"Cardiac Emergencies - Rapid and Extensive“

1st Intercontinental Emergency Medicine Congress and 10th National Emergency Medicine Congress
Antalya 2014

Hans Domanovits
Vienna Medical University
Emergency Department

"When all is said and done, cardiac tachyarrhythmias account for considerable distress and untimely death"

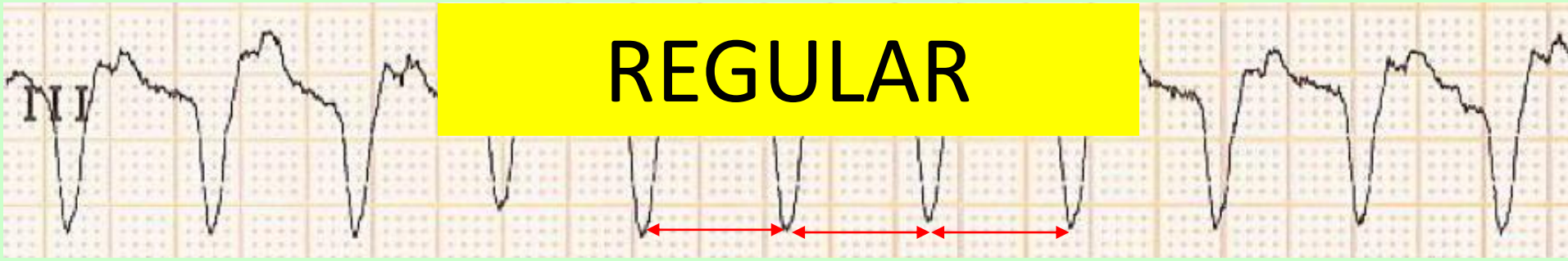
John Camm 1993

Agenda

- Introduction – Basics
- Guidelines-Recommendations
- Cases
- Conclusion

Heart rate >100/min, QRS >0.12sec

(paper speed 25mm/sec)



Heart rate >100/min, QRS >0.12sec

(paper speed 25mm/sec)

- Broad complex tachycardia (BCT) mechanism
  - Ventricular tachycardia
  - SVT mit BBB
  - SVT with AV conduction over an accessory pathway

Current practice in Europe: how do we manage patients with ventricular tachycardia? European Heart Rhythm Association survey

AETIOLOGY

• Ischaemia (acute-chronic)	55%
• Dilated cardiomyopathy	18%
• Idiopathic VT	11%
• ARVD	5%
• Valvular disease	4%
• Channelopathies	4%
• Hypertrophic cardiomyopathy	4%

Europace (2013) **15**, 167–169

Acute treatment of arrhythmias

Class	Known as	Examples	Mechanism
Ia	fast-channel blockers-affect QRS complex	• Quinidine • Procainamide • Disopyramide	(Na^+) channel block (intermediate association/dissociation)
Ib	Do not affect QRS complex	• Lidocaine • Phenytoin • Mexiletine • Tocainide	(Na^+) channel block (fast association/dissociation)
Ic		• Encainide • Flecainide • Propafenone • Moricizine	(Na^+) channel block (slow association/dissociation)
II	Beta-blockers	• Pr • E • Ti • M • At • Bi	
III		• Ar • Sc • Ib • Dr • Dr • E-	
IV	slow-channel blockers	• Ve • Di	
V		• Ad • Di • Magnesium Sulfate	

Drugs and Electricity

Drugs are not as effective and safe as electricity!

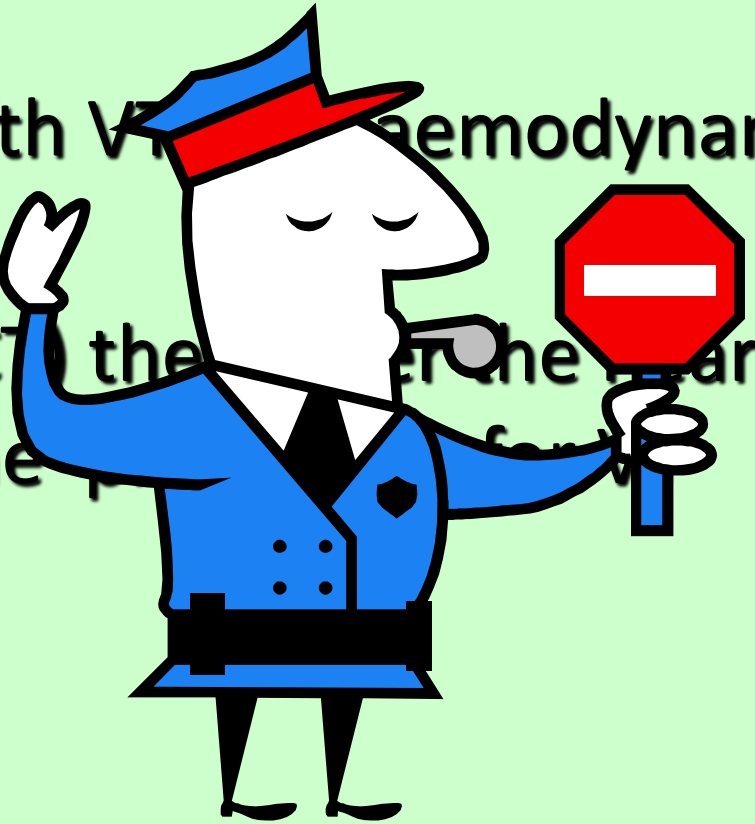
Acute treatment of arrhythmias

- How is your patient?

- In cardiac arrest
- Haemodynamically stable
- Haemodynamically unstable

Old stories ....., but not true

- Patients with V[illegible]emodynamically unstable
- In WCT (BC[illegible] the[illegible] the heart rate is, the higher is the [illegible]



Experts recognise always the mechanism of tachycardia in WCT, can differentiate VT from SVT.

Guidelines?

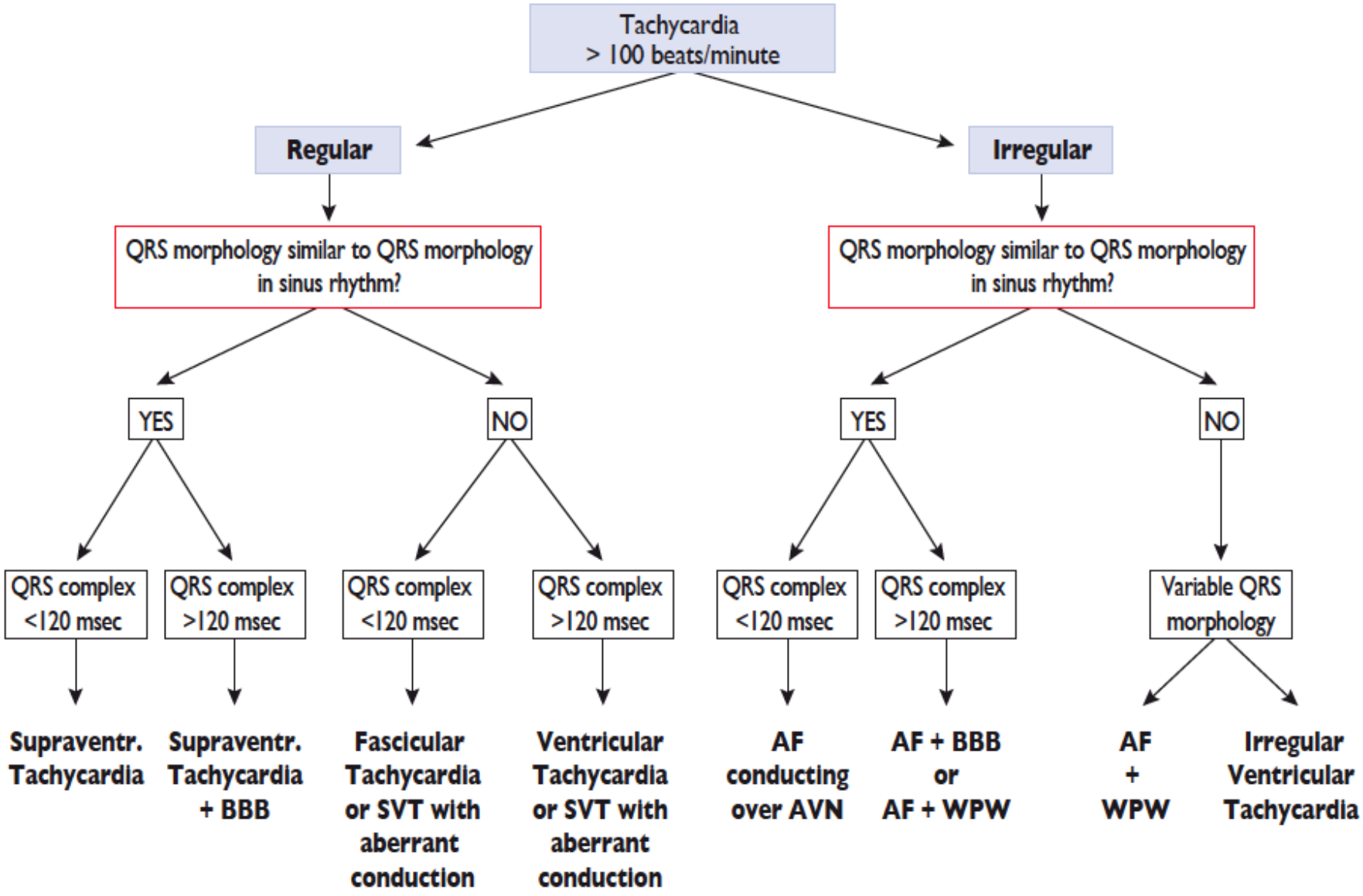
Acute Cardiovascular Care Association
Clinical Decision-Making
Toolkit

www. escardio.org/ACCA

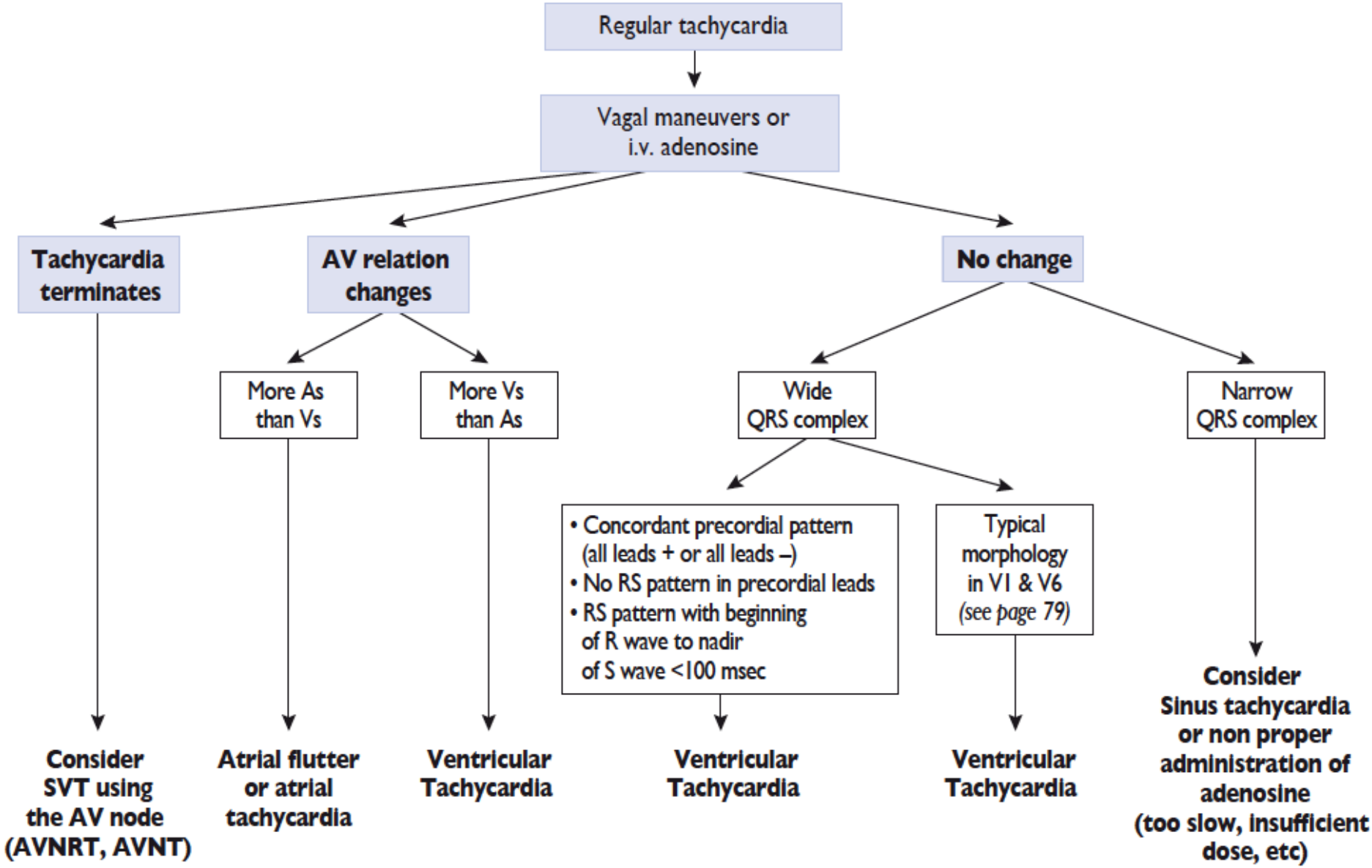
Acute Cardiovascular Care Association
A Registered Branch of the ESC

EUROPEAN SOCIETY OF CARDIOLOGY®

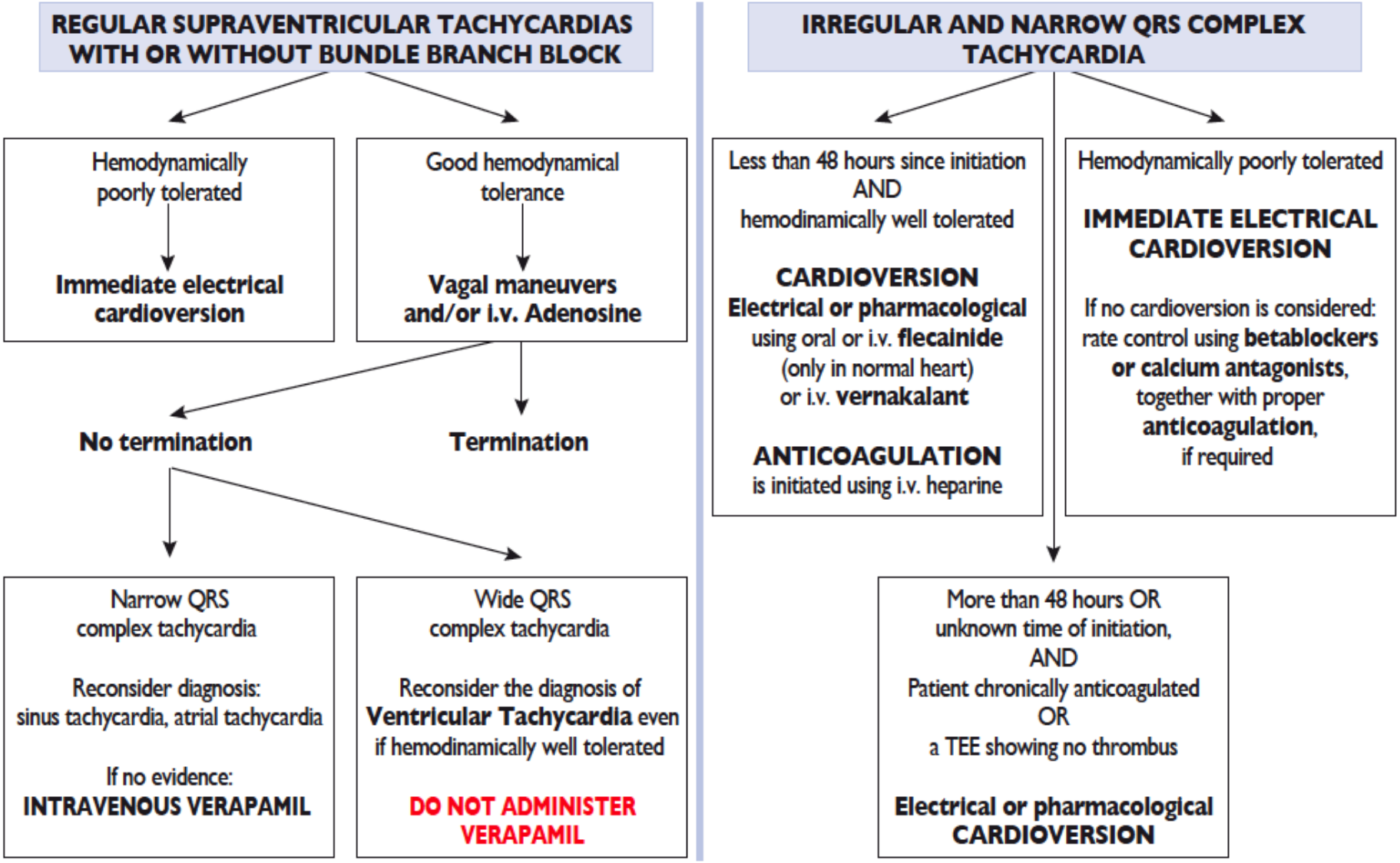
TACHYARRHYTHMIAS: DIAGNOSTIC CRITERIA



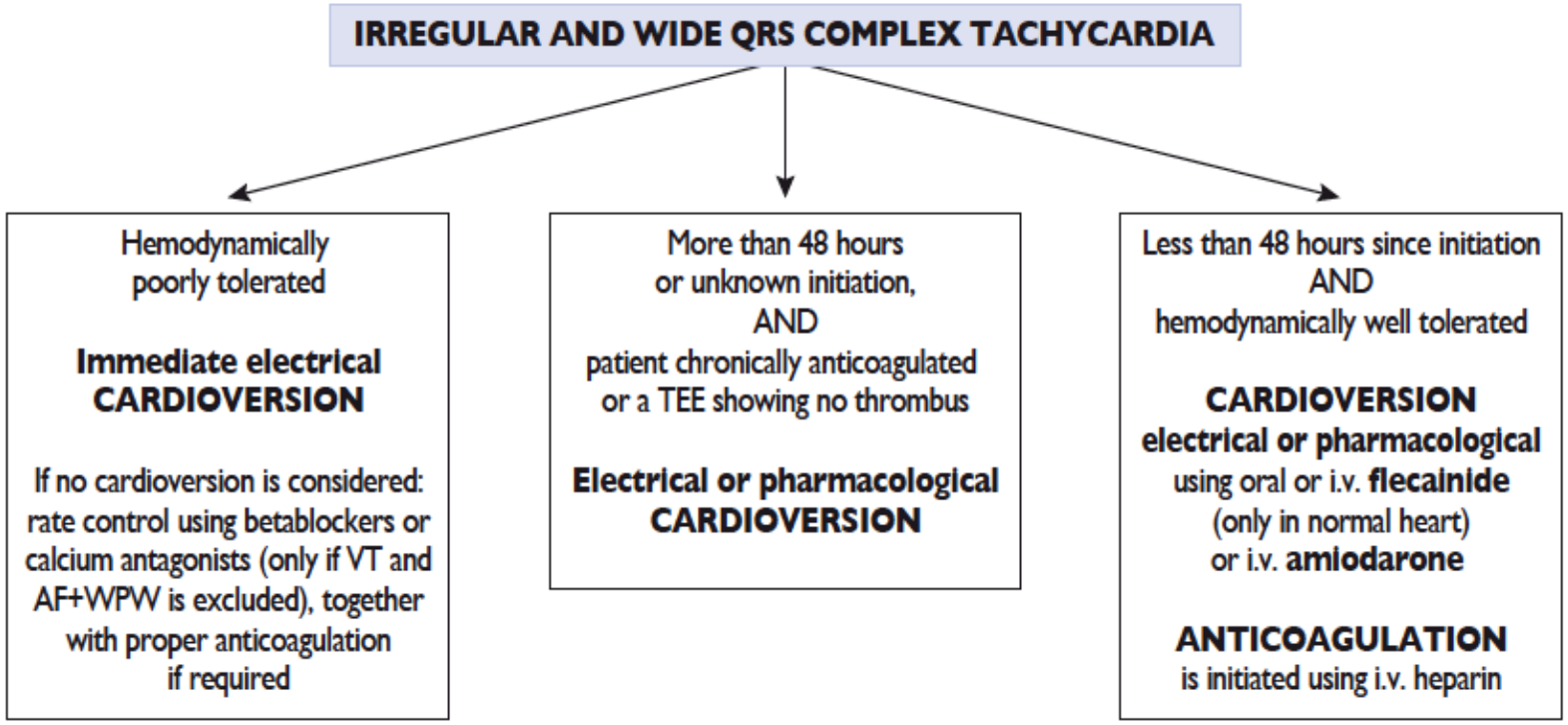
TACHYARRHYTHMIAS: DIAGNOSTIC MANEUVERS



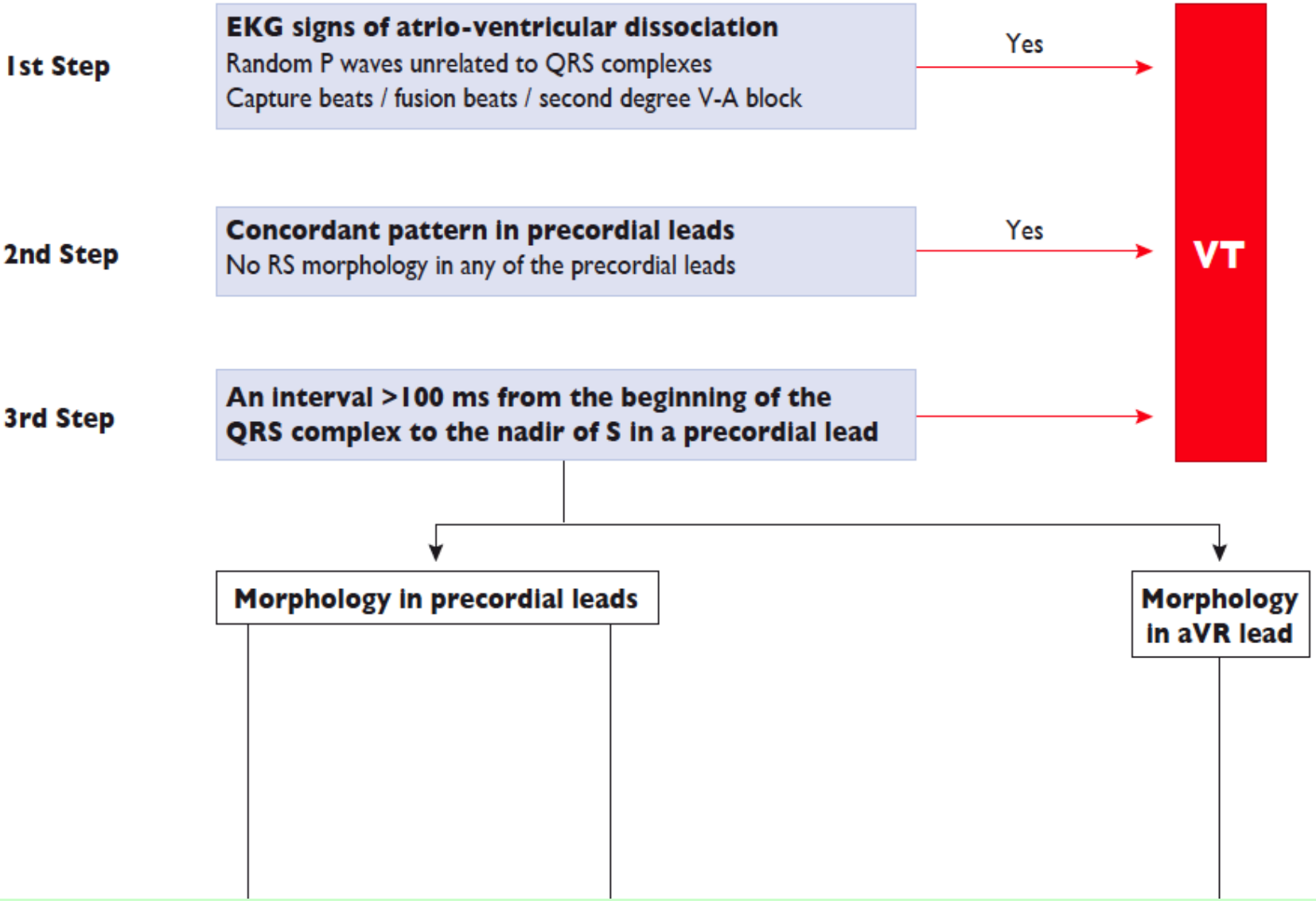
TACHYARRHYTHMIAS: THERAPEUTIC ALGORITHMS (I)

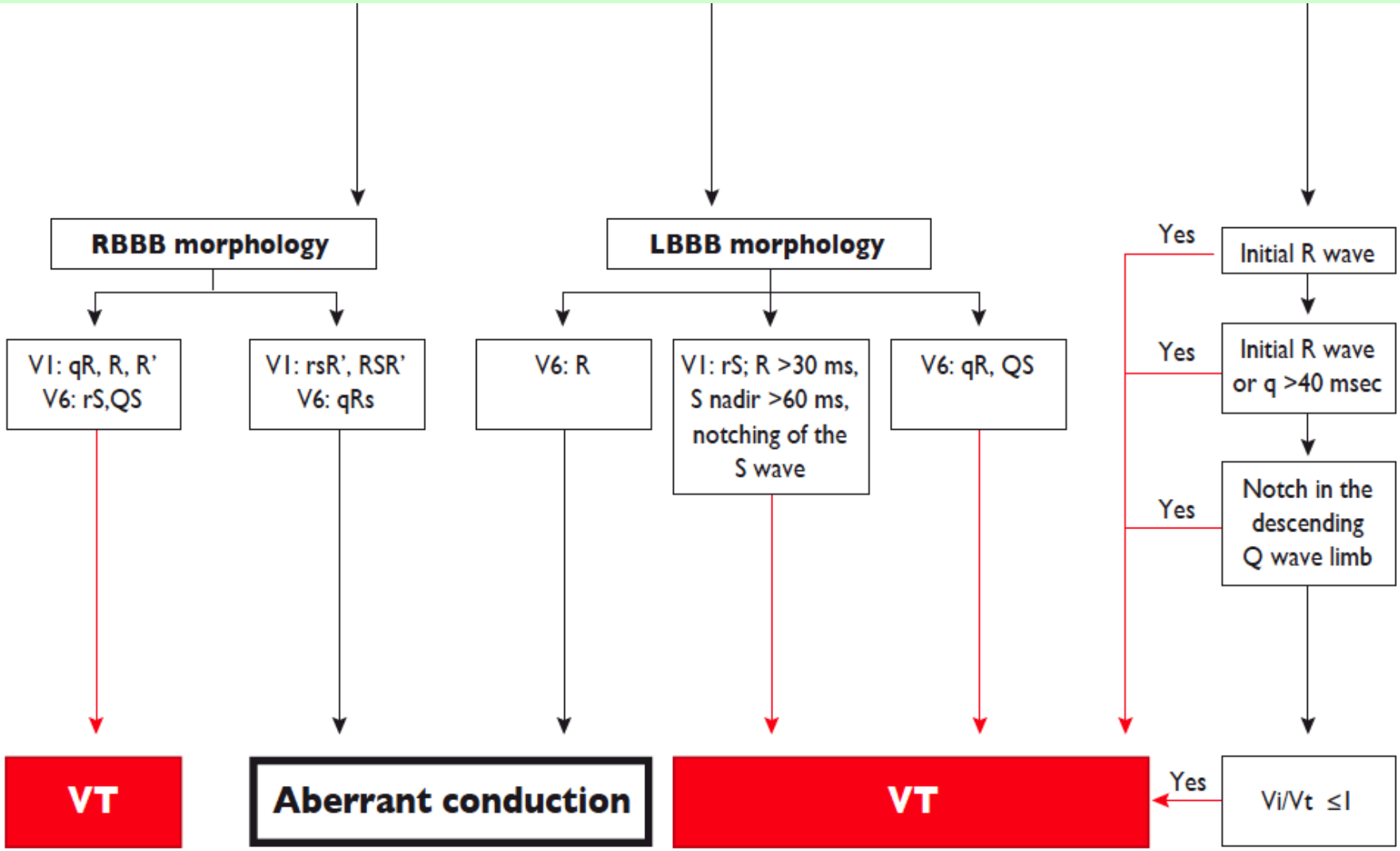


TACHYARRHYTHMIAS: THERAPEUTIC ALGORITHMS (2)

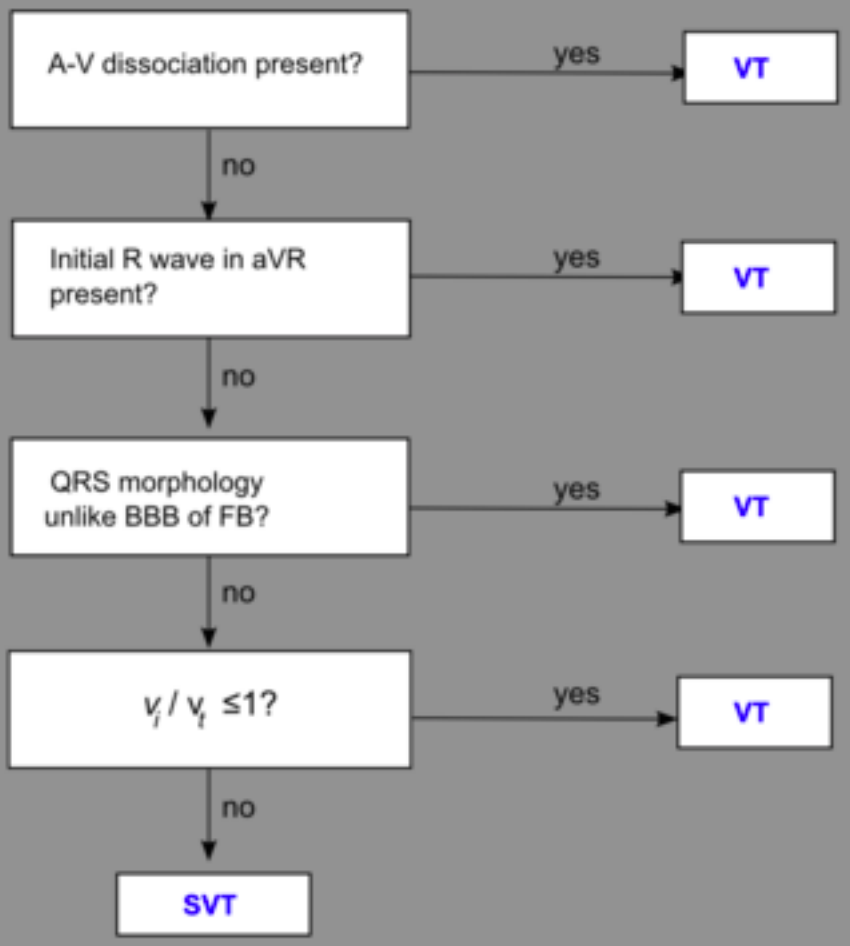


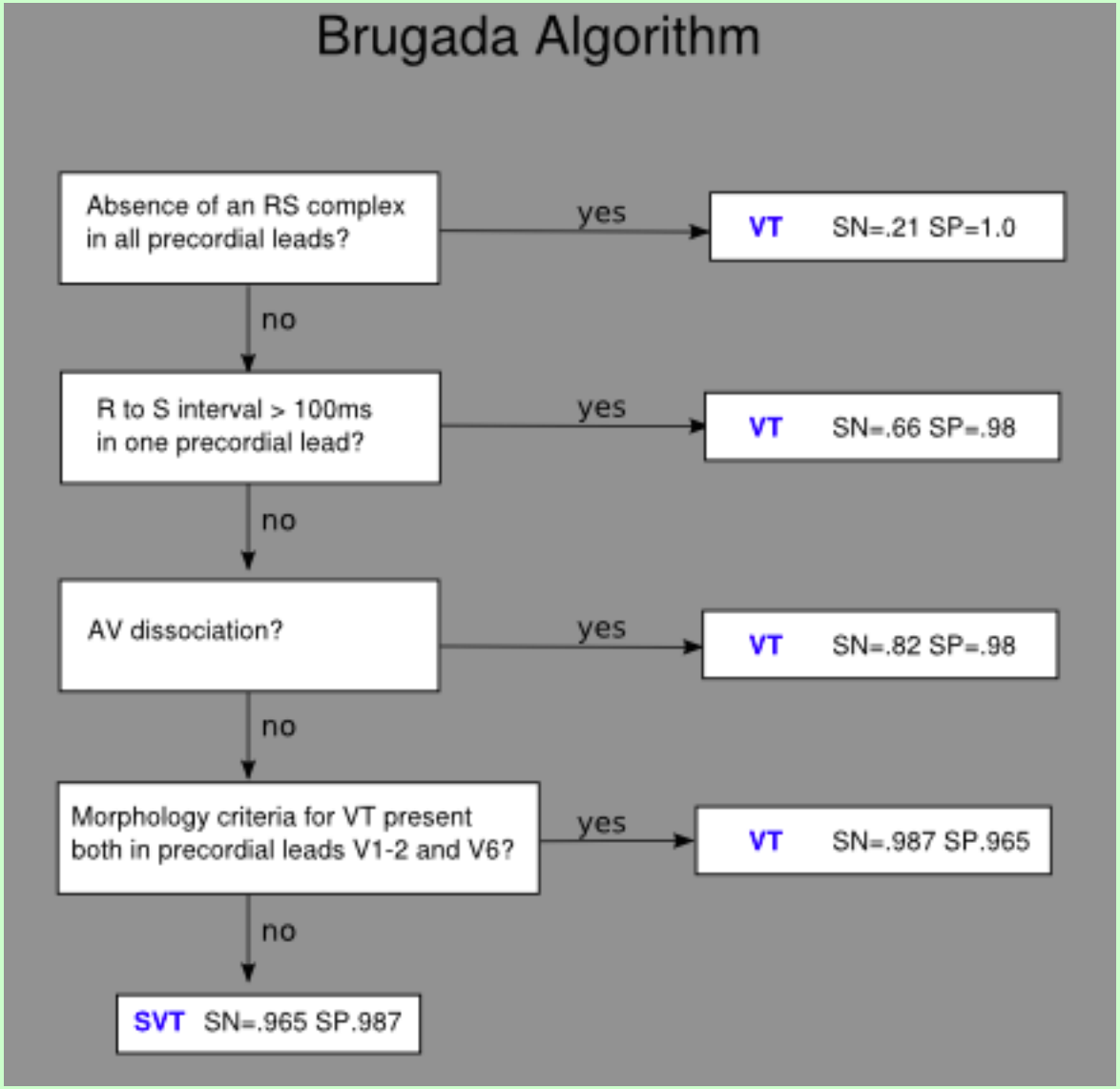
VENTRICULAR TACHYCARDIAS: DIFERENTIAL DIAGNOSIS OF WIDE QRS TACHYCARDIA




RBBB morphology
LBBB morphology
V1: qR, R, R'
V6: rS,QS
V1: rsR', RSR'
V6: qRs
V6: R
V1: rS; R >30 ms, S nadir >60 ms, notching of the S wave
V6: qR, QS
Yes
Initial R wave
Yes
Initial R wave or q >40 msec
Yes
Notch in the descending Q wave limb
Yes
Vi/Vt ≤1
VT
Aberrant conduction
VT

Vereckei Algorithm




Brugada Algorithm
Absence of an RS complex in all precordial leads?
yes
VT SN=.21 SP=1.0
no
R to S interval > 100ms in one precordial lead?
yes
VT SN=.66 SP=.98
no
AV dissociation?
yes
VT SN=.82 SP=.98
no
Morphology criteria for VT present both in precordial leads V1-2 and V6?
yes
VT SN=.987 SP.965
no
SVT SN=.965 SP.987

MANAGEMENT OF WIDE QRS TACHYCARDIAS

Hemodynamic Tolerance

Poorly Tolerated

Pulseless

ACLS Resuscitation algorithm

- Immediate **high- energy defibrillation** (200J biphasic or 360 monophasic)
- Resume CPR and continue according to the ACLS algorithm

Drugs used in the ACLS algorithm

- **Epinephrine** 1 mg i.v./i.o. (repeat every 3-5min)
- **Vasopressin** 40 i.v./i.o.
- **Amiodarone** 300 mg i.v./i.o. once then consider an additional 150 mg i.v./i.o. dose
- **Lidocaine** 1-1.5 mg/kg first dose then 0.5-0-75 mg/kg i.v./i.o. for max 3 doses or 3 mg/kg
- **Magnesium** loading dose 1-2 gr i.v./i.o. for torsade des pointes

With pulse

- **Sedation or analgesia**
- **Synchronised cardioversion** 100 to 200 J (monophasic) or 50-100 J (biphasic)

Well Tolerated

Irregular rhythm

Differential Diagnosis

No

Yes

AF with aberrant ventricular conduction
- β-blockers
- i.v.
- Verapamil or diltazem

Pre excited AF
- Class 1 AADs

Polymorphic VT
- Amiodarone

Regular rhythm

Vagal maneuver and/or i.v. adenosine (push)

Interruption or slow down HR

No

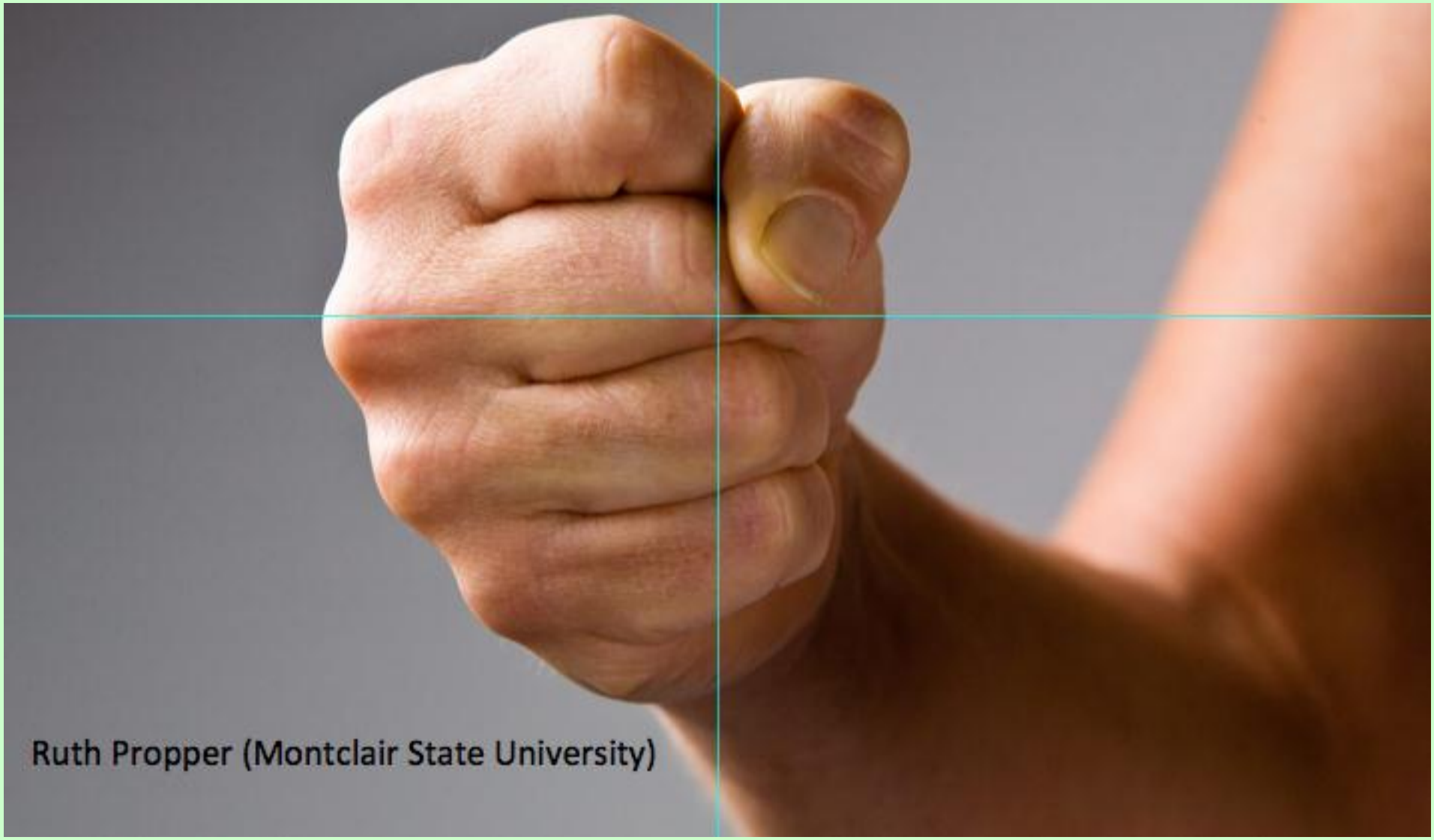
Yes

Differential Diagnosis *(see page 75)*

SVT

Amiodarone 150 mg i.v. (can be repeated up to a maximum dose of 2.2 g in 24 h)

Synchronised cardioversion


Ruth Propper (Montclair State University)

EUROPEAN RESUSCITATION COUNCIL

Advanced Life Support

Tachycardia Algorithm

- Assess using the ABCDE approach
- Ensure oxygen given and obtain IV access
- Monitor ECG, BP, SpO_2, record 12 lead ECG
- Identify and treat reversible causes (e.g. electrolyte abnormalities)

Assess for evidence of adverse signs
1. Shock
2. Syncope
3. Myocardial ischaemia
4. Heart failure

Unstable → **Synchronised DC Shock*** Up to 3 attempts
- Amiodarone 300 mg IV over 10-20 min and repeat shock; followed by:
- Amiodarone 900 mg over 24 h

Stable → **Is QRS narrow (< 0.12 sec)?**

Broad

Broad QRS Is QRS regular?

Irregular → Seek expert help

Possibilities include:
- **AF with bundle branch block** treat as for narrow complex
- **Pre-excited AF** consider amiodarone
- **Polymorphic VT** (e.g. torsades de pointes - give magnesium 2 g over 10 min)

Regular → If **Ventricular Tachycardia** (or uncertain rhythm):
- Amiodarone 300 mg IV over 20-60 min; then 900 mg over 24 h

If previously confirmed **SVT with bundle branch block**:
- Give adenosine as for regular narrow complex tachycardia

Narrow

Narrow QRS Is rhythm regular?

Regular →
- Use vagal manoeuvres
- Adenosine 6 mg rapid IV bolus; if unsuccessful give 12 mg; if unsuccessful give further 12 mg.
- Monitor ECG continuously

Normal sinus rhythm restored?

Yes → Probable re-entry PSVT:
- Record 12-lead ECG in sinus rhythm
- If recurs, give adenosine again & consider choice of anti-arrhythmic prophylaxis

No → Seek expert help

Possible **atrial flutter**
- Control rate (e.g. ß-Blocker)

Irregular → **Irregular Narrow Complex Tachycardia**
Probable **atrial fibrillation**
Control rate with:
- ß-Blocker or diltiazem
- Consider digoxin or amiodarone if evidence of heart failure

Anticoagulate if duration > 48h

*Attempted electrical cardioversion is always undertaken under sedation or general anaesthesia

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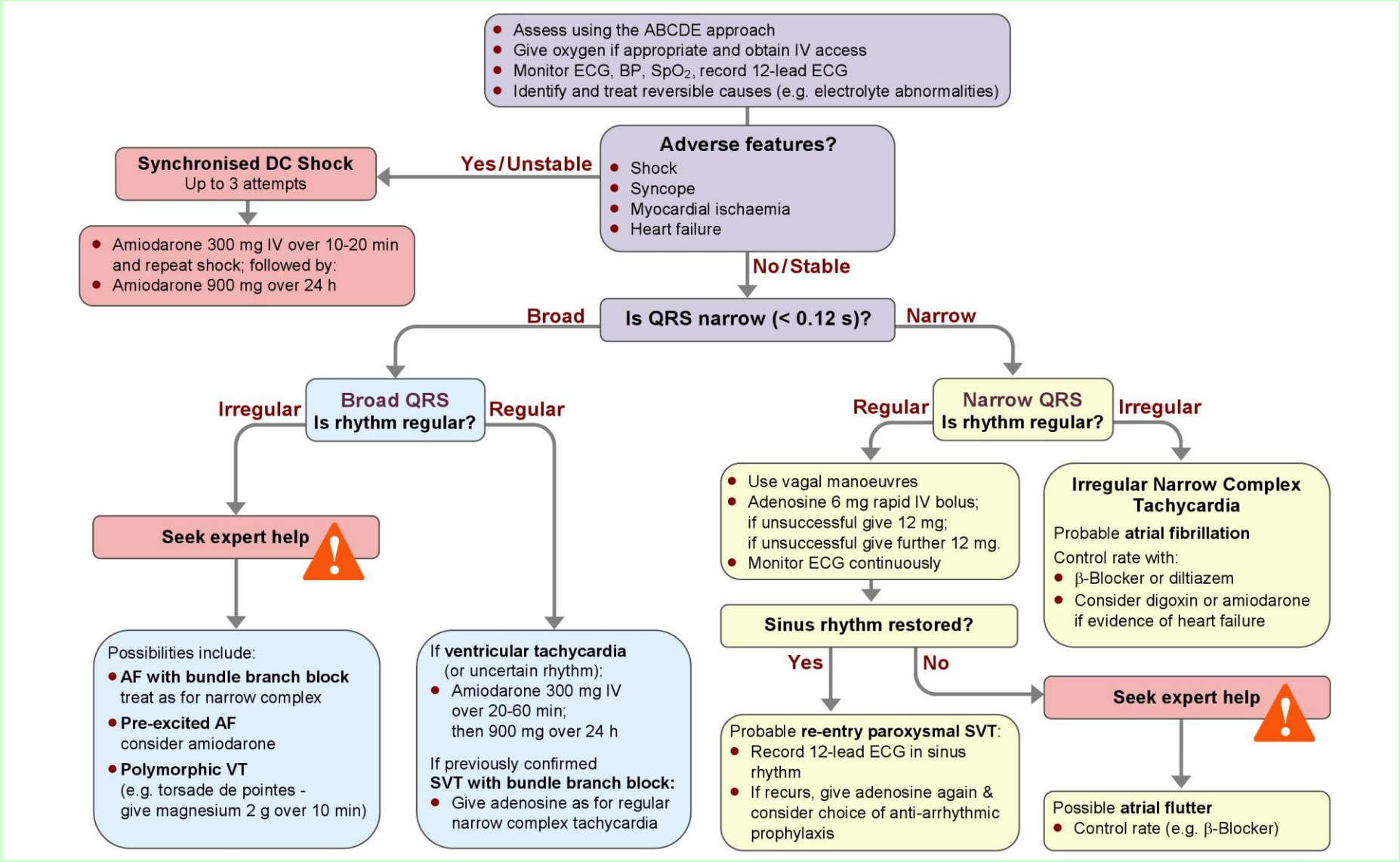
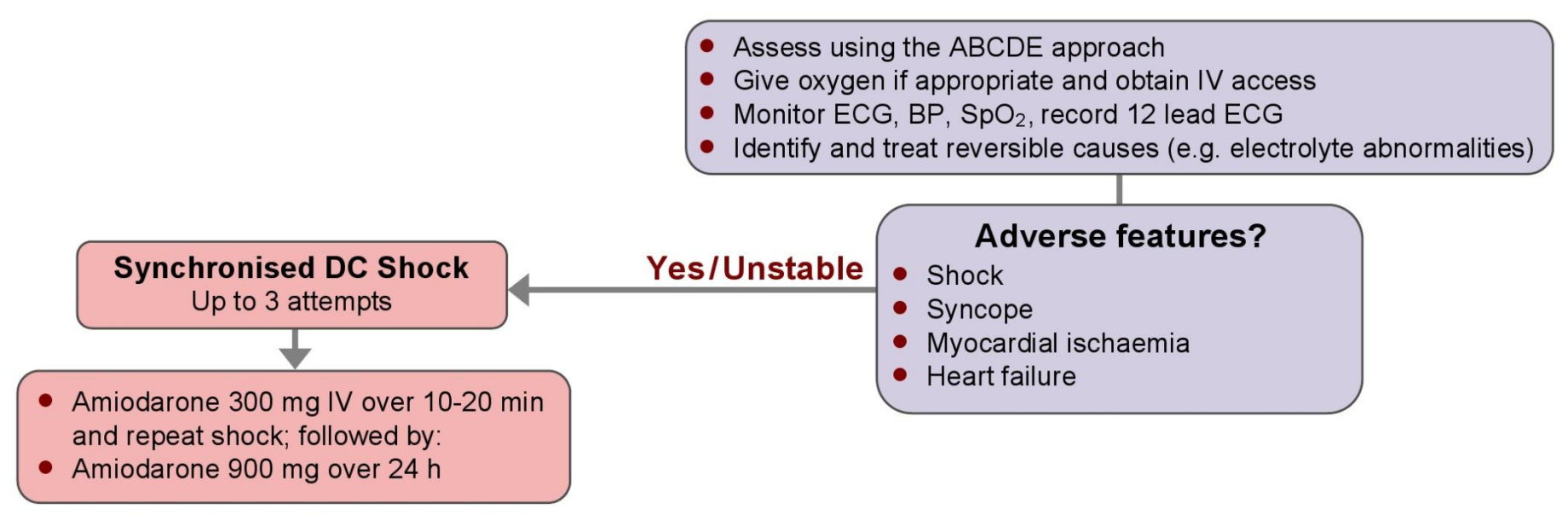
Tachycardia algorithm (with pulse)



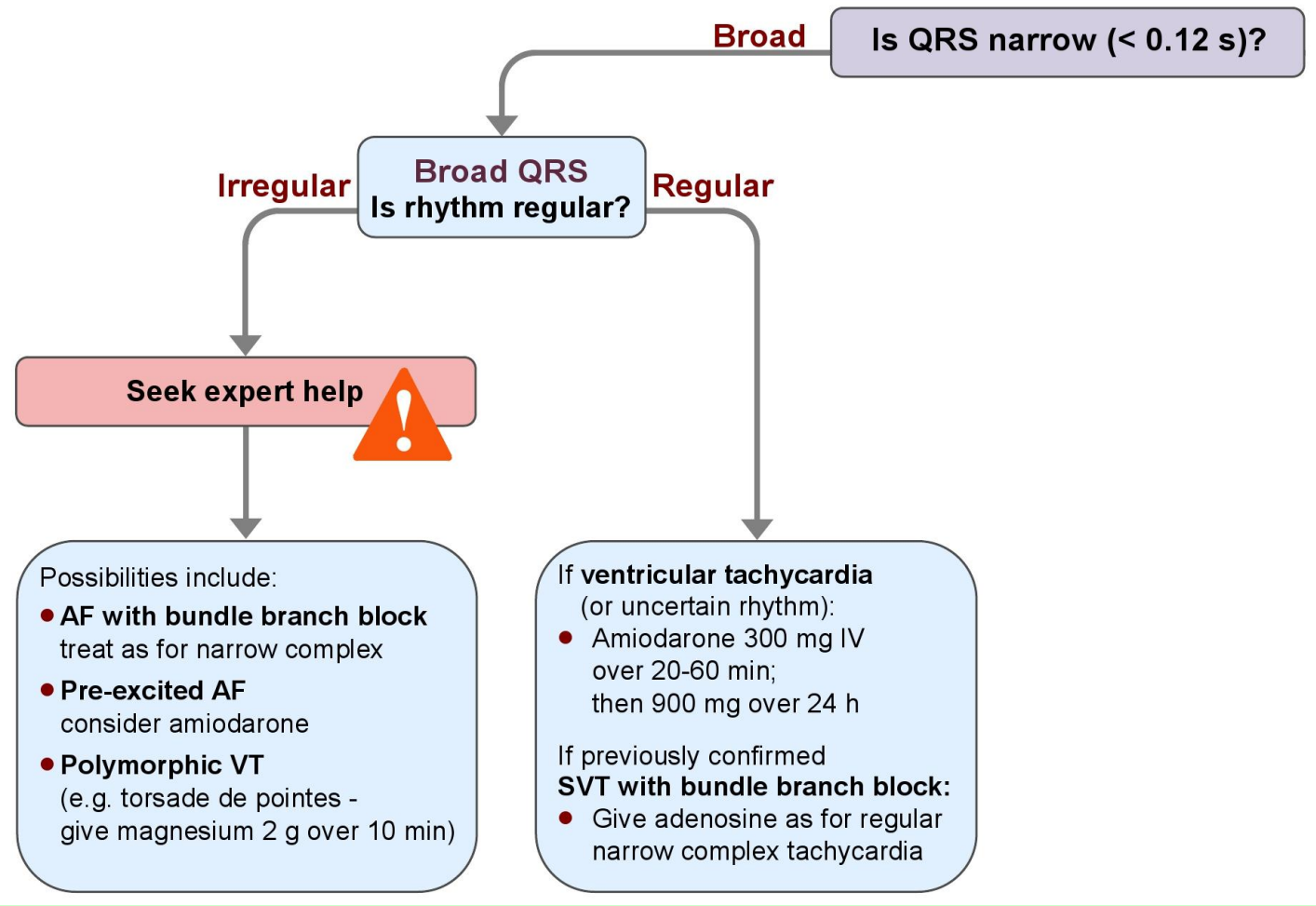
Tachycardia algorithm

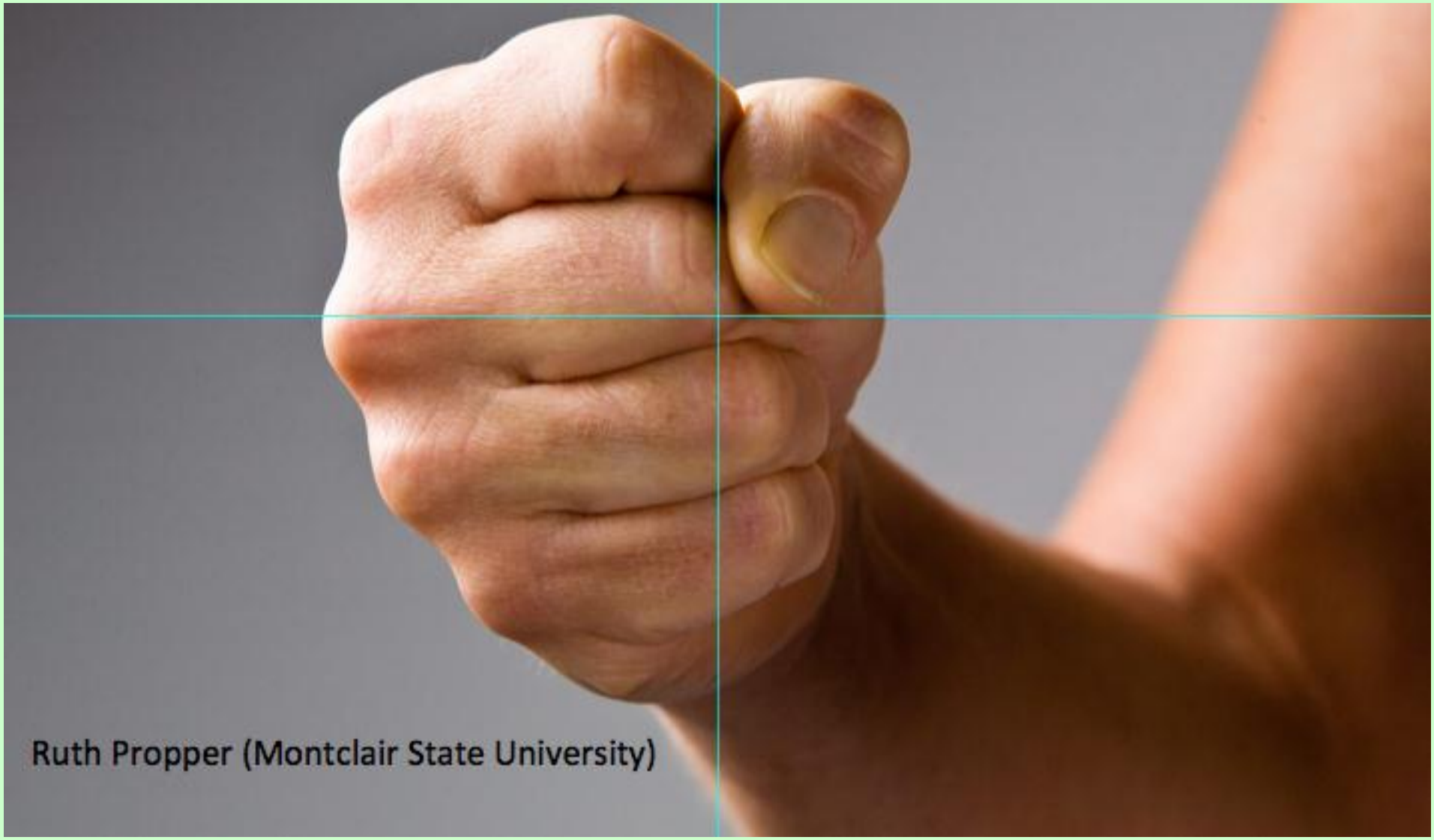


„Oh my god!!!“

positive

Stable broad-complex tachycardia

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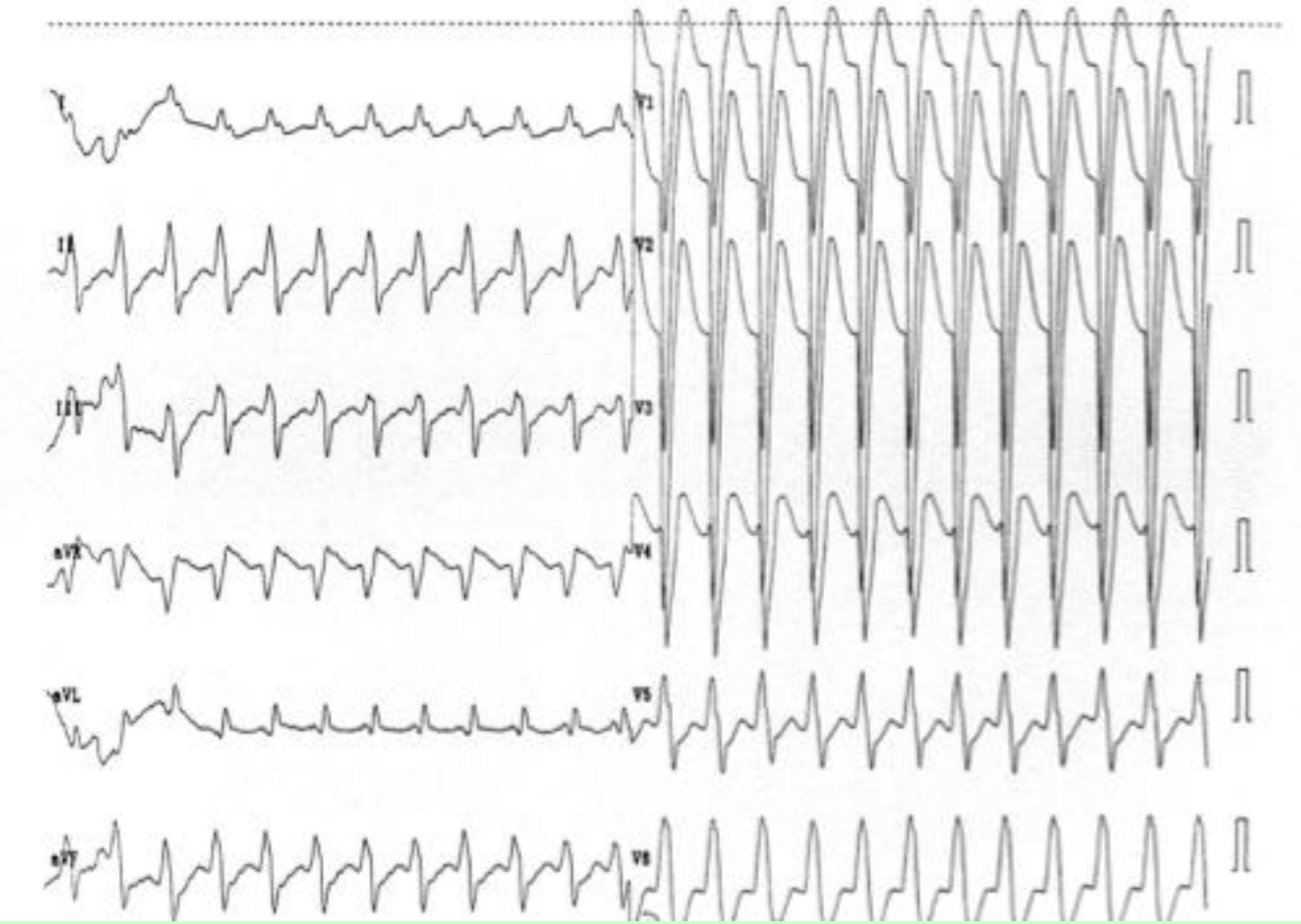
Case 1

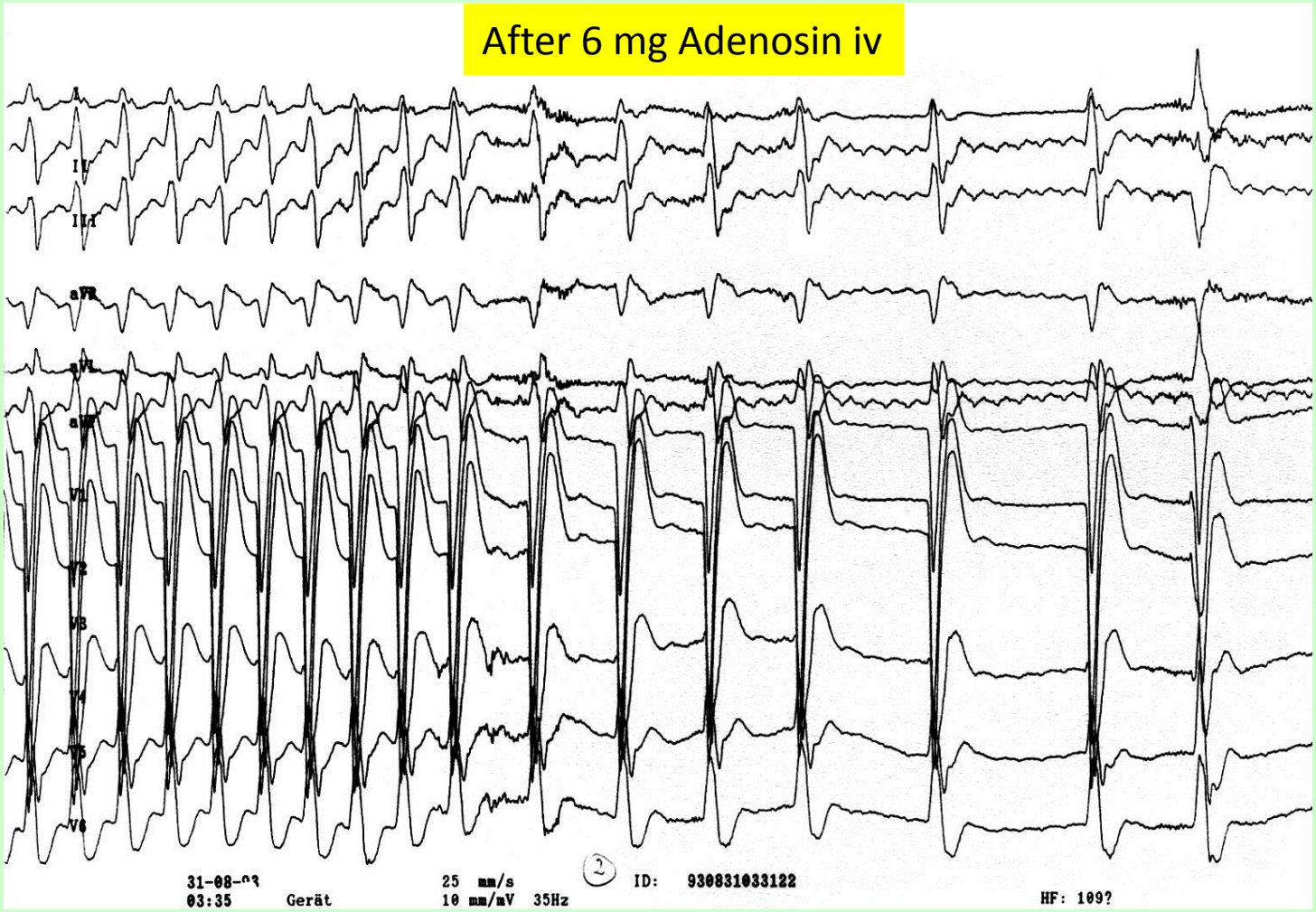
Female, 80a

RR 120/90, LBBB since years



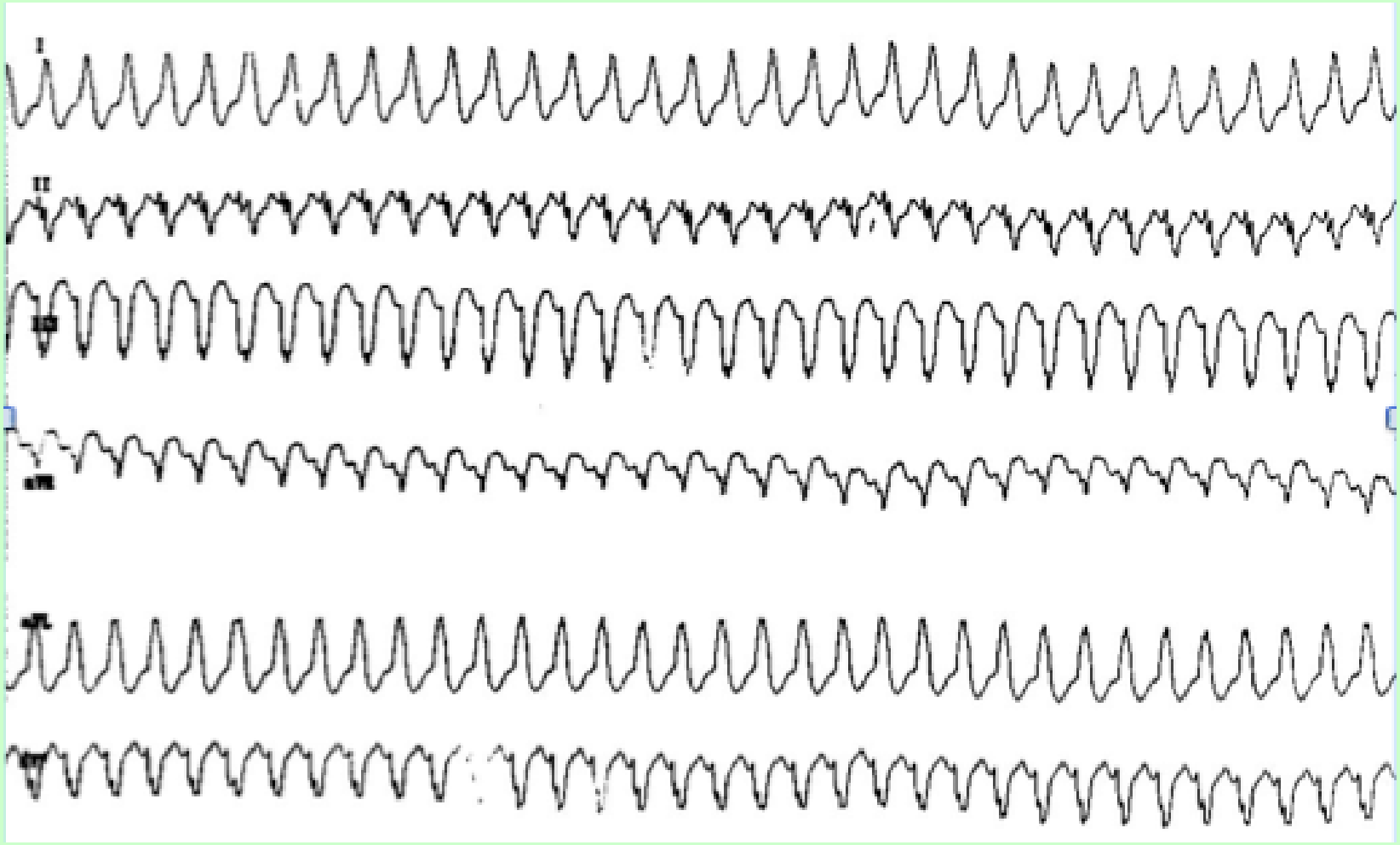
Female, 80a

RR 120/90, LBBB since years

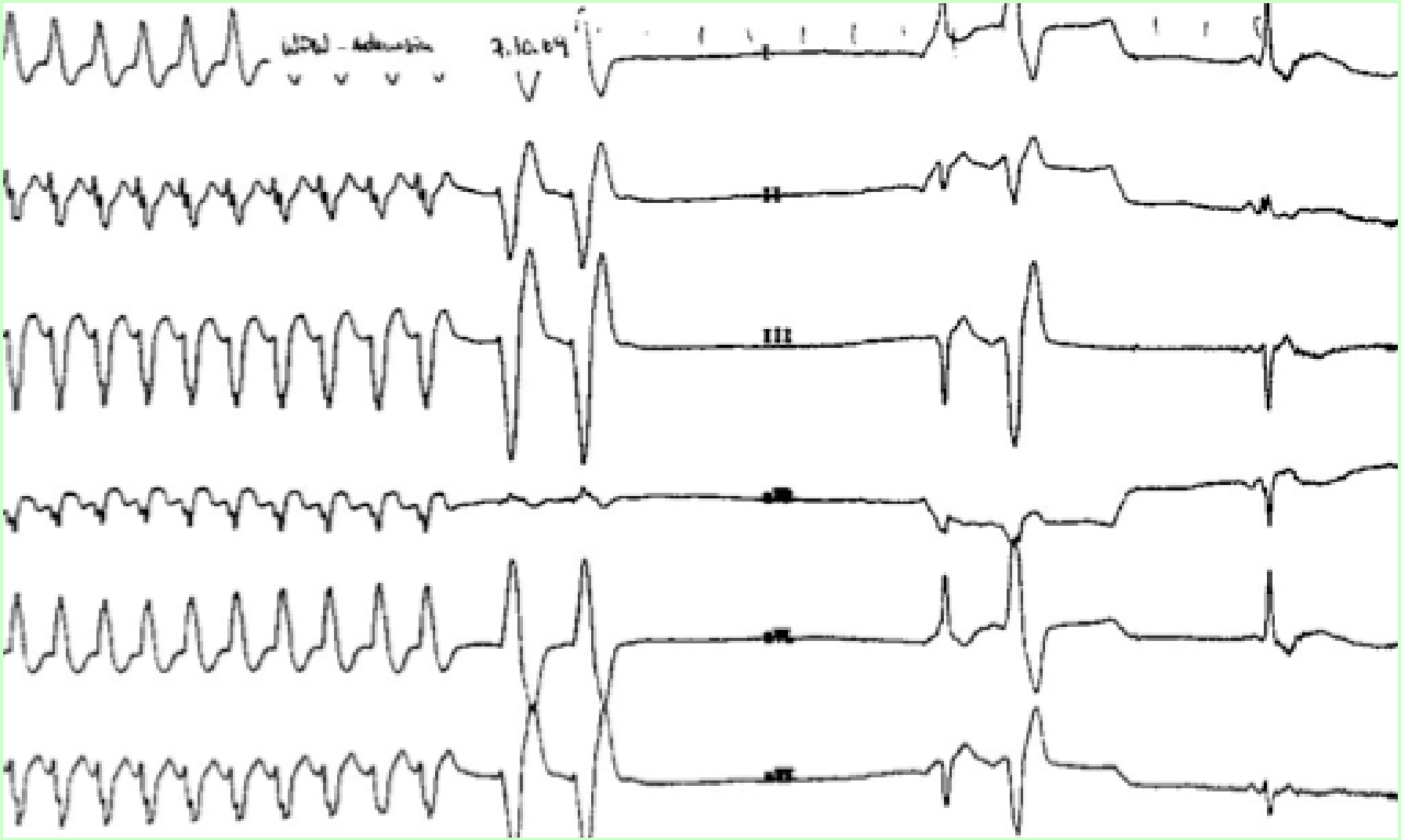


Case 2

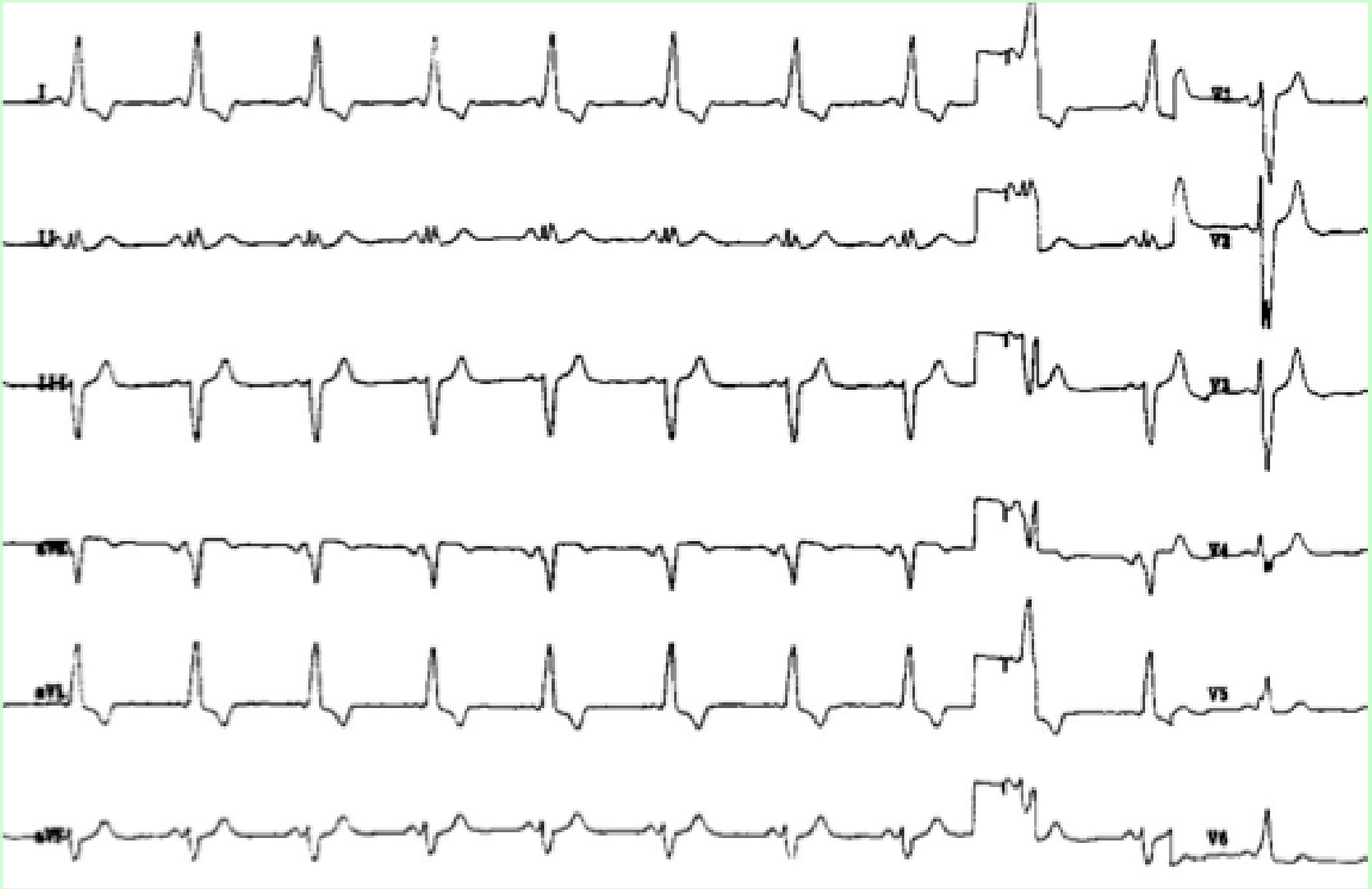
Young female, history of WPW syndrome

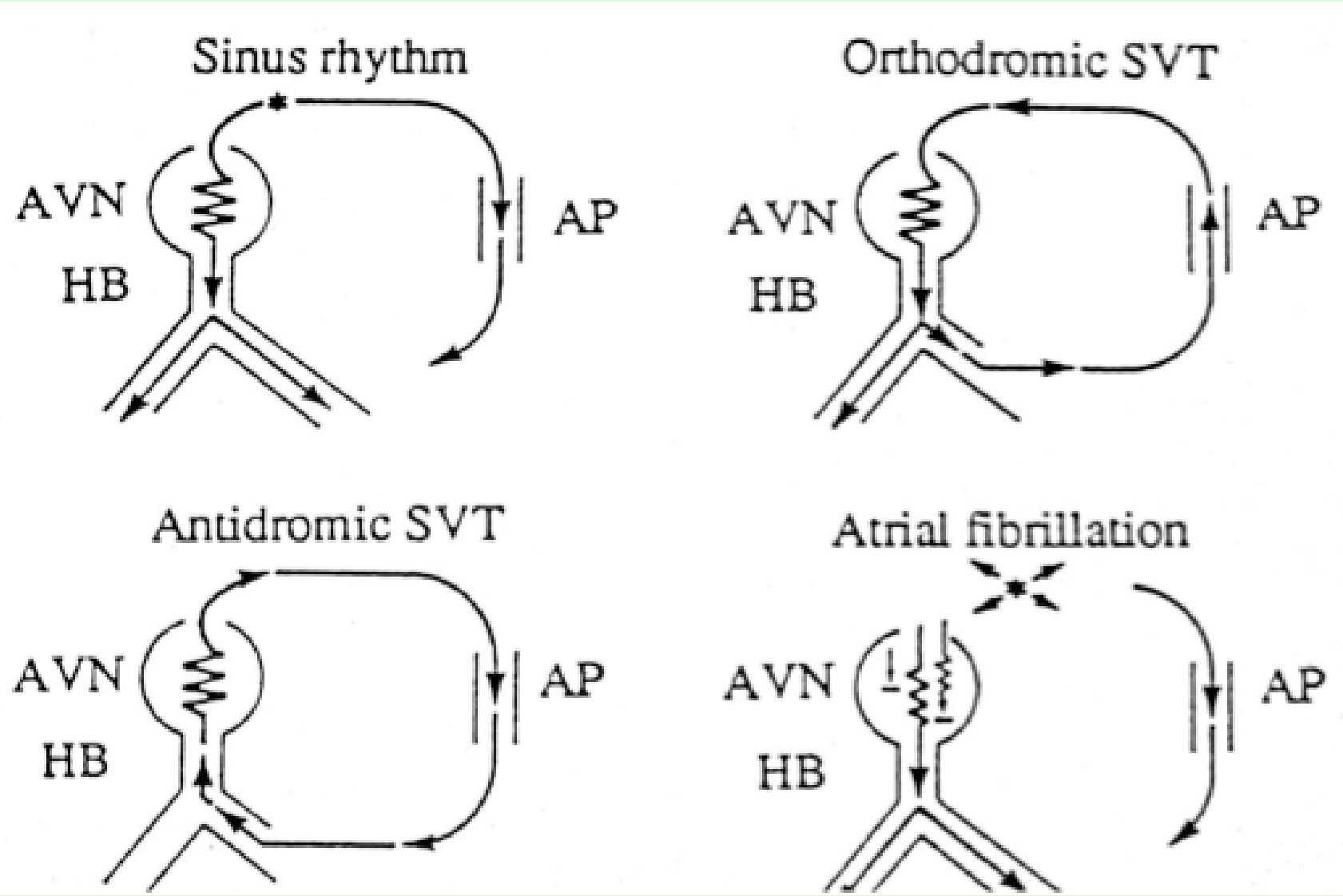


Young female, history of WPW syndrome



Young female, history of WPW syndrome




Sinus rhythm
AVN
HB
AP
Orthodromic SVT
AVN
HB
AP
Antidromic SVT
AVN
HB
AP
Atrial fibrillation
AVN
HB
AP

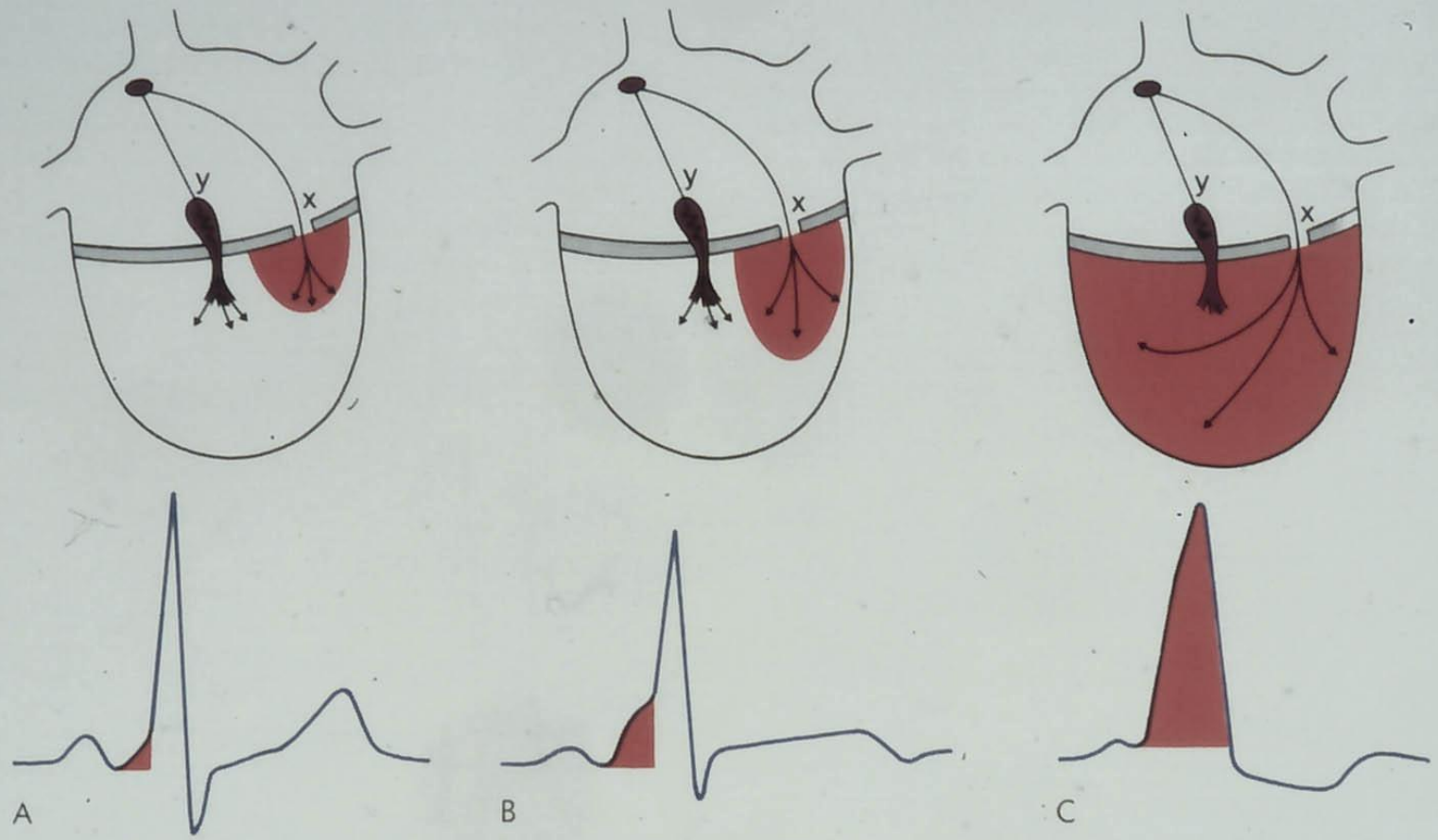


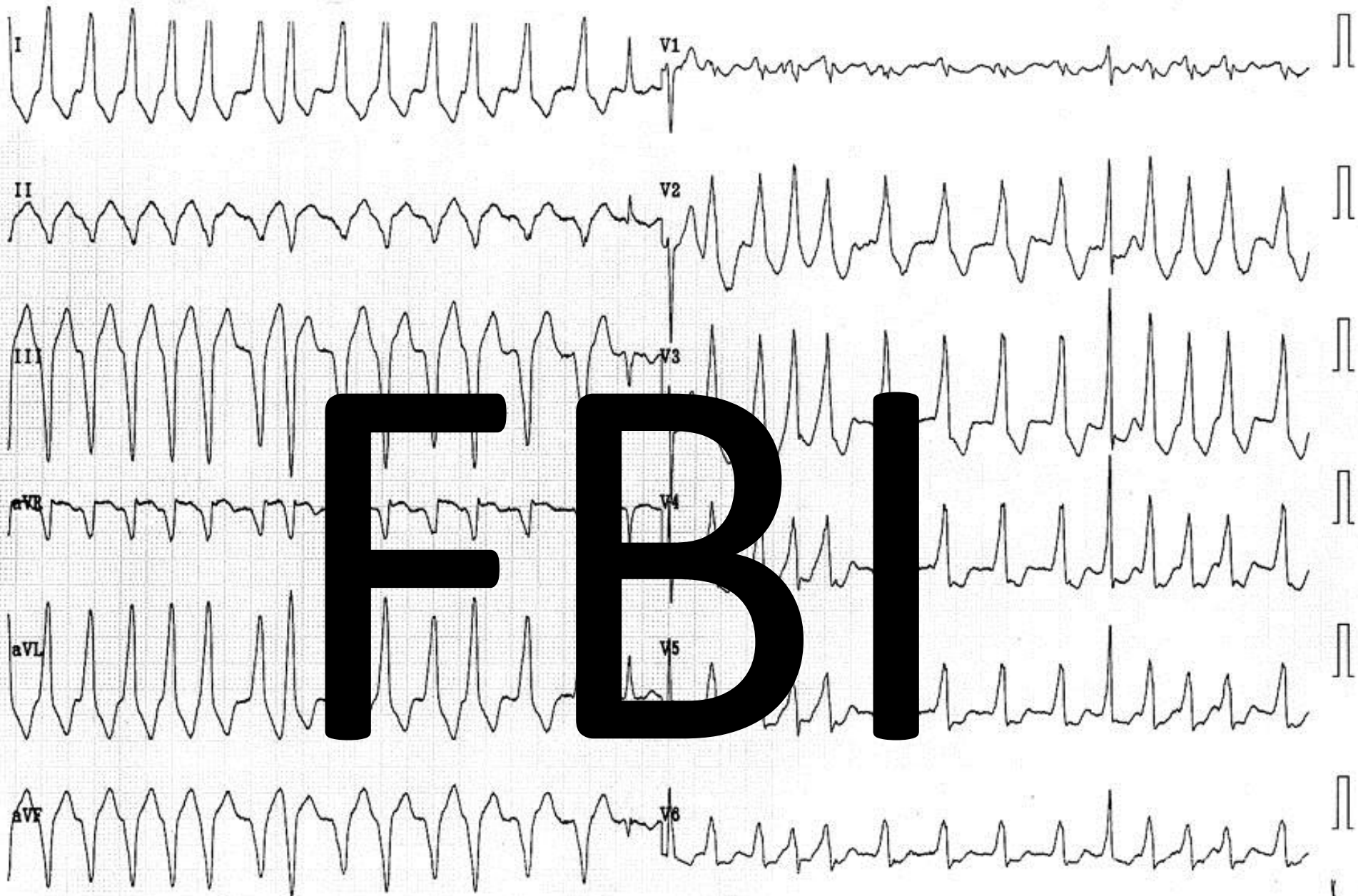
Fig. 7.4
The WPW pattern
The width of the delta wave depends on the ratio between the AV conduction time over the accessory AV connection (X) and over the AV node and bundle of His (Y)

A Small delta wave as X is only slightly shorter than Y
B Higher and broader delta wave due to a greater difference between X and Y
C Because of a very short X the QRS complex becomes one large delta wave

Case 3

ID:
Nachname:
Vorname:

HF: 183 Datum: 06-04-02 Zeit: 17:26
Gerät EK099
Standort: 907511
Ort: E 06D



FBI

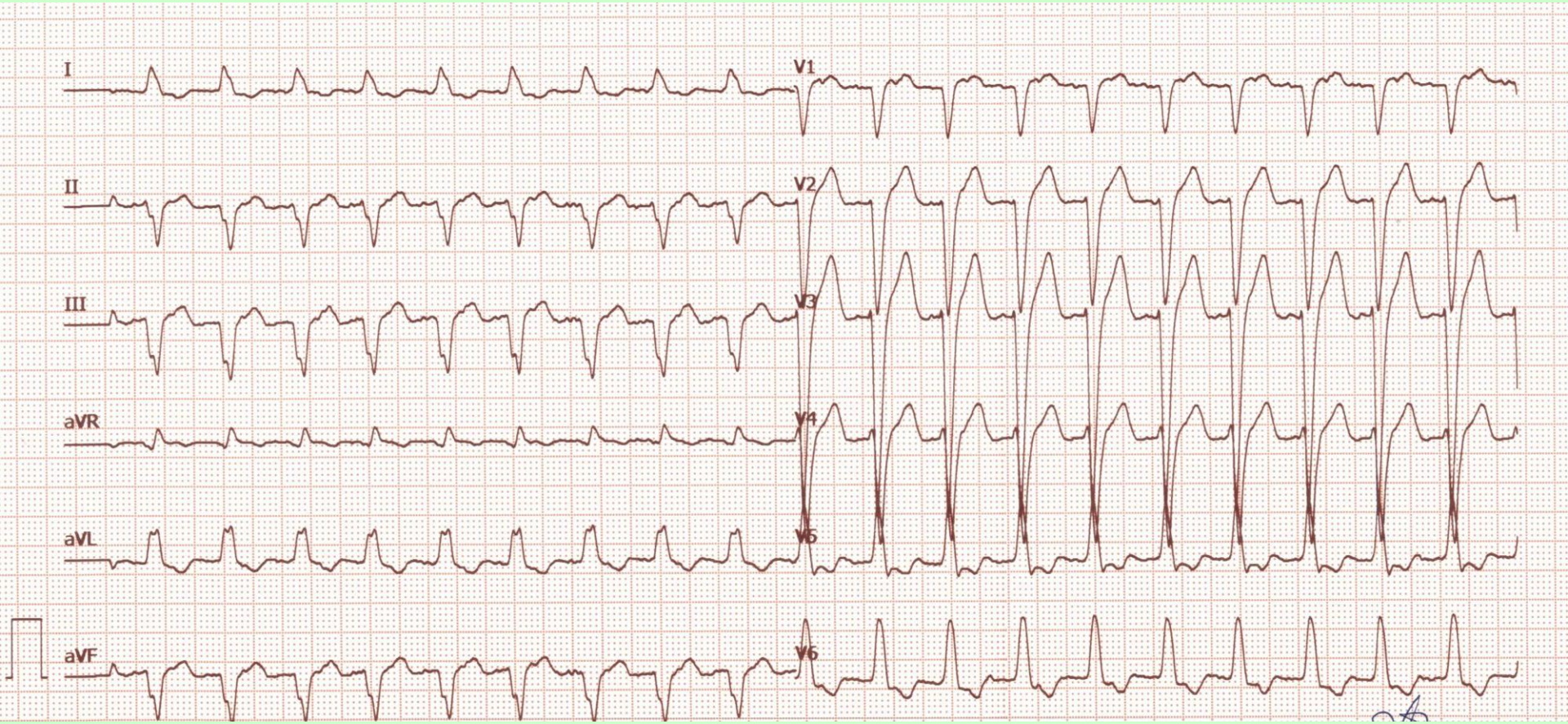
„FBI“ Tachycardia

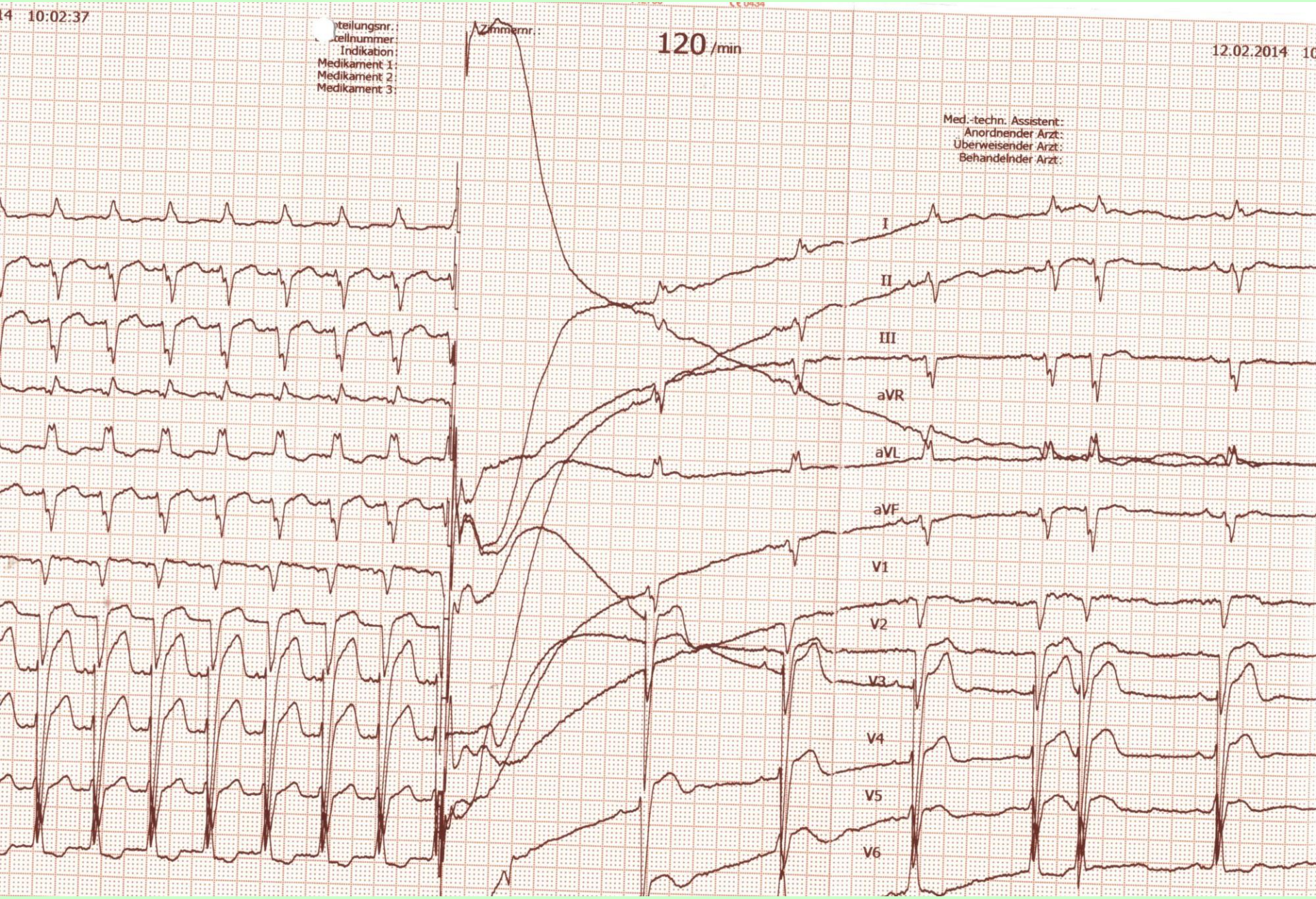
- Electrical therapy preferred, also in stable patients

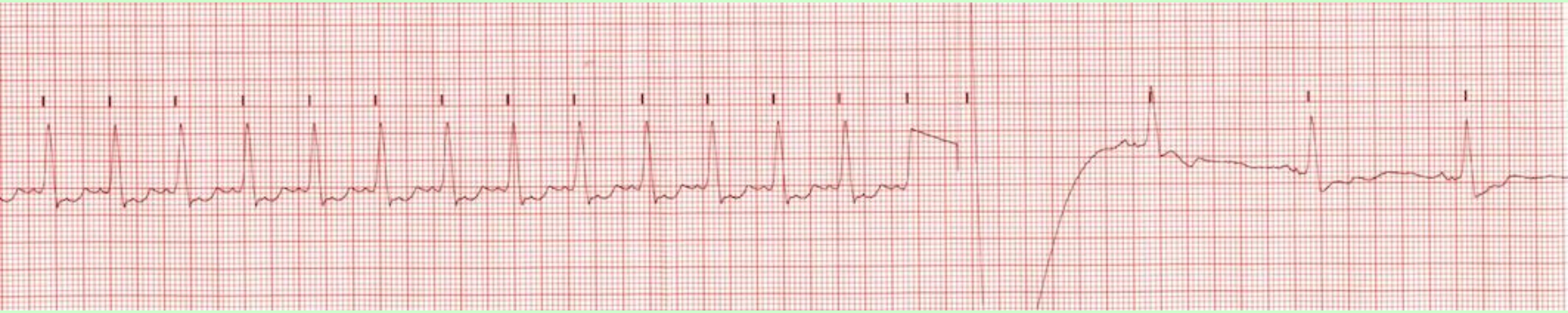
- Contraindicated:
  - Beta Blockers
  - Ca++ Chanel Blockers
  - Digoxin
  - Adenosine
  - Lidocaine

Case 4

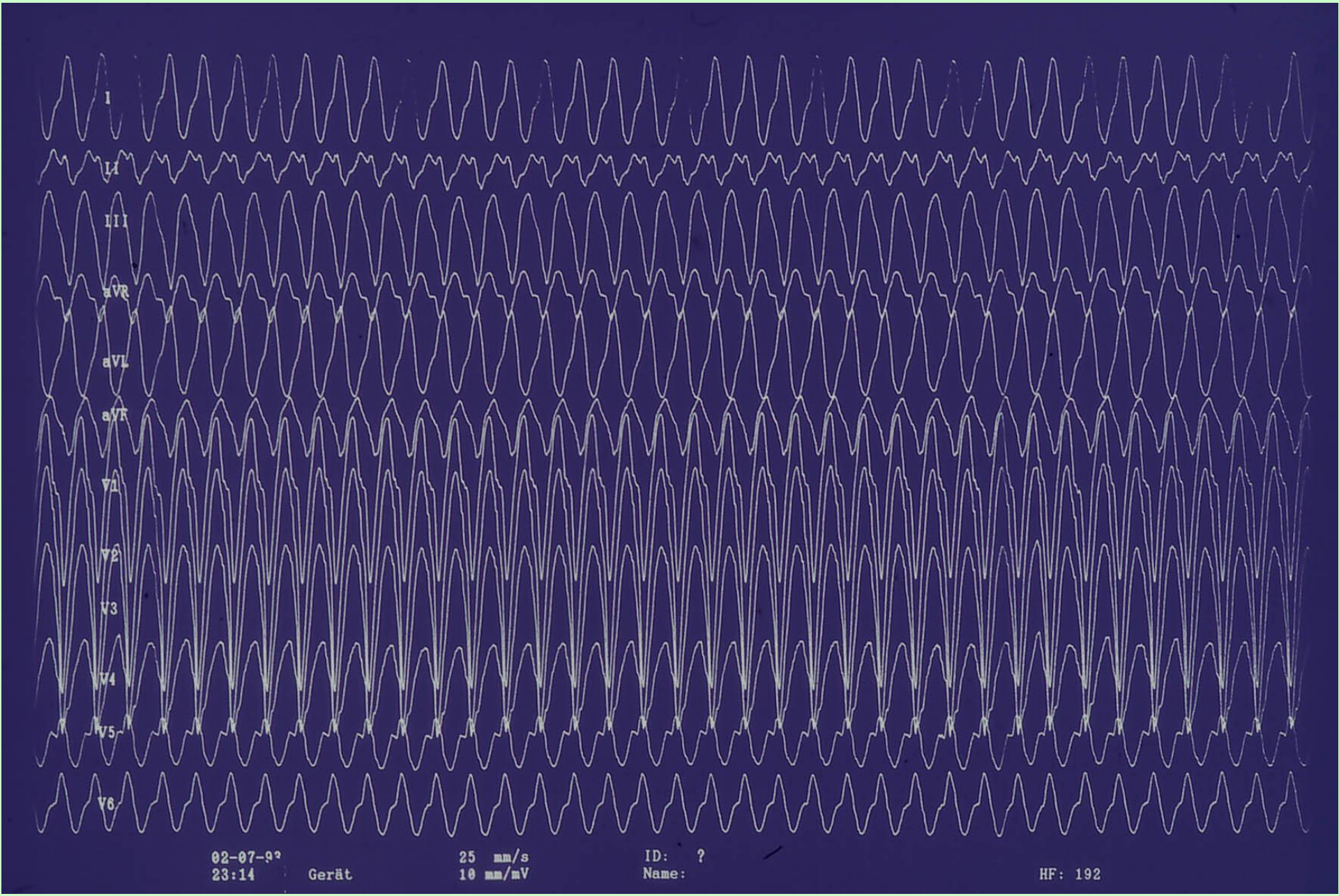
Male, 67a, st. p. a. fib. ablation; EF 10%




14 10:02:37
teilungsnr.:
tellnummer:
Indikation:
Medikament 1:
Medikament 2:
Medikament 3:
Zimmernr.:
120 /min
12.02.2014 10
Med.-techn. Assistent:
Anordnender Arzt:
Überweisender Arzt:
Behandelnder Arzt:
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6



Case 5

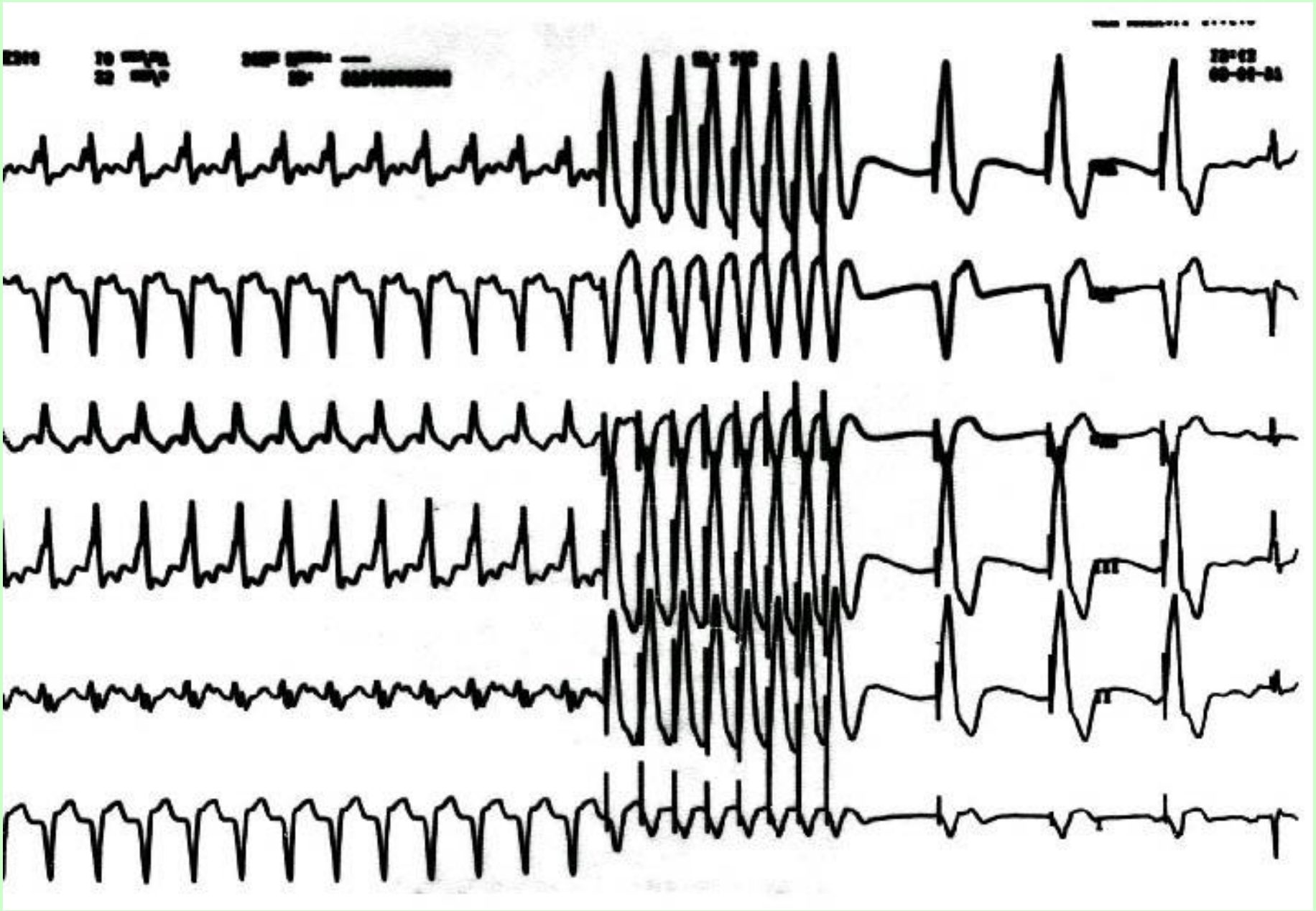

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
02-07-9?
23:14
Gerät
25 mm/s
10 mm/mV
ID: ?
Name:
HF: 192

„Electrical storm“

Incessant (several) sustained VTs during the day

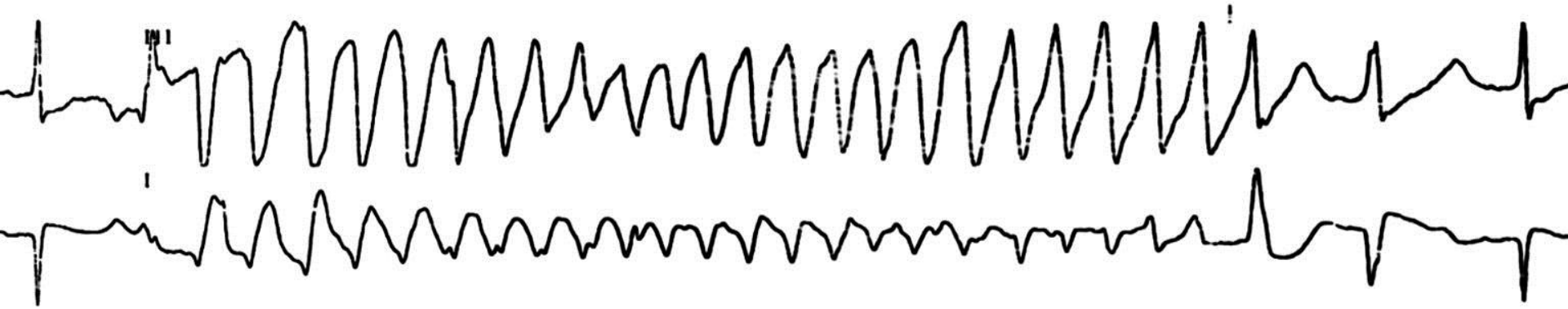
Therapy

- „Preloading“
  - Intravenous amiodarone
  - Intravenous Beta blocking agent
- External electrical cardioversion



Case 6

Torsade de pointes



Long QT Syndrom

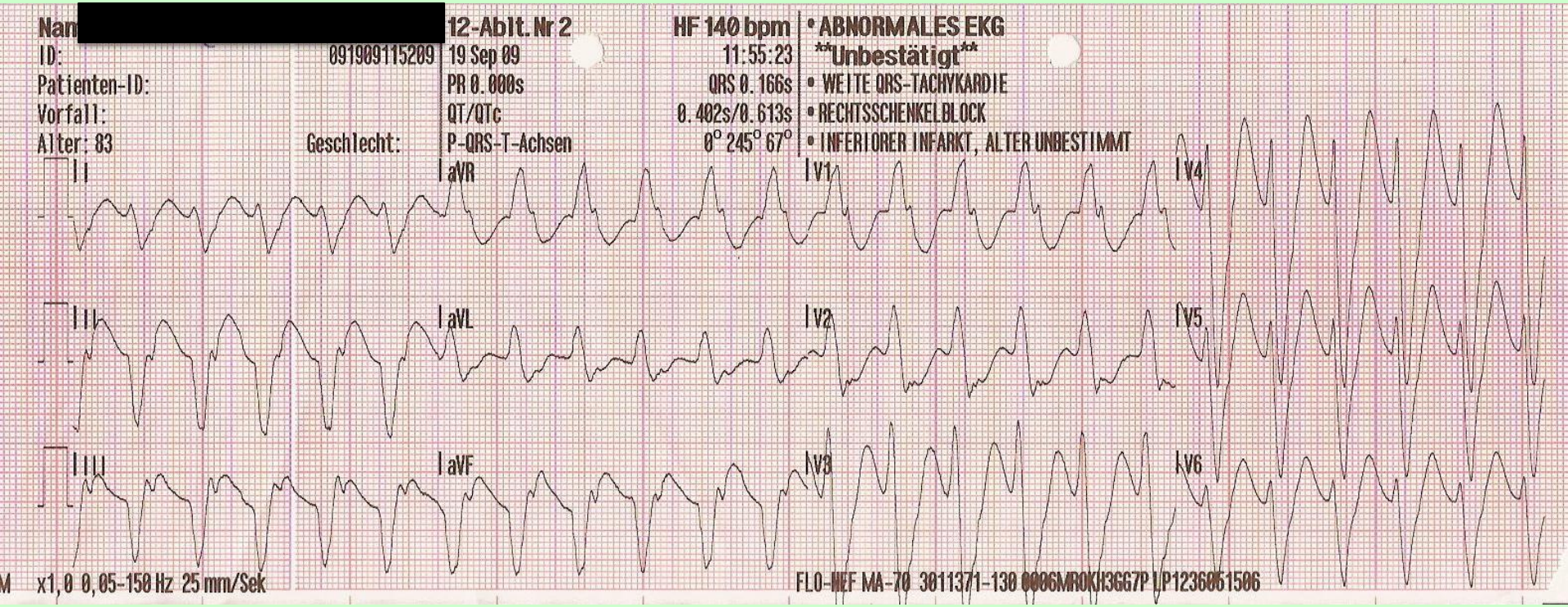
Proarrhythmia

Case 7

Male, 85a

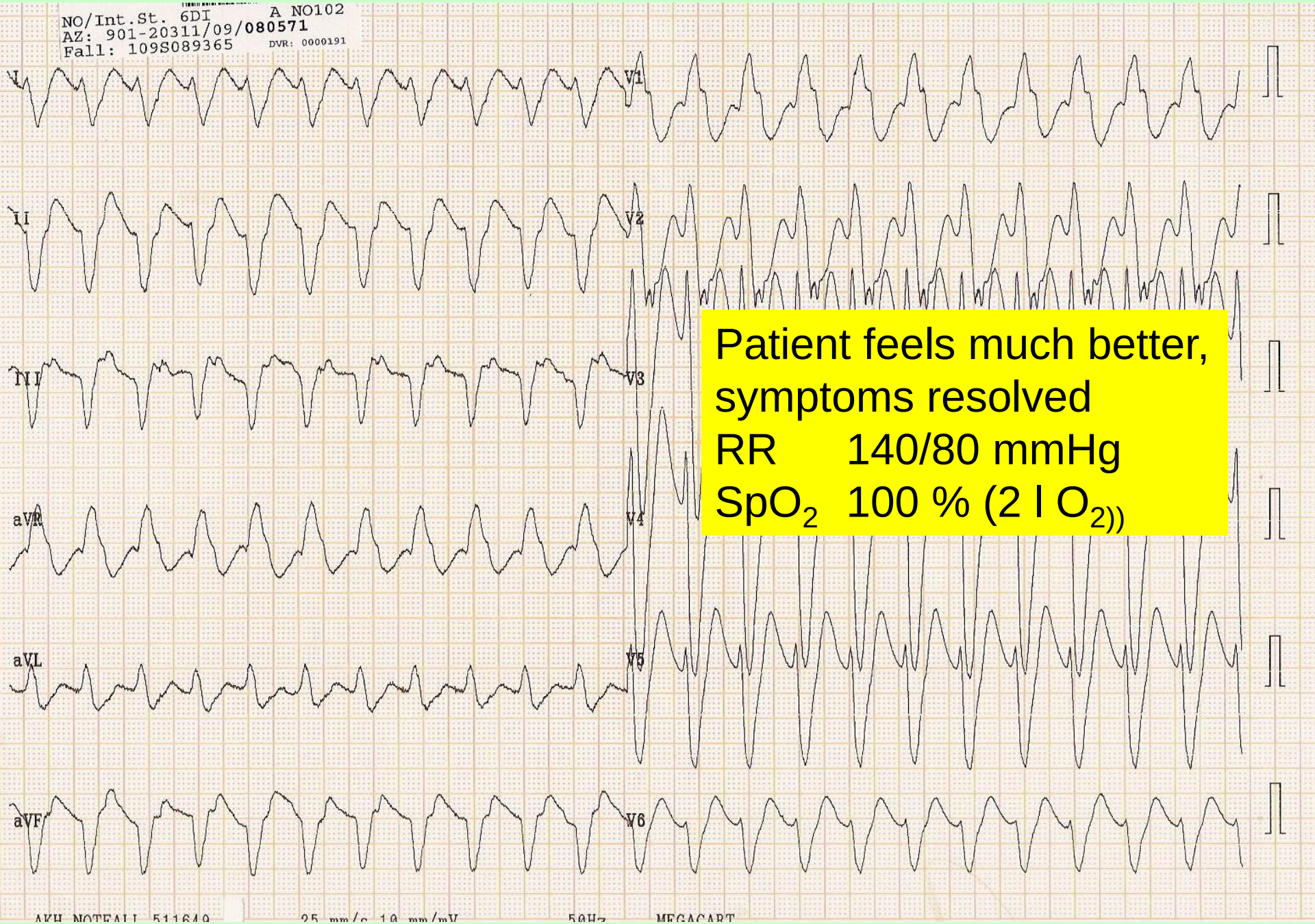
- History of myocardial infarction 20 years ago
- Very good condition, regular sports
- DM II, hypertension

- Suffers from sudden onset dyspnoea and chest pain after psychic alteration in a shop
- Ambulance with an emergency physician is called



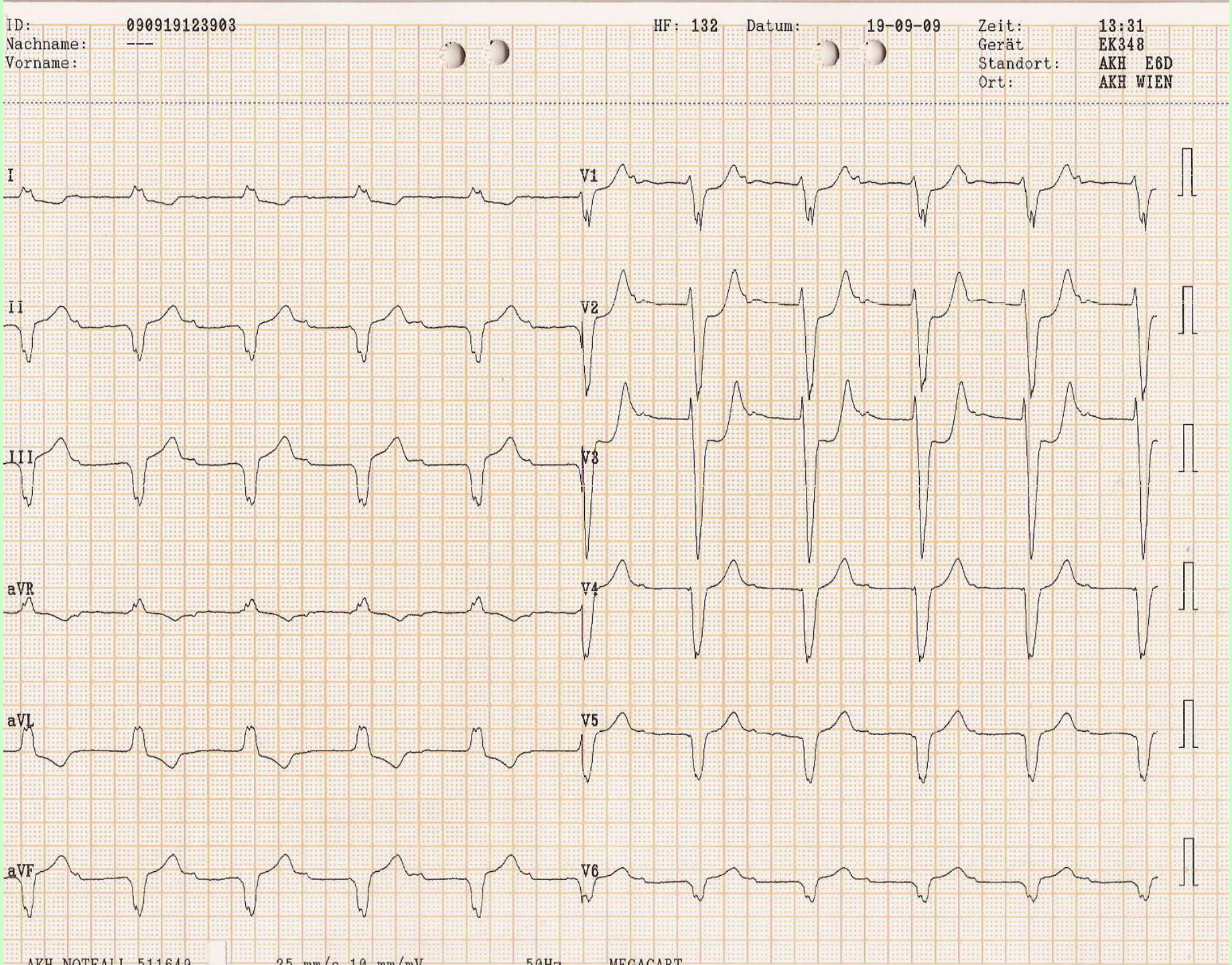
GCS 15
RR 90/60 mm HG
SpO_2 86 %
onholding chest pain
and dyspnoea

Oxygen by mask
Amiodarone 300 mg
Ringer´s solution 500 ml


NO/Int.St. 6DI A NO102
AZ: 901-20311/09/080571
Fall: 109S089365 DVR: 0000191
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
Patient feels much better,
symptoms resolved
RR 140/80 mmHg
SpO2 100 % (2 l O2))
AKH NOTFALL 511649
25 mm/s 10 mm/mV
50Hz
MEGACART

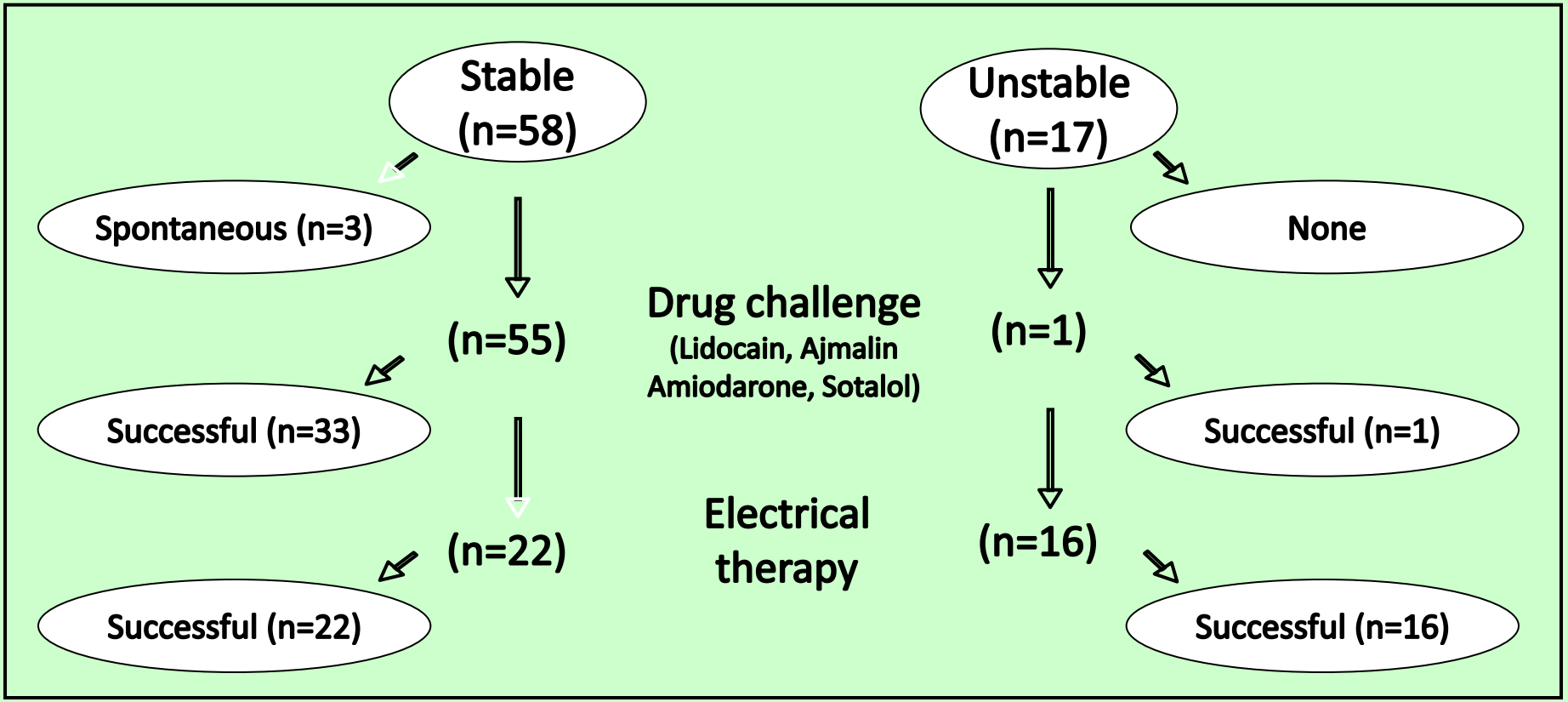

13:25:47
13:25:52
13:25:57


13:25:57
13:26:02
13:26:07


ID: 090919123903
Nachname: ---
Vorname:
HF: 132
Datum: 19-09-09
Zeit: 13:31
Gerät EK348
Standort: AKH E6D
Ort: AKH WIEN
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
AKH NOTFALL 511649
25 mm/s 10 mm/mV
50Hz
MEGACART

Ventricular Tachycardia

77% initially stable – treated with drugs, successful in 60%;
at the end 50 % needed electrical therapy



Domanovits et al. *Resuscitation* 1999;42:19

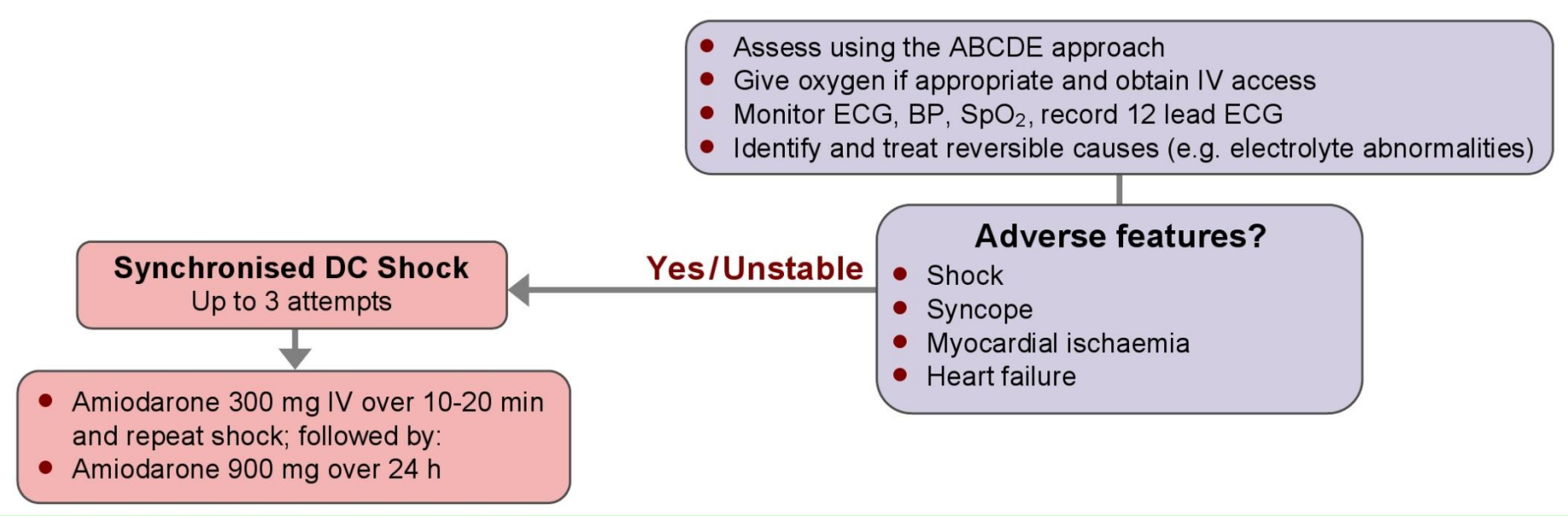
Further Evaluation and Treatment

- Treat underlying mechanism (ischaemia?)
- ICD therapy (±CRT)
- MRI, electrophysiologic study?
- Ablation
- Surgical ablation
- Antiarrhythmic drug therapy

Arrhythmia management

- ECG Diagnosis
- Treat the patient– not the ECG
- Treat the underlying cause
- Haemodynamically unstable – electrical therapy
- Haemodynamically stable – medical therapy possible
    - No antiarrhythmic „cocktails“
- Seek expert help

Tachycardia algorithm



„Oh my god!!!“

Ruth Prop