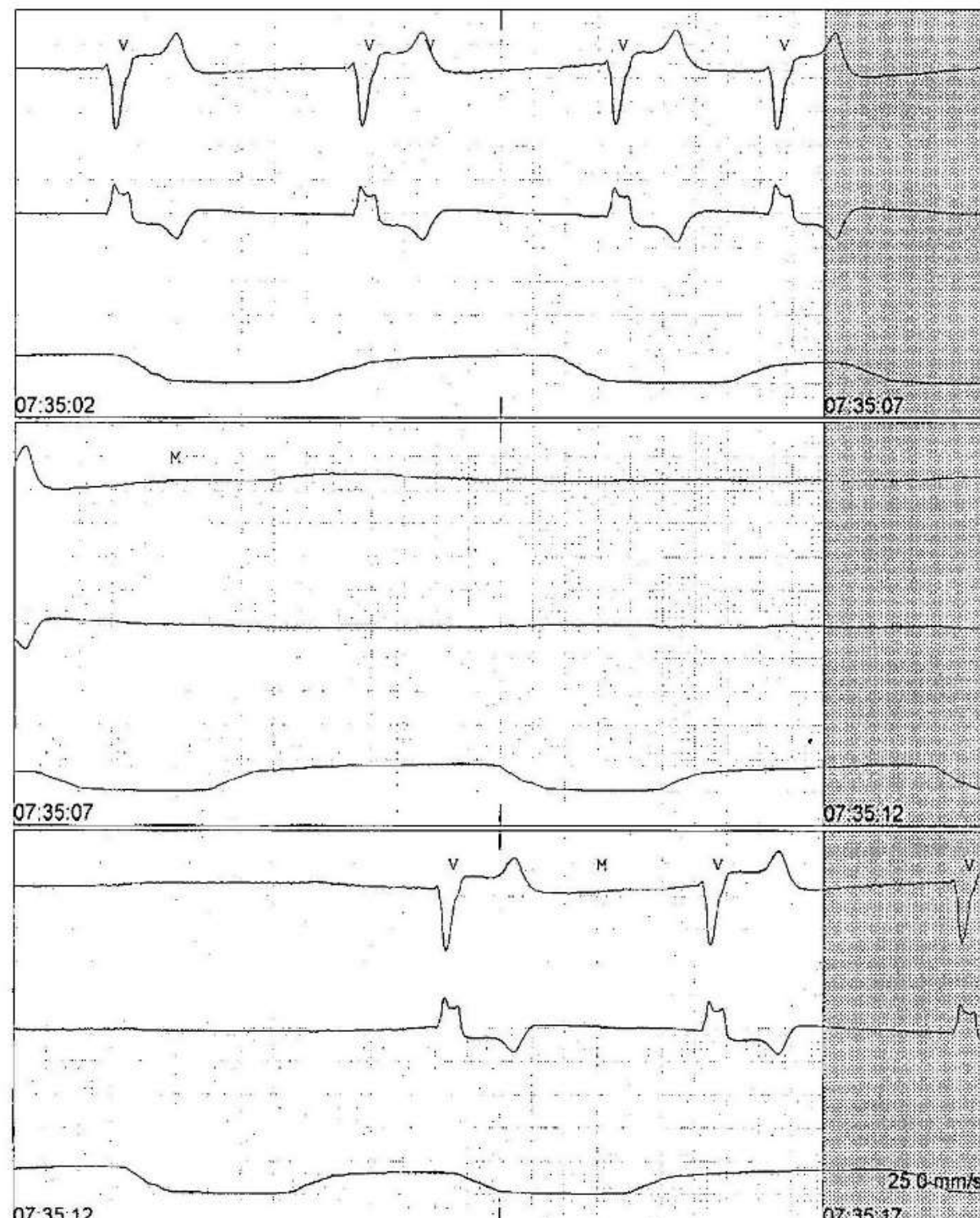
Referred by: BEECROFT

Electronically signed by: MATTHEW BEECROFT MD



Now what

- Slows down to 30s and then spaces out without morphology changing
- Pause of about 10 seconds.....does this a couple times
- CPR initiated and he grunts a little and winces
- Held and rhythm is back at 30 then drifts up to 40s
- BP is 88/40



Bradycardia and trouble

- Don't let them DIE
- D – Drugs
- I – Ischemia
- E – Electrolytes

ID:000818917

31-OCT-2017 07:42:44

Providence Reg Med Cnt Everett

Vent. rate	45	BPM
PR interval	*	ms
QRS duration	128	ms
QT/QTc	472/408	ms
P-R-T axes	* -74	80

Wide QRS rhythm with occasional Premature ventricular complexes

Left axis deviation

Right bundle branch block

Abnormal ECG

When compared with ECG of 31-OCT-2017 06:22, (unconfirmed)

Previous ECG has undetermined rhythm, needs review

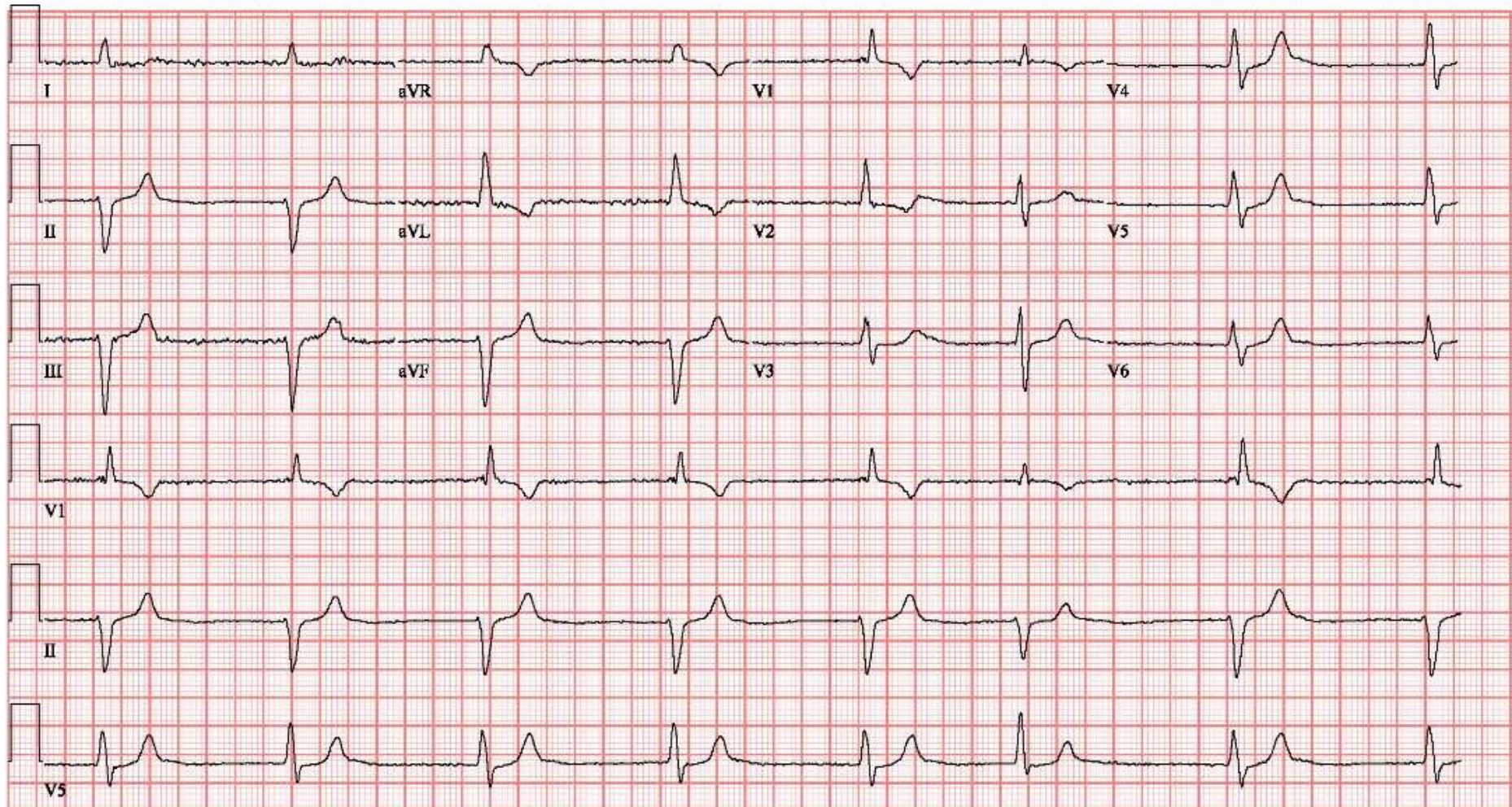
Confirmed by BEECROFT MD, MATTHEW (4245), editor PILCHARD, MIRANDA (20015) on 11/1/2017 8:20:16 AM

Technician: KB

Test ind: CARDIAC ARREST

Referred by: BEECROFT

Electronically signed by: MATTHEW BEECROFT MD



Med list

- Albuterol
- Amlodipine
- Aspirin
- Lipitor
- Neurontin
- Glipizide
- Hydrochlorothiazide
- Prinivil
- Glucophage
- Remeron
- Prilosec
- Quetiapine
- Tamsulosin
- Brilinta
- Tramadol
- Verapamil SR

Med list

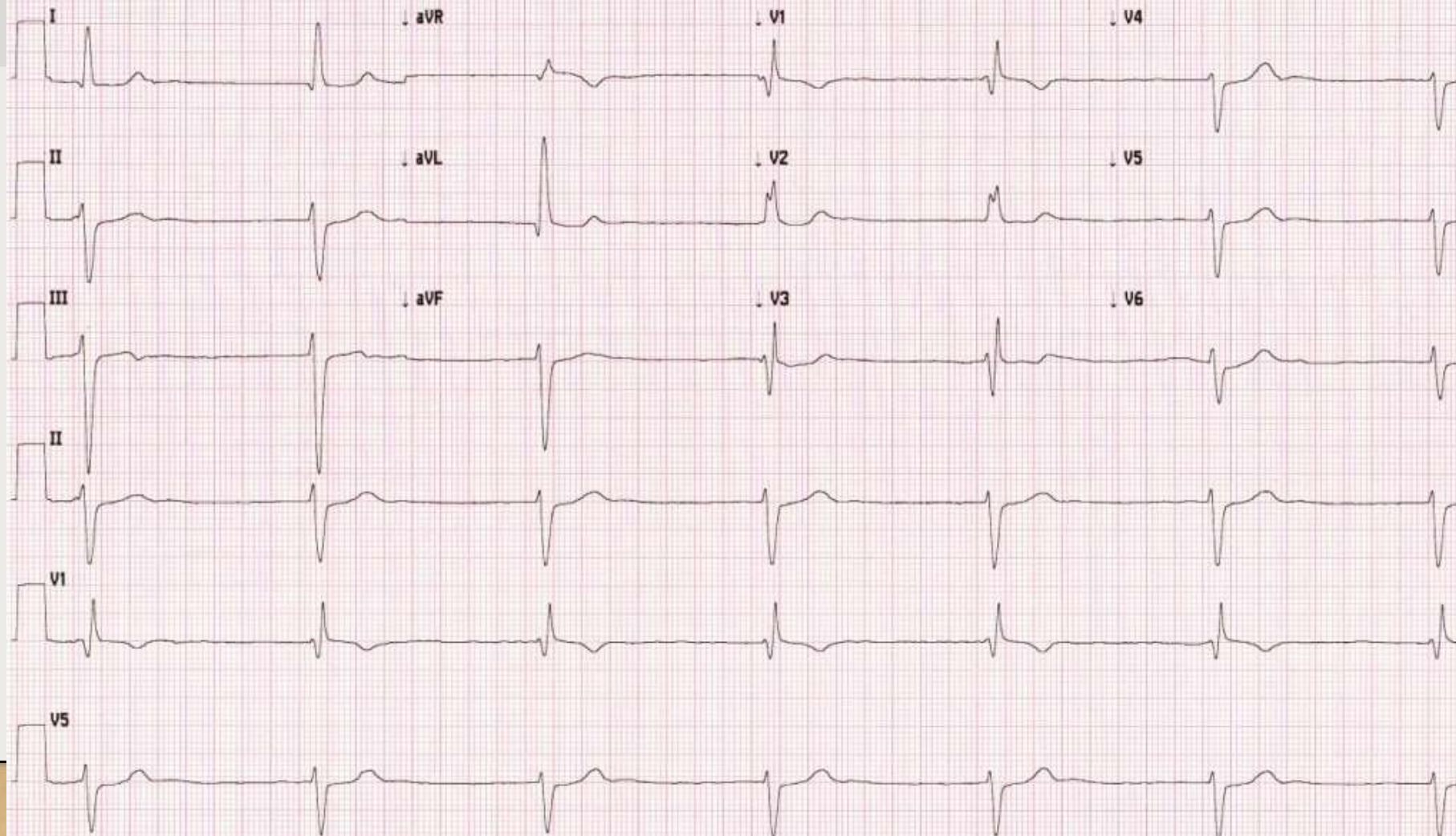
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- Amlodipine
- Aspirin
- Lipitor
- Neurontin
- Glipizide
- Hydrochlorothiazide
- Prinivil
- Glucophage
- Remeron
- Prilosec
- Quetiapine
- Tamsulosin
- Brilinta
- Tramadol
- Verapamil SR

Vent rate: 37 BPM
PR int: * ms
QRS dur: 146 ms
QT/QTc: 513/429 ms
P-R-T axes: * -60 22

UNCERTAIN REGULAR RHYTHM
RIGHT BUNDLE BRANCH BLOCK
LEFT ANTERIOR FASCICULAR BLOCK
VOLTAGE CRITERIA FOR LVH
POSSIBLE ANTERIOR MYOCARDIAL INFARCTION, PROBABLY OLD
ABNORMAL ECG
WARNING: DATA QUALITY MAY AFFECT INTERPRETATION

UNCONFIRMED REPORT

Vince DiGiulio, EMT-CC - EMS12Lead.com

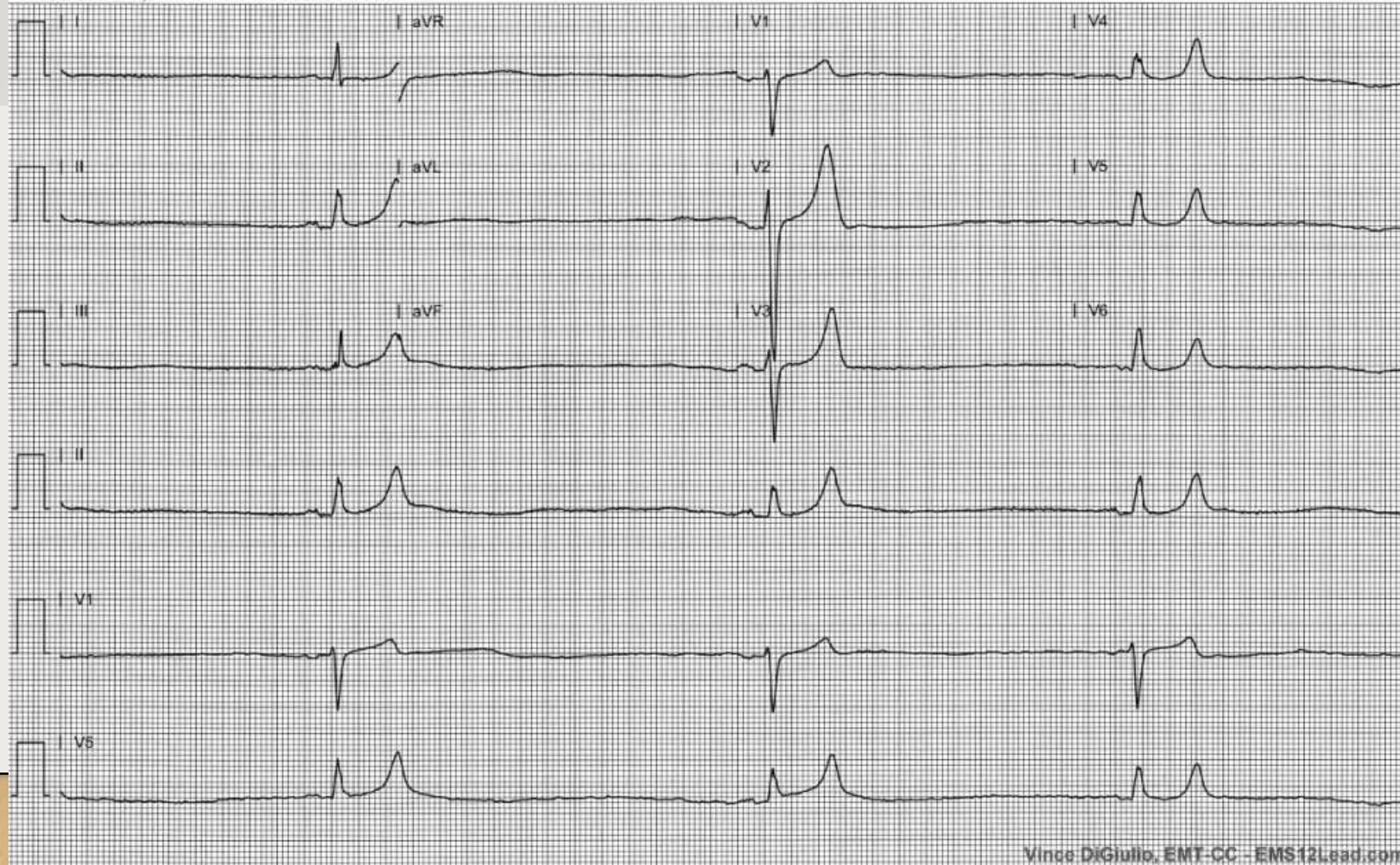


Vince DiGiulio, EMT-CC - EMS12Lead.com

Vent rate: 20 BPM
PR int: 131 ms
QRS dur: 134 ms
QT/QTc: 581/302 ms
P-R-T axes: 57 63 75



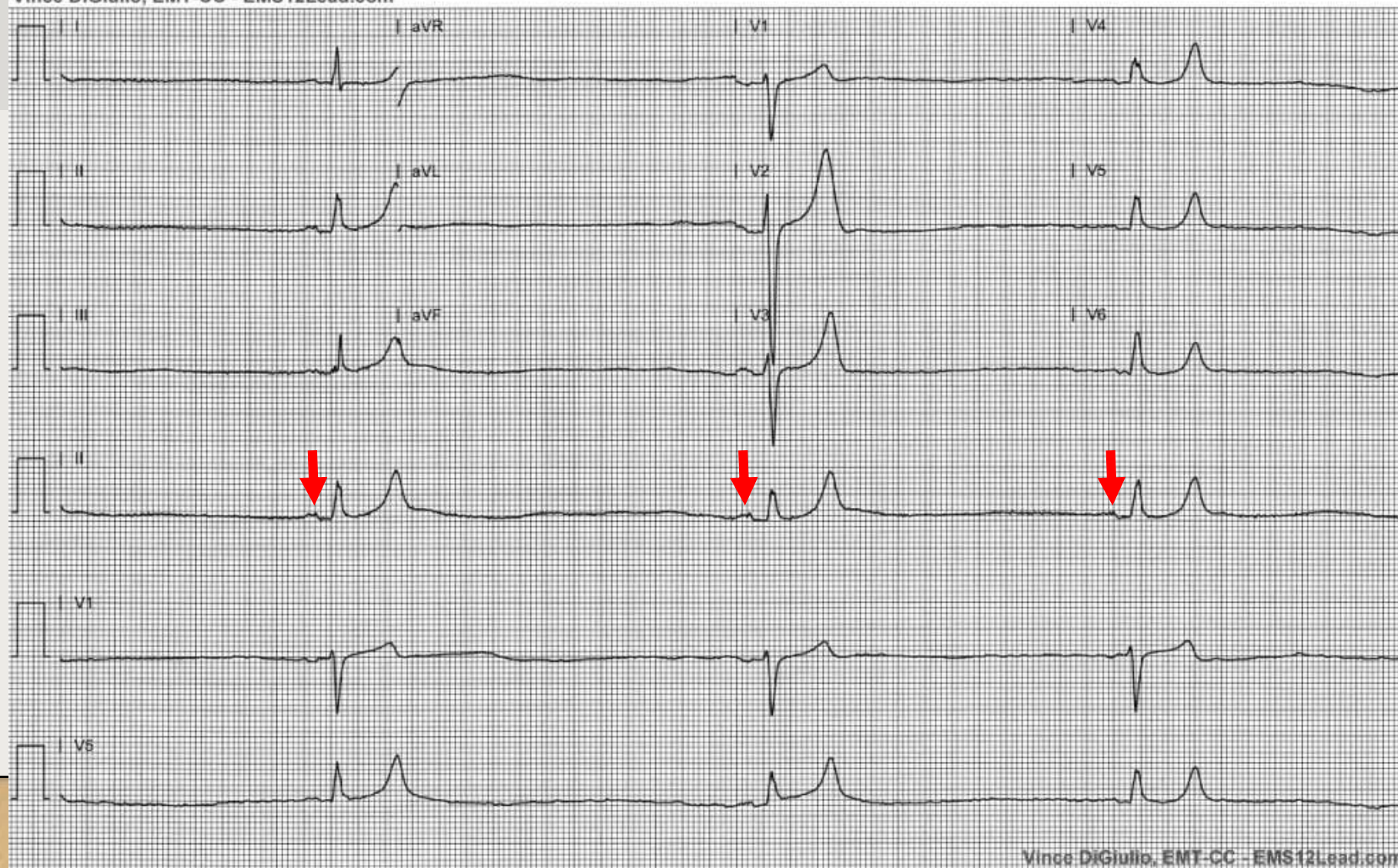
Vince DiGiulio, EMT-CC - EMS12Lead.com



Vent rate: 20 BPM
PR int: 131 ms
QRS dur: 134 ms
QT/QTc: 581/302 ms
P-R-T axes: 57 63 75

..PEDIATRIC ECG INTERPRETATION
SINUS BRADYCARDIA
INTRAVENTRICULAR CONDUCTION DELAY
ABNORMAL ECG
UNCONFIRMED REPORT

Vince DiGiulio, EMT-CC - EMS12Lead.com



Vince DiGiulio, EMT-CC - EMS12Lead.com

25 mm/s 10 mV 0.05-40 Hz

Bradycardia and trouble

- Don't let them DIE
- D – Drugs
- I – ischemia
- E – Electrolytes
- Standard treatments:
- Atropine
- Dopamine
- Pacing

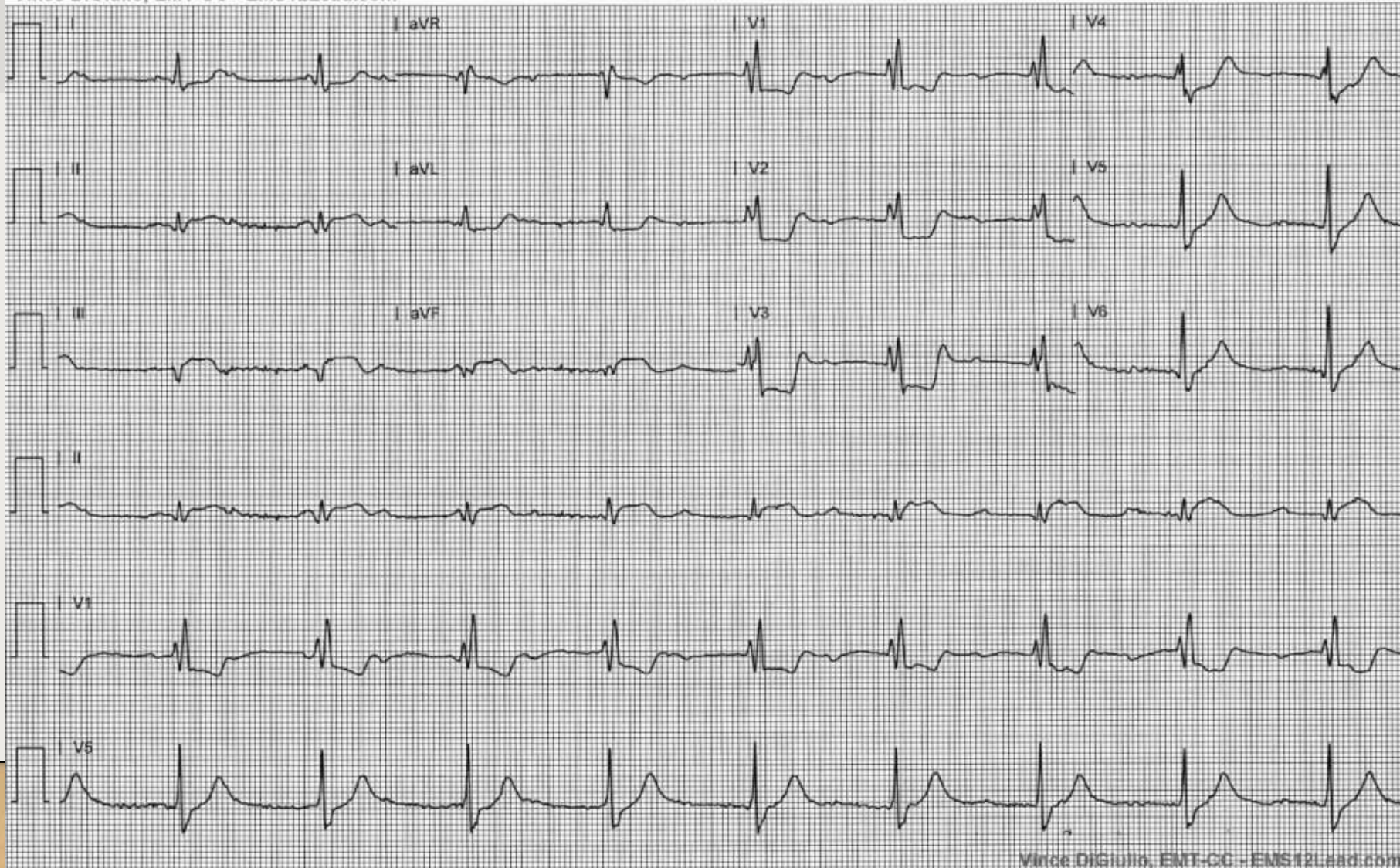
Case #7 – Crushing substernal chest pain

- 65 yo male with history of HTN, diabetes who smokes
- Diaphoretic and clutching his chest
- Takes no meds
- BP 120/60, HR 45

Vent rate: 56 BPM
PR int: 0 ms
QRS dur: 146 ms
QT/QTc: 467/459 ms
P-R-T axes: 999 -2 23

IDIO' RICULAR RHYTHM
ABNC AL ECG
UNCONFIRMED REPORT

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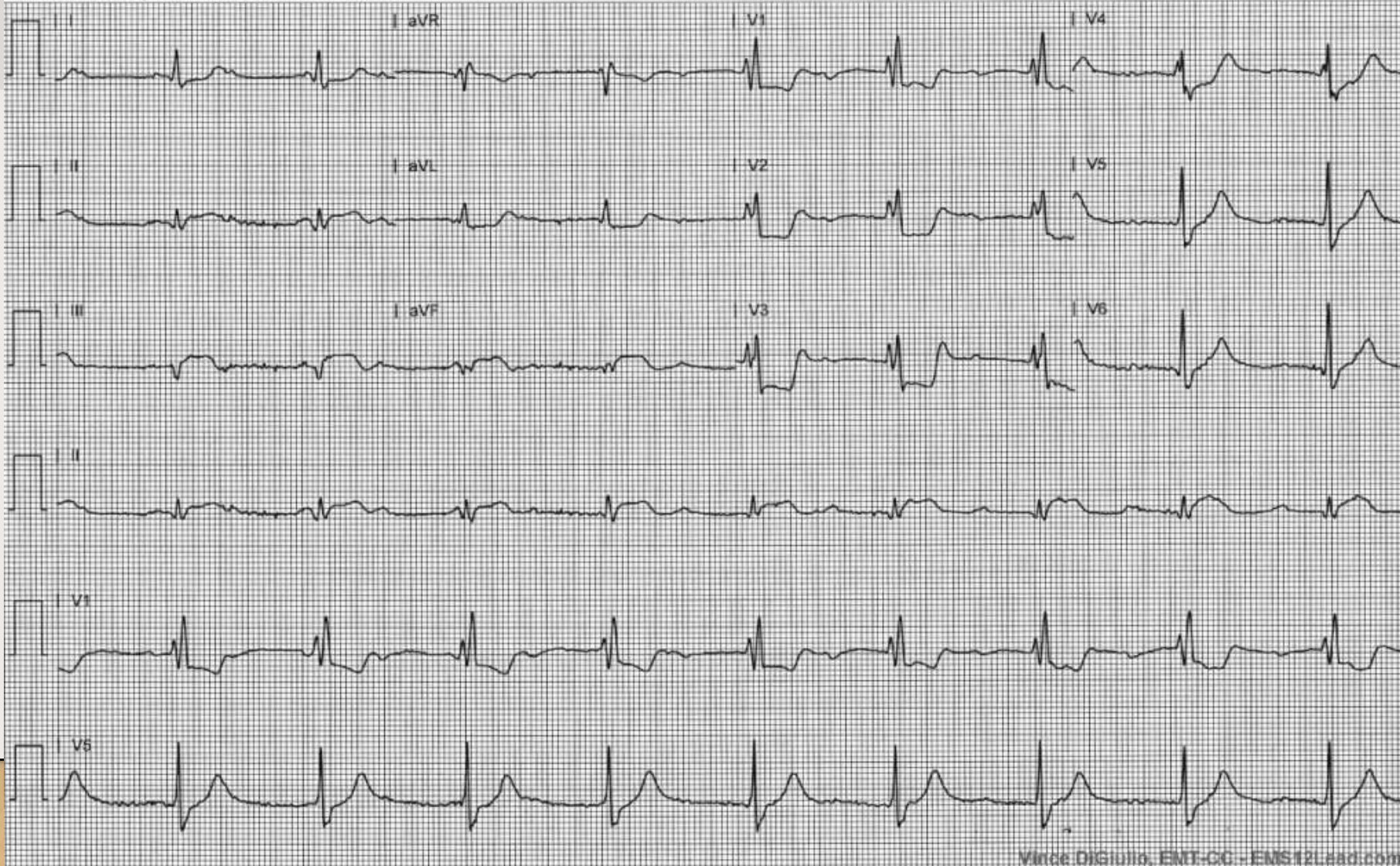


Vent rate: 56 BPM
PR int: 0 ms
QRS dur: 146 ms
QT/QTc: 467/459 ms
P-R-T axes: 999 -2 23

IDIO- RIGULAR RHYTHM
ABNC-AL ECG
UNCONFIRMED REPORT

Fast or Slow?
Narrow or Wide?
Reg or Irreg?

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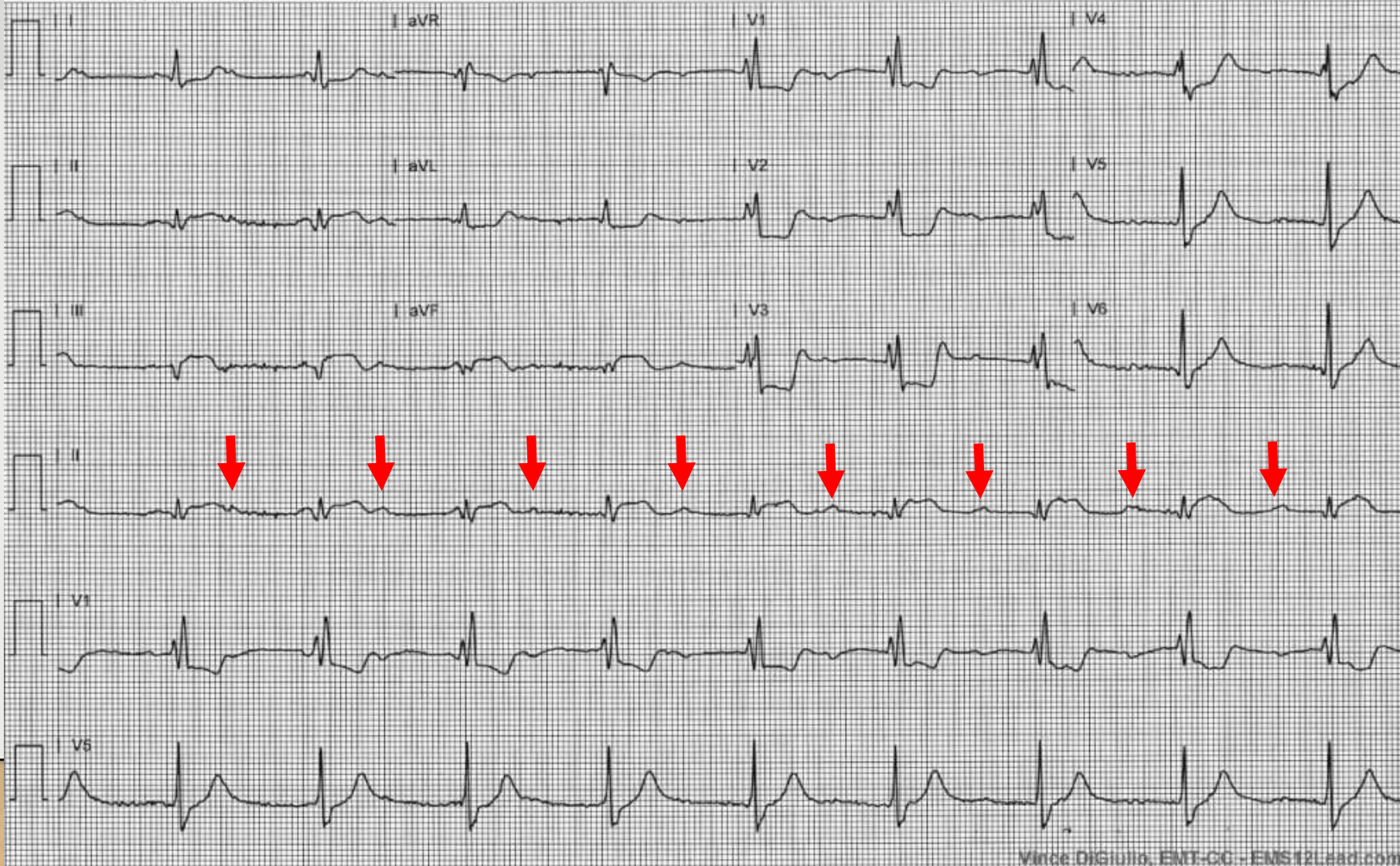


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UNCONFIRMED REPORT

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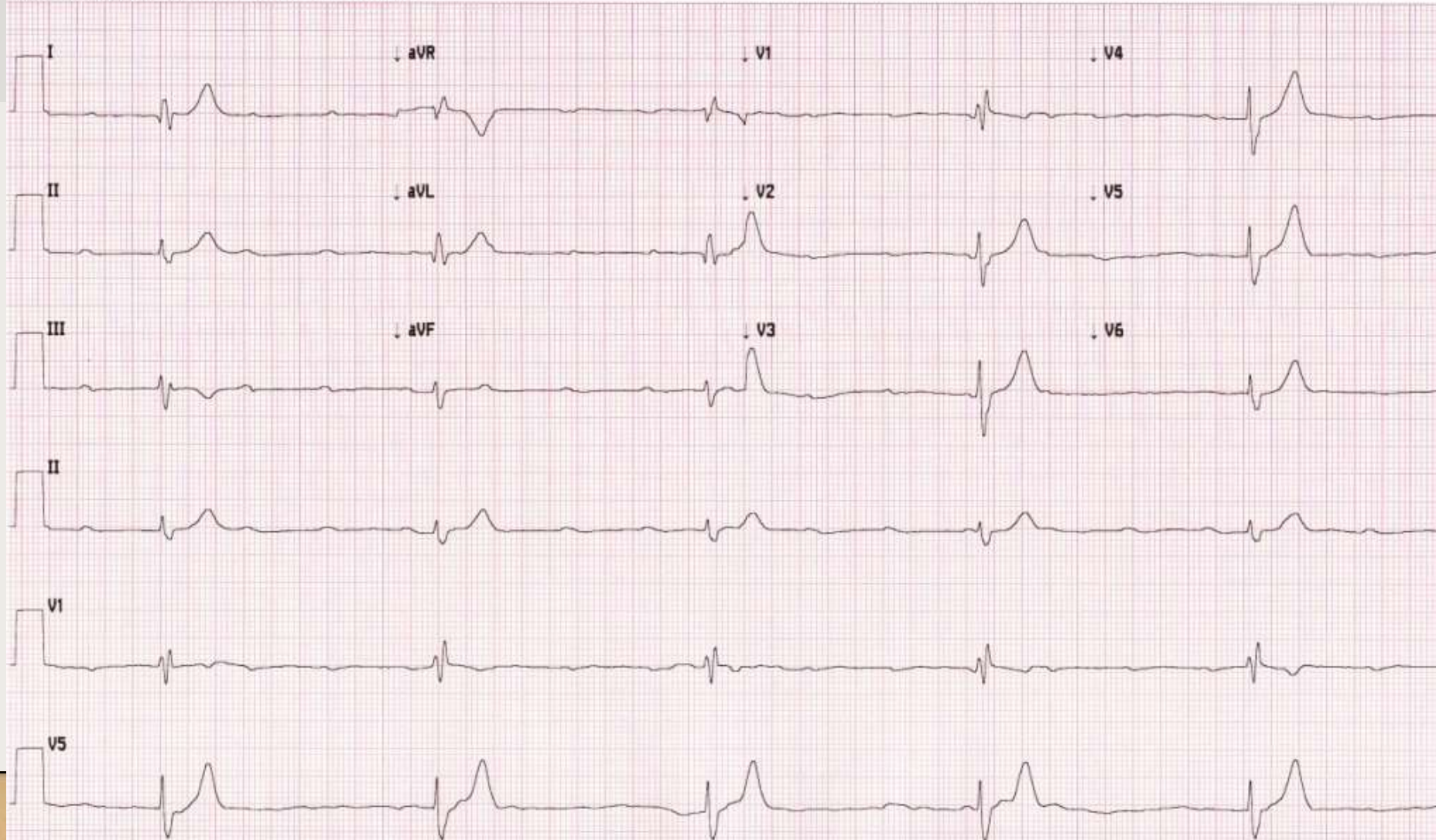
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Vent rate: 30 BPM
PR int: * ms
QRS dur: 118 ms
QT/QTc: 468/333 ms
P-R-T axes: * -29 6

ABNORMAL ECG

UNCONFIRMED REPORT

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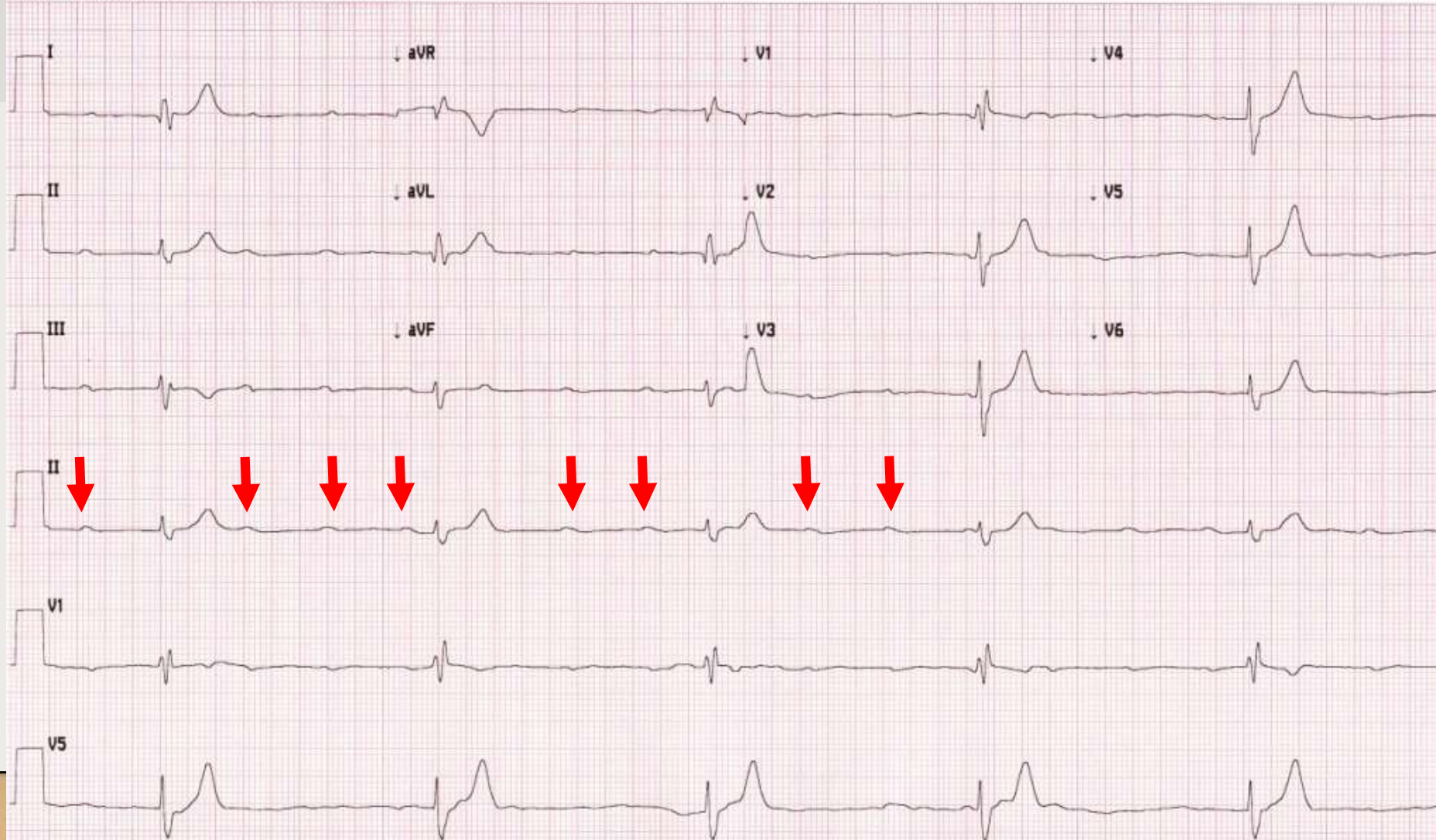
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Vent rate: 30 BPM
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SINUS RHYTHM WITH HIGH GRADE AV BLOCK
INDETERMINATE AXIS
INCOMPLETE RIGHT BUNDLE BRANCH BLOCK
POSSIBLE LATERAL MYOCARDIAL INFARCTION, OF INDETERMINATE AGE
ABNORMAL ECG

UNCONFIRMED REPORT

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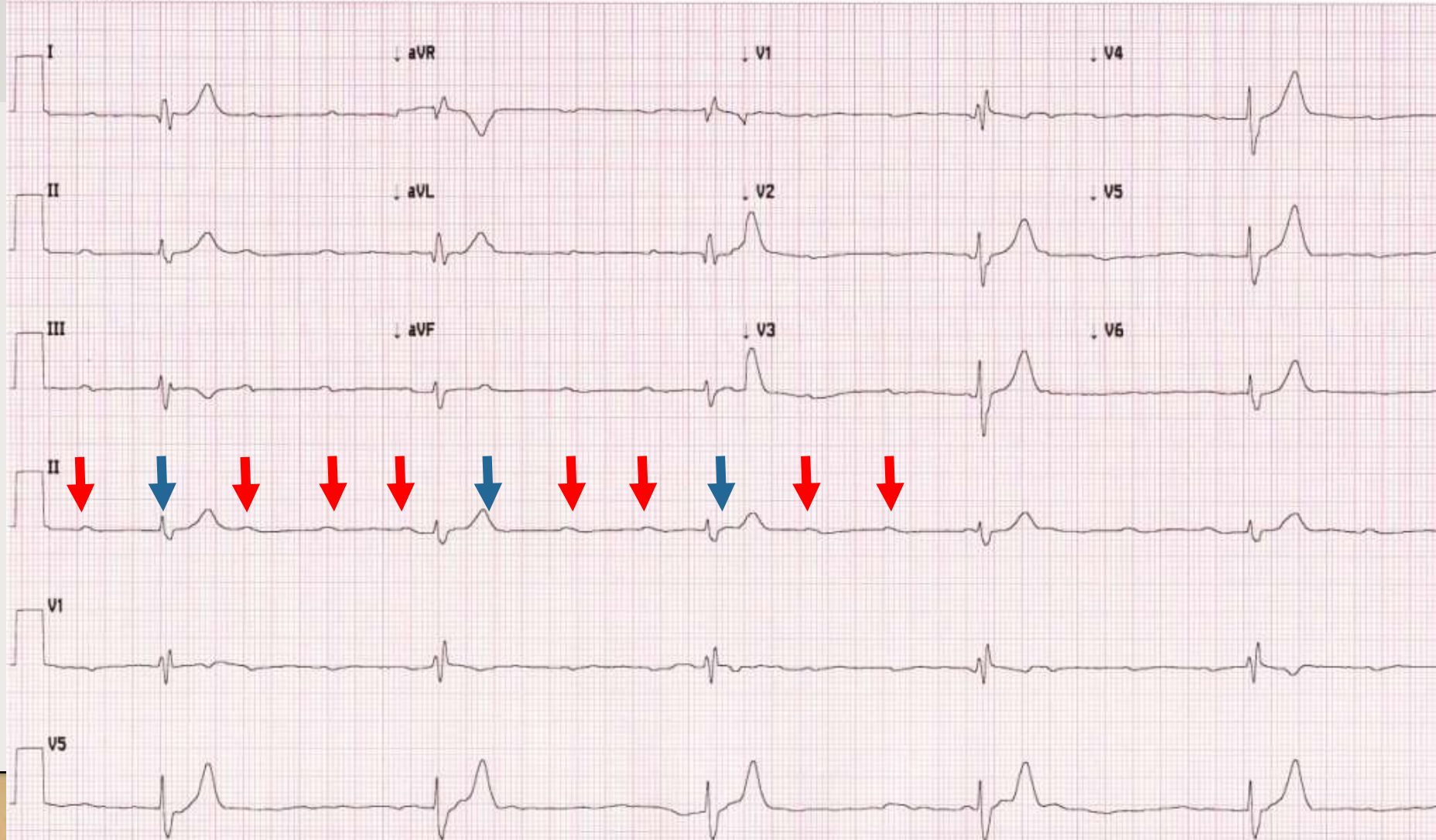
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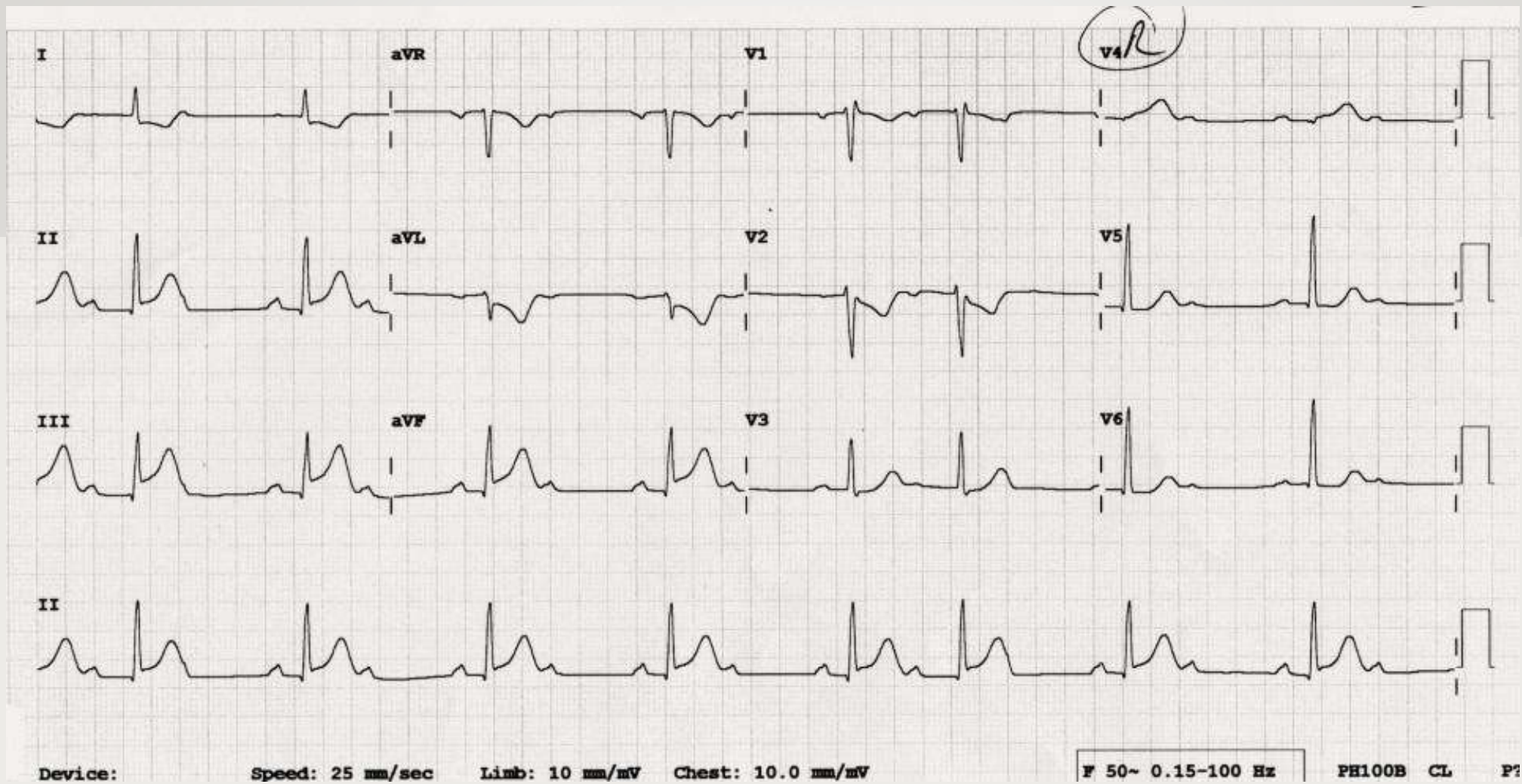
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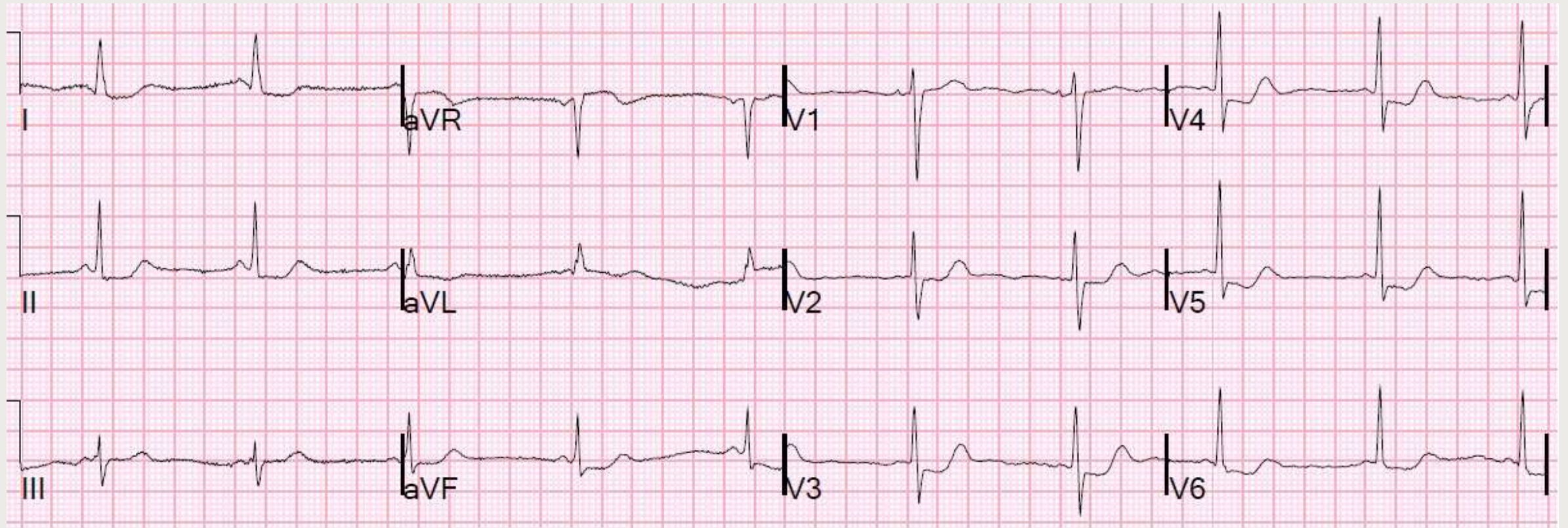
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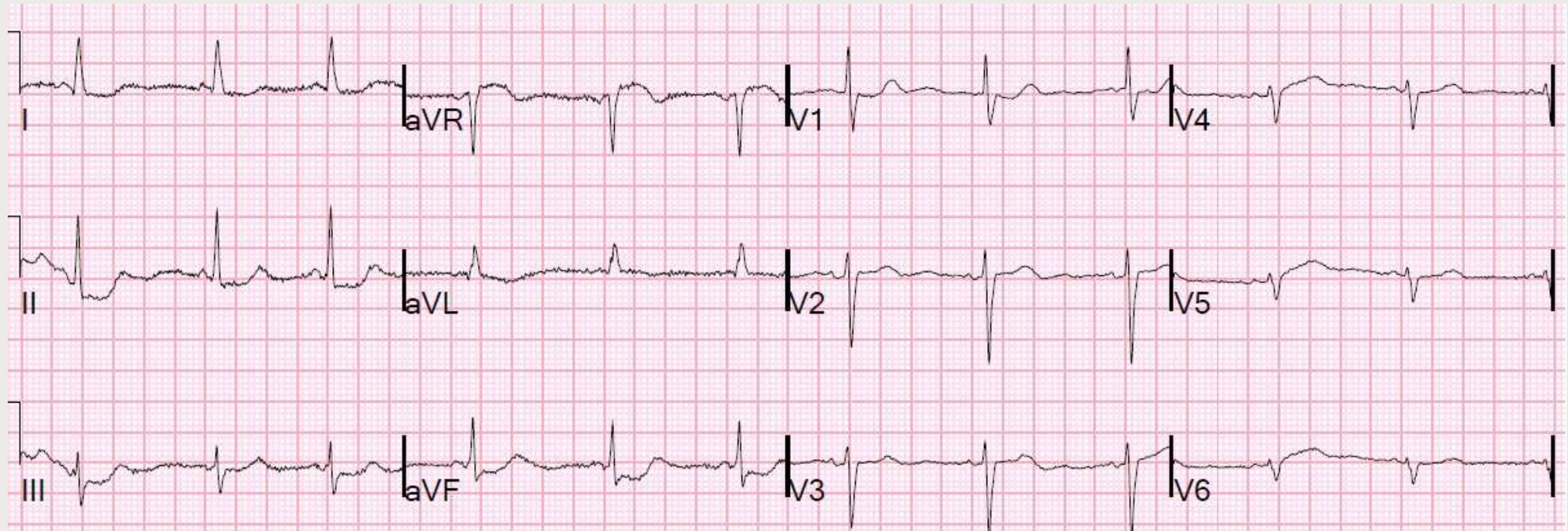
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Right sided MI



Here's with Right sided leads



Bradycardia and trouble

- Don't let them DIE
- D – Drugs
- I – ischemia
- E – Electrolytes

Bradycardia and trouble

- Don't let them DIE
- **D – Drugs**
- I – ischemia
- E – Electrolytes
- Beta Blockers
- Calcium channel blockers
- Digoxin
- Clonidine (visine, afrin)
- TCA's
- Flexeril
- Opiates
- Supplements

Bradycardia and trouble

- Don't let them DIE
- D – Drugs
- I – ischemia
- E – Electrolytes
- Typically associated with inferior MIs
- Complete HB with anterior MI has a poor prognosis

Non-toxicologic causes

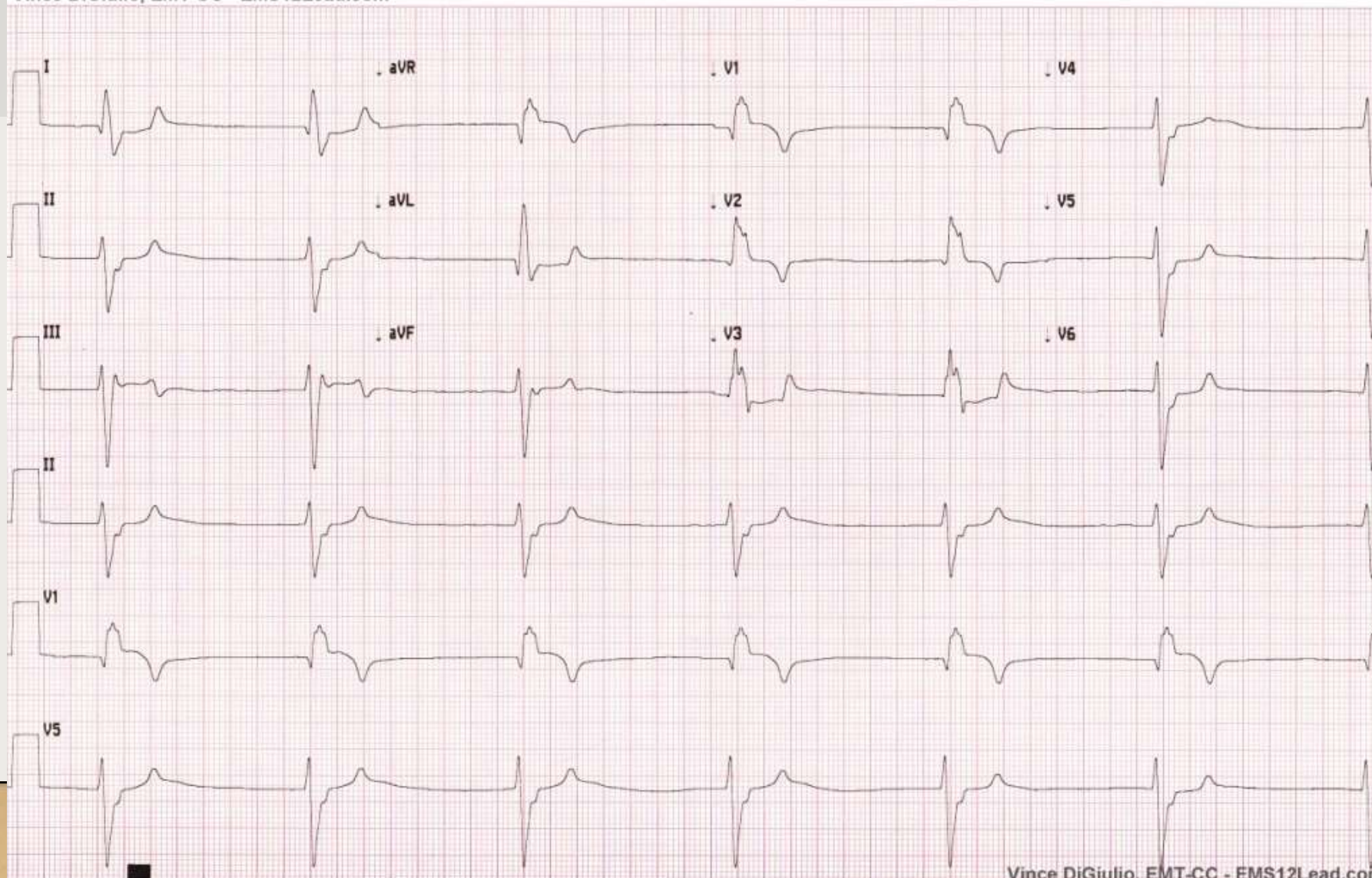
- MI with cardiogenic shock
- Hyperkalemia
- Myxedema coma
- Spinal cord injury
- Hypothermia

Vent rate: 38 BPM
PR int: * ms
QRS dur: 190 ms
QT/QTc: 529/447 ms
P-R-T axes: * -74 32

UNCERTAIN REGULAR RHYTHM
RIGHT BUNDLE BRANCH BLOCK
LEFT ANTERIOR FASCICULAR BLOCK
SEPTAL MYOCARDIAL INFARCTION, OF INDETERMINATE AGE
ABNORMAL ECG
WARNING: DATA QUALITY MAY AFFECT INTERPRETATION

UNCONFIRMED REPORT

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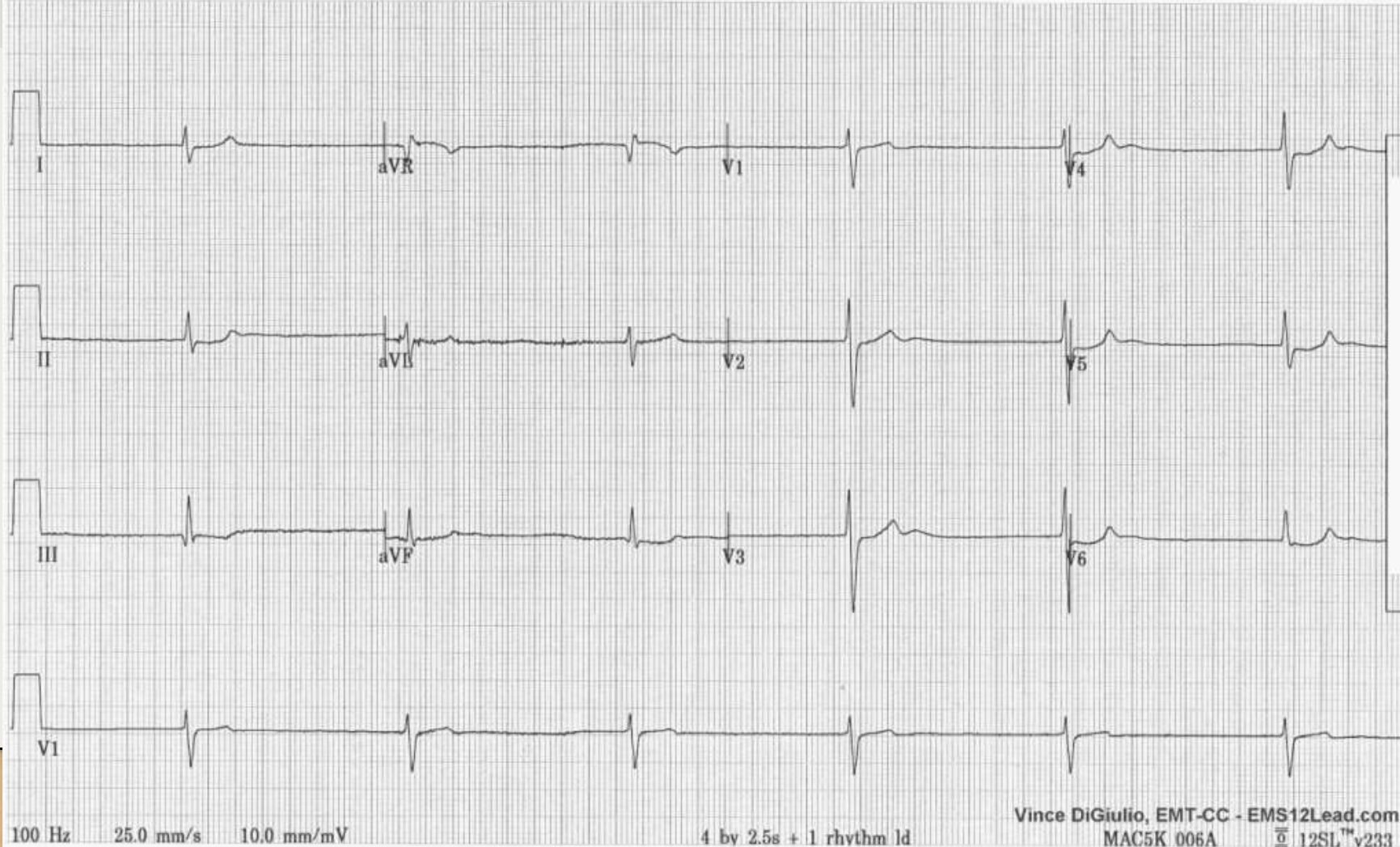


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Vent. rate 37 bpm
PR interval * ms
QRS duration 112 ms
QT/QTc 566/444 ms
P-R-T axes * 91 30

*** Age and gender specific ECG analysis ***
Junctional bradycardia
Rightward axis
ST abnormality, possible digitalis effect
Abnormal ECG

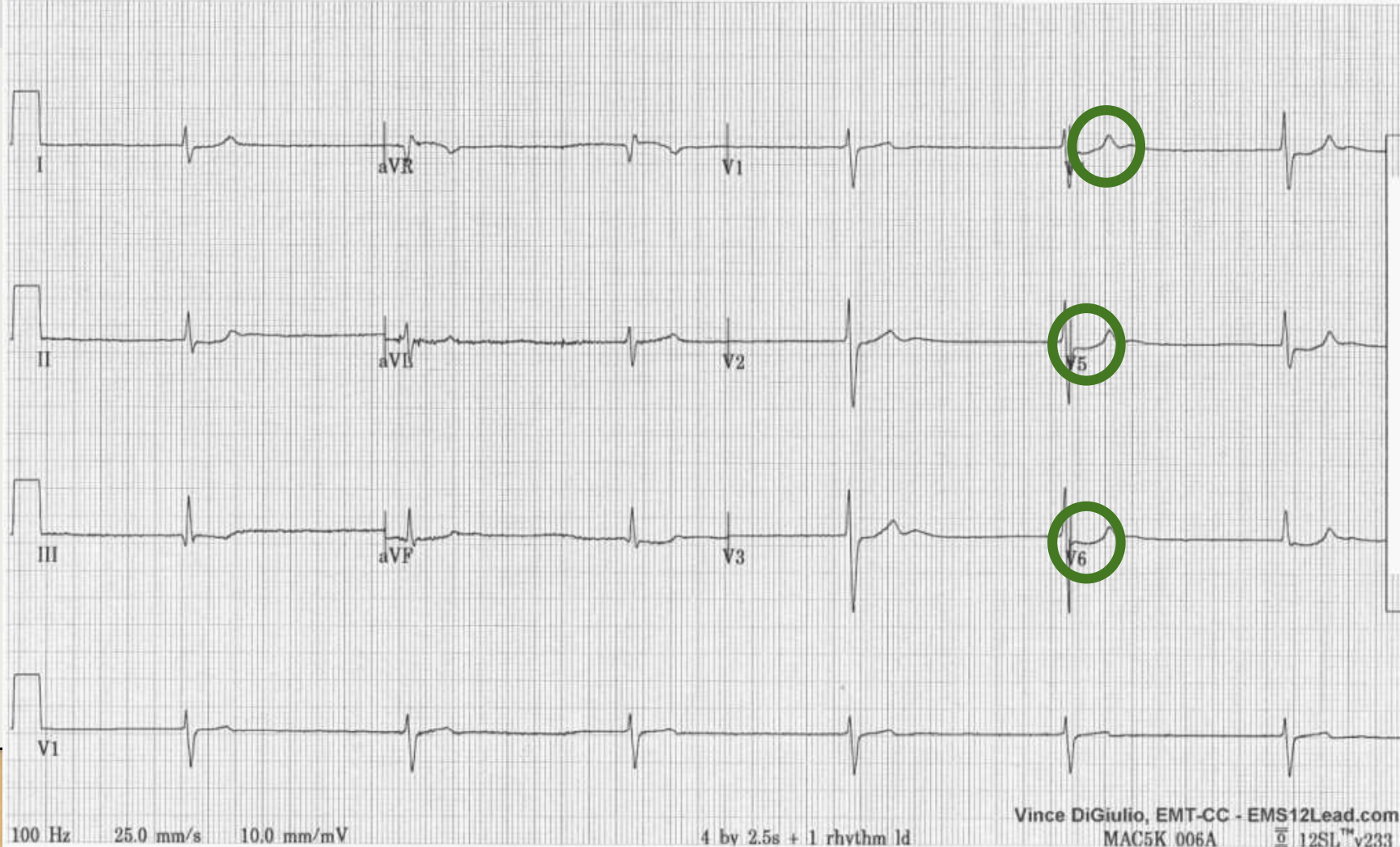
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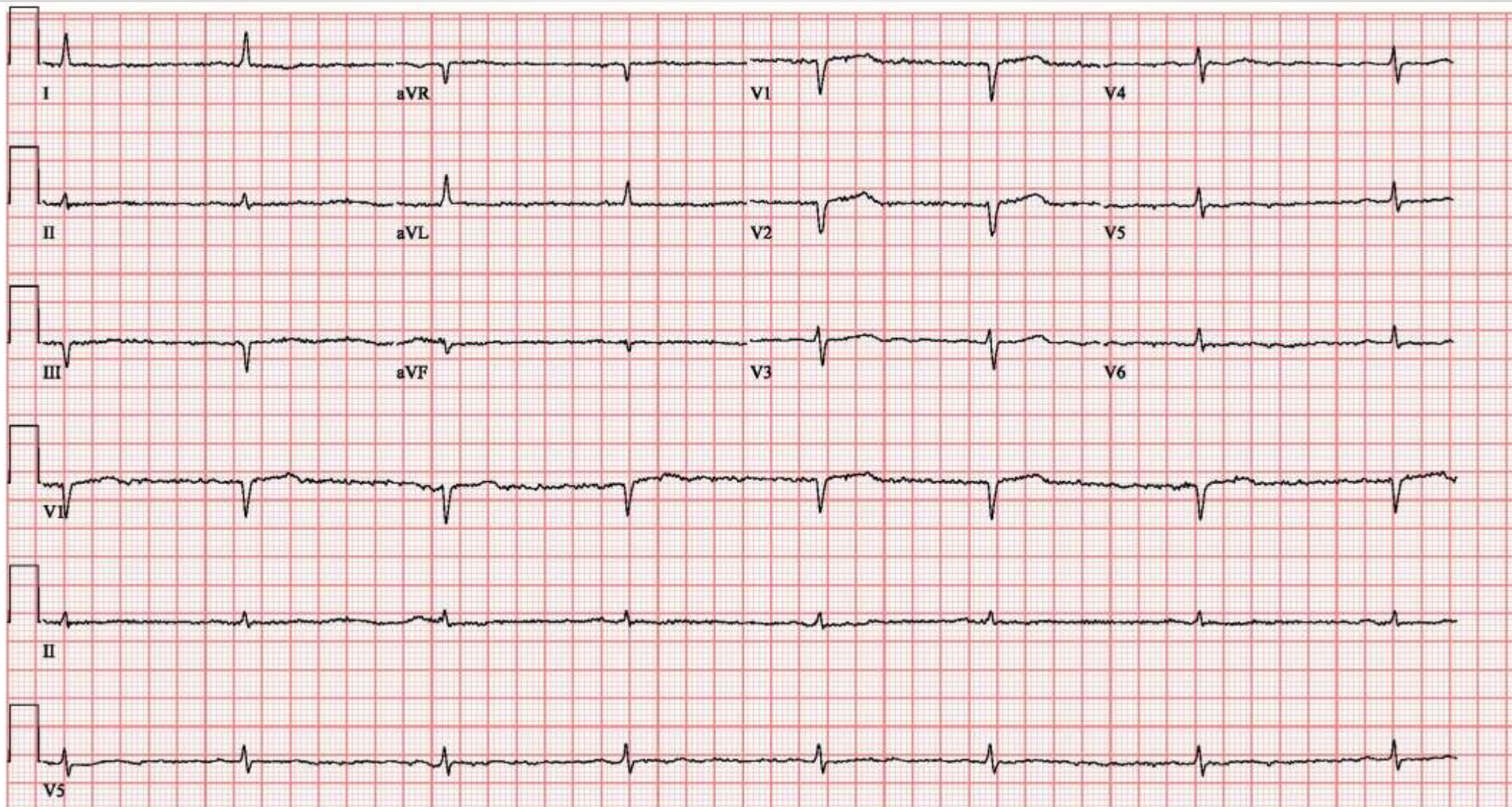


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Summary

- Have an approach.
- Don't let them DIE
- Atrium relationship to the ventricles
- Know your meds
- Still try atropine and pacing
- Be thorough