ECG med 442
NCR & WCT

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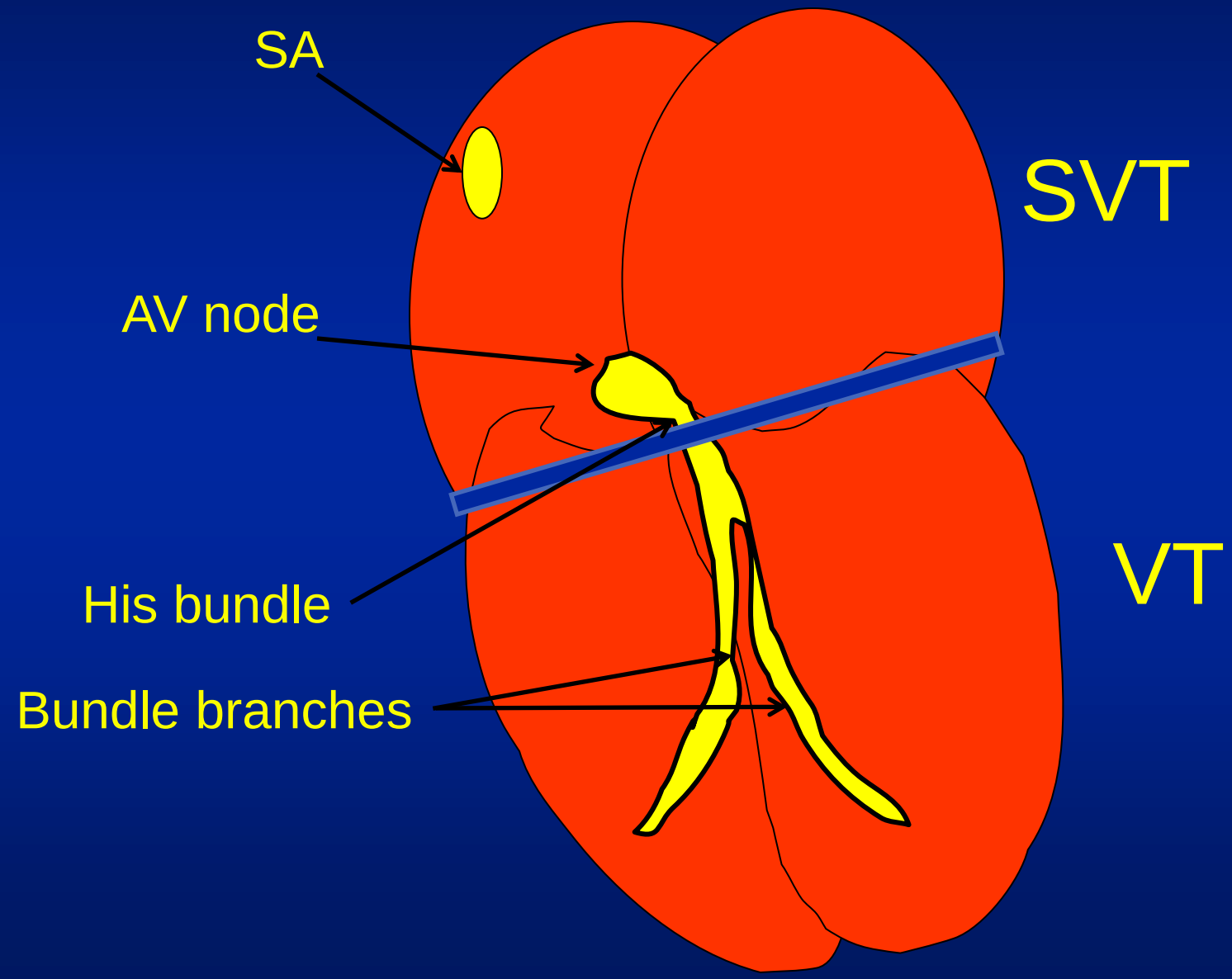
Consultant Electrophysiologist

Notes taken by: Amal Alshaibi

We can classify tachyarrhythmias By QRS complex appearance or by the anatomical structure.
1. Narrow complex tachycardia vs Wide complex tachycardia
2. Supraventricular tachycardia vs Ventricular tachycardia

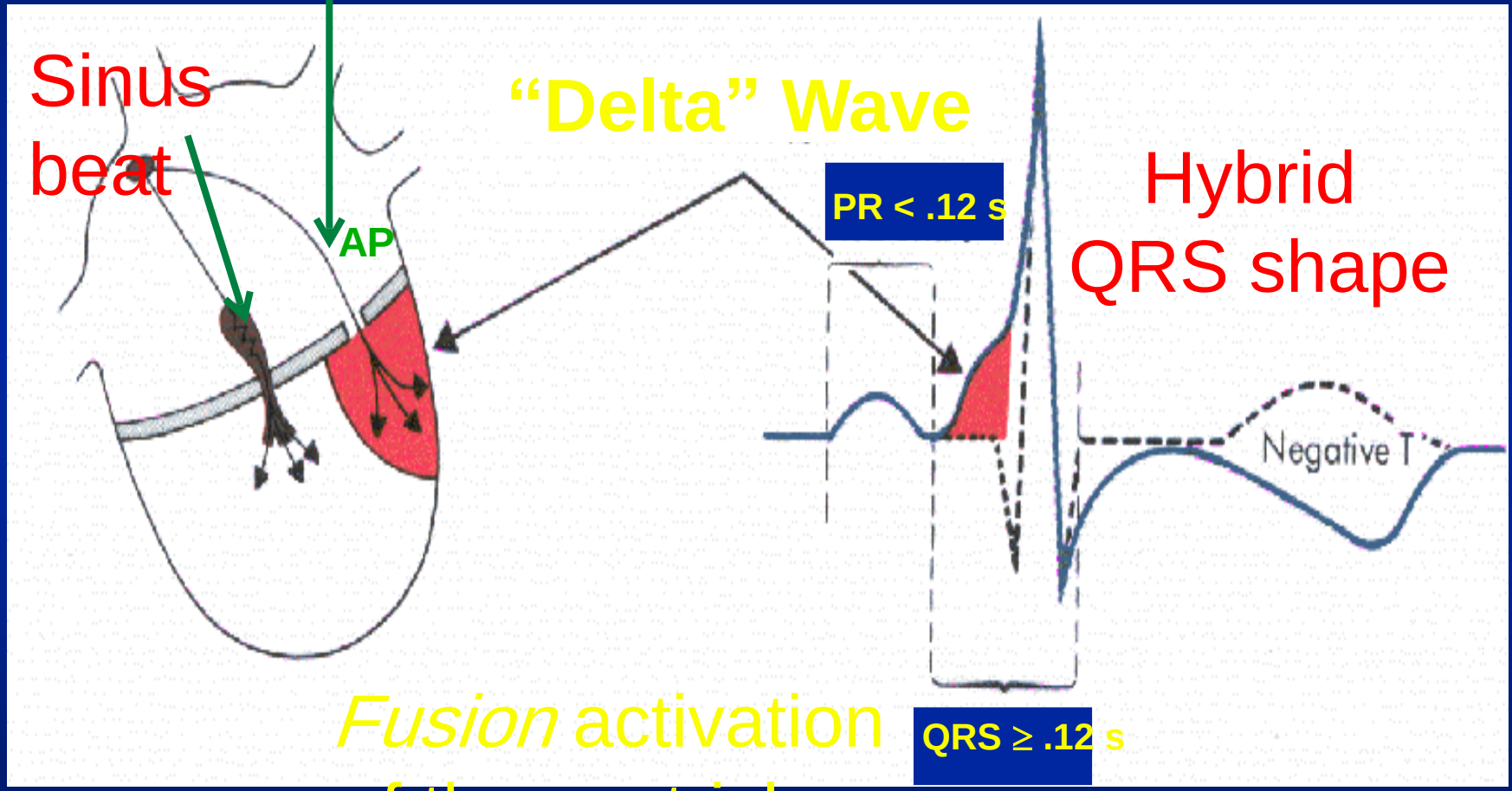


Based on the anatomical location:

- Sinus tachycardia — Physiological response: Fever, bleeding, anxious, exercising. Or drugs: Ventolin… We don't treat it. We treat the underlying problem
- SA nodal reentry tachycardia — Problem within the SA node itself
- Atrial tachycardia /PAT/MAT — Due to a hyperactive foci of cells in atrium triggering atrial tachycardia automatically
  MAT: Multifocal atrial tachycardia
  PAT: Paroxysmal Atrial tachycardia نوبية
- Atrial flutter — Due to a circuit (with sawtooth appearance on ECG)
- Atrial fibrillation — Due to micro circuits in the atrium
- AVNRT (AV nodal reentrant tachycardia) — A circuit inside the AV node
- AVRT (AV reentrant tachycardia) — A wire between the atrium and ventricle causing the tachycardia. AKA: WPW
- Junctional tachycardia

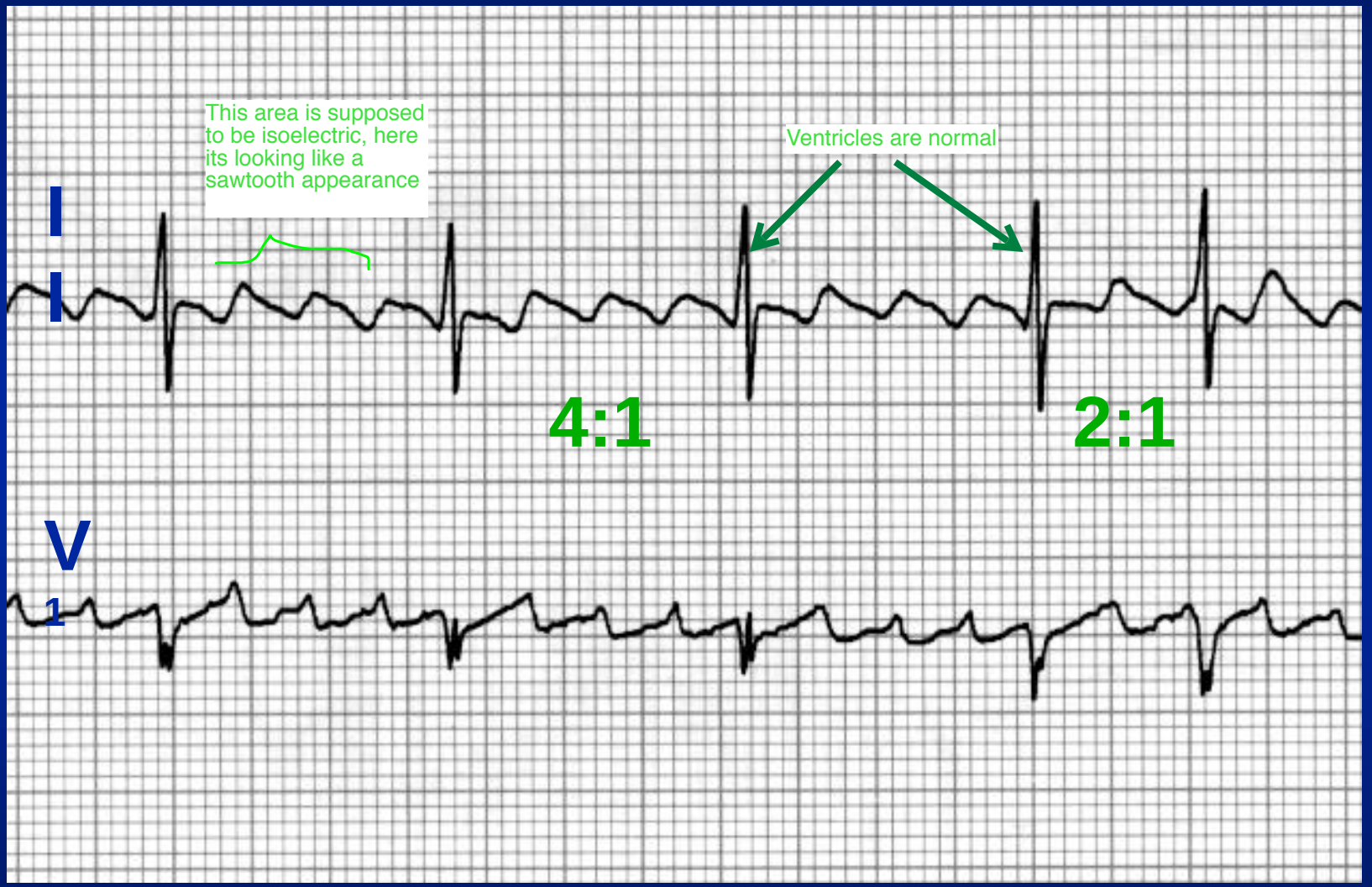
In cases of WPW, there's an extra wire connecting the atrium with the ventricle.

Characterized by tachycardia, short PR and a delta wave (its like a ramp).

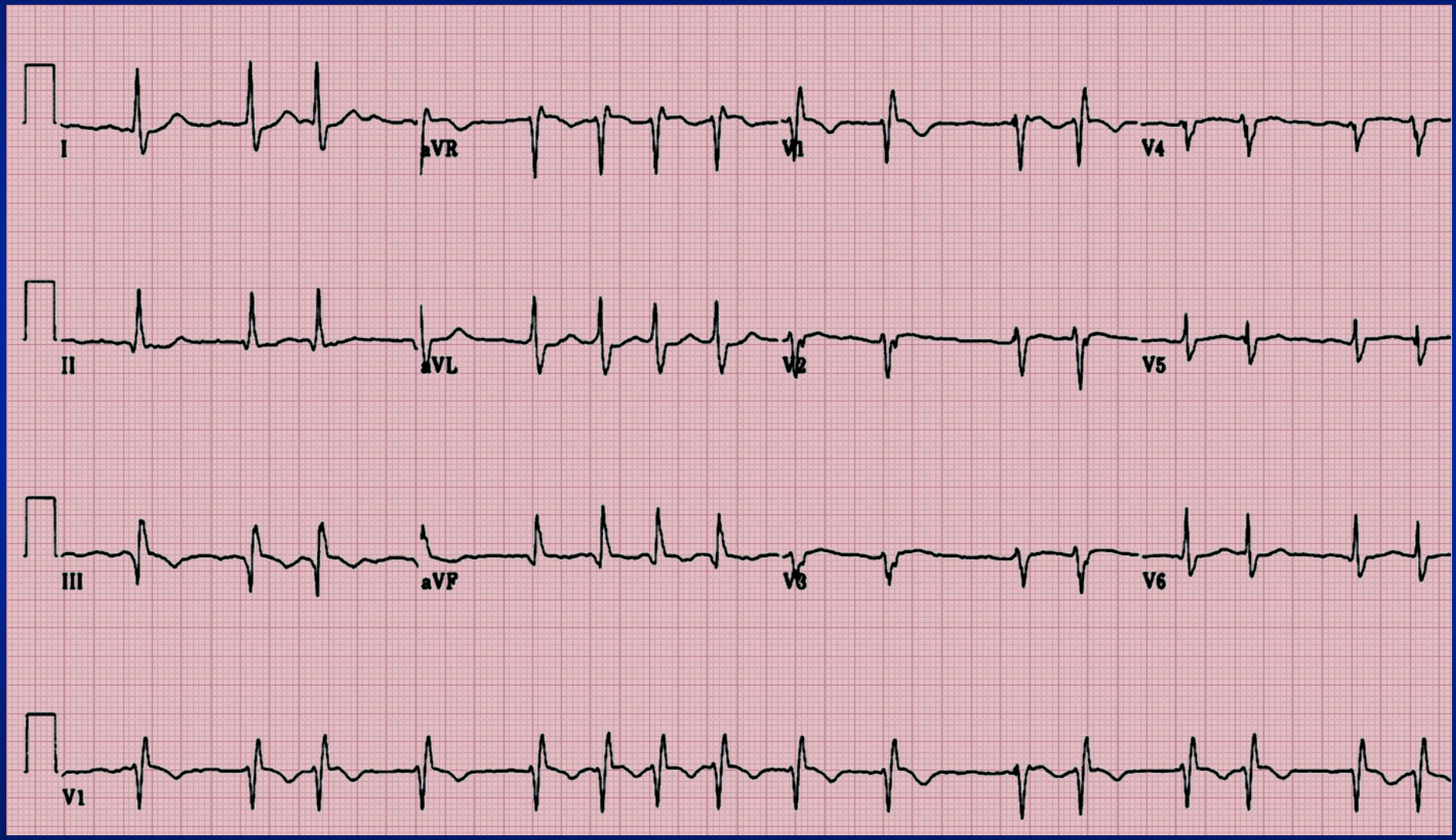


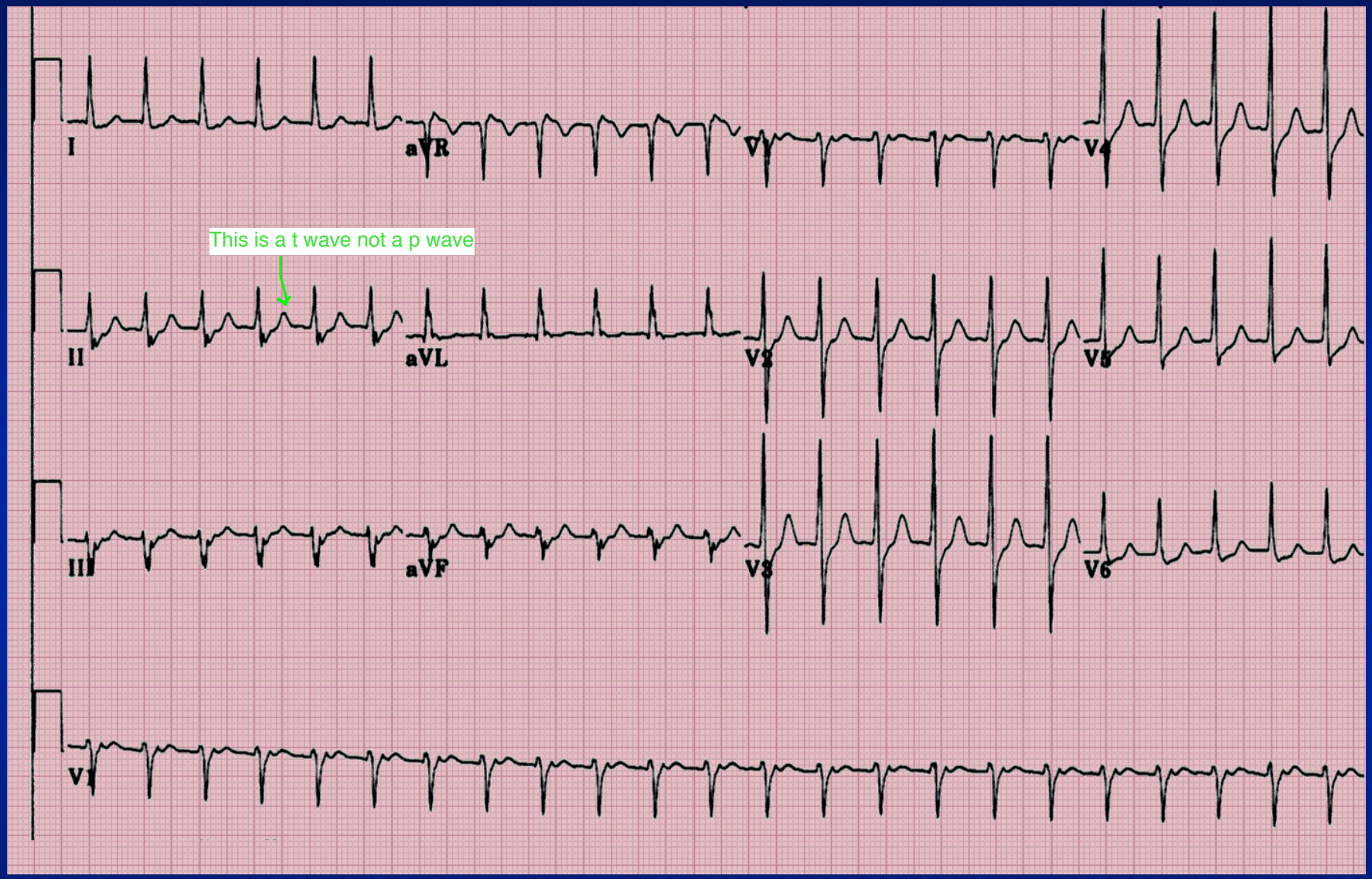
Fusion activation of the ventricles

Atrial Flutter



Irregularly irregular. This is Afib





1. Tachycardia
2. Narrow complex
3. Regular or irregular? Its regular
4. Look for P wave. If there's 1 to 1 ratio of P waves its sinus tachycardia, if there's absent p wave its SVT.

If there's an elevation between R and an R, its T wave. P wave can be absent but t wave is never absent.

This is SVT. Our differentials are: AVNRT, AVRT, or AT

What is your management?

SVT is a very benign condition almost never causes death

Management

Narrow Complex tachycardia

Serious signs and symptoms

I m m e d i a t e Cardioversion

Stable clinically

Vagal maneuvers

Like telling the patient to gag and vomit. This is a very strong vagal stimulant

Or valsalva maneuver, like labor pushing or put your hand on the belly and ask the pt to push the hand with hiss belly

Or splash their faces with ICE cold water

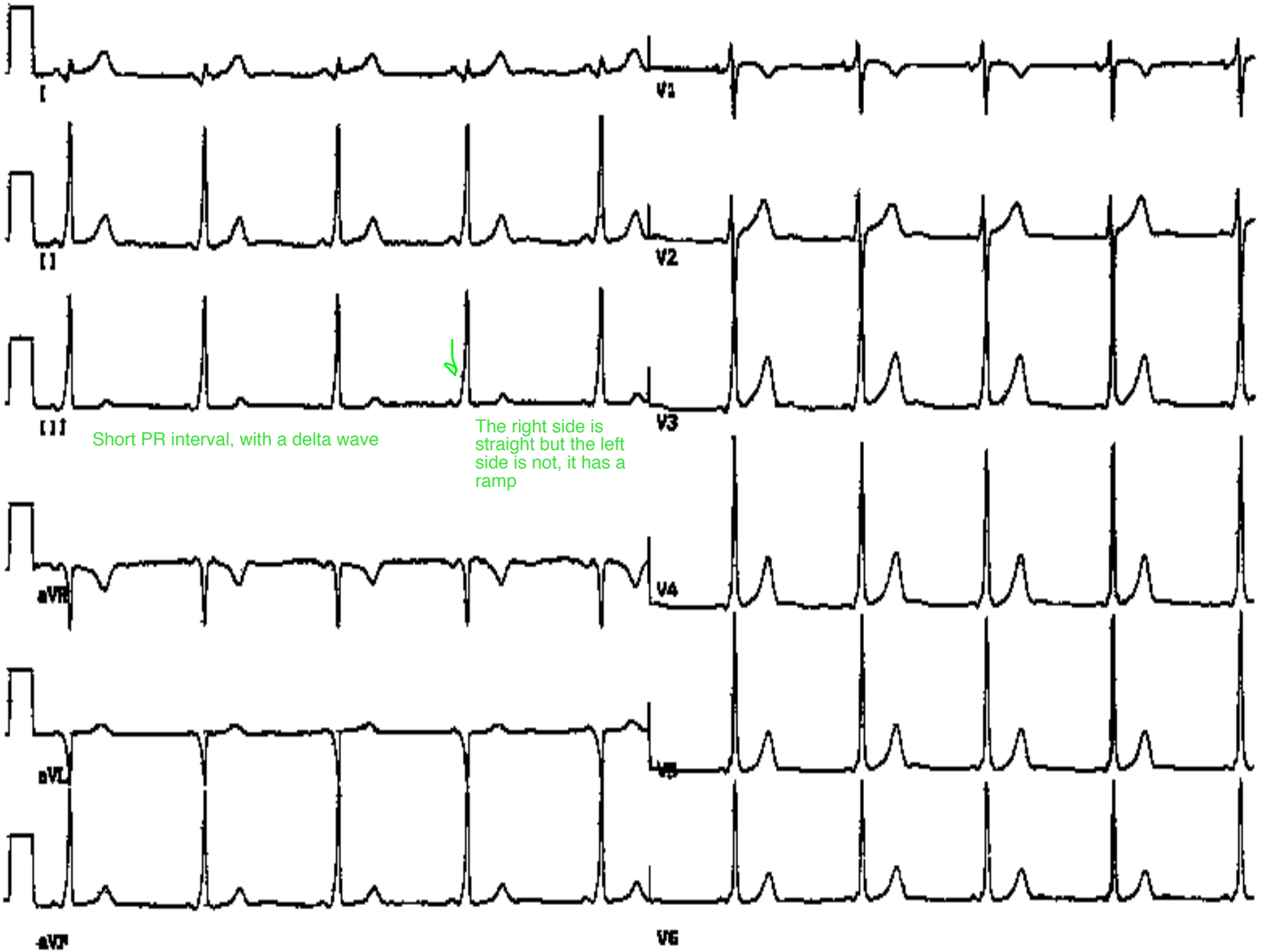
Adenosine or Verapamil

If all maneuvers failed, give adenosine, 6mg and it has an ultra short half life because it gets absorbed immediately, so you have to give it and flush it right away. If 6mg did work, give 12mg

Consider BB, Diltiazem , or Digoxin

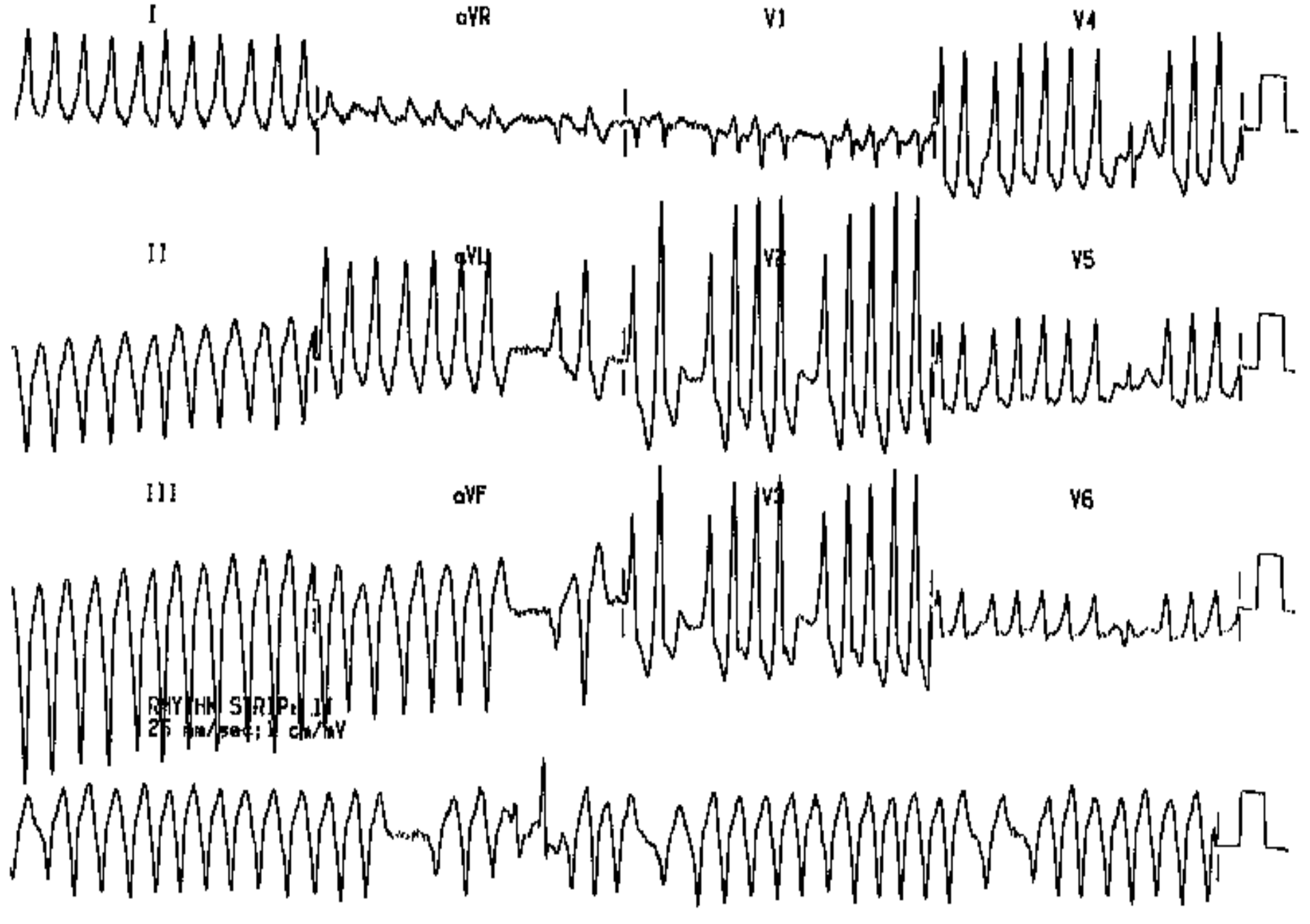
If adenosine didn't work, give BB, if it didn't work, give Ca channel blocker, if they didn't work give digoxin, LAST option is cardioversion

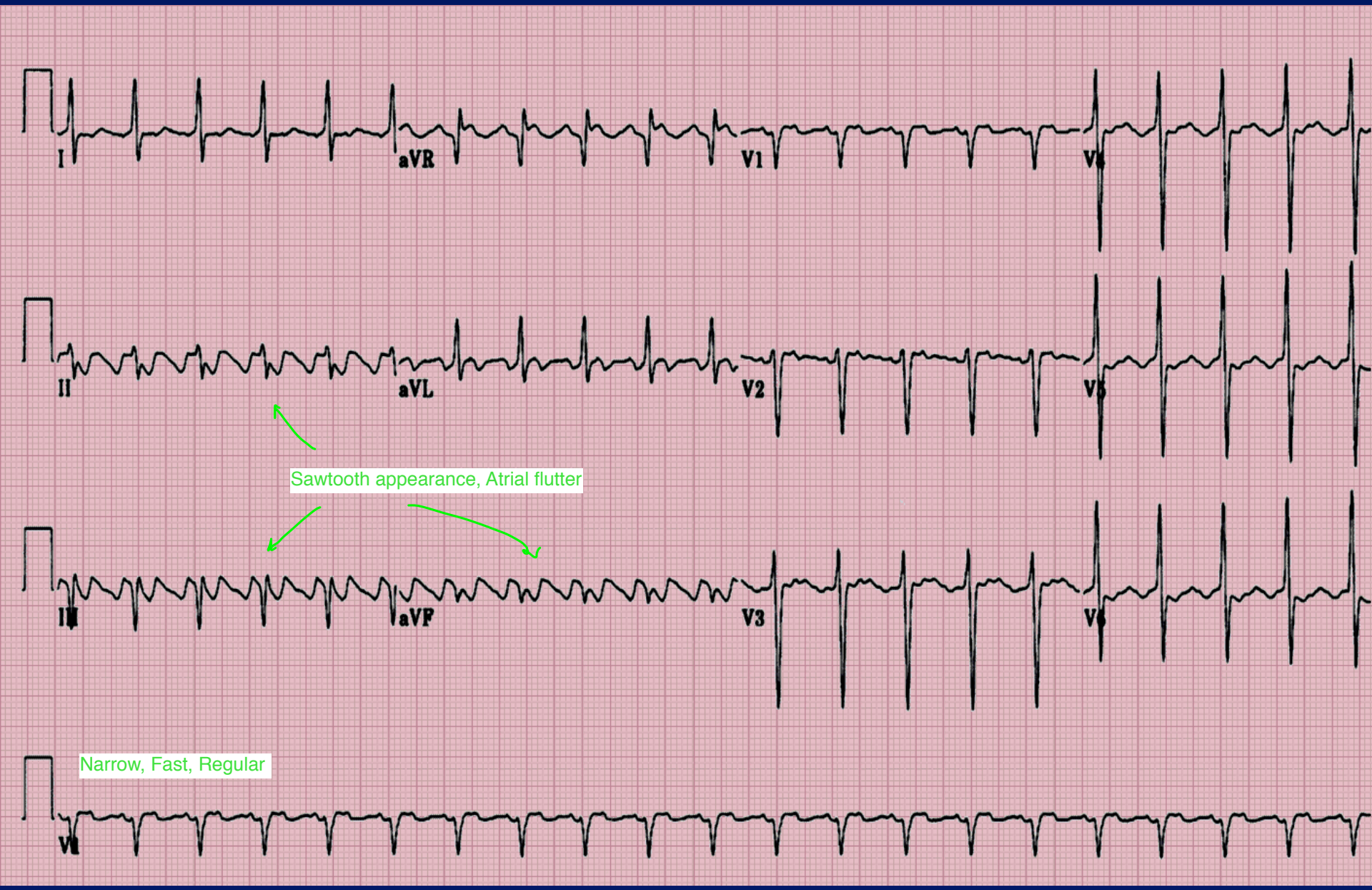
*The ultimate and curative treatment is with ablation


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
Short PR interval, with a delta wave
The right side is straight but the left side is not, it has a ramp

WPW

- Short PR interval, less than 3 small squares (120 ms)
- Slurred upstroke to the QRS indicating pre-excitation (delta wave)
- Broad QRS
- Secondary ST and T wave changes
- An accessory pathway, bundle of Kent, exists between atria and ventricles and causes early depolarisation of the ventricle.


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
RHYTHM STRIP: II
25 mm/sec; 1 cm/mV


I
aVR
V1
II
aVL
V2
III
aVF
V3
Sawtooth appearance, Atrial flutter
Narrow, Fast, Regular

[redacted] 23-Aug-21 [redacted] A

Male

Dept:

[redacted], ASSUMED TO BE 50 YEARS OLD FOR PURPOSE OF ECG INTERPRETATION

[redacted]N, V-RATE 119-165.....var'd rate, irreg atrial activity

[redacted]H BLOCK.....QRSd>120, terminal axis(90,270)

[redacted]CUTE.....ST >.20mV, Q >35mS, I aVL V5 V[redacted]

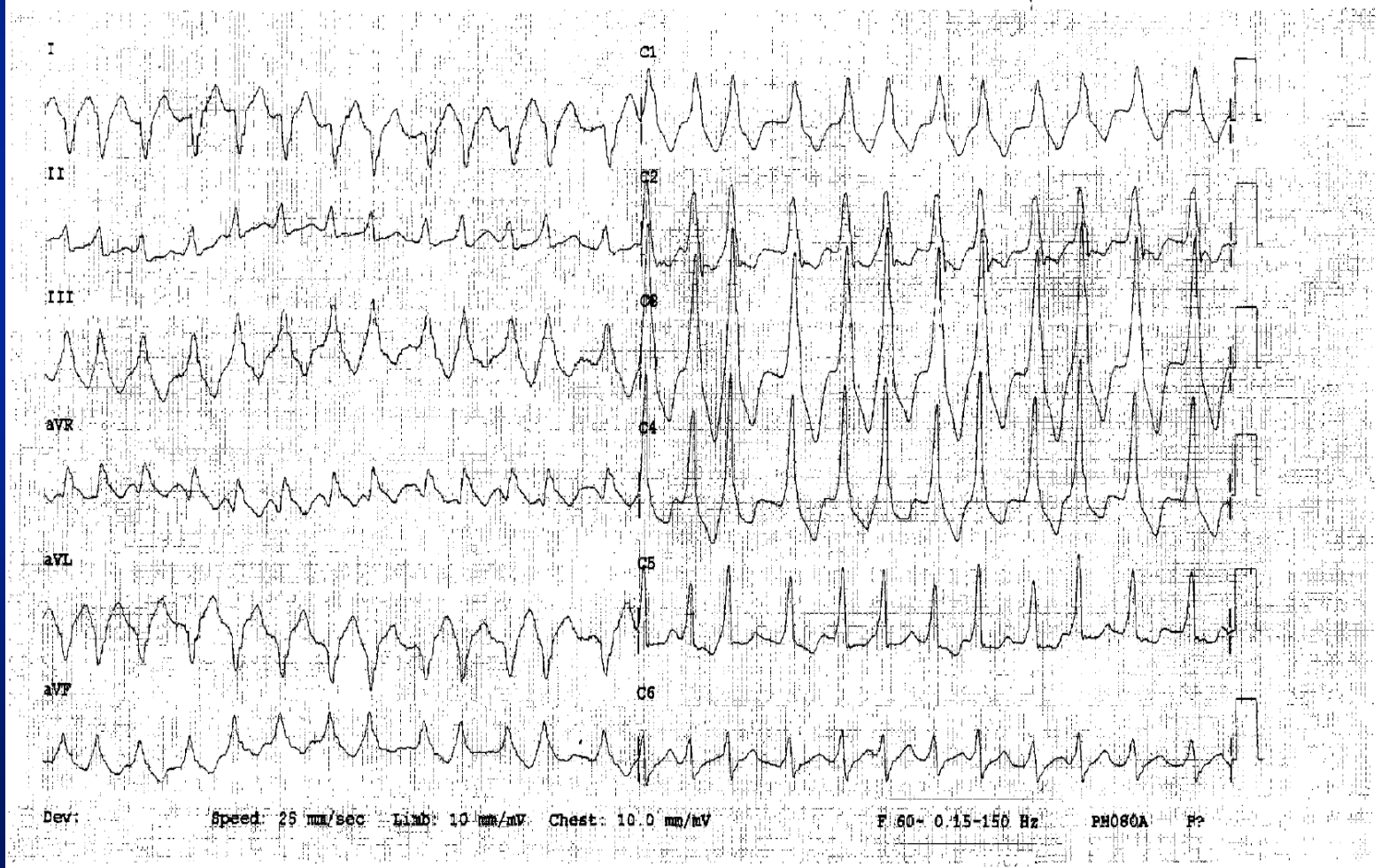
QT 368
QTc 574

--AXIS--
P
QRS 140
T -29

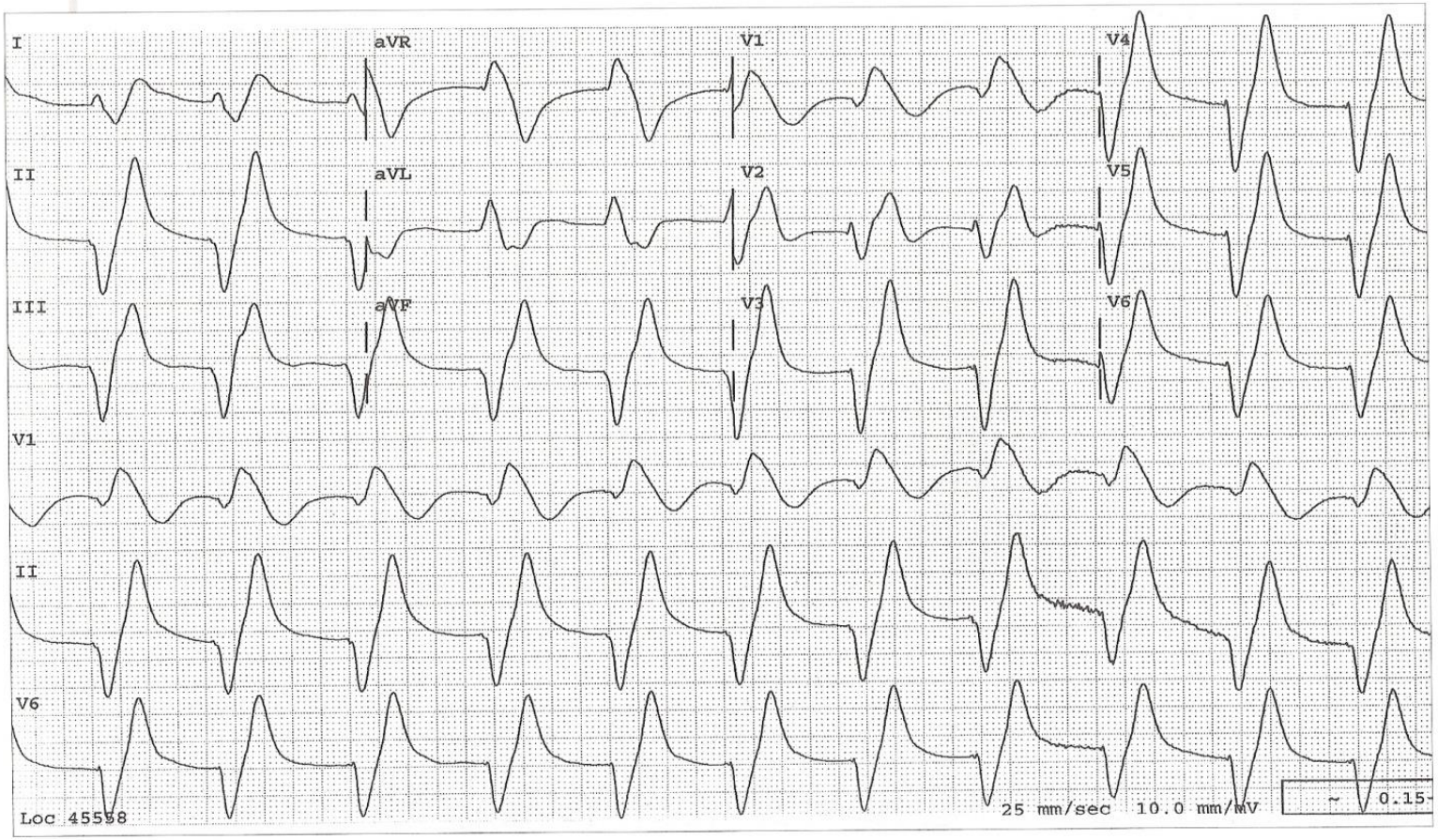
[redacted]

- ABNORMAL ECG -

Unconfirmed Diagnosis



ECG VIII-15


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V6
Loc 45598
25 mm/sec
10.0 mm/mV
0.15

WCT

- It has to be wide : QRS complex >0.12

- It has to be fast: HR >100

Step # 1 determine if the patient is stable

- 1- Hemodynamically unstable: ACLS protocol > Cardiovert
- 2- Hemodynamically stable: Go to step#2

Generally at our level, ANY wide complex tachycardia is VT until proven otherwise

Step#2 Is this VT or others

- DDx for WCT :
- 1- VT 70%- 80% Or 90%
- 2- SVT with abberation
- 3-AF with BBB
- 4- AF with WPW
- 5-Paced rhythm
- 6-Sinus tachycardia with BBB

Step #3 EKG criteria

- 1-QRS duration
- 2-QRS axis
- 3-QRS concordance
- 4-AV dissociation
- 5-Fusion and capture beat
- 6-Specific pattern in V1
- 7-Absent RS in precordial leads

Skip

1 QRS duration

- SVT with RBBB aberration QRS <140 ms
- SVT with LBBB aberration QRS <160ms

- Sensitivity 58% , Specificity 73%

Skip

2 QRS axis

- Superior axis (-90 to 180) VT
- Right axis with LBBB VT

- Sensitivity 20%, specificity 96%

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(7)

Rate	193	. [redacted], ASSUMED TO BE 50 YEARS OLD FOR PURPOSE OF ECG INTERPRETATION
		. [redacted].....V-rate> 99, QRSd>120
PR	56	. [redacted].....long R-R interval, normal QRSd
QRSD	136	[redacted]
QT	340	. [redacted].....QRSd >110mS, not LBBB/RBBB
QTc	610	DELAY

--AXIS--

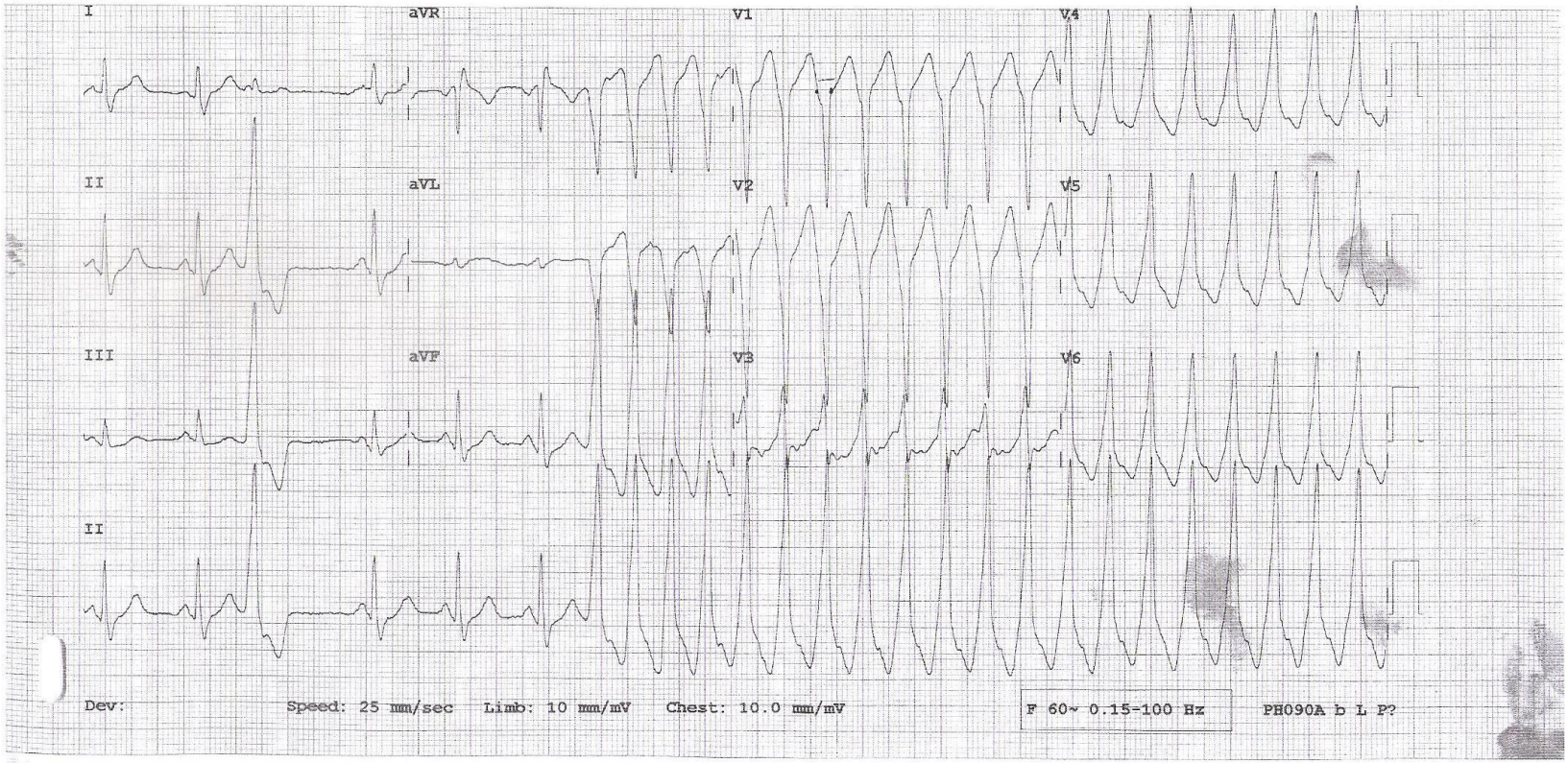
P	0
QRS	90
T	267

S/B Dr. Samer

- ABNORMAL ECG -

Unconfirmed [redacted]

98524
SHERIN SALAH SALEEM
DOB: 27/08/1979 Sex: F
Nationality EGYPTIAN



EXERCISE TEST / ECG Strips

8

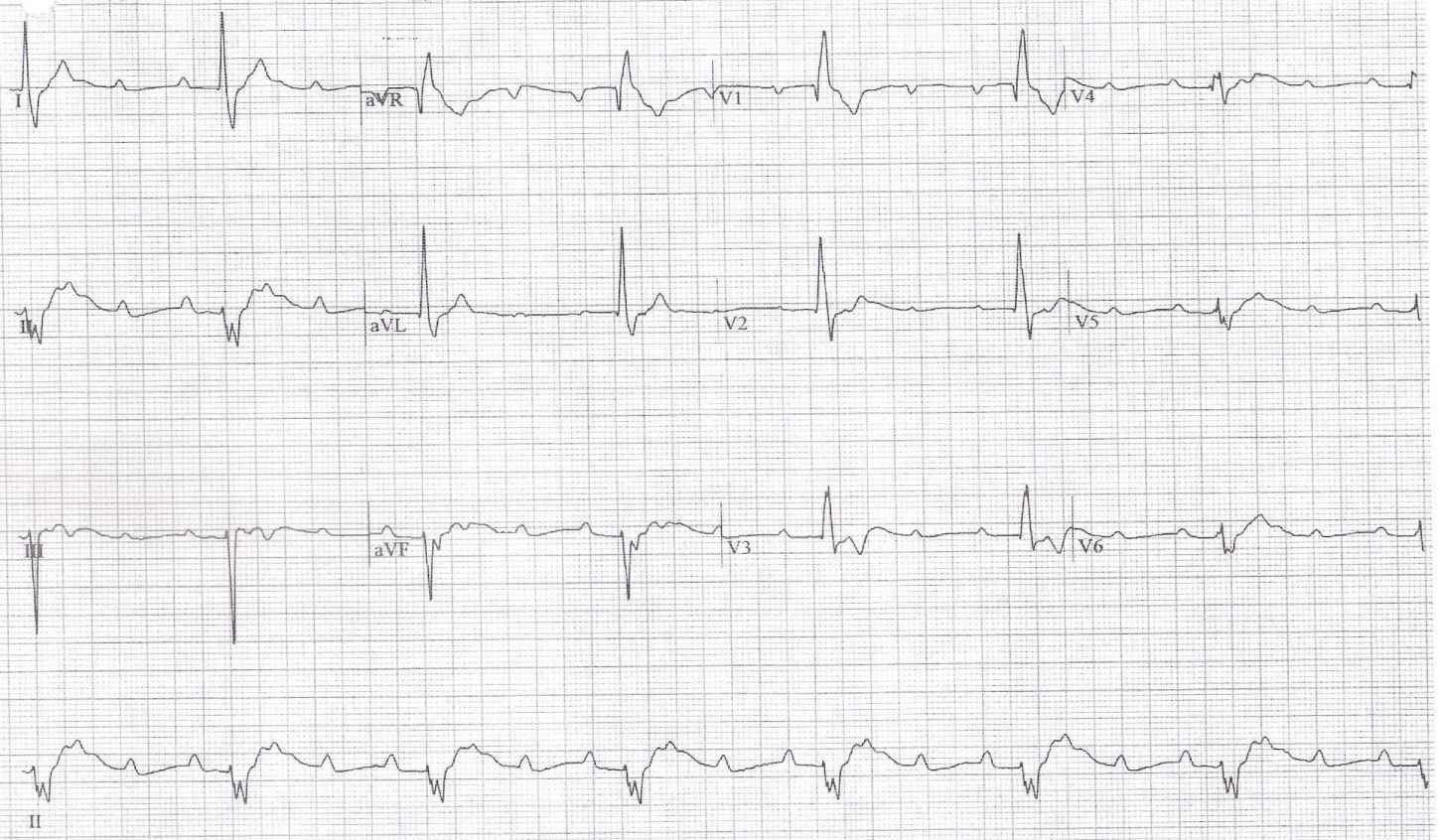
KKUH

774305

43 bpm
125/80 mmHg

RECOVERY
2:50

BRUCE
0.0 km/h
0.0 %



GE CASE V5.15 (0)
25mm/s 10mm/mV 60Hz 0.01Hz FRF+ HR(V2,V3)

Unconfirmed

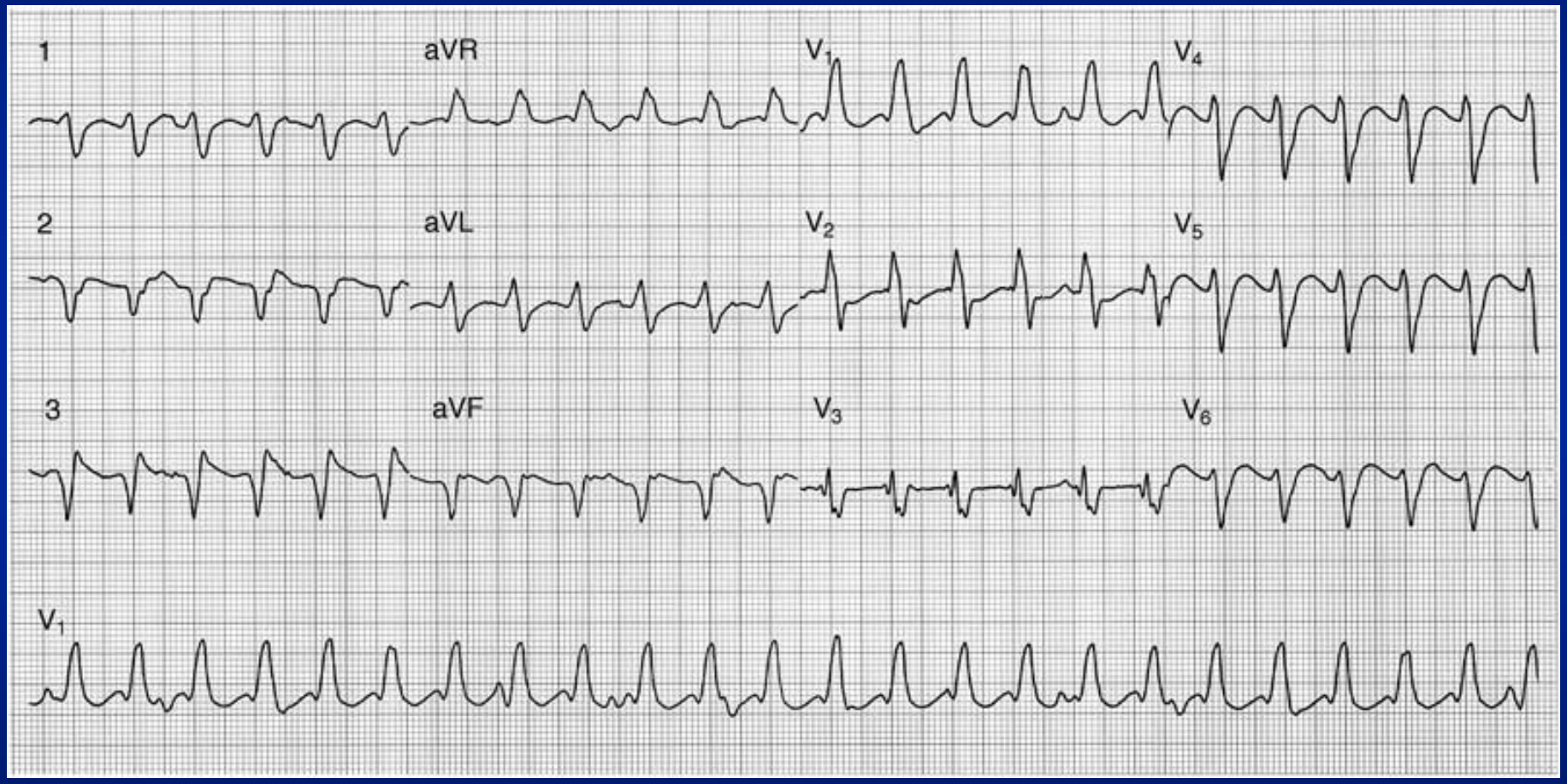
Attending MD: Dr.Raed

Page 1

Premium™

GE Medical Systems

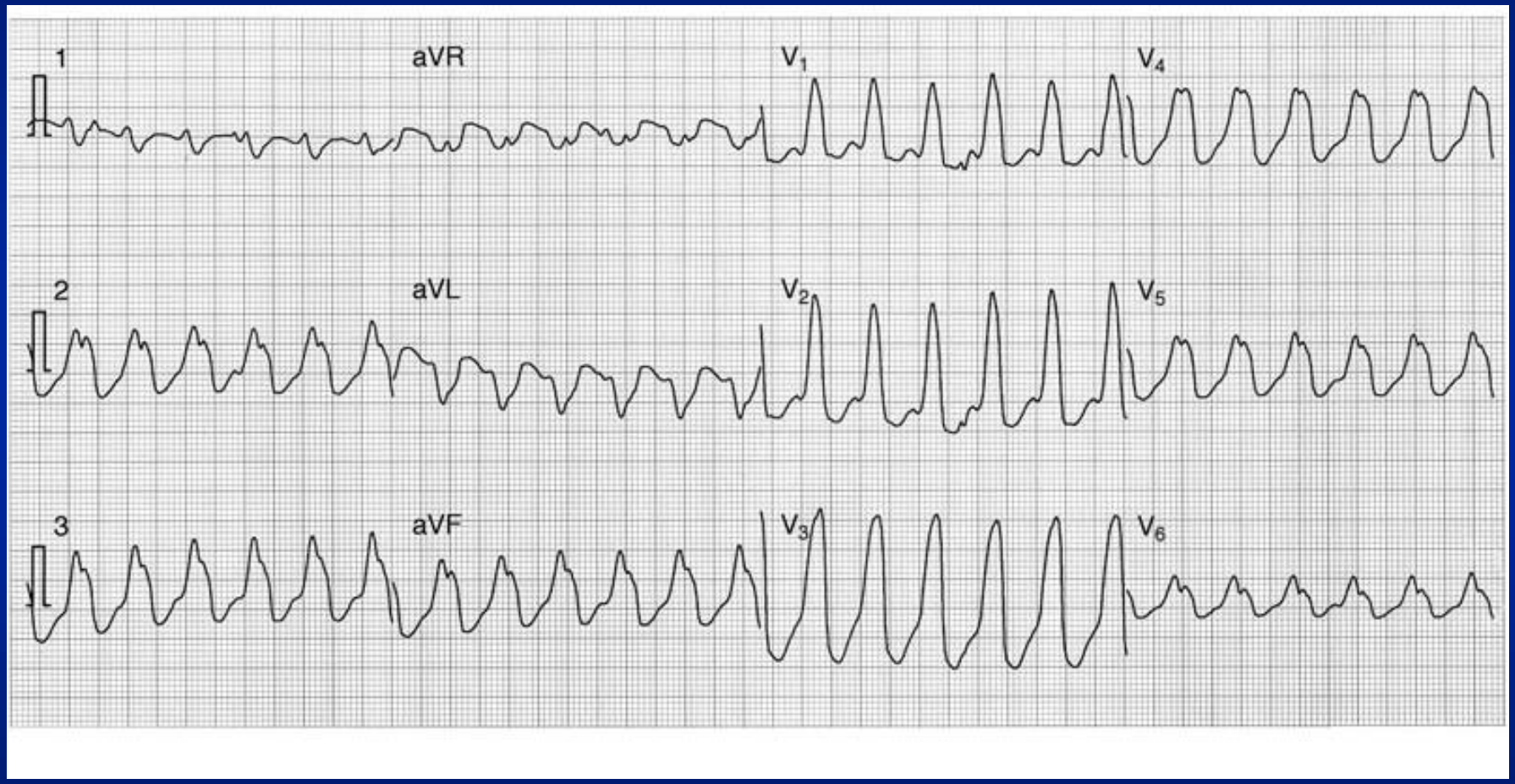
Wide complex, tachycardia. Its VT until proven otherwise



skip

3 concordance

- Positive concordance sensitivity 18%, specificity 96% for VT
- Negative concordance sensitivity 12% , specificity 90% for VT


1
aVR
V1
V4
2
aVL
V2
V5
3
aVF
V3
V6

Skip

#4 AV dissociation

- Specificity 100%
- Sensitivity 31%

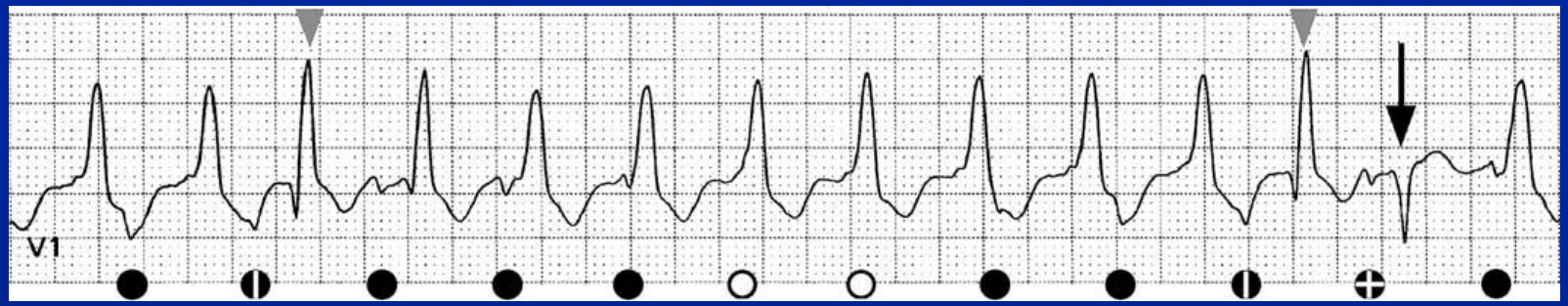
Skip

#5 Fusion beat and capture beat

- Very rare 0.5% of VT will have fusion and capture beats

Skip

- Fusion and capture complexes:



Skip

#6 QRS pattern in V1 & V6

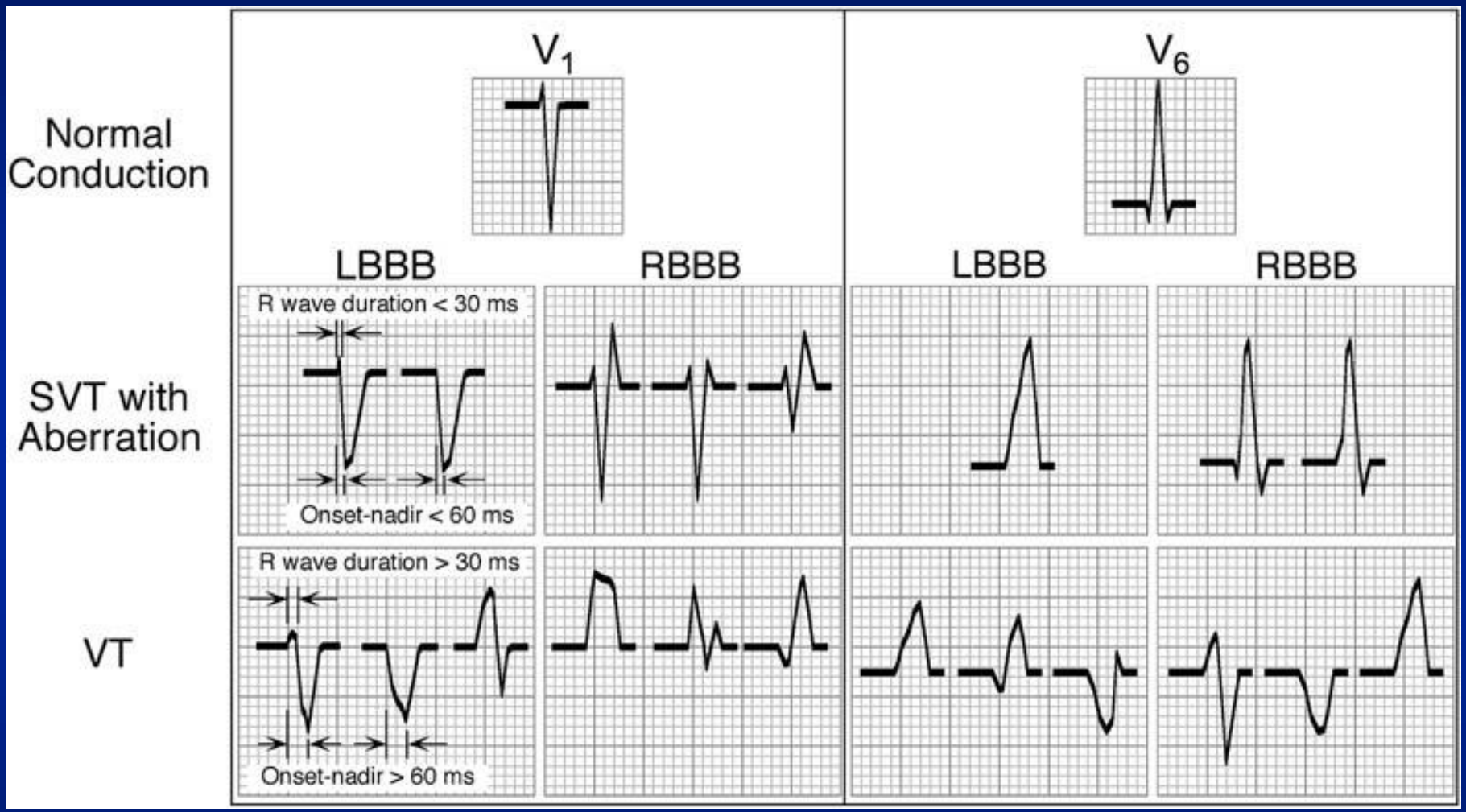
Lead	QRS Morphology		Incidence
V_1	Single peak		15/15
	Taller first rabbit ear		7/7
	QR		16/17
	RS		4/4
V_6	rS		27/31

Skip

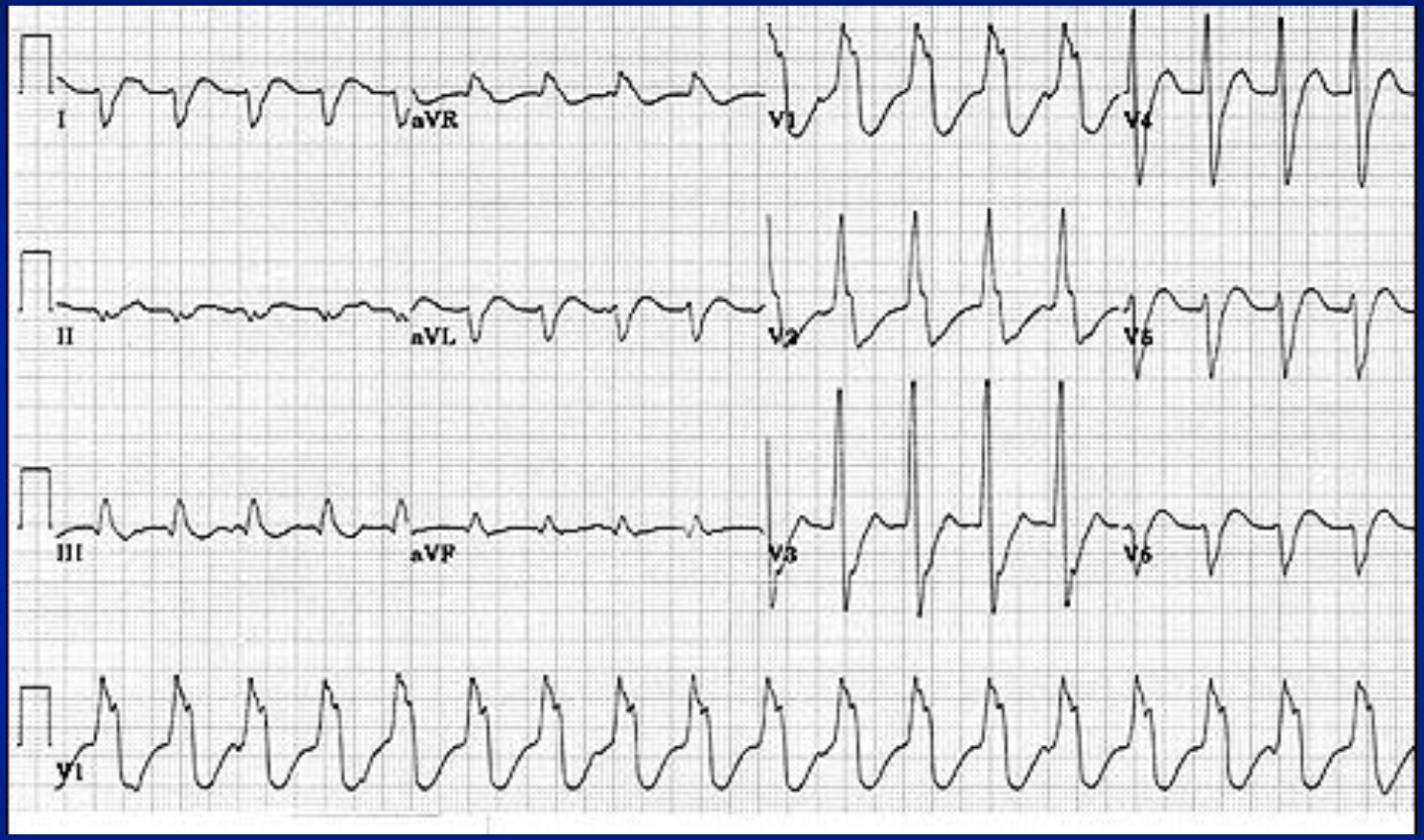
#6 QRA pattern in V1 & V6

	QS		17/17
	QR		8/8
Axis -30 to -180 degrees[a]			68/75
QRS interval >0.14 sec[a]			59/59

Skip


Normal Conduction
SVT with Aberration
VT
V1
V6
LBBB
RBBB
LBBB
RBBB
R wave duration < 30 ms
Onset-nadir < 60 ms
R wave duration > 30 ms
Onset-nadir > 60 ms

Skip



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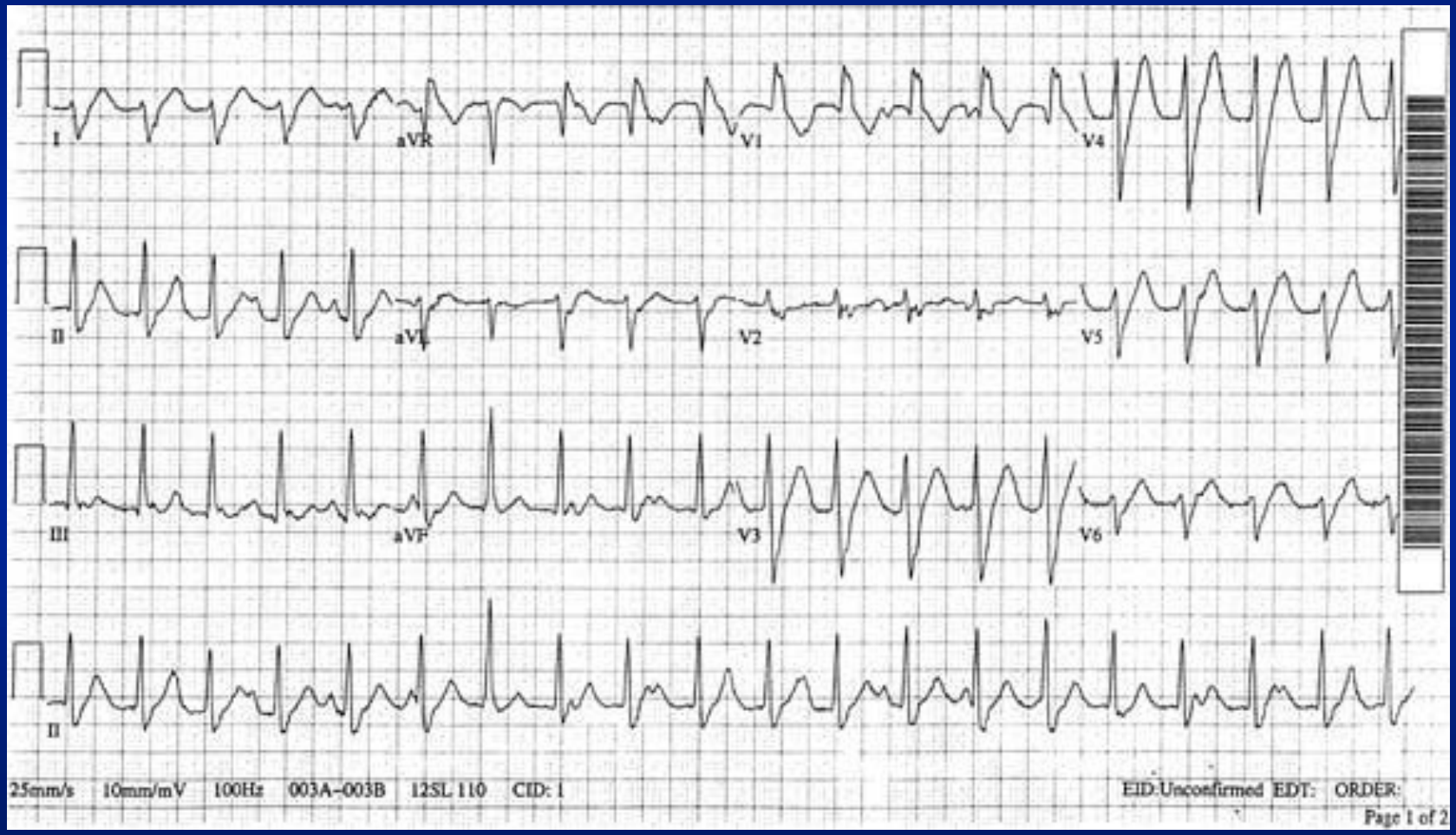
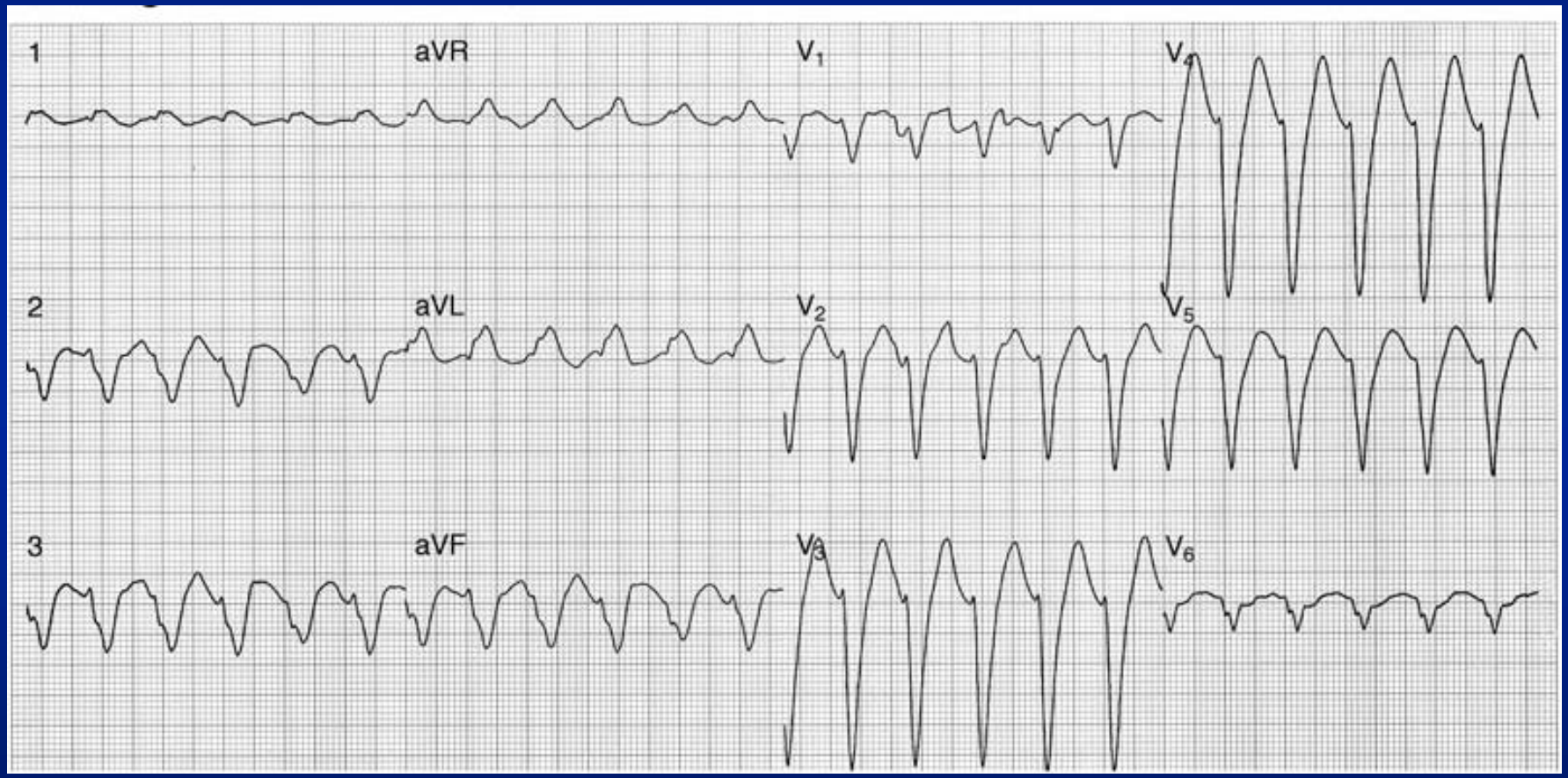

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
25mm/s 10mm/mV 100Hz 003A-003B 12SL 110 CID: 1
EID:Unconfirmed EDT: ORDER:
Page 1 of 2

Skip

7 absent RS pattern in precordial leads

- Sensitivity 29%
- Specificity 88%

Skip

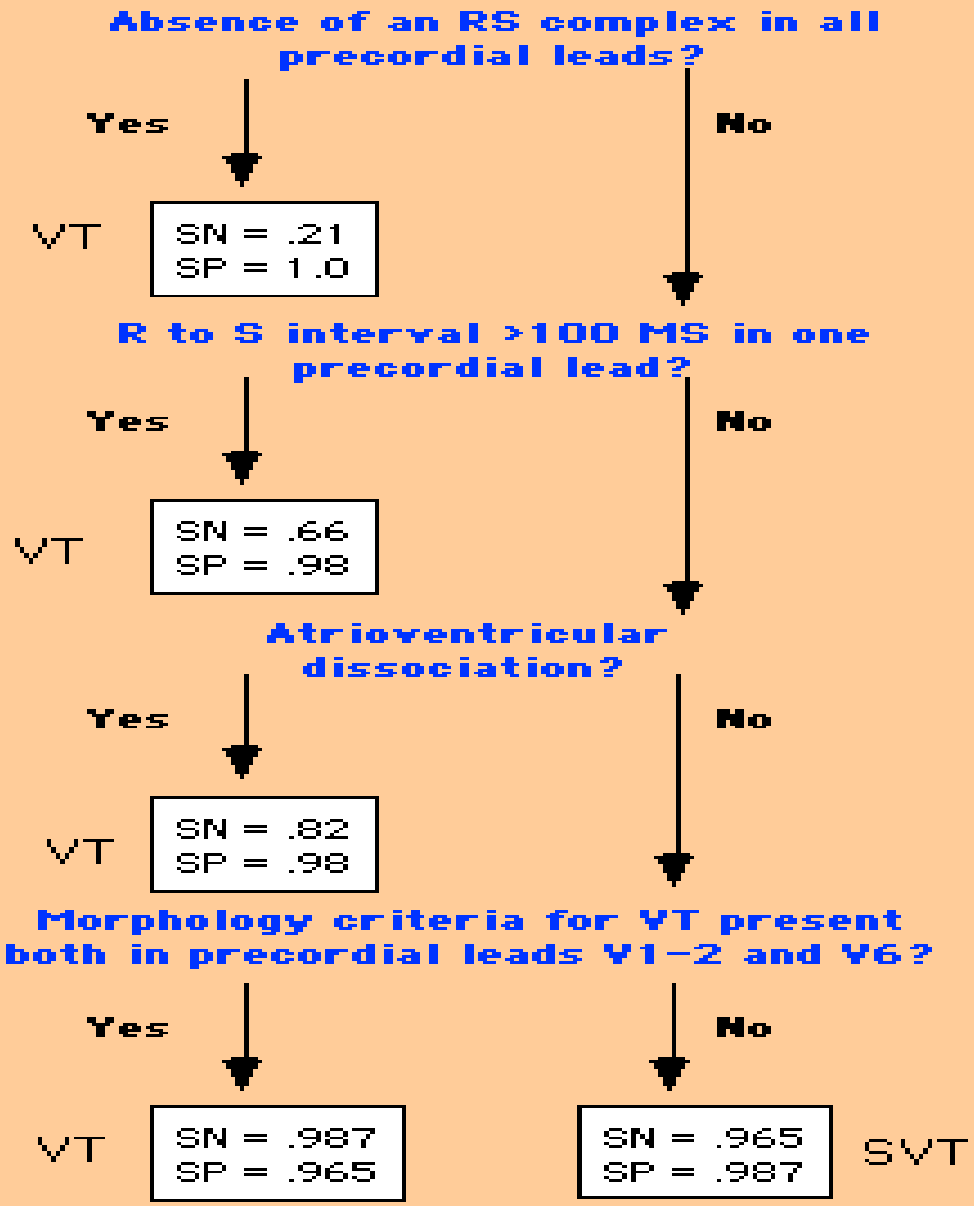


Skip

VT

- If the patient has a contralateral BBB pattern.
- WCT narrower than the baseline BBB

Skip

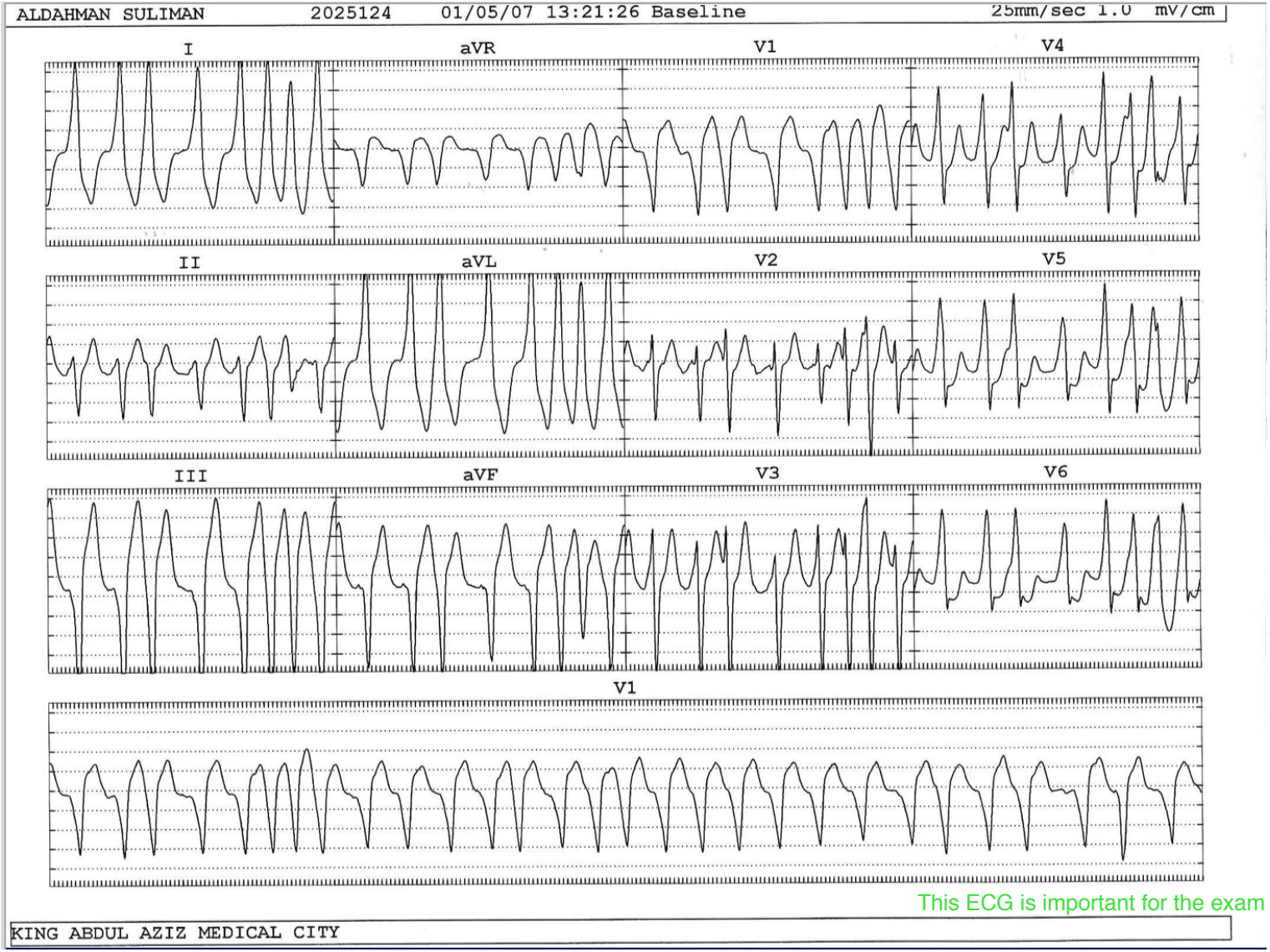


Diagnosis of wide QRS tachycardia Algorithm for distinguishing ventricular (VT) from supraventricular tachycardia (SVT) with aberration. SN = sensitivity; SP = specificity.

Thats Afib with WPW
There's a delta wave

The treatment here is with anti-arrhythmic or cardiovert. NOT ADENOSINE.

This patient has an accessory pathway, so part of the A fib impulses go through the accessory and part of it will pass through the AV node. The Adenosine will block the AV node making all the impulses pass from the accessory pathway doesn't have decremental conduction. It gives one to one conduction. So,the patient Dies.



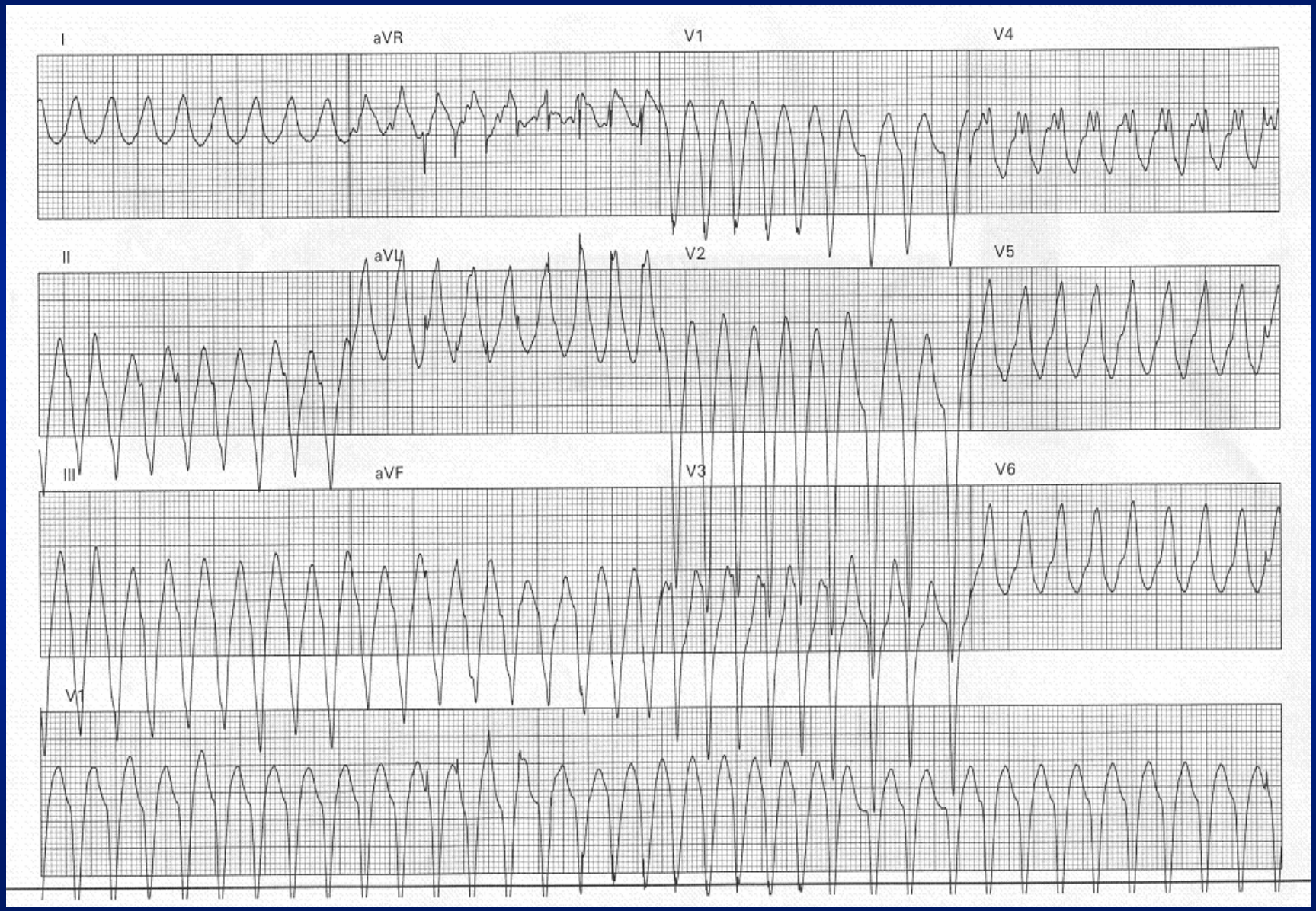
This ECG is important for the exam

Thats one of the examples of a wide complex tachycardia that is not VT. Because →

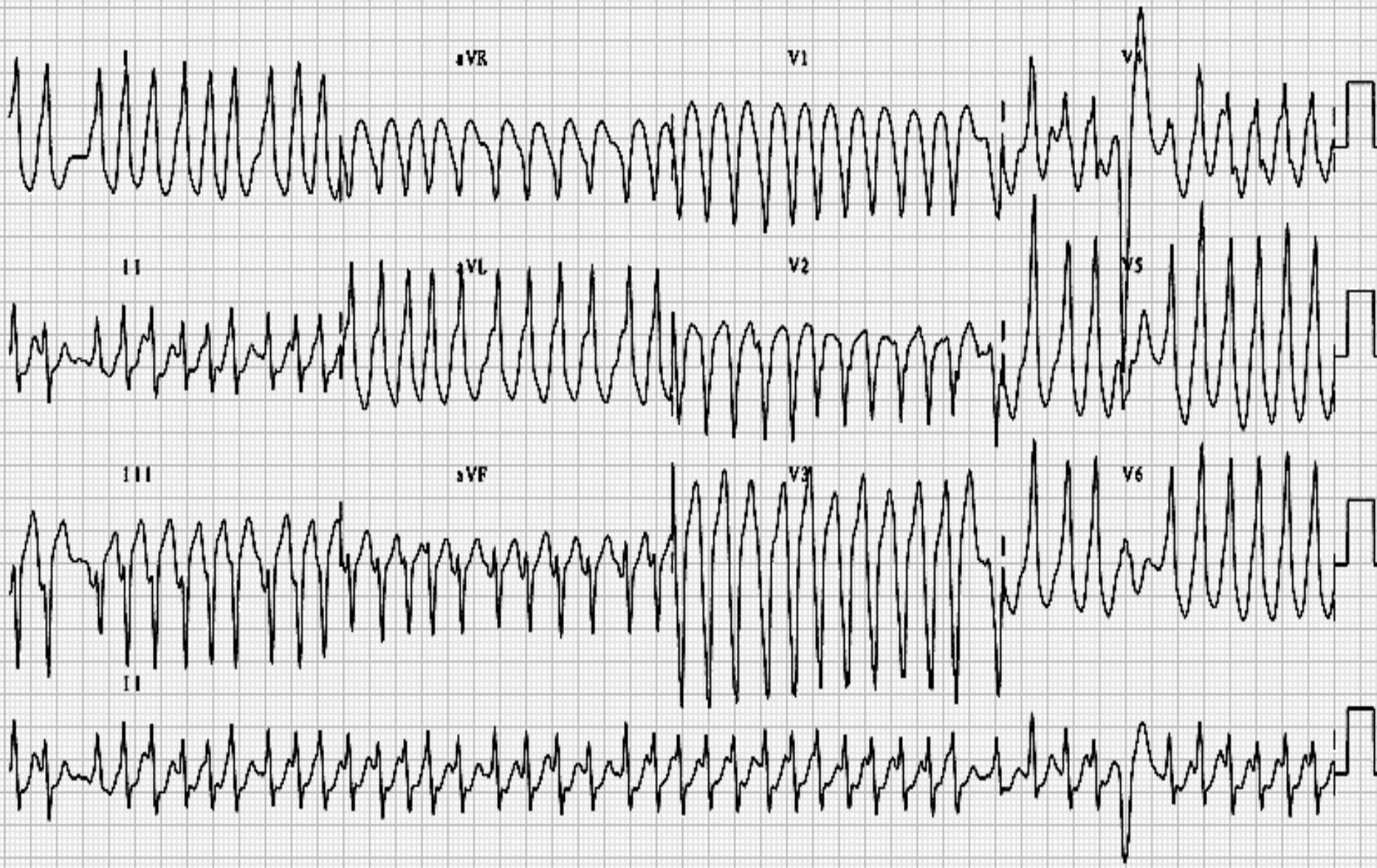
Predominantly wide QRS and not homogenous (different presentations).
Irregular
Some narrow QRS (in V2)

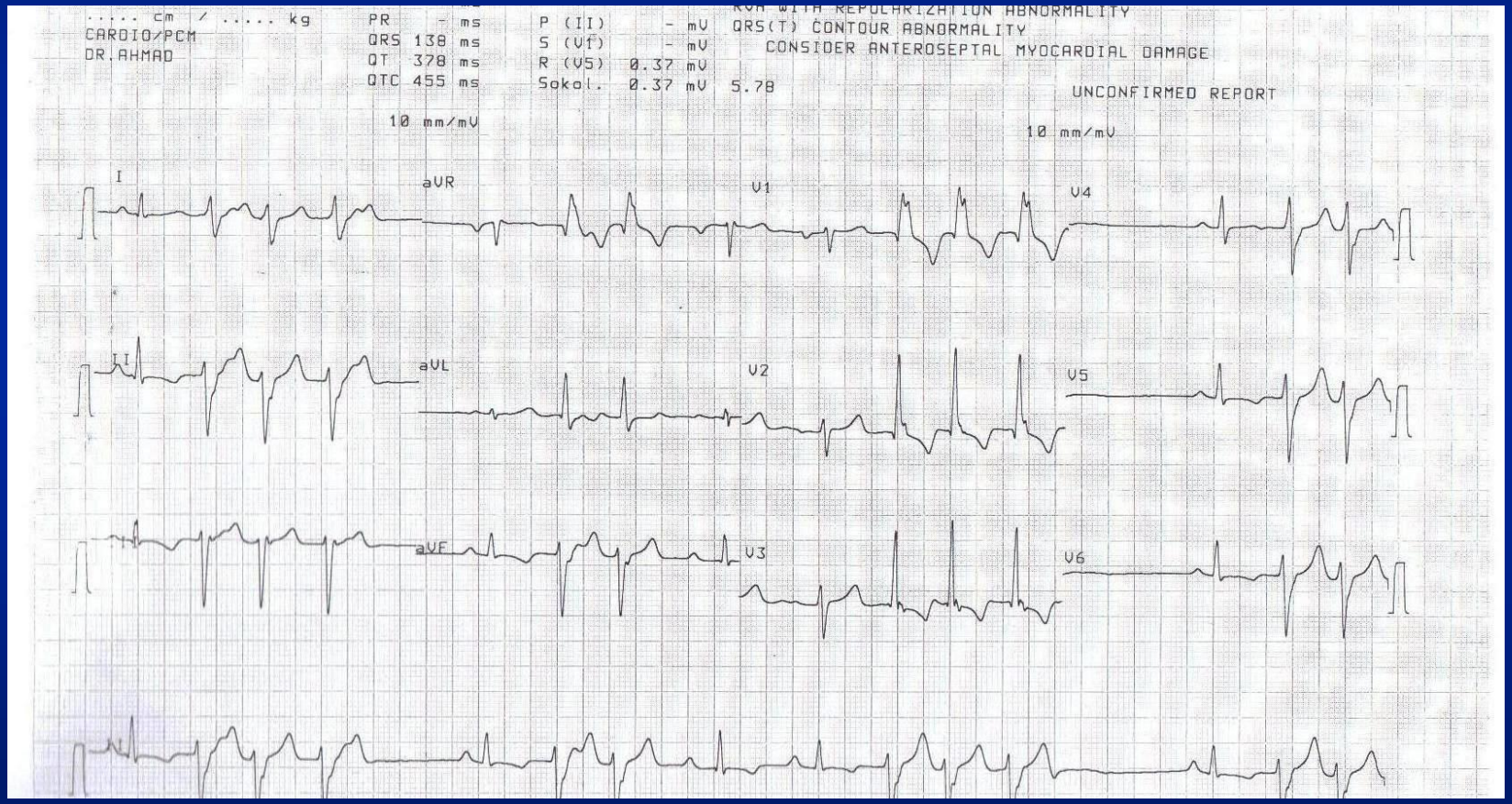
What are the usual causes of VT?
Coronary heart disease (MI)
Electrolyte imbalance (Hyperkalemia, Hypomagnesemia)
Medications (anti-arrhythmic or digoxin toxicity)
Infections like myocarditis
Connective tissue disease (sarcoidosis)
Heart failure

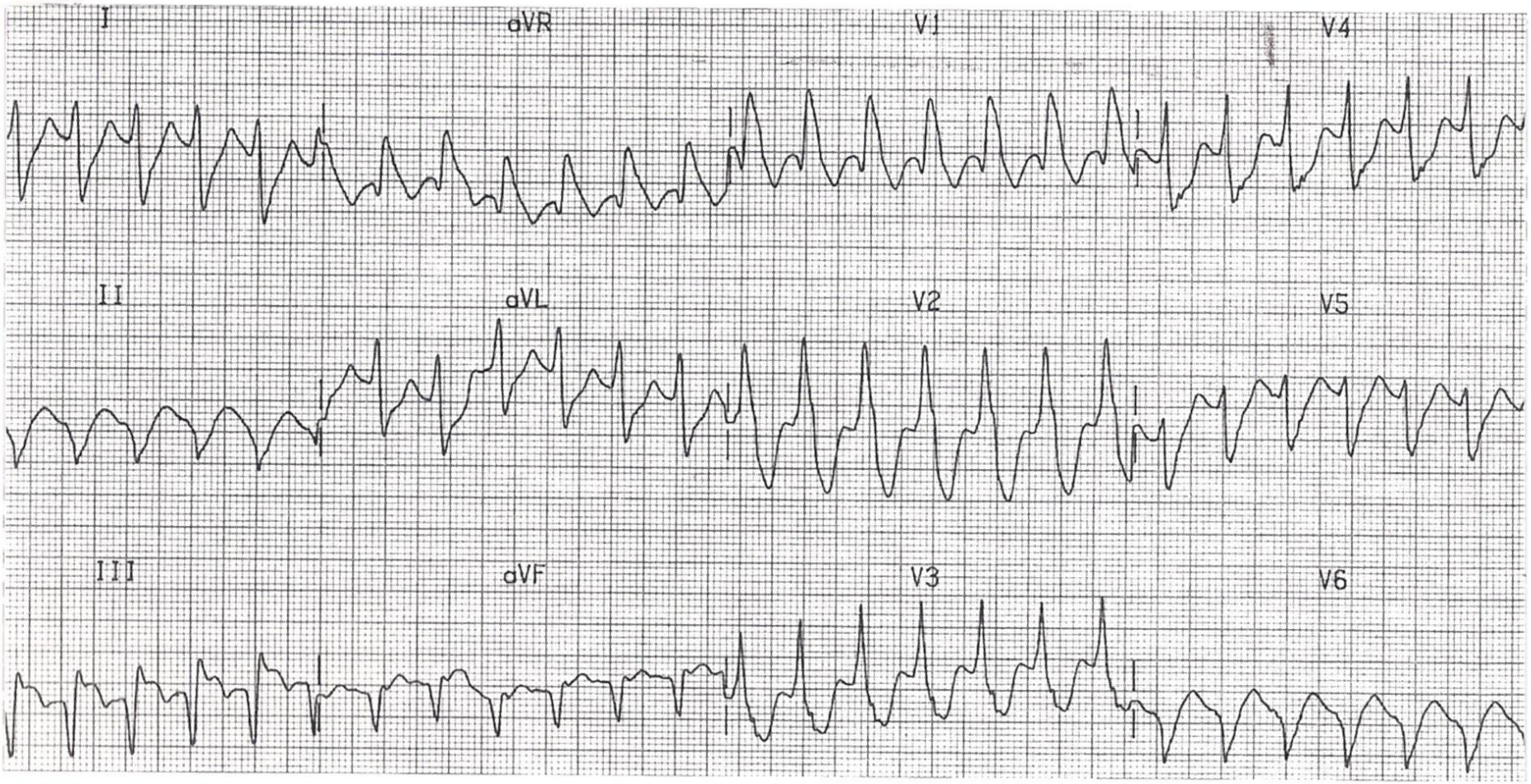
In the ER, the first thing you have to rule out in a patient with VT is MI.
Order 12 lead ECG, cardiac enzymes and take a good history and rule out MI, then do echo. If there's a reversible cause, like medication induced or electrolyte abnormality, treat the underlying cause. If there's not an obvious cause, or long term treatment, you rather put the patient on long term anti-arrhythmic medication or you implant an ICD. (Internal cardioverter defibrillator)

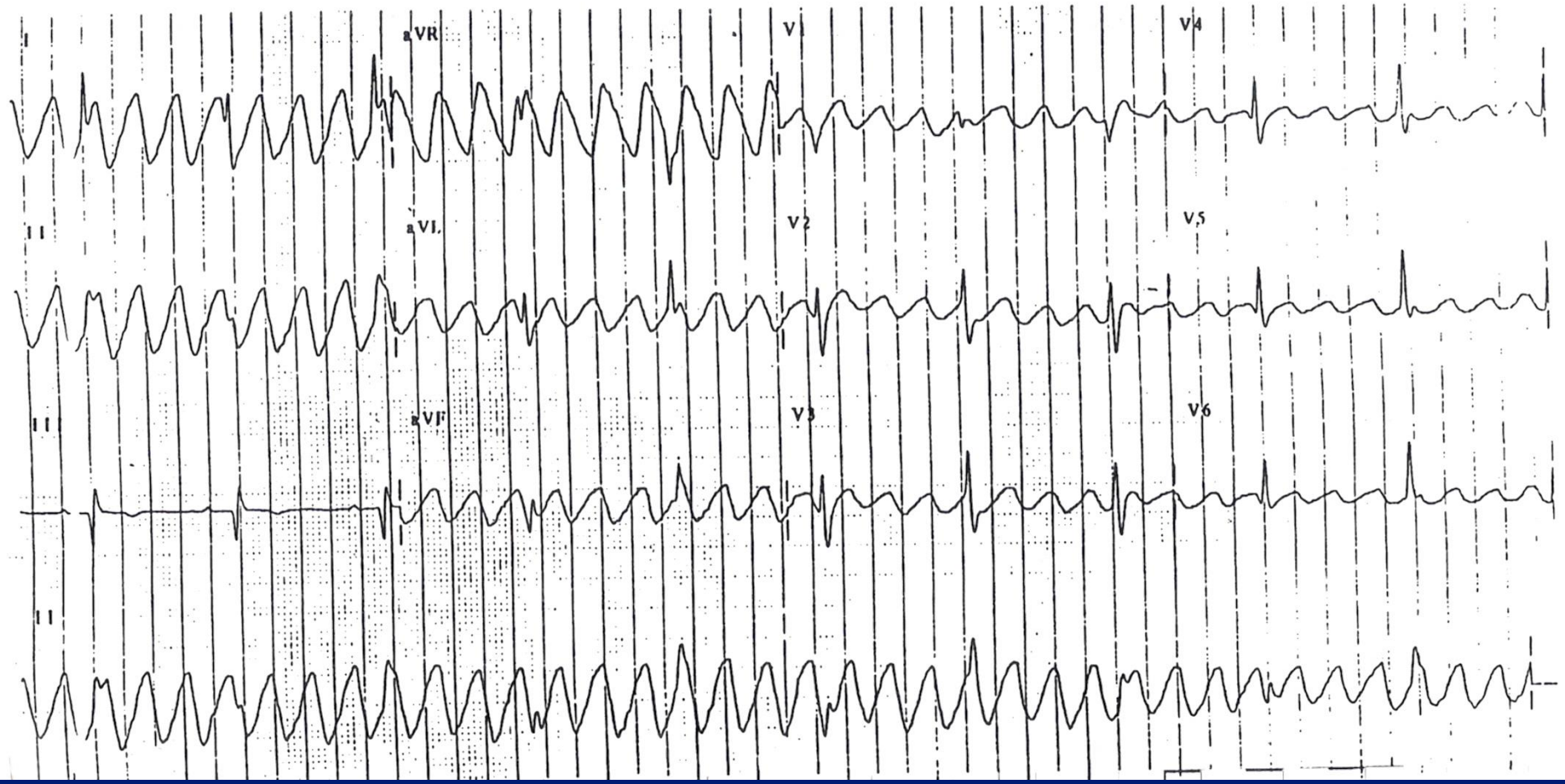

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1

A 23 year old man with episodes of palpitations.




..... cm / ..... kg
CARDIO/PCM
DR.AHMAD
PR - ms
QRS 138 ms
QT 378 ms
QTC 455 ms
P (II) - mV
S (V1) - mV
R (V5) 0.37 mV
Sokol. 0.37 mV 5.78
RVH WITH REPOLARIZATION ABNORMALITY
QRS(T) CONTOUR ABNORMALITY
CONSIDER ANTEROSEPTAL MYOCARDIAL DAMAGE
UNCONFIRMED REPORT
10 mm/mV
10 mm/mV
I
II
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6


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


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

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Rate	193	. AGE IS NOT ENTERED, ASSUMED TO BE 50 YEARS OLD FOR PURPOSE OF ECG INTERPRETATION
		. WIDE COMPLEX TACHYCARDIA.....V-rate> 99, QRSd>120
PR	56	. SINUS PAUSE/ARREST W/ SUPRAVENTRICULAR.....long R-R interval, normal QRSd
QRSD	136	ESCAPE
QT	340	. NONSPECIFIC INTRAVENTRICULAR CONDUCTION.....QRSd >110mS, not LBBB/RBBB
QTc	610	DELAY

--AXIS--

P	0
QRS	90
T	267

S/B Dr. Samee

- ABNORMAL ECG -

Unconfirmed