Tachycardia
When faster isn't better

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Disclosures

- I get nothing….from EVERYONE…
- I stink at Power Point
- I am not an electrophysiologist

Props and Kudos

- Dr. Amal Mattu

Mentorship and guidance

- www.ecgweekly.com

The little website that could…

- www.lifeinthefastlane.com

Gazillions of images

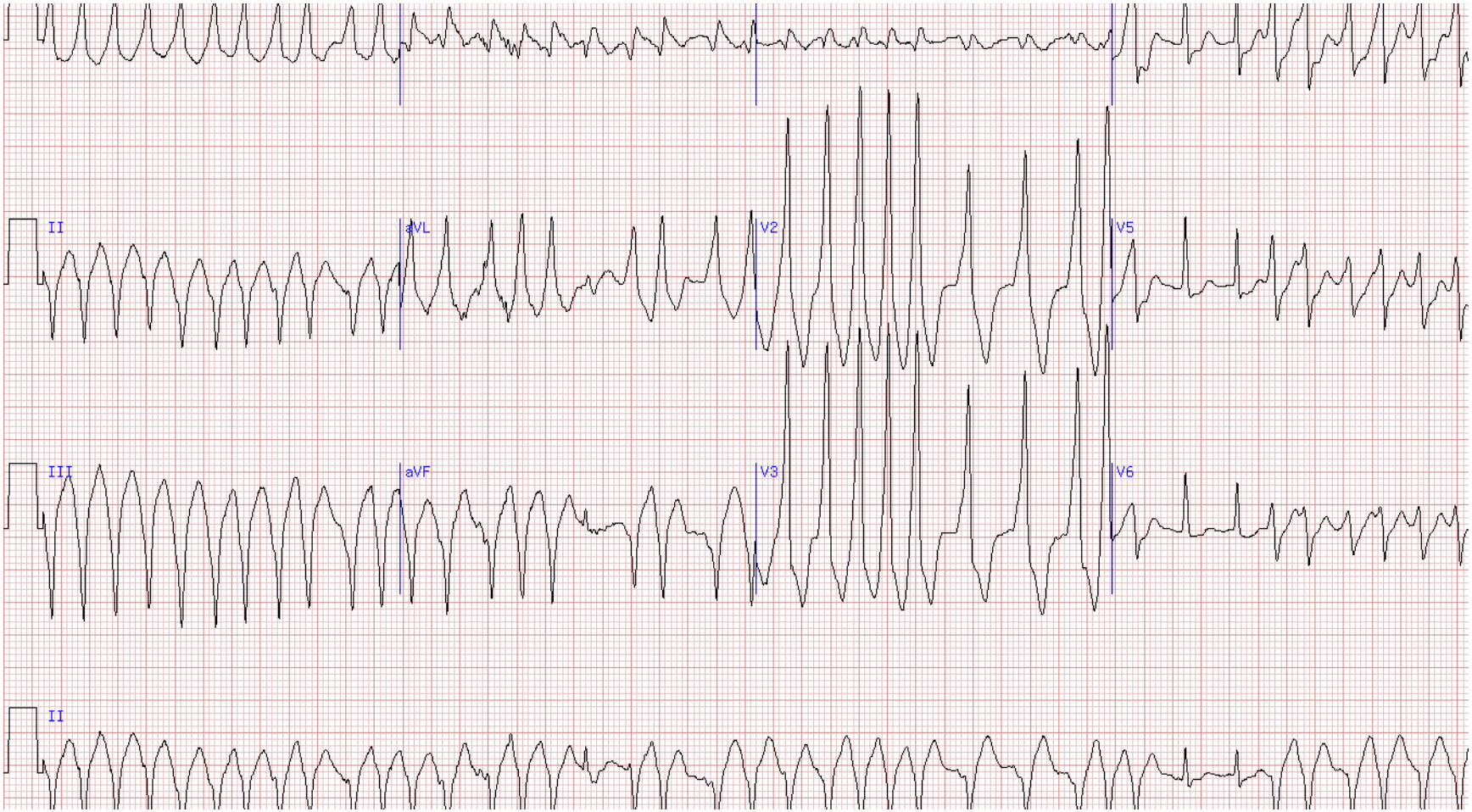
Objectives

- Crazy Cases
- Systematic Approach
- WPW and V-tach Mimics
- Case Discussions

Case #1
19 yo sudden onset dizziness

- Vitals BR 120/90 HR 200-225 RR 22 Temp 37.1
- Physical Exam
  - Appears pale and mildly SOB
  - Skin dry
  - Rales at bases
  - Pulses weak
  - HR 220 irreg

EKG



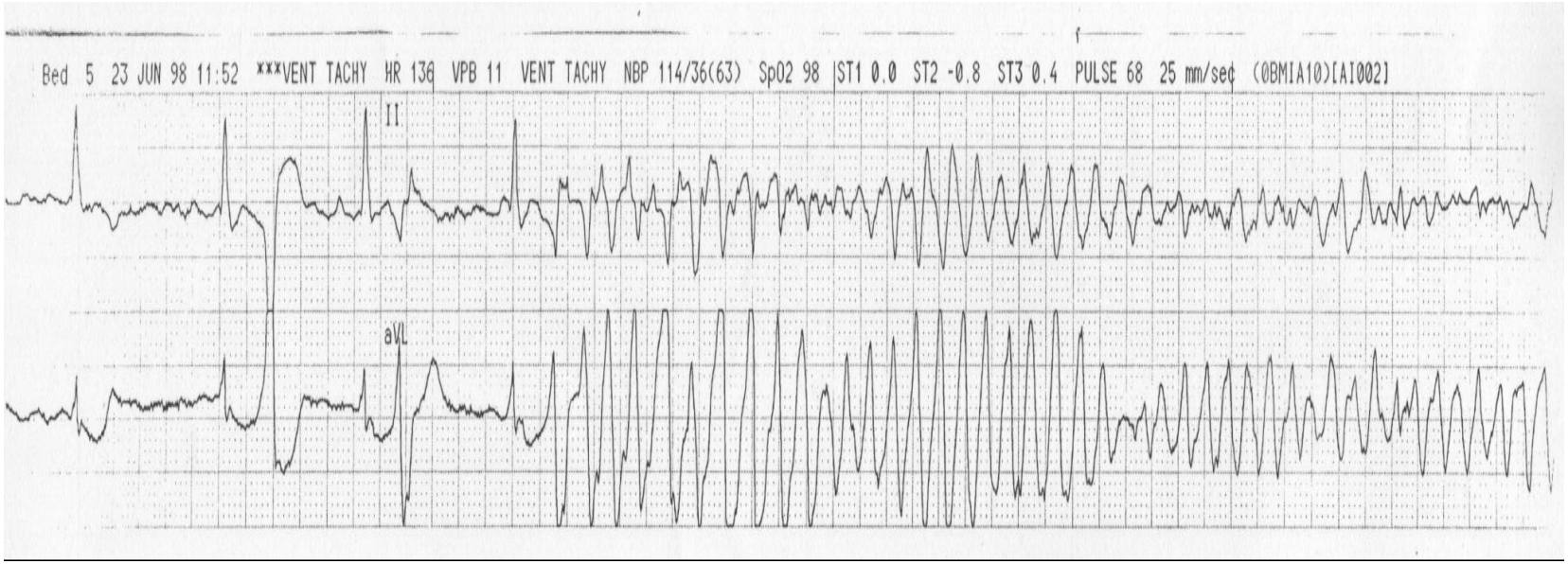
What is your next move???

- Adenosine?
- Nothing?
- Amiodarone?
- Diltiazem?
- Cardioversion?
- Procainamide?

Case #2
40 y.o sudden onset LOC

- On Monitor in ED
- Sudden onset seizure
- Pulseless

EKG


Bed 5 23 JUN 98 11:52 ***VENT TACHY HR 136 VPB 11 VENT TACHY NBP 114/36(63) SpO2 98 ST1 0.0 ST2 -0.8 ST3 0.4 PULSE 68 25 mm/sec (0BMIA10)[AI002]
II
aVL

Next Move?

- Magnesium?
- Adenosine?
- Amiodarone?
- Electricity?
- Call for help?
- Check lead placement?
- CPR?

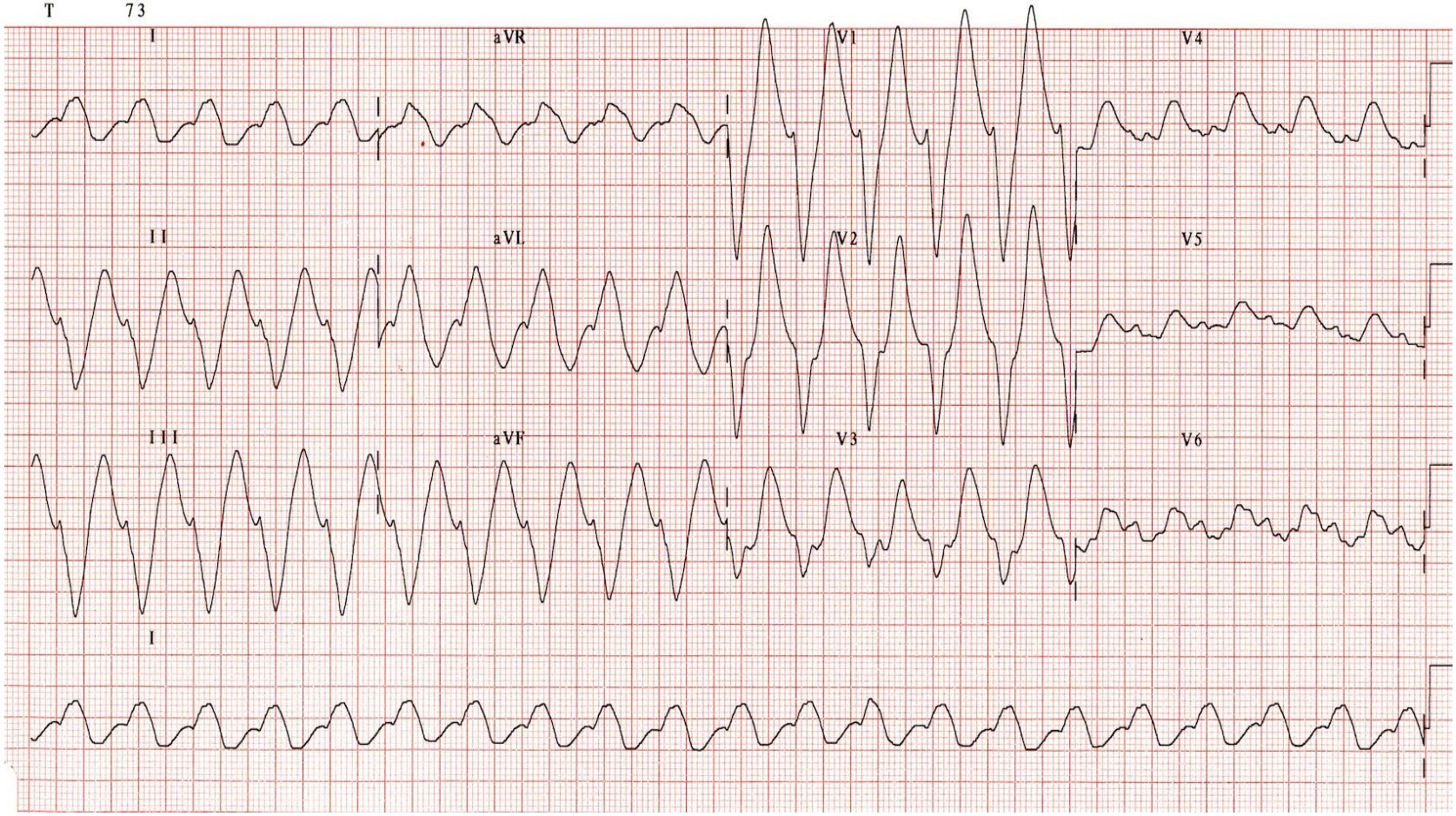
Case #3
35 y.o. “unresponsive”

- BP 90/60 RR 12 HR 120 Afeb

- Found in bed by family members

- Responds only to painful stimuli

EKG



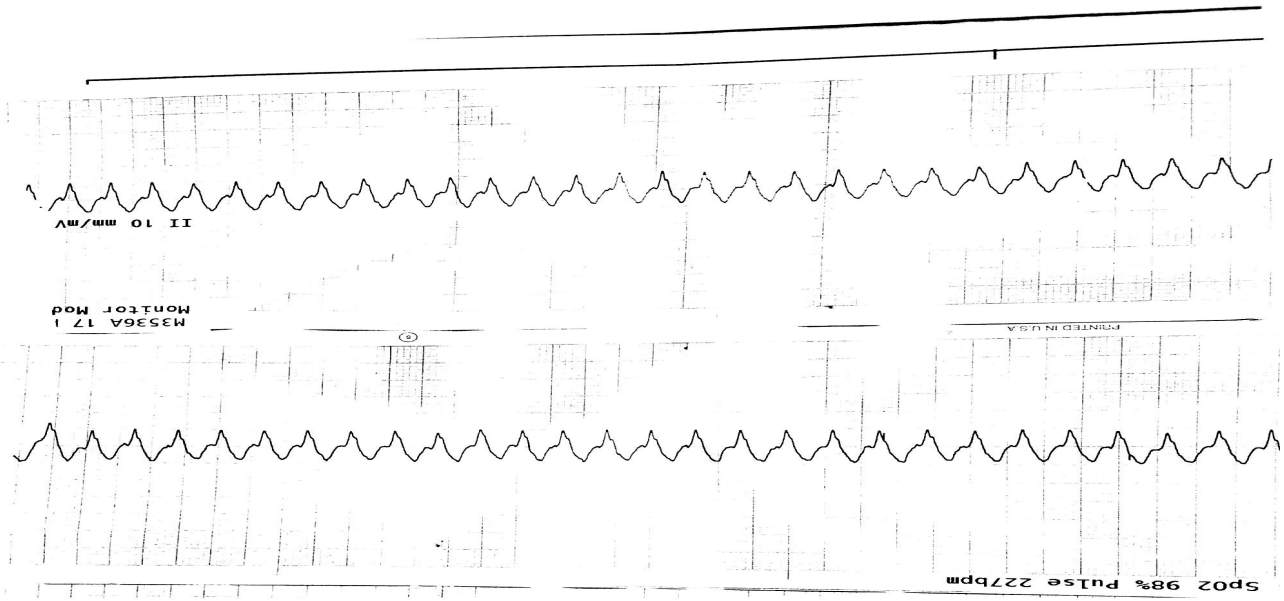
Next move?

- Intubation?
- Amiodarone?
- Electricity?
- Magnesium?
- Adenosine?
- NaHco3?
- Ca 2+?

Case #4
56 y.o Sudden onset Palpitations

- BP 120/90 HR 220 RR 18 afeb
- Anxious
- Diaphoretic but well perfused

EKG
EMS Rhythm Strip

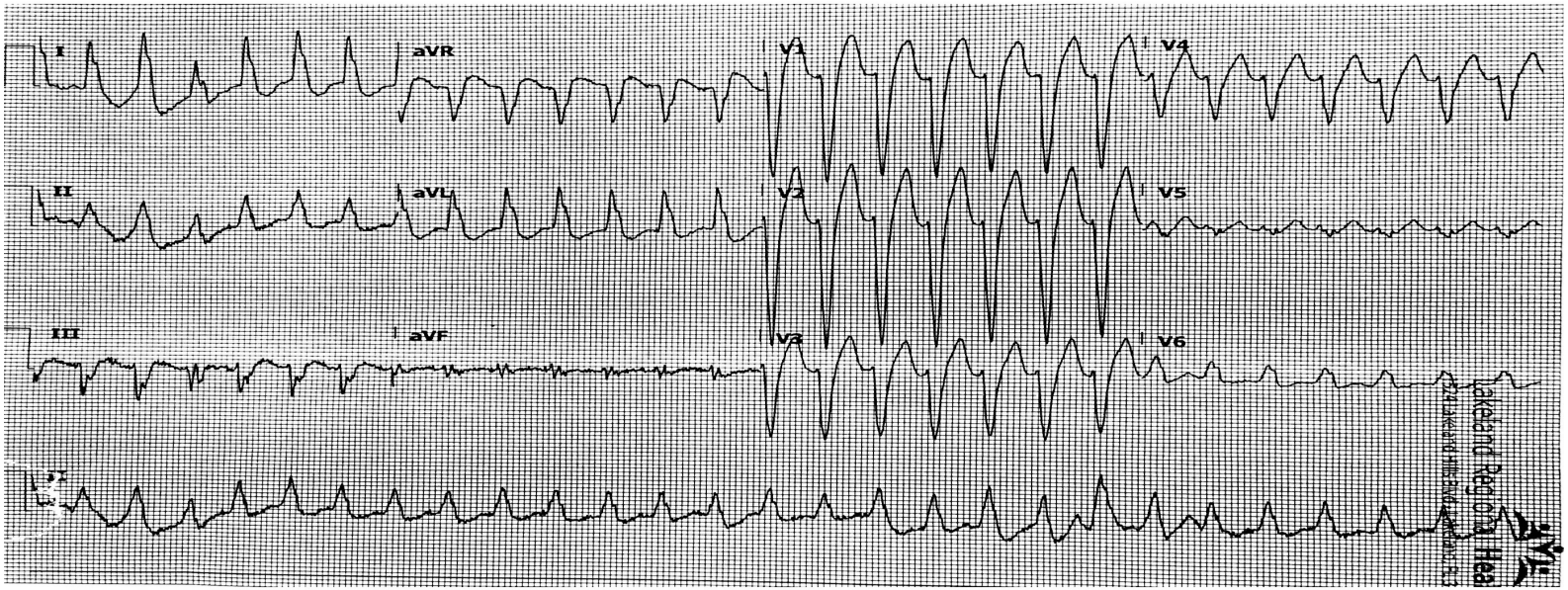


Next Move?

- Adenosine?
- Electricity?
- Diltiazem?
- Procainamide?
- Amiodarone
- Nothing?

Case #5
47 y.o. w/sudden onset palpitations

- BP 170/90 HR 165 RR 16 afeb
- Anxious but comfortable
- Normal mental status.


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

Next move?

- Diltiazem?
- Adenosine?
- Electricity?
- Amiodarone?
- Magnesium?
- Procainamide?

Approach to patient with tachycardia

- Focused History and Physical
  - Symptoms
  - Perfusion
  - Stable/Unstable
- EKG analysis
- Formulate treatment

Is Tachycardia the cause or the result?

Tachycardia

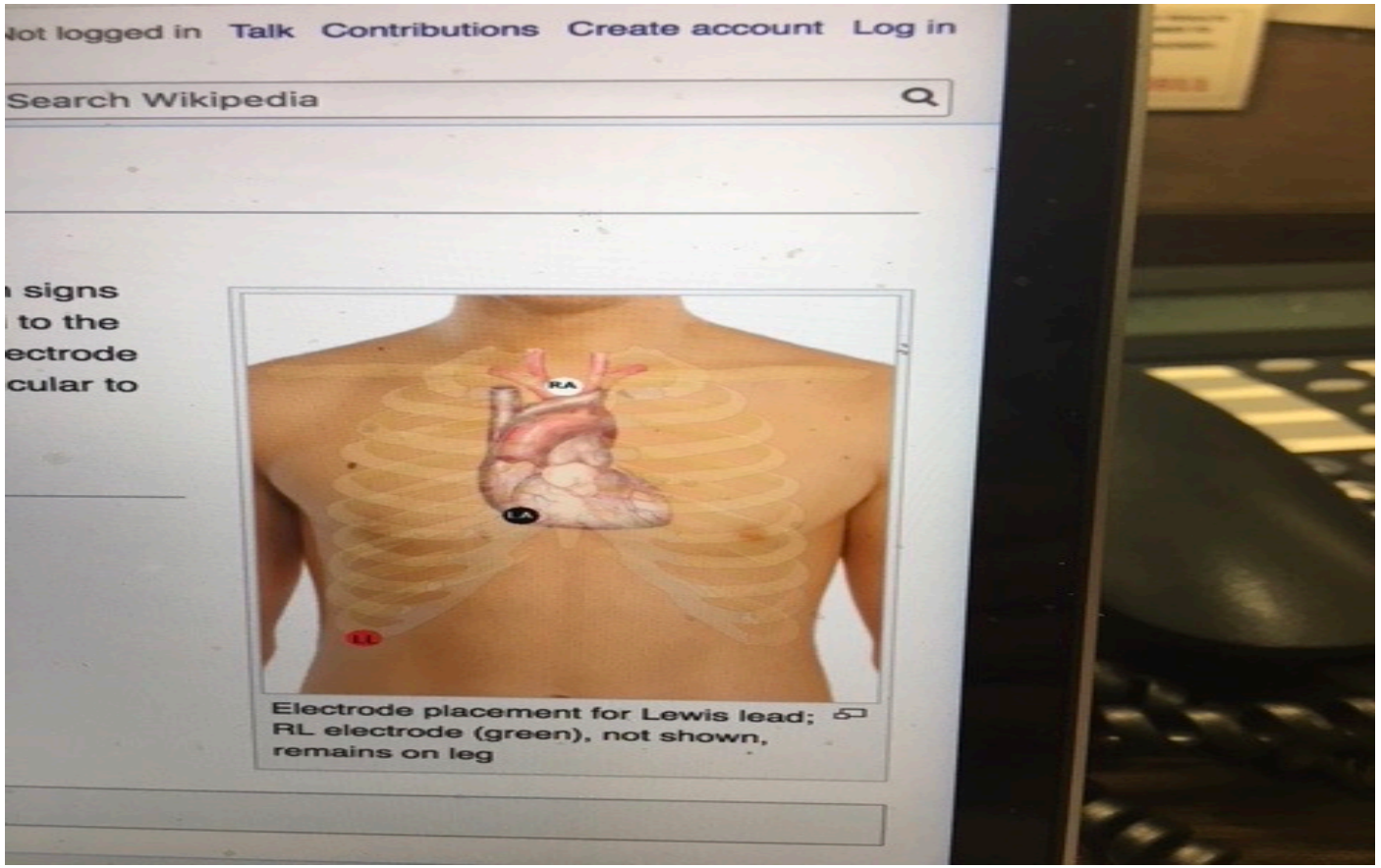
- QRS rate >100
- Rule of boxes
  - 300/N N= # large boxes
  - One large box HR 300
  - Two large boxes HR 150
  - Three large boxes HR 100
- Entire page is 10 seconds
  - Multiply #QRS times 6 for HR bpm…

Systematic EKG analysis of Tachycardia

- What are the Ventricles (QRS) Doing?
  - How many morphologies?
  - Reg/Irreg?
  - Wide?/Narrow?

- What are the atria (p waves) doing?
  - Are there P waves?
  - Are P/QRS married?
  - P followed by QRS, QRS preceded by P ?
  - Hidden P waves?

Lewis Leads…


lot logged in Talk Contributions Create account Log in
Search Wikipedia
signs
to the
ectrode
cular to
RA
LA
LL
Electrode placement for Lewis lead; RL electrode (green), not shown, remains on leg

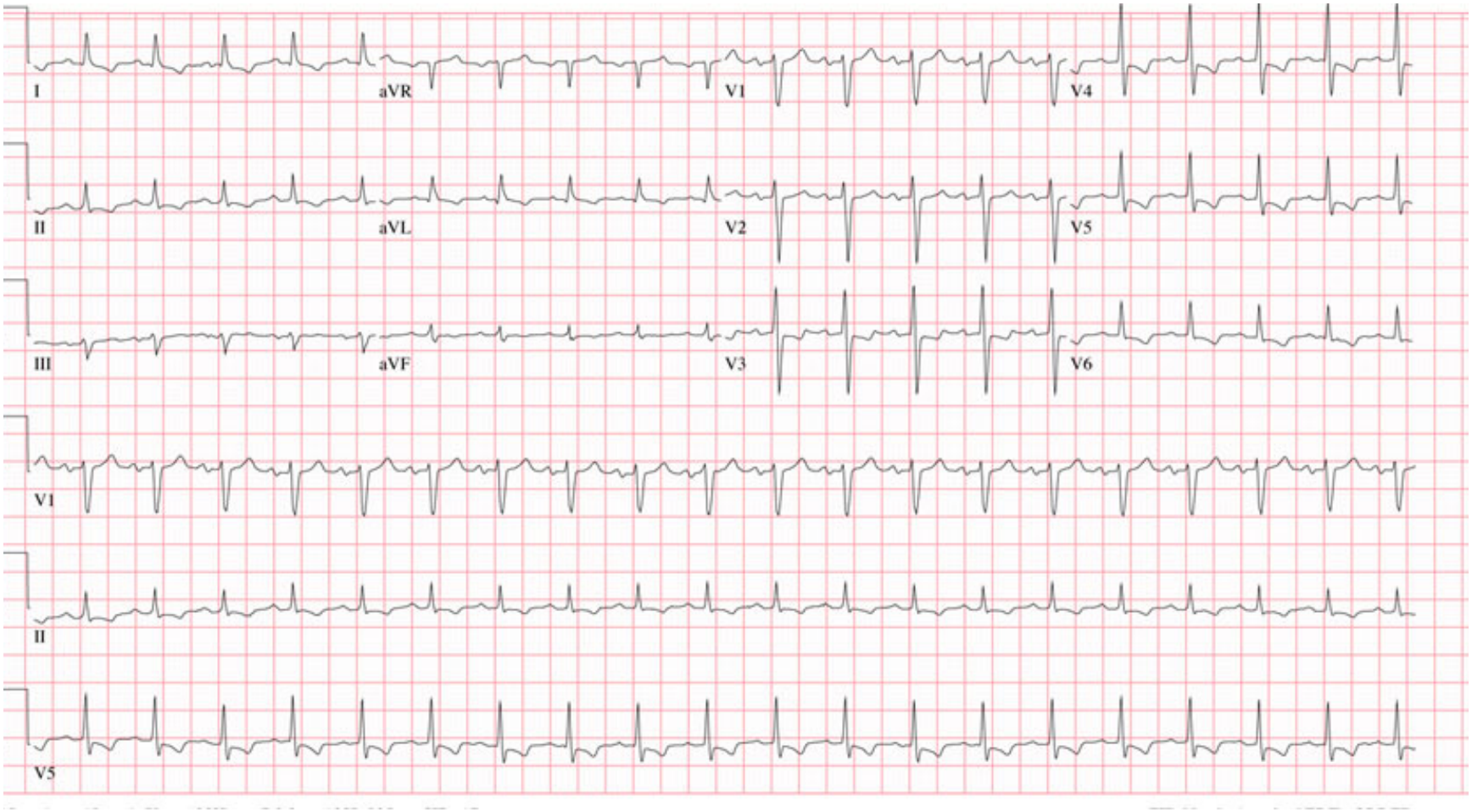
Narrow/ Regular

- Sinus Tachycardia
- PSVT
- Aflutter

Sinus Tachycardia

- Every P followed by QRS, QRS preceded by P
- Rate 220 minus age
- P waves hide in T waves-look for notched T's

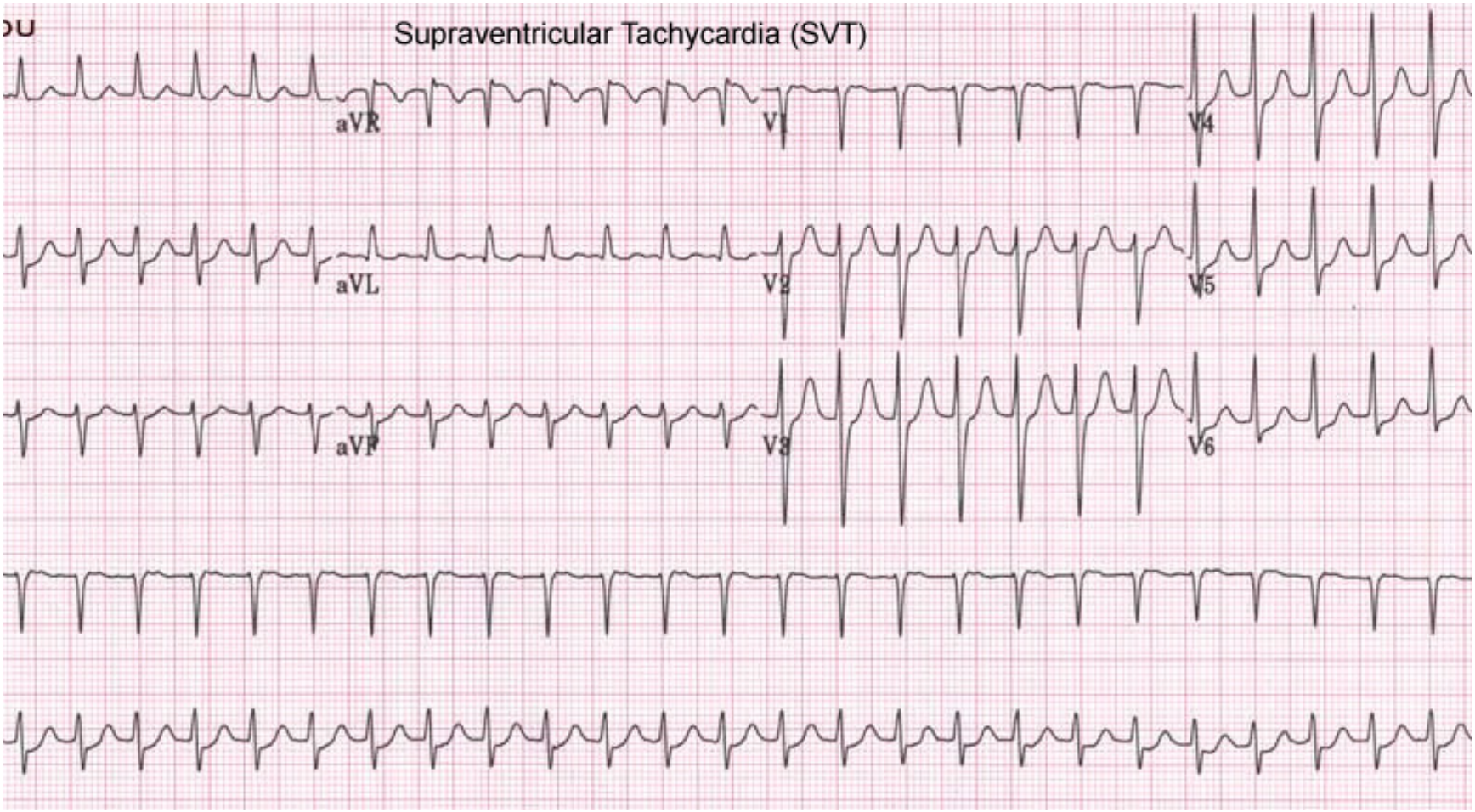
Sinus Tachycardia



PSVT/AVNRT

- Rate 130-200
- Often no p waves
- P waves hidden, or just before /after QRS

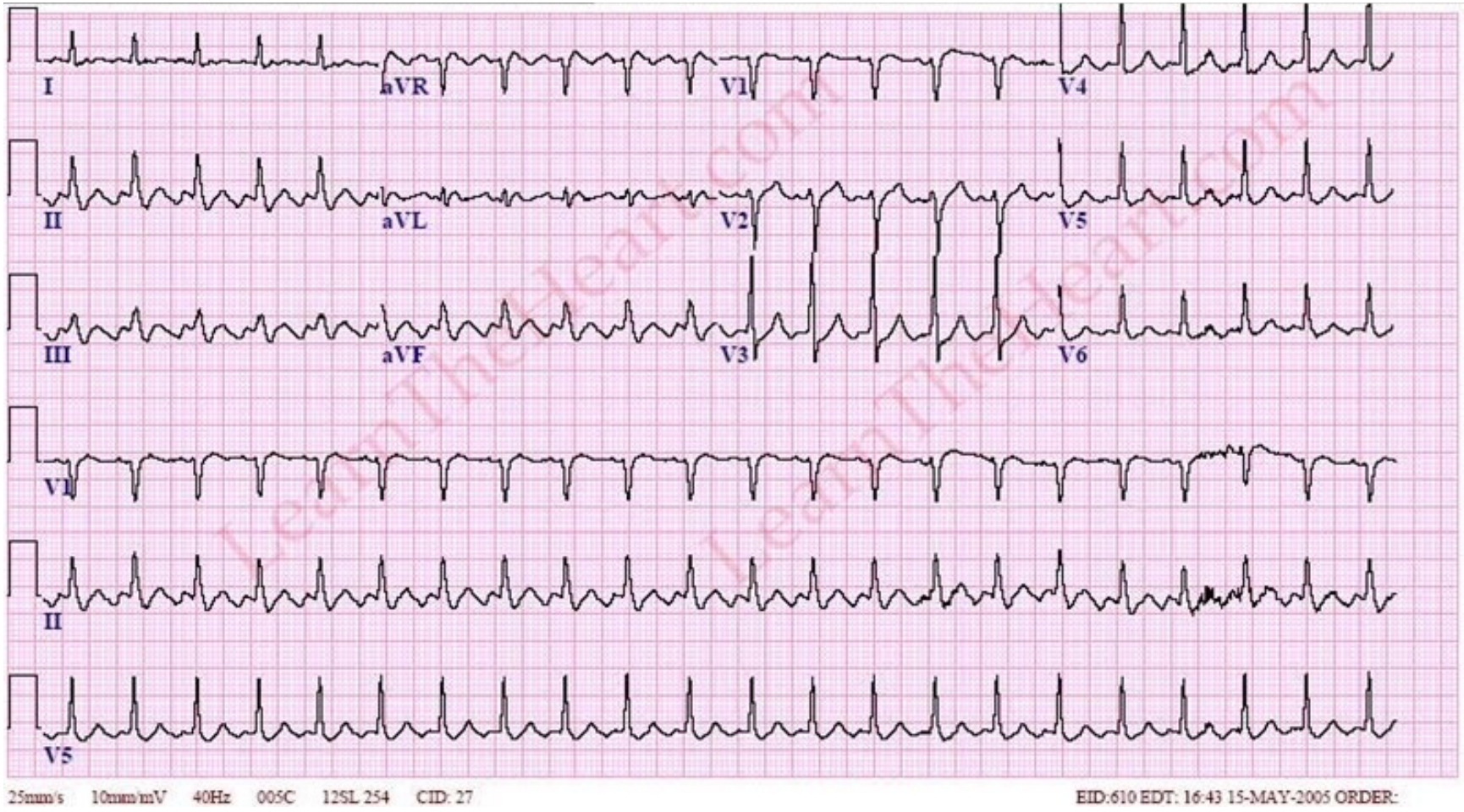
PSVT


Supraventricular Tachycardia (SVT)
aVR
V1
V4
aVL
V2
V5
aVF
V3
V6

Aflutter

- Atrial Rate 250-350
- Ventricular Rate 130-170 usually 150 (2:1)
- Flutter wave seen
- Flip upside down

Aflutter w 2:1



Treatment

- Sinus tach Treat underlying condition
- All others
  - Stable/asymptomatic nothing/rate control
  - Stable/symptomatic rate control
  - Unstable cardioversion
- Pitfall-
  - Failure to identify sinus tach
  - Treating aflutter as ST

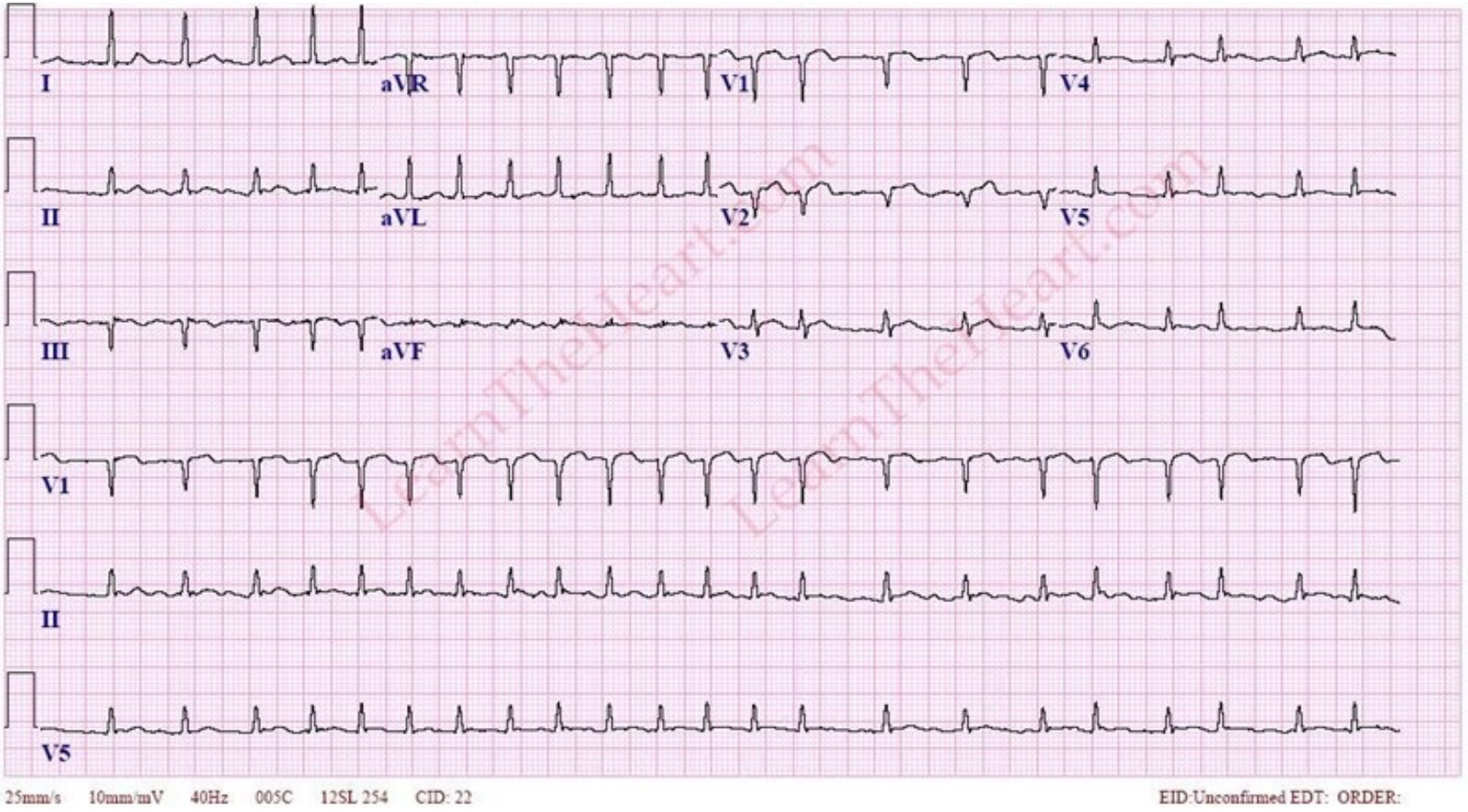
Narrow/irregular

- Afib w/RVR
- Aflutter w/varying block
- MAT

Afib w/RVR

- Ireg irreg
- No organized P waves

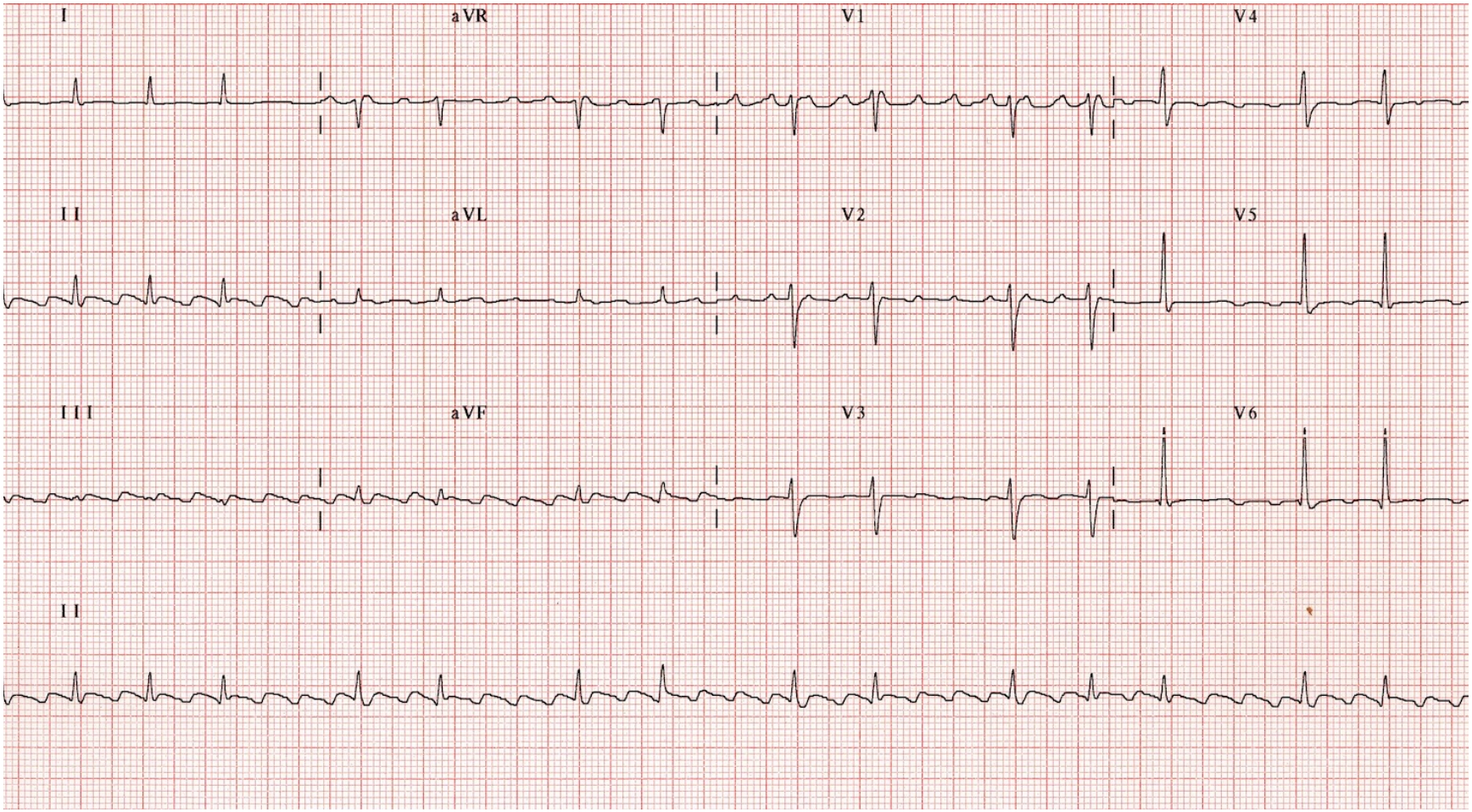
Afib w/RVR


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5
25mm/s 10mm/mV 40Hz 005C 12SL 254 CID: 22
EID:Unconfirmed EDT: ORDER:

Aflutter v/variable block

- Irreg/irreg
- Organized P waves/flutter

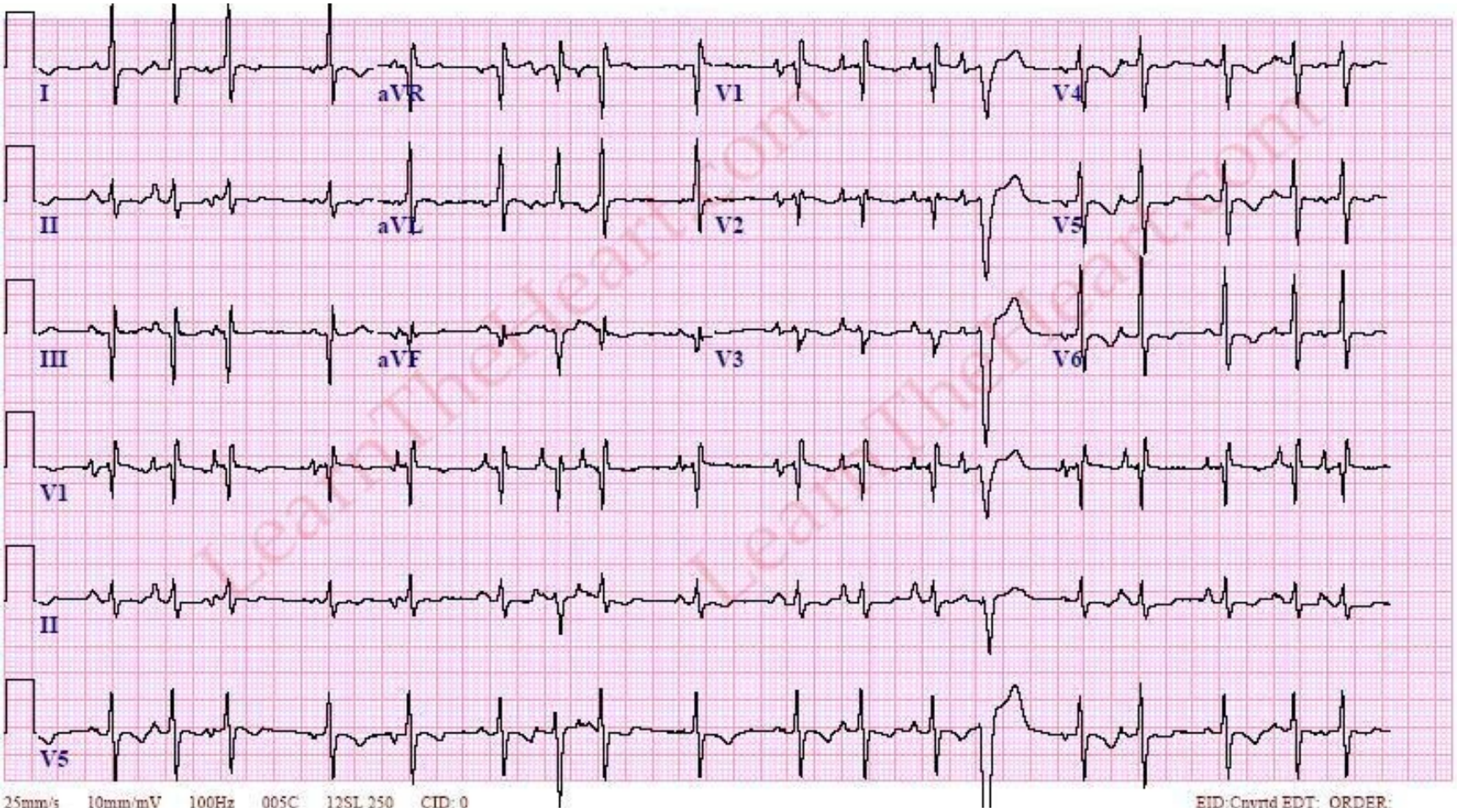
Aflutter w/varying block



MAT

- 3 different P waves
- varying PR intervals

MAT


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5
25mm/s 10mm/mV 100Hz 005C 12SL 250 CID: 0
EID:Cnvrtd EDT: ORDER:

Treatment

- MAT-underlying condition
- Afib/aflutter
  - Stable/asymptomatic nothing
  - Stable symptomatic rate control
  - Unstable cardioversion
- Pitfall Treating MAT

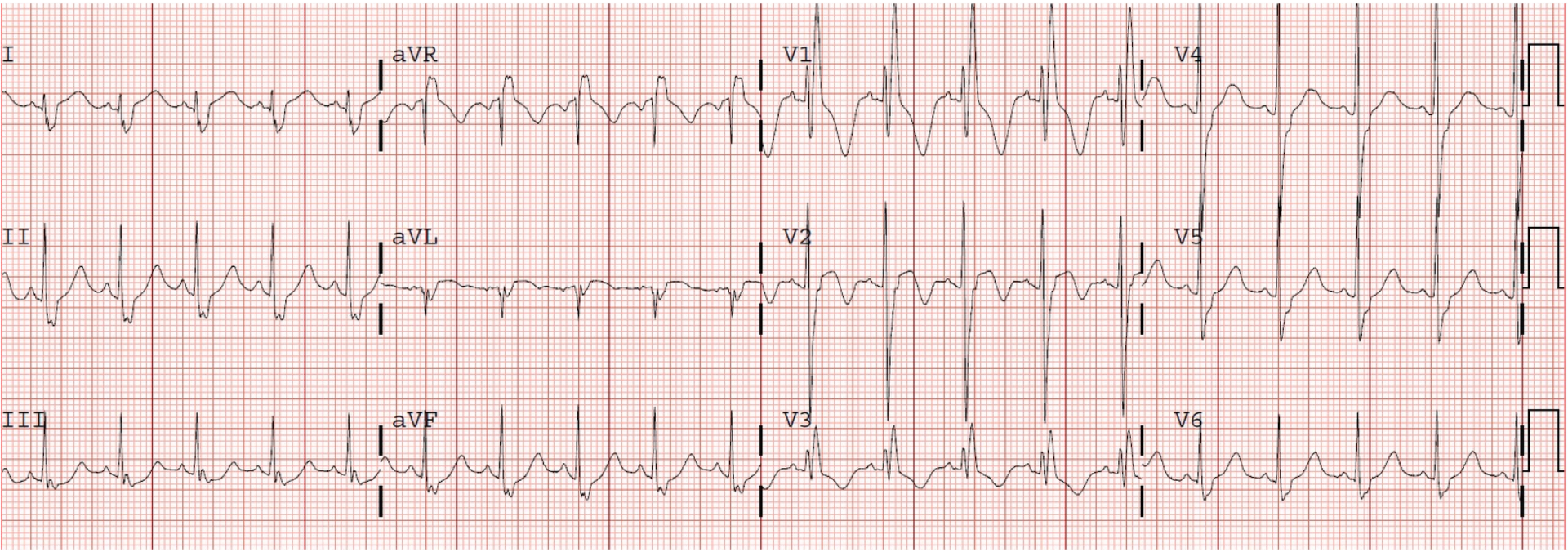
Wide/regular

- Sinus tach w/bbb
- PSVT w/aberrancy
- Vtach
  - Rate >120
  - Monomorphic/polymorphic

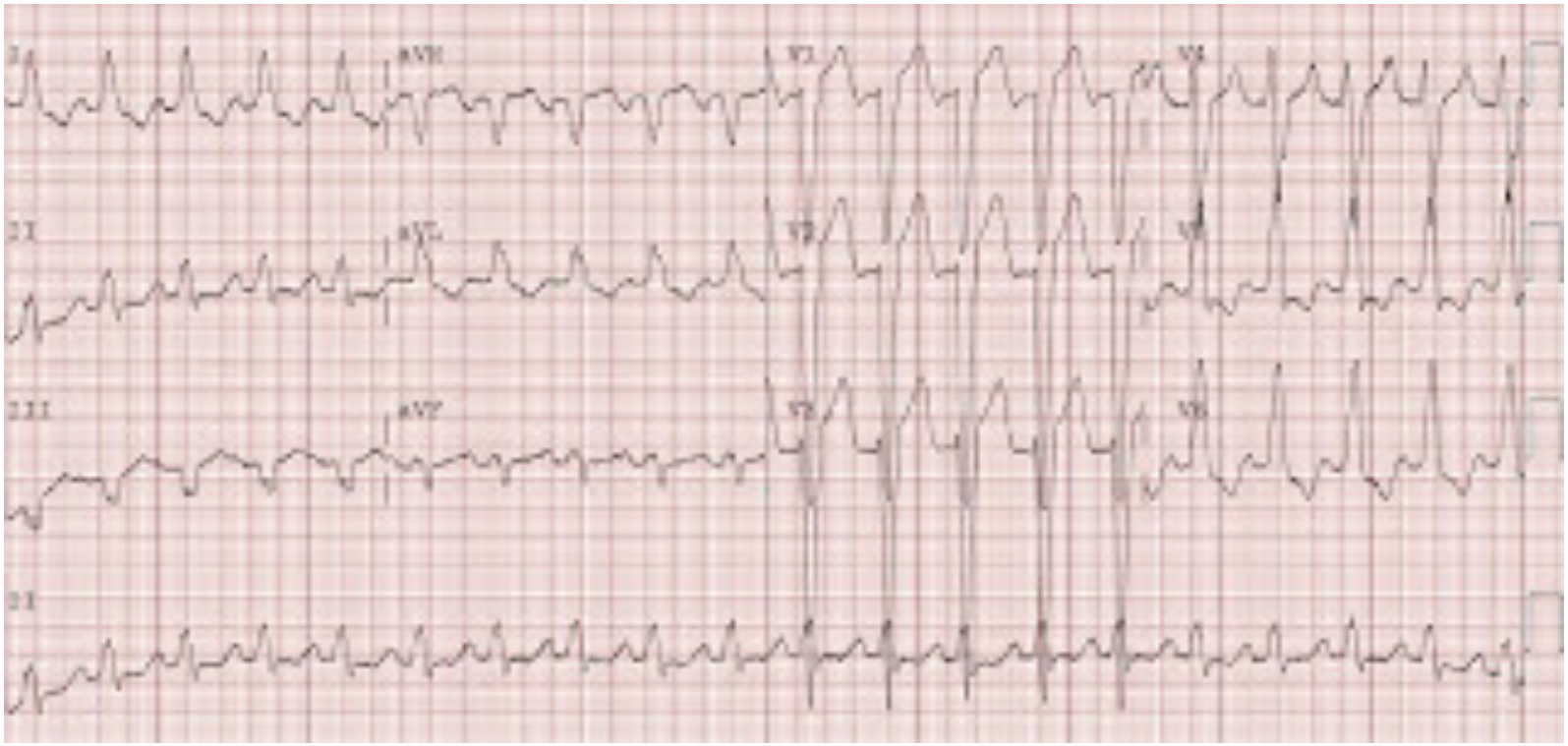
Sinus tach w/BBB

- P followed by QRS, QRS preceded by P
- Hx of BBB

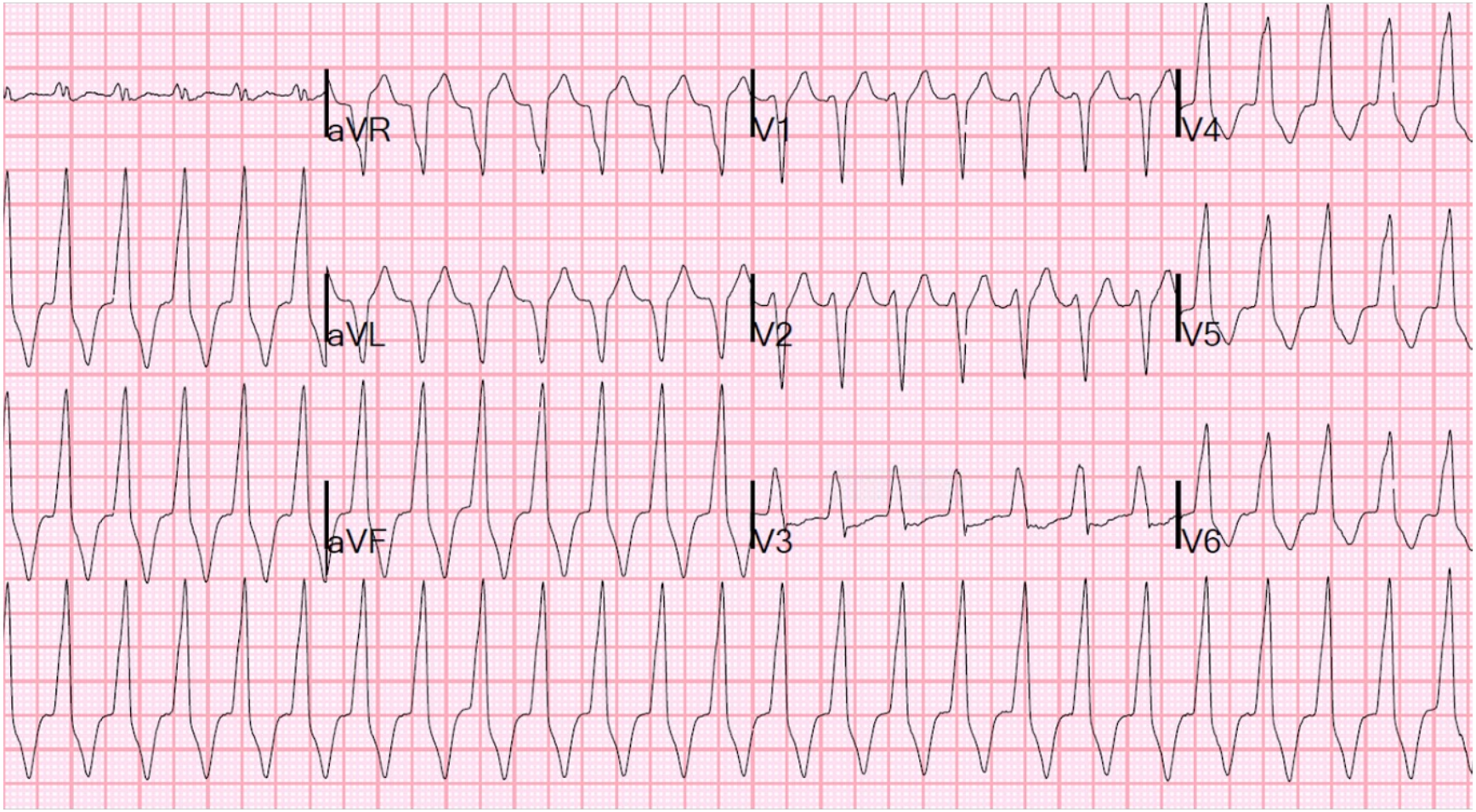
ST w/RBBB



ST w/LBBB



SVT w/aberrancy vs VTach



SVT w/aberrancy vs Vtach
Factors that favor Vtach

History and Physical

- Prior VT
- Previous ischemia
- Age > 35
- AV dissociation on Physical
- BP is not predictive

ECG features

- Bizzarre axis 180-270
- QRS >160 msec
- Pos or neg concordance
- Absence of LBBB/RBBB
- AV dissociation
- Fusion or Capture Beats
- Brugada sign (R-S >100msec)
- RSR’ w/taller L rabbit ear
- Josephson sign (notched S)

SVT w/aberrancy vs Vtach

Favors SVT

- Previous ecg w/ similar LBBB RBBB pattern
- Previous ecg w/ WPW short PR/delta/wide QRS
- Previous tachycardia responsive to adenosine/vagal

SVT w/aberrancy vs Vtach
Mattu Algorithm

- If it's clearly not ST then….
- ASSUME VTACH
- Treating Vtach as SVT can be LETHAL

Vtach mimics

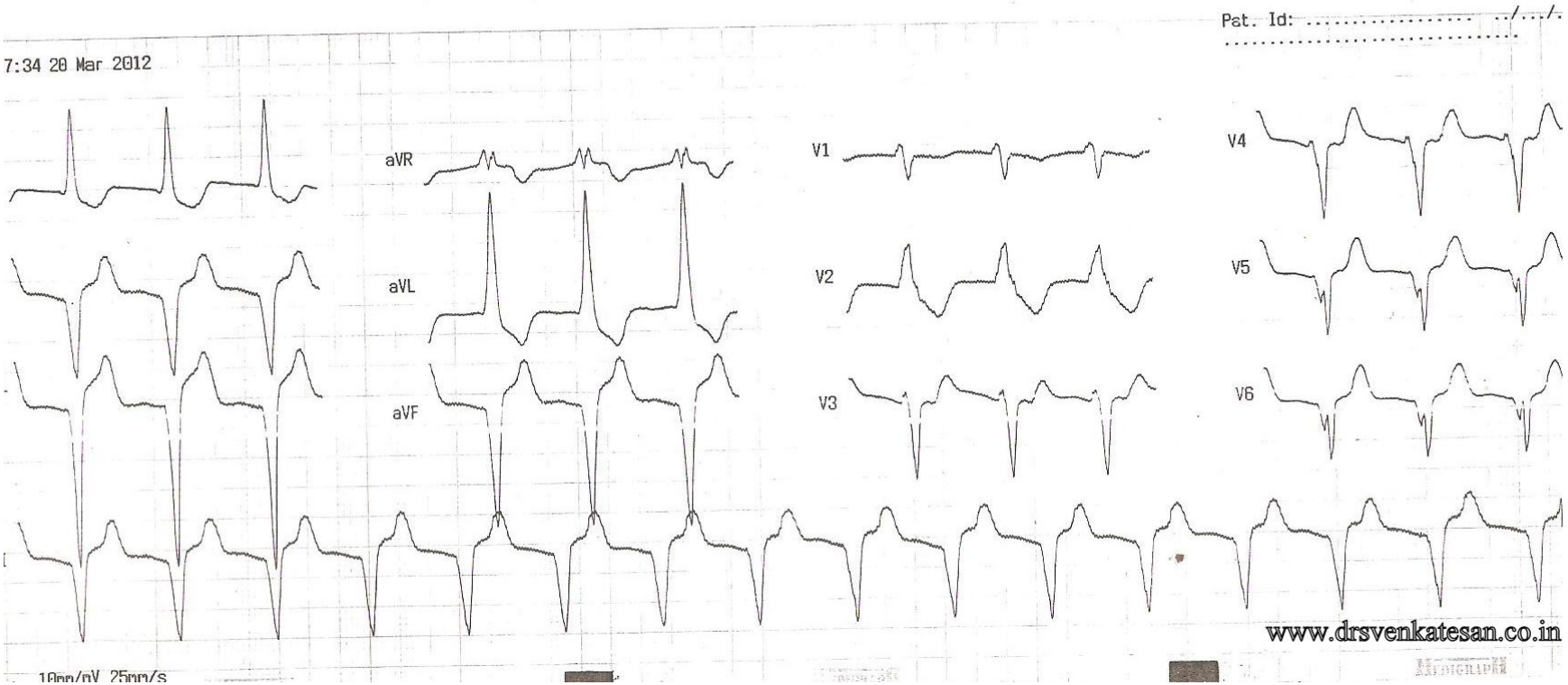
Consider when HR <125

QRS >200 msec (RWWCT)

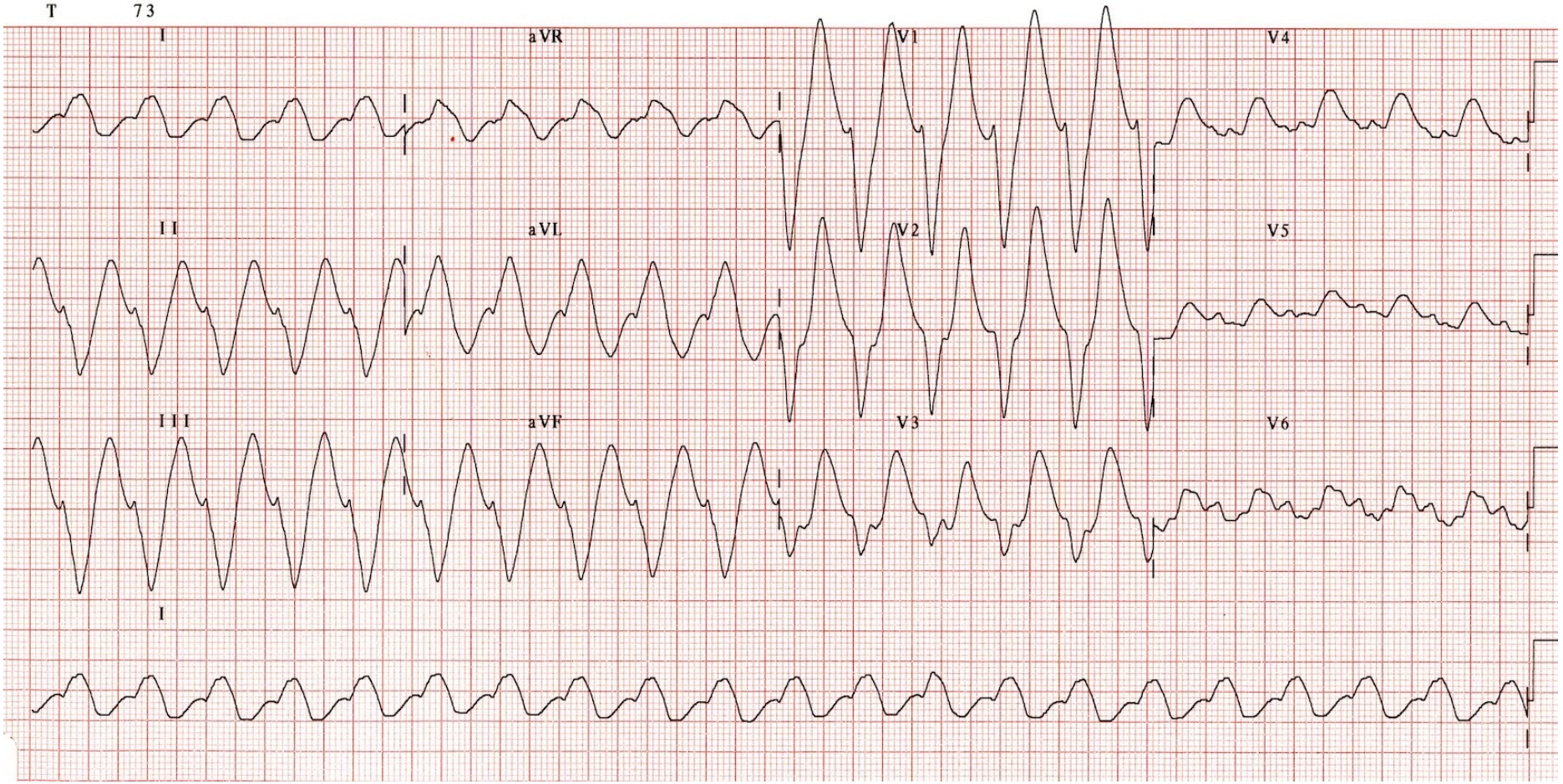
- **Reperfusion AIVR**
- **Tox-Na channel Blockers**
- **Hyperkalemia**

AIVR

Acelerated Idio -Ventricular Rhythm



Na channel Toxicity



Treatment

- Sinus Tach treat underlying condition
- Otherwise treat Vtach
  - stable chemicals
  - unstable cardioversion
  - pulseless or critical defibrillate
  - Watch for mimics
- after cardioversion Check QTc consider mag

Treatment Pitfalls

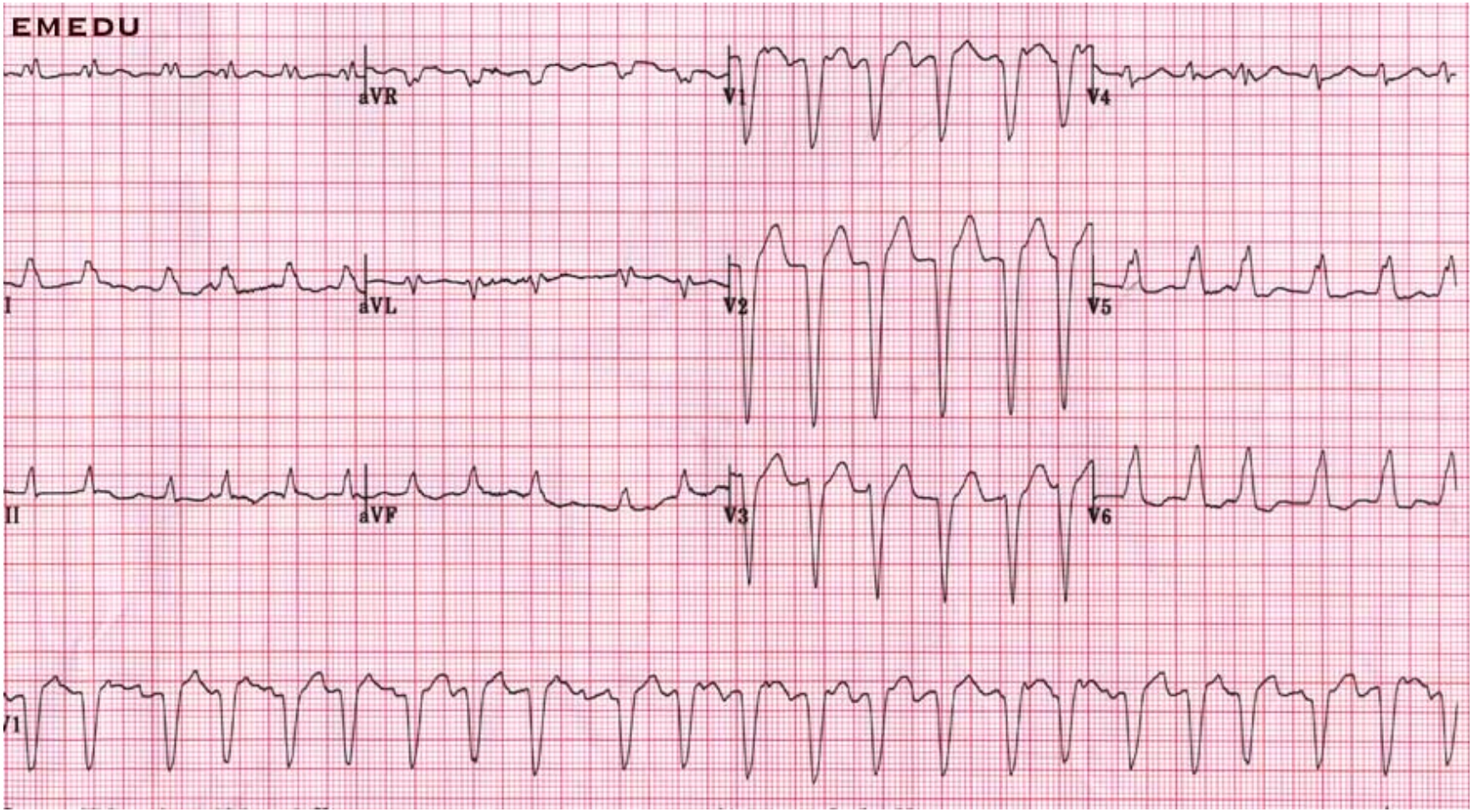
- Assuming PSVT w/aberrancy
  - Ca 2+ blockers/b-blockers
  - Can be lethal
- Treating mimics
  - Can cause asystole

Wide/irregular

- Afib w/bbb
- Aflutter w/bbb and varying block
- WPW/preexcitation afib
  - Conduction via accessory pathway

Afib w/BBB

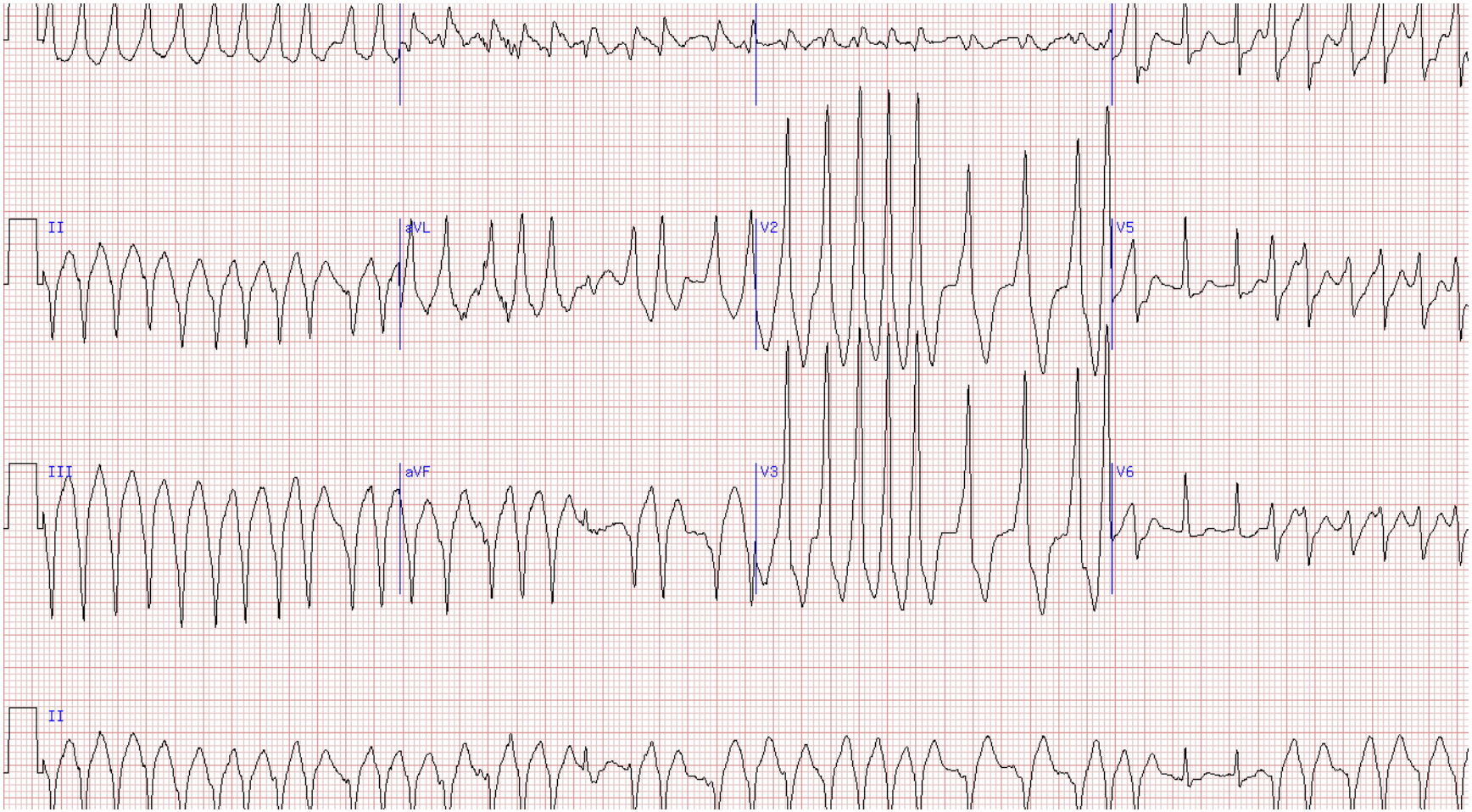
- Rate usually 130-170
- Must be 100% sure
- OLD EKG or HX crucial


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

WPW/ afib

- UGLY EKG
- Rate usually 250
- Wide and narrow QRS
- Mixed slurred QRS
- Conduction down both pathways

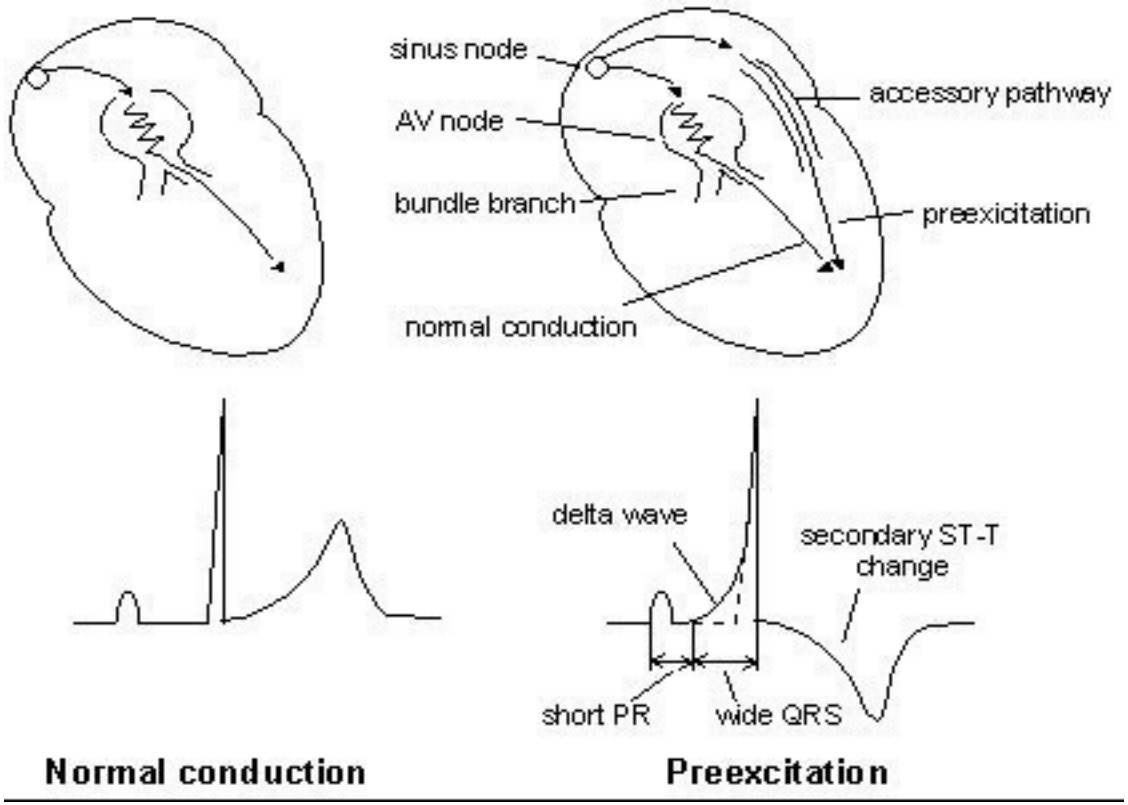
EKG



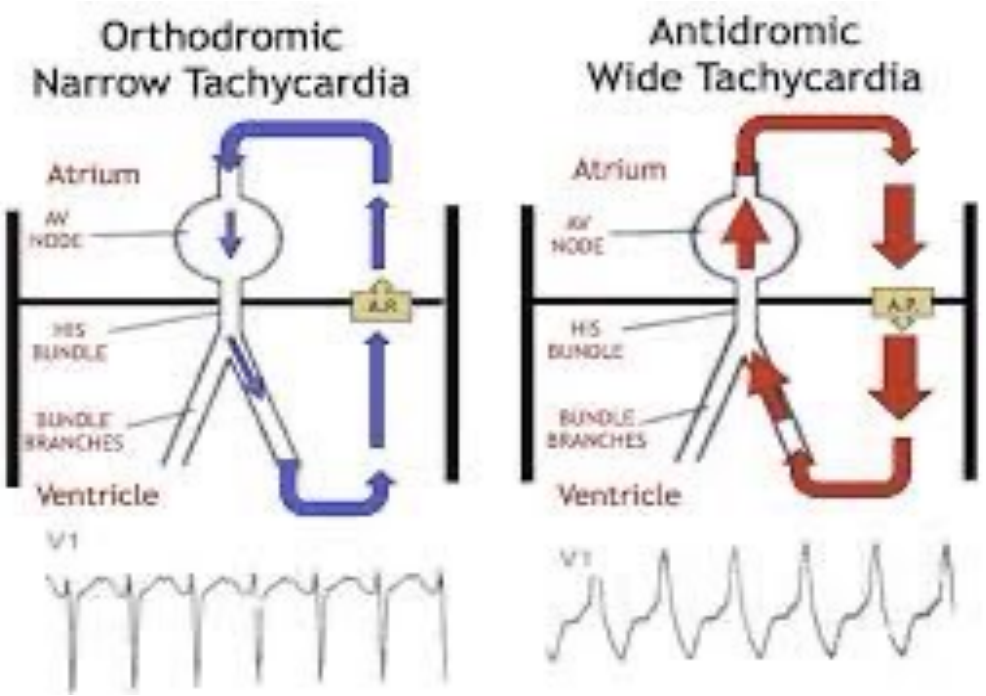
Treatment

- **Afib w/BBB need to be 100% sure**
  - **Stable rate control**
  - **Unstable cardioversion**
- **WPW/afib**
  - **Stable Procainamide ONLY**
    - ***chemical cardioversion***
    - ***Avoid AV Node blockers***
  - **Unstable**
    - ***Cardioversion***

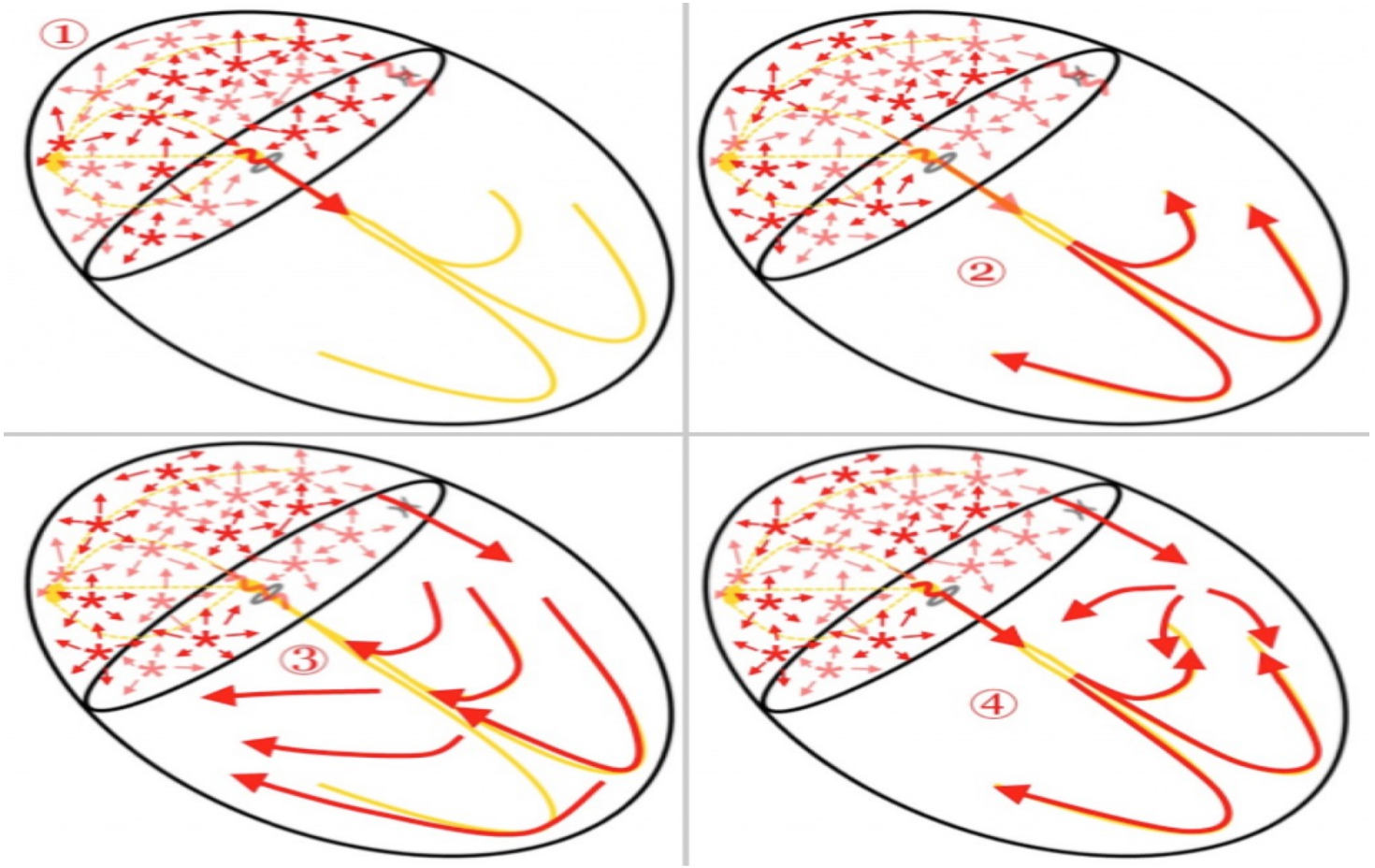
WPW
Pearls and Pitfalls



WPW w/SVT


Orthodromic
Narrow Tachycardia
Atrium
AV NODE
HIS BUNDLE
BUNDLE BRANCHES
Ventricle
V1
Antidromic
Wide Tachycardia
Atrium
AV NODE
HIS BUNDLE
BUNDLE BRANCHES
Ventricle
V1

WPW and afib



Narrow Regular

Sinus Tachycardia

P with every QRS, 220 – age.
Treat underlying issue (dehydration, pain, etc)

PSVT

Rate 130- 200, p waves may be hidden.
Symptomatic treatment is rate control
Unstable: cardioversion

Atrial flutter

Rate 130-170, Flutter waves, saw tooth pattern
Symptomatic treatment is rate control
Unstable: cardioversion

Narrow Irregular

A fib w/RVR

Irregularly irregular, No organized P waves
Stable symptomatic: rate control
Unstable: cardioversion

Aflutter w/varying block

Irregularly irregular, organized P waves/flutter
Stable symptomatic: rate control
Unstable: cardioversion

MAT

3 different P waves, varying PR intervals
Treat underlying condition (COPD)

Wide Regular

Sinus tach w/BBB

P followed by QRS, QRS preceded by P, Hx of BBB
Treat underlying condition

PSVT w/aberrancy

ASSUME VTACH, Treating PSVT can be LETHAL
Stable chemicals, unstable cardioversion
Pulseless or critical defibrillate

Vtach

Rate >120, Monomorphic/polymorphic
Stable chemicals, unstable cardioversion
Pulseless or critical defibrillate

Watch for mimics: Reperfusion AIVR & RRWCT toxicology/K+

Wide Irregular

Afib w/BBB

Rate usually 130-170, must be 100% sure: old EKG or hx crucial
Stable: rate control
Unstable: Cardioversion

Aflutter w/BBB and varying block

Rate usually 130-170, must be 100% sure: old EKG or hx crucial
Stable: rate control
Unstable: Cardioversion

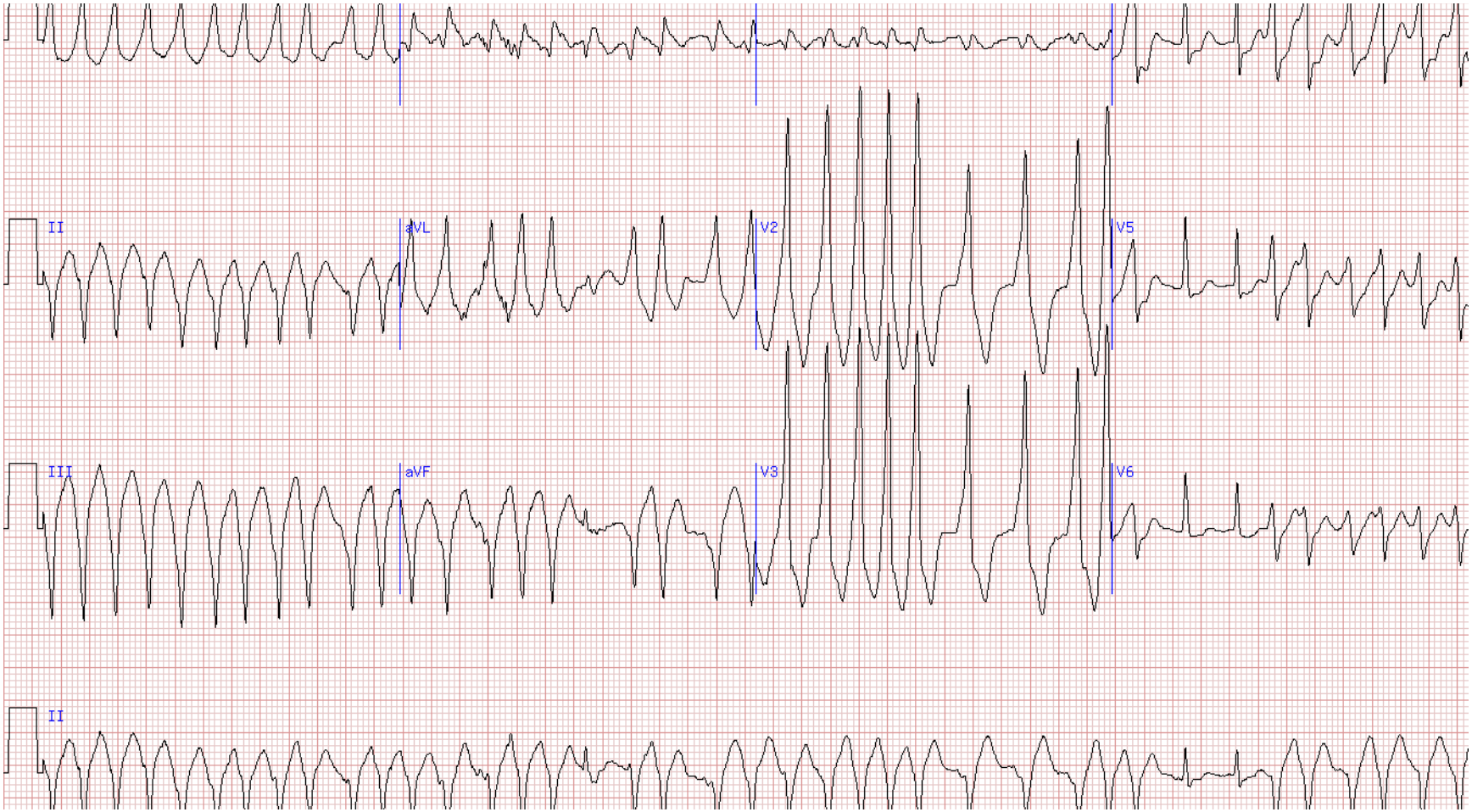
WPW/preexcitation afib

Conduction via accessory pathway (down both pathways)
UGLY EKG, rate usually 250, wide and narrow QRS
Stable: Procainamide ONLY, chemical cardioversion
Unstable: Cardioversion
NO AV node blockers!!

Case #1
19 yo sudden onset dizziness

- Vitals BR 120/90 HR 200-225 RR 22 Temp 37.1
- Physical Exam
  - Appears pale and mildly SOB
  - Skin dry
  - Rales at bases
  - Pulses weak
  - HR 220 irreg

EKG



What is your next move???

- Adenosine?
- Nothing?
- Amiodarone?
- Diltiazem?
- Cardioversion?
- Procainamide?

WPW afib RVR

- Symptomatic
- Low perfusion

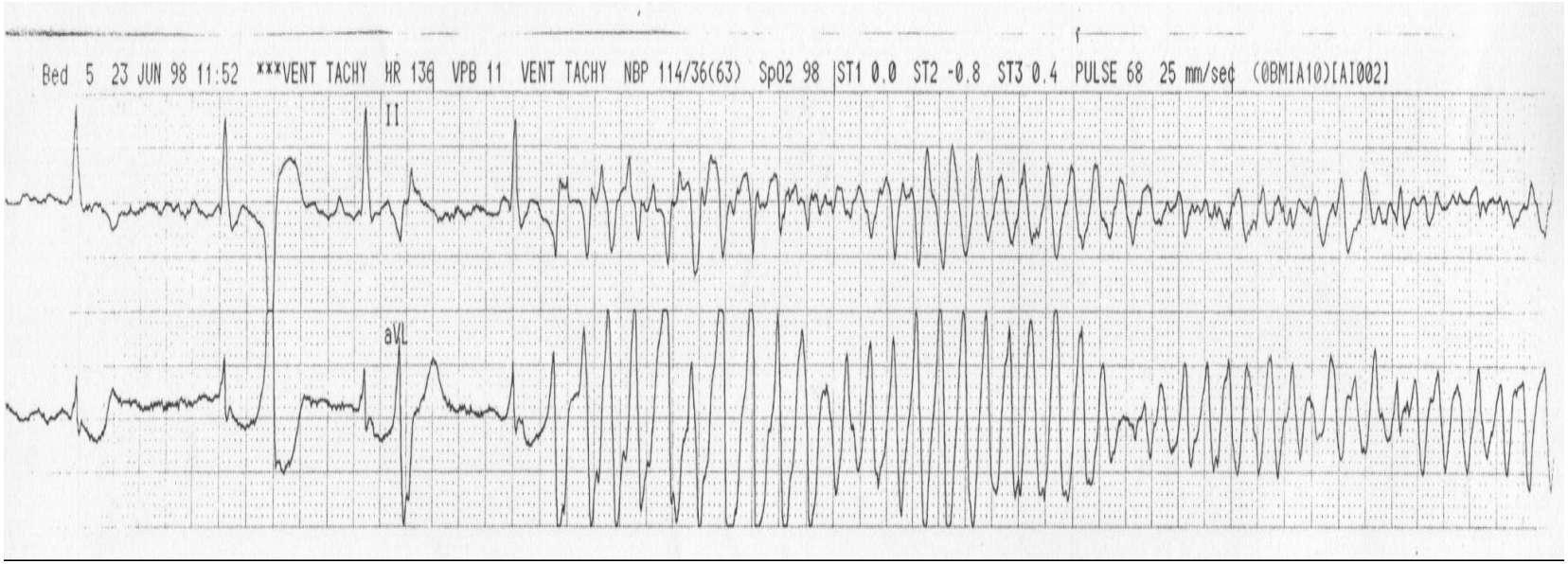
Treatment

- Electrical cardioversion
  - Best choice
- Procainamide
  - Chemical cardioversion
  - Controls accessory pathway
  - Doesn’t block AV node
- Diltiazem, adenosine, amiodarone
  - Av node blockers
  - Increase accessory conduction
  - Can be lethal

Case #2
40 y.o sudden onset LOC

- On Monitor in ED
- Sudden onset seizure
- Pulseless

EKG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II
aVL

Next Move?

- Magnesium?
- Adenosine?
- Amiodarone?
- Electricity?
- Call for help?
- Check lead placement?
- CPR?

Polymorhic VTach

- Treatment

  - CPR
  - Electricity
  - Magnesium (if QTC prolonged/Torsades)

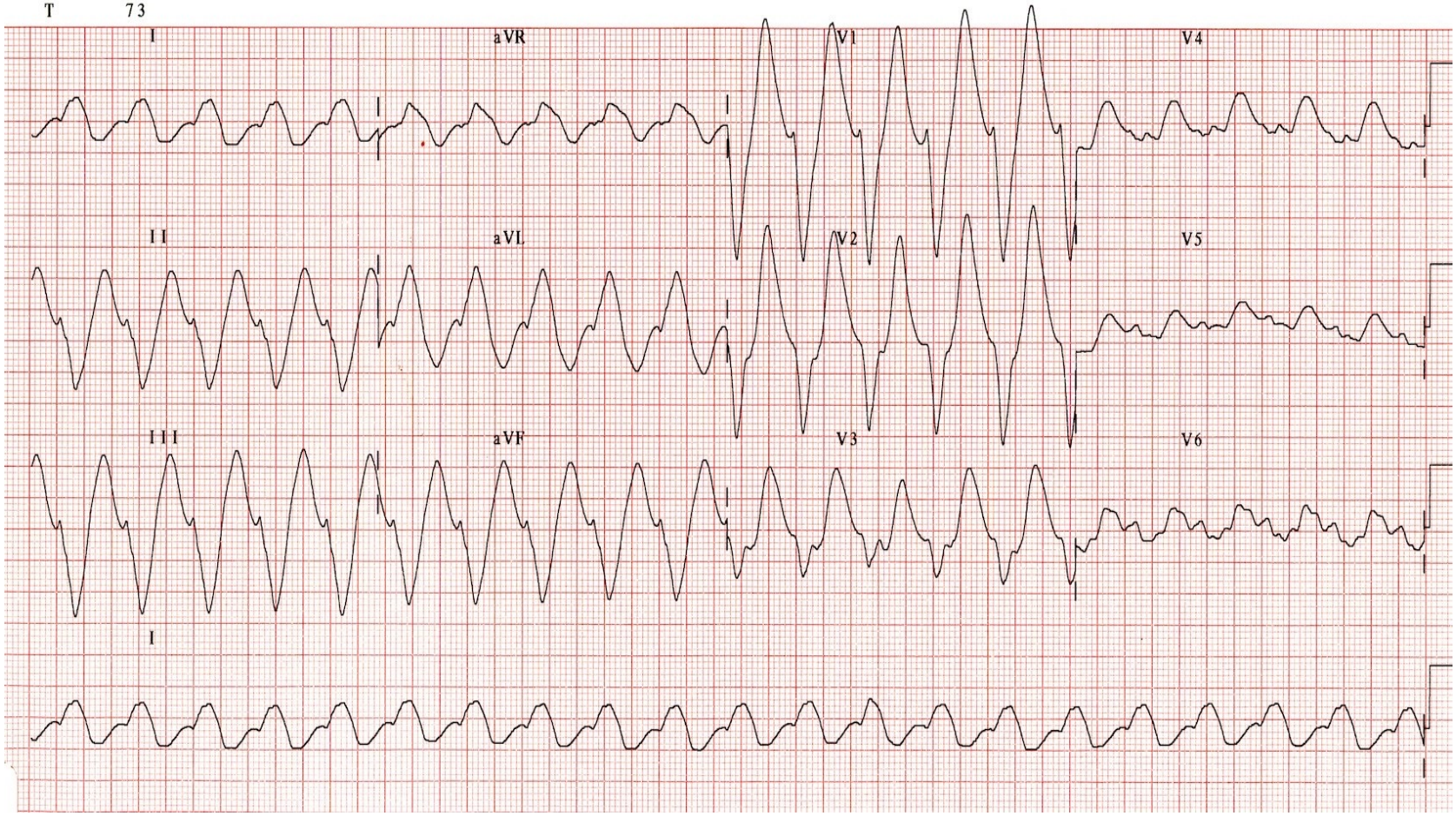
Case #3
35 y.o. “unresponsive”

- BP 90/60 RR 12 HR 120 Afeb

- Found in bed by family members

- Responds only to painful stimuli

EKG



Next move?

- Intubation?
- Amiodarone?
- Electricity?
- Magnesium?
- Adenosine?
- NaHco3?
- Ca 2+?

RWWCT

- Consider TOX/HyperK

- Treatment

– NaHCo3

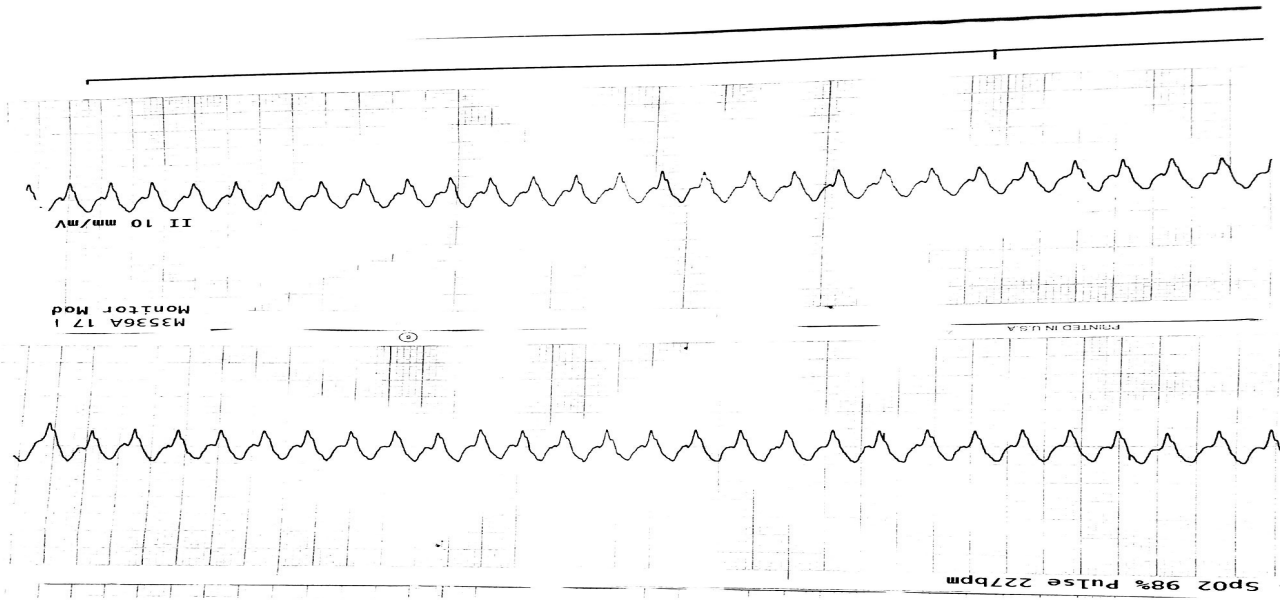
– Ca 2+

– Avoid Na Channel blockers

Case #4
56 y.o Sudden onset Palpitations

- BP 120/90 HR 220 RR 18 afeb
- Anxious
- Diaphoretic but well perfused

EKG
EMS Rhythm Strip



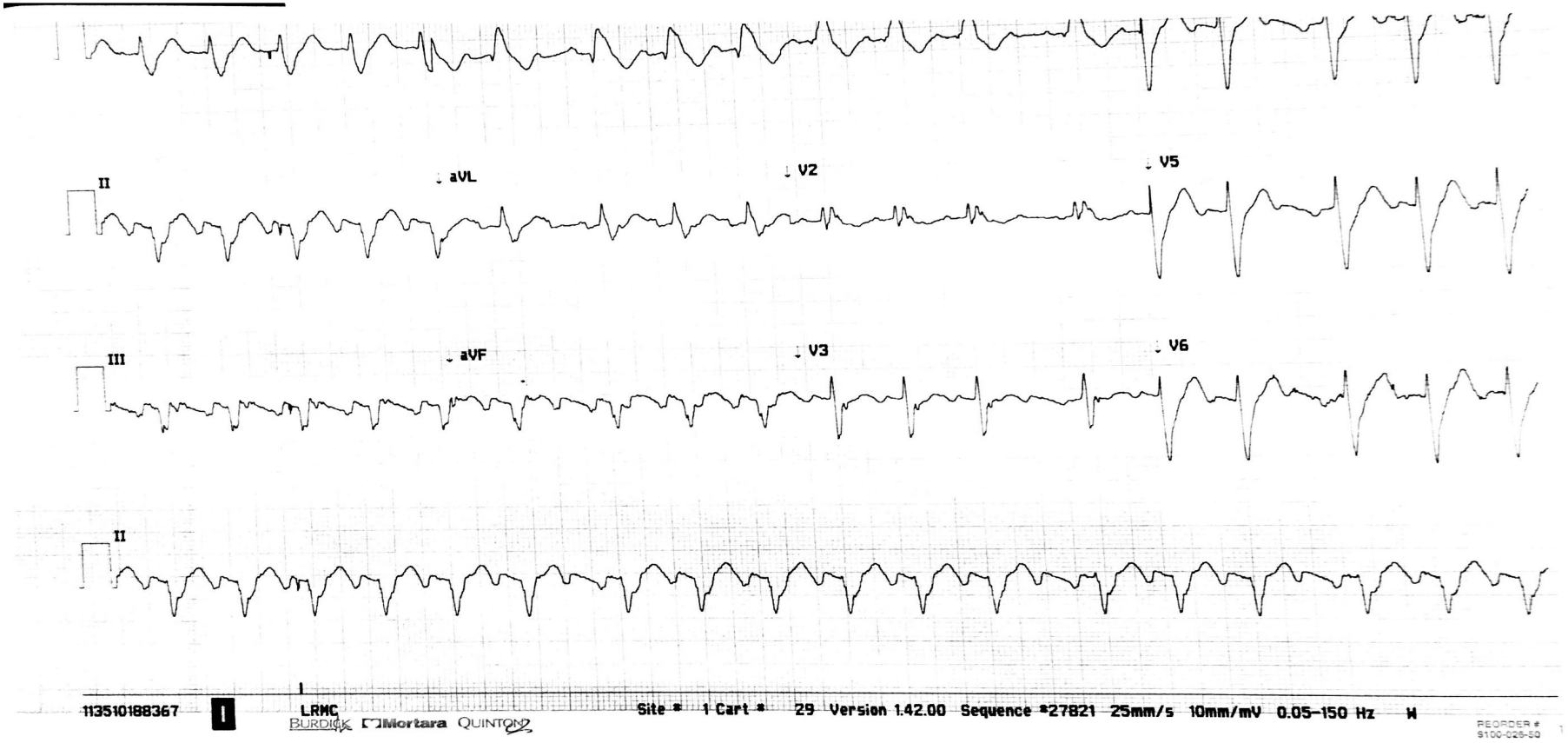
Next Move?

- Adenosine?
- Electricity?
- Magnesium?
- Procainamide?
- Amiodarone
- CCB’s/B-Blockers?

WCT

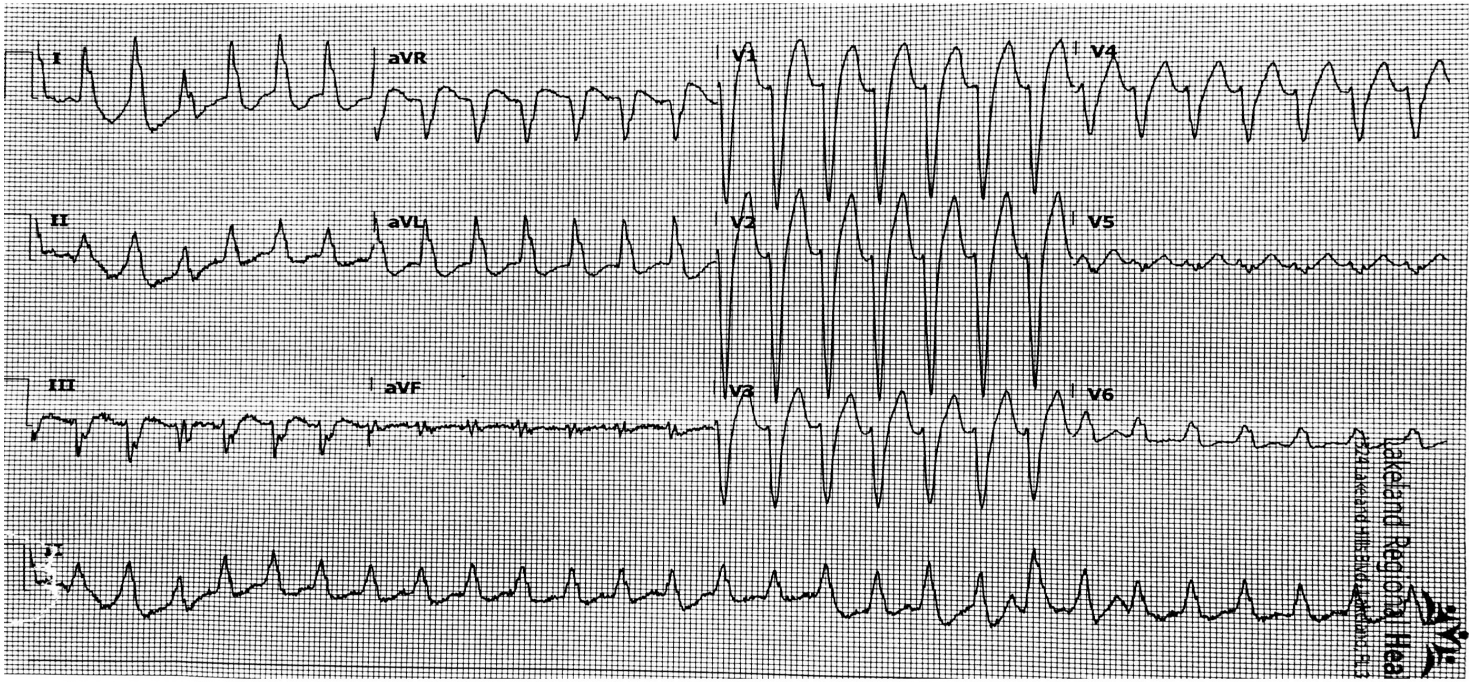
- P waves (rate 220)
- Too fast for sinus tach
- Differential
  - Atrial tachycardia 1:1 w/aberrancy
  - SVT w/ retrograde P's
  - Vtach w/retrograde P's
- Tread gently w/AV node blockade

After adenosine/amiodarone



Case #5
47 y.o. w/sudden onset palpitations

- BP 170/90 HR 165 RR 16 afeb
- Anxious but comfortable
- Normal mental status.


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

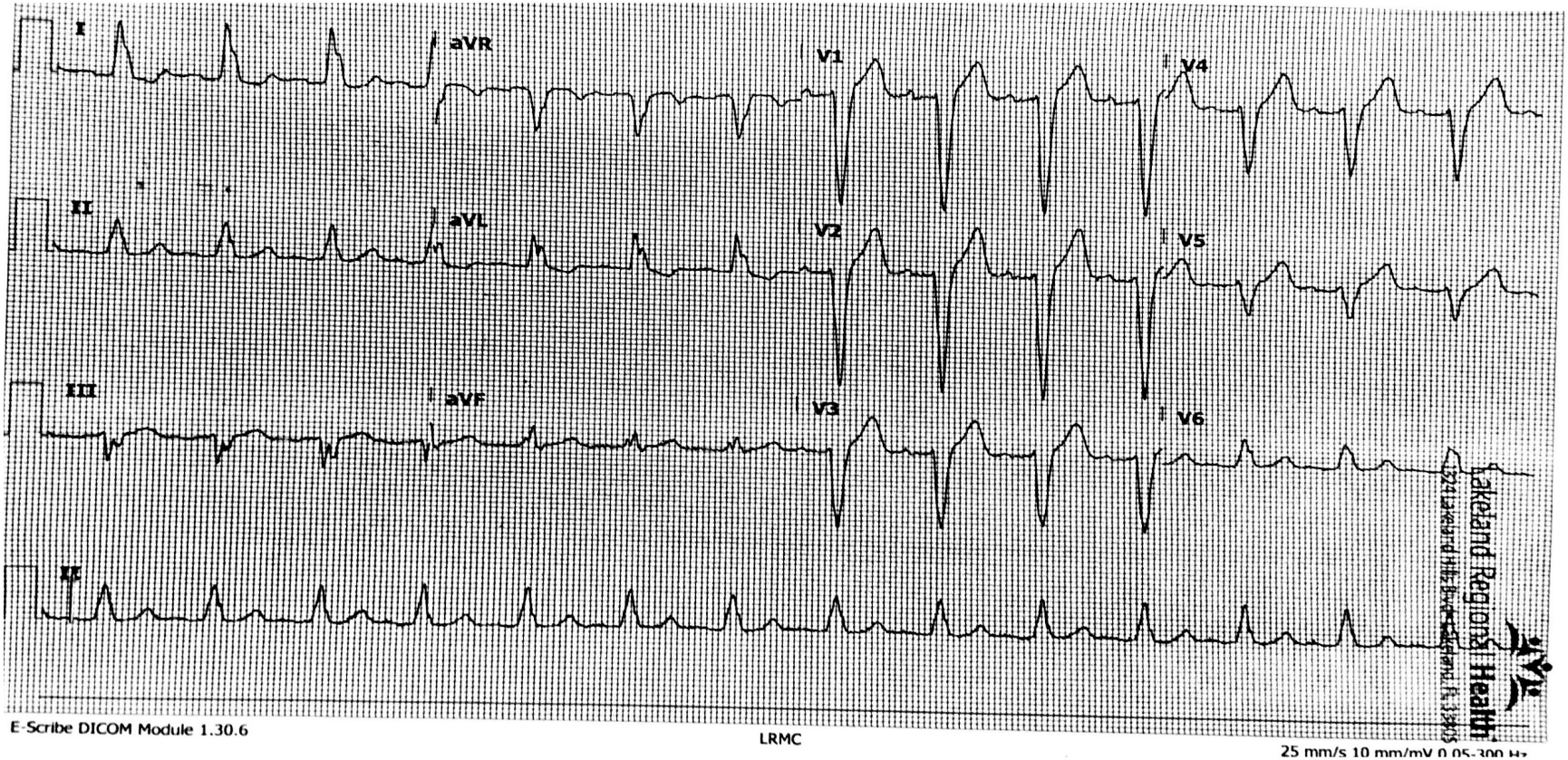
Next move?

- Diltiazem?
- Adenosine?
- Electricity?
- Amiodarone?
- Magnesium?
- Procainamide?

WCT

- No p waves (ST almost eliminated)
- SVT w/aberrancy vs Vtach
- Factors favoring SVT
  - Non concordant
  - QRS < 160 msec w/LBBB pattern
- Mattu algorithim Treat Vtach

After CCB's/B blocker



Summary

- Tachycardia QRS rate >100
- Focused History/ Physical
- 3 questions
  - Reg/Irreg?
  - Wide/Narrow?
  - What are atria doing? (p waves)
- Formulate Treatment Plan….

Treatment

- Based on symptoms/stabilty
- Sinus tach/ MAT treat underlying cause
- Wide complex regular (assume Vtach)
  - Unless clear Sinus tach w/bbb
- Vtach rate >120 avoid treating mimics
  - Tox, metabolic, AIVR
  - After electricity check QTc
- Wide irreg
  - Consider afib w/WPW
  - Avoid Ca 2+/b-blockers unless sure its afib/flutter w BBB
  - Procainamide/Cardioversion

Thanks for Playing

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