KEGAWATAN KARDIOVASKULAR (ARITMIA)

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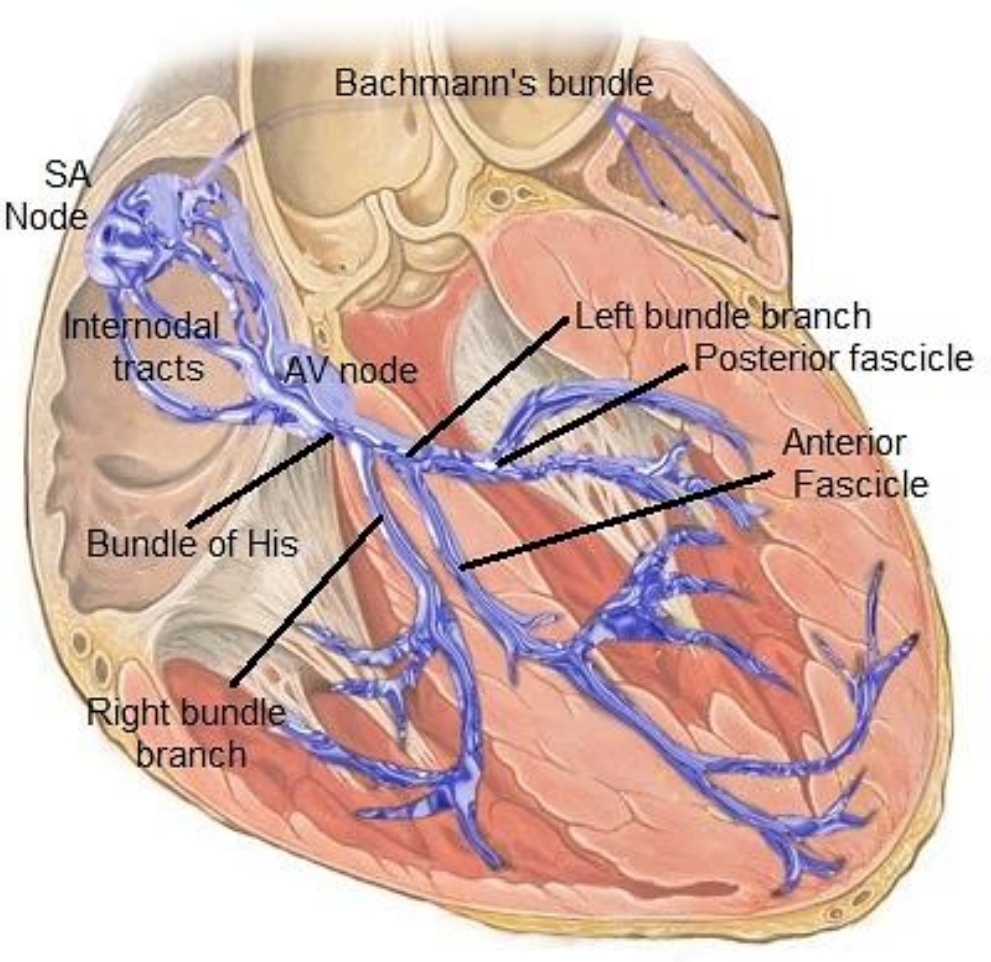
Arrhythmia?..what it is

- Abnormalities of the electric rhythm are known as ***arrhythmias*** and are among the most common clinical problems encountered.
- Disorders of heart rhythm result from alterations of :
  - ✓ Impulse formation,
  - ✓ Impulse conduction, or
  - ✓ Both

ELECTRICAL CONDUCTION OF SYSTEM OF THE HEART



Latent Pacemaker

Sinoatrial Node

Native Pacemaker;
Rate: 60 – 100x /min

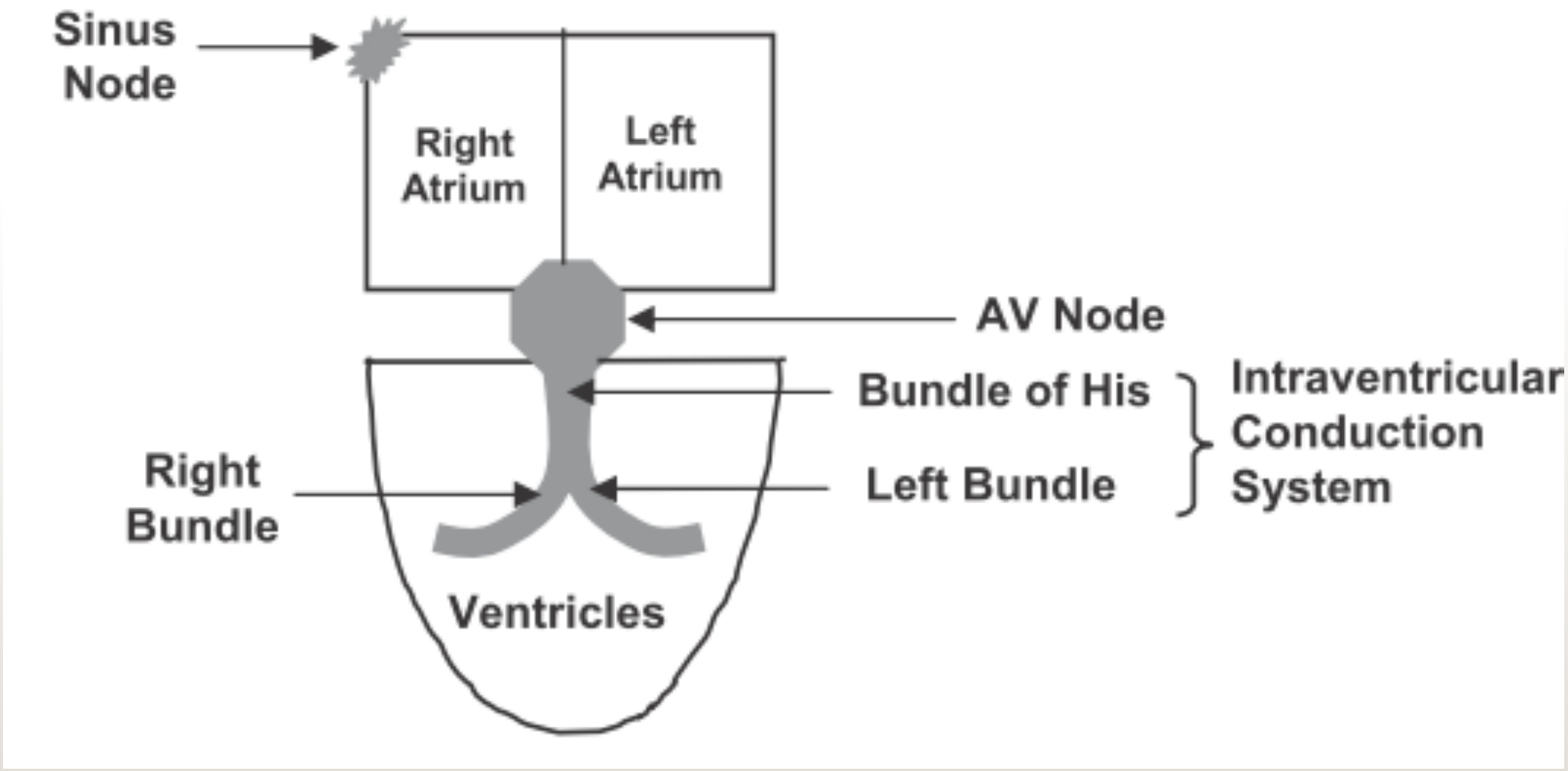
Junctional

Latent / Ectopic Pacemaker;
Rate: 40-60x /min

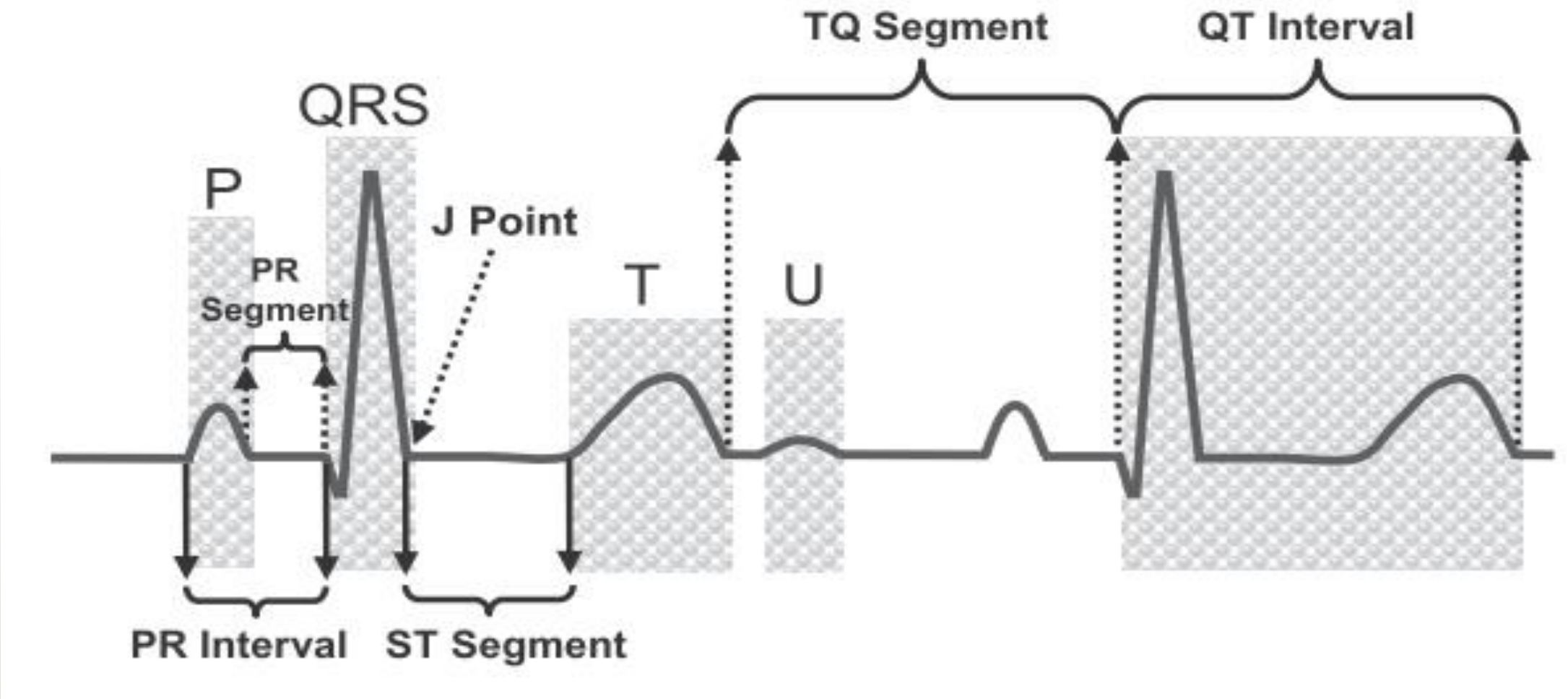
Ventricular

Latent/ Ectopic Pacemaker;
Rate: 30-40x /min

Latent Pacemaker will initiate impulses and take over the pacemaking function if the SA node slows or fails to fire, or if conduction abnormalitites block the normal wave of depolarization from reaching them (Escape Rhythm)



Conduction System of the Heart



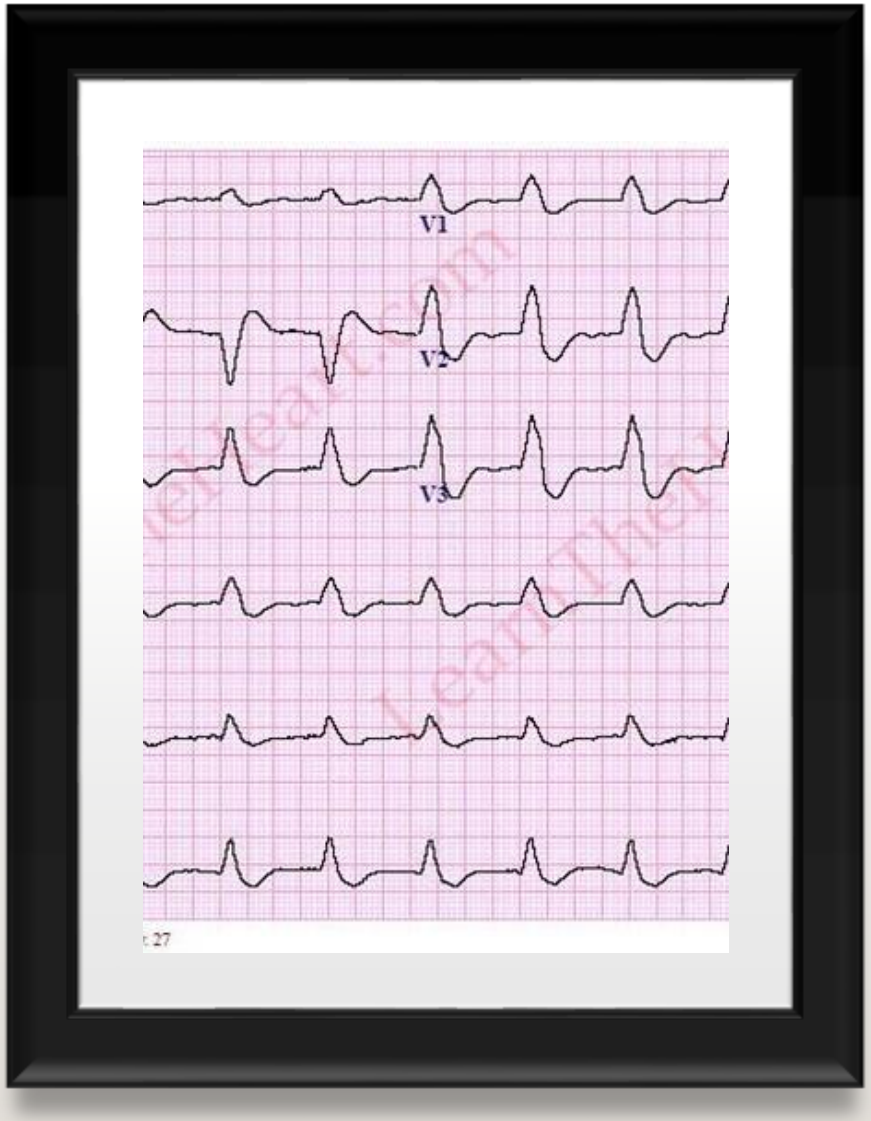
ECG components

Table 12.1. Common Arrhythmias

Location	*Bradyarrhythmias*	*Tachyarrhythmias*
SA node	Sinus bradycardia Sick sinus syndrome	Sinus tachycardia
Atria		Atrial premature beats Atrial flutter Atrial fibrillation Paroxysmal supraventricular tachycardias Focal atrial tachycardia Multifocal atrial tachycardia
AV node	Conduction blocks Junctional escape rhythm	Paroxysmal reentrant tachycardias (AV or AV nodal)
Ventricles	Ventricular escape rhythm	Ventricular premature beats Ventricular tachycardia Torsades de pointes Ventricular fibrillation

AV, atrioventricular; SA, sinoatrial.

TAKIKARDIA



TAKIKARDIA

DEFINISI:
Takikardia adalah aritmia dengan denyut jantung > 100 kali per menit
Gejala gangguan hemodinamik biasanya timbul pada **denyut jantung > 150 x/menit**

Klasifikasi Takikardia (harus dapat membedakan):

- Sinus takikardia
- Takikardia QRS sempit supraventrikular
- Takikardia QRS lebar (biasanya berasal dari ventrikel)

Sinus Tachycardia

- The SA node discharges more frequently than in NSR.

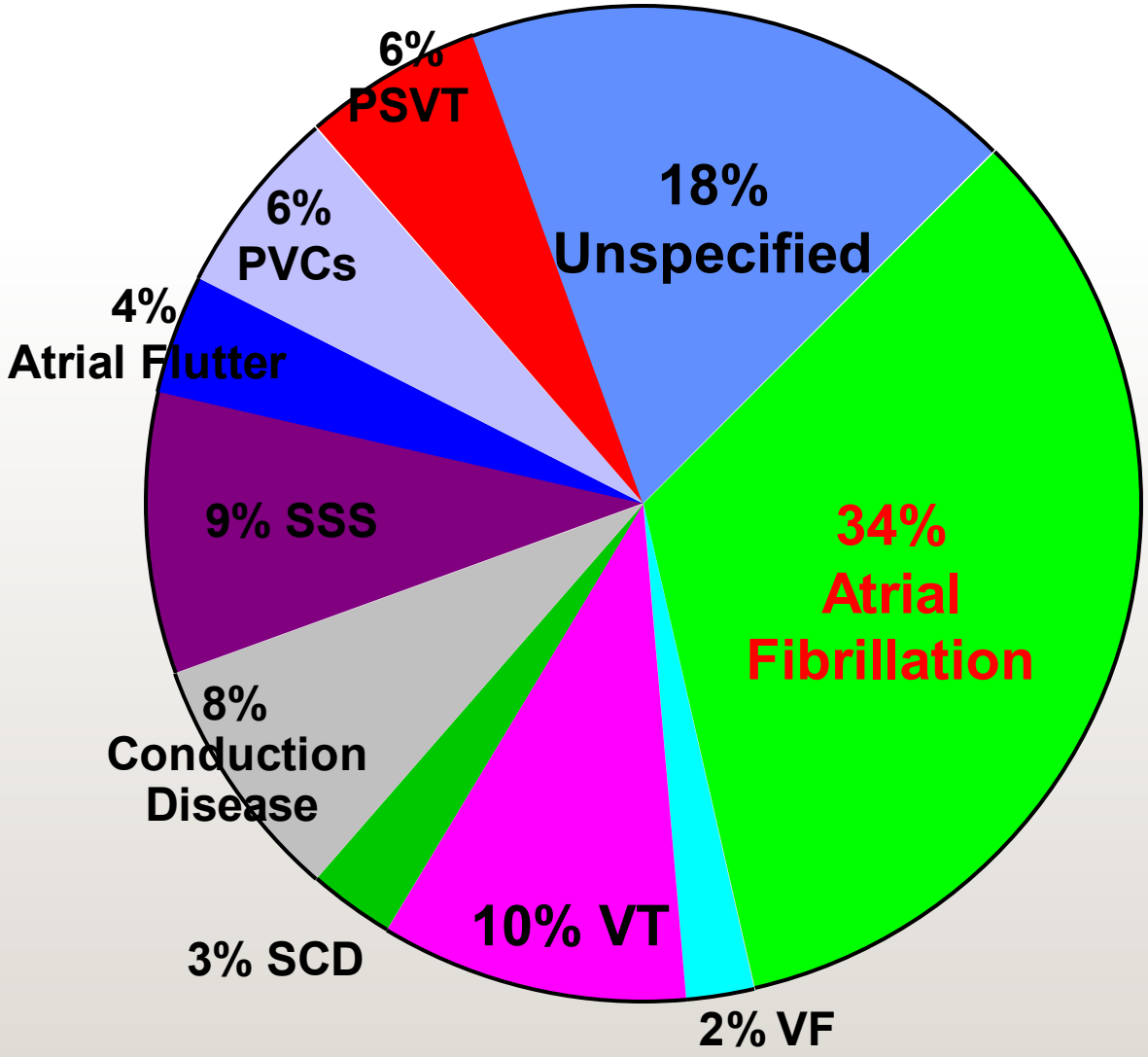
Rate: Fast (>100 bpm)
Rhythm: Regular
P Waves: Normal (upright and uniform)
PR Interval: Normal (0.12–0.20 sec)
QRS: Normal (0.06–0.10 sec)

Clinical Tip: Sinus tachycardia may be caused by exercise, anxiety, fever, hypoxemia, hypovolemia, or cardiac failure.

ATRIAL FIBRILLATION

Atrial fibrillation accounts for 1/3 of all patient discharges with arrhythmia as principal diagnosis.

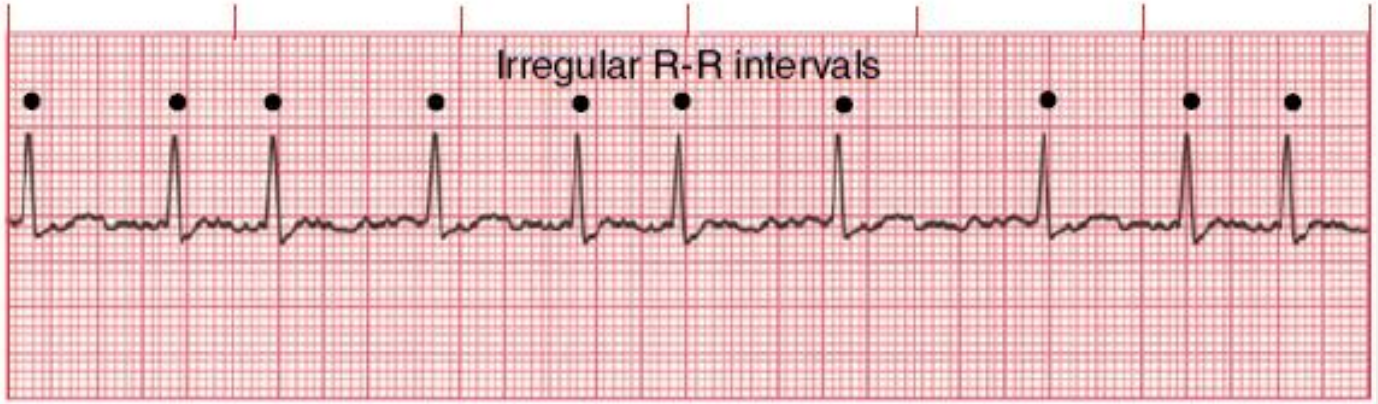
Baily D. J Am Coll Cardiol. 1992;19(3):41A.



- ***Multiple reentrant wavelets***, that circulate chaotically throughout the atria and drive the ventricular rate in a typically rapid and irregularly irregular fashion
- Transmission of multiple atrial impulses through AV Node → ***Irregularly irregular*** ventricular rate

Atrial Fibrillation (A-fib)

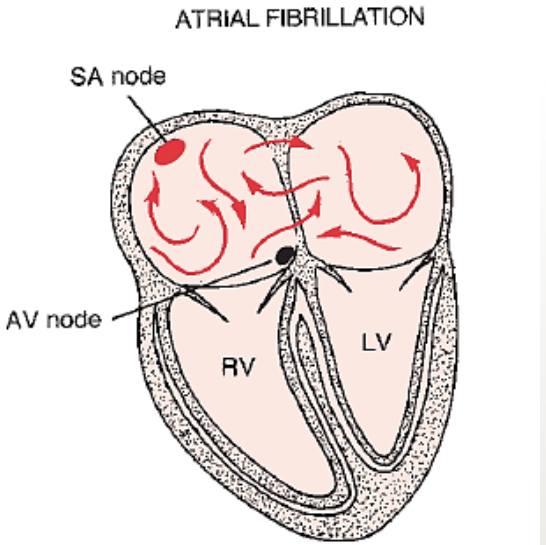
- Rapid, erratic electrical discharge comes from multiple atrial ectopic foci.
- No organized atrial depolarization is detectable.



Rate: Atrial: ≥350 bpm; ventricular: variable
Rhythm: Irregular
P Waves: No true P waves; chaotic atrial activity
PR Interval: None
QRS: Normal (0.06–0.10 sec)

Clinical Tip: A-fib is usually a chronic arrhythmia associated with underlying heart disease.

Clinical Tip: Signs and symptoms depend on ventricular response rate.

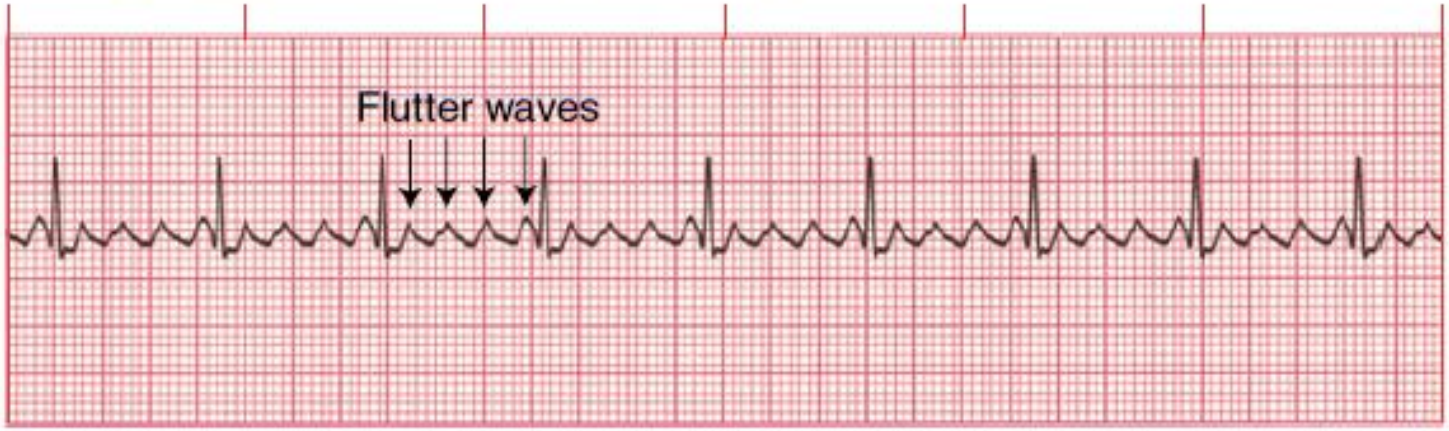


Multiple Wavelet

ATRIAL FLUTTER

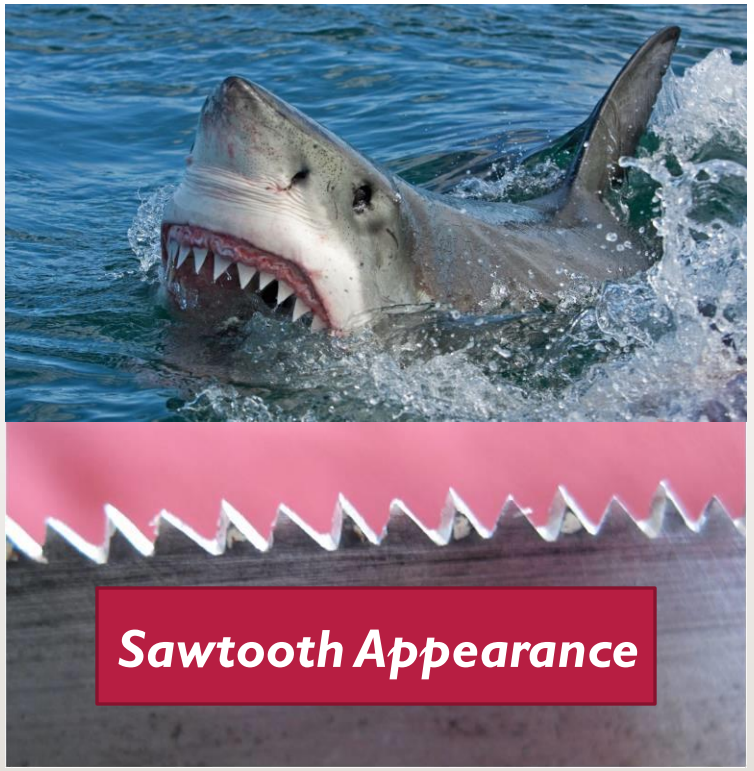
- Atrial flutter is characterized by rapid, regular atrial activity
- Many of these fast impulses reach the AV node during its refractory period and do not conduct to the ventricles, resulting in a slower ventricular rate

- AV node conducts impulses to the ventricles at a ratio of 2:1, 3:1, 4:1, or greater (rarely 1:1).
- The degree of AV block may be consistent or variable.



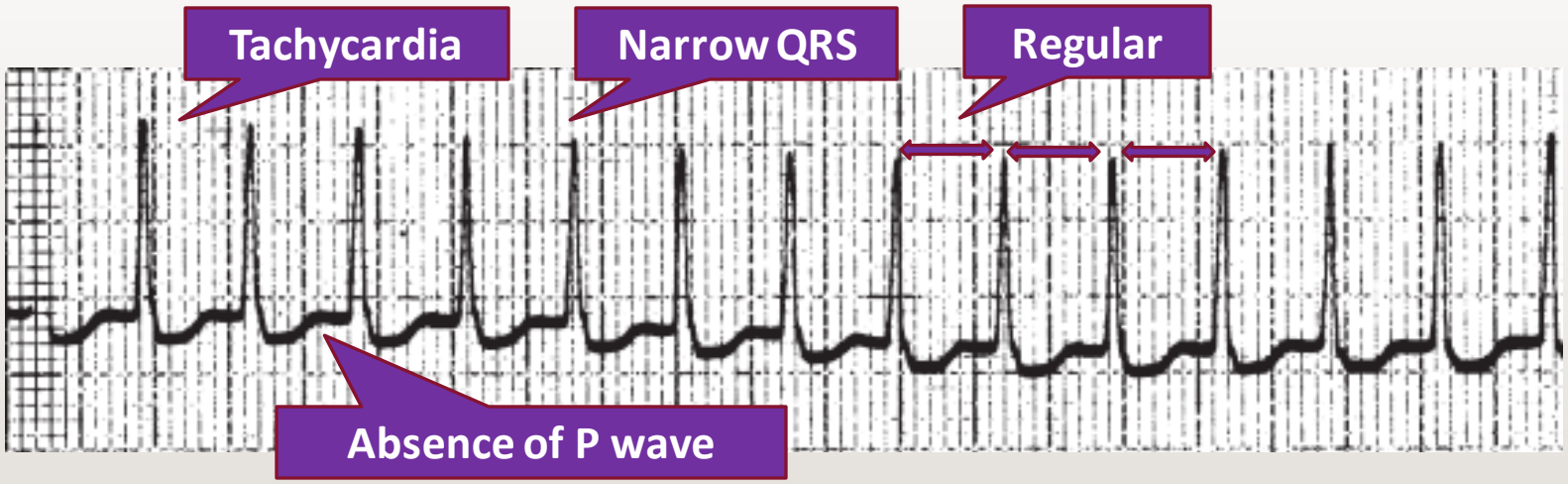
Rate: Atrial: 250–350 bpm; ventricular: variable
Rhythm: Atrial: regular; ventricular: variable
P Waves: Flutter waves have a saw-toothed appearance; some may be buried in the QRS and not visible
PR Interval: Variable
QRS: Usually normal (0.06–0.10 sec), but may appear widened if flutter waves are buried in QRS

Clinical Tip: A-flutter may be the first indication of cardiac disease.
Clinical Tip: Signs and symptoms depend on ventricular response rate.



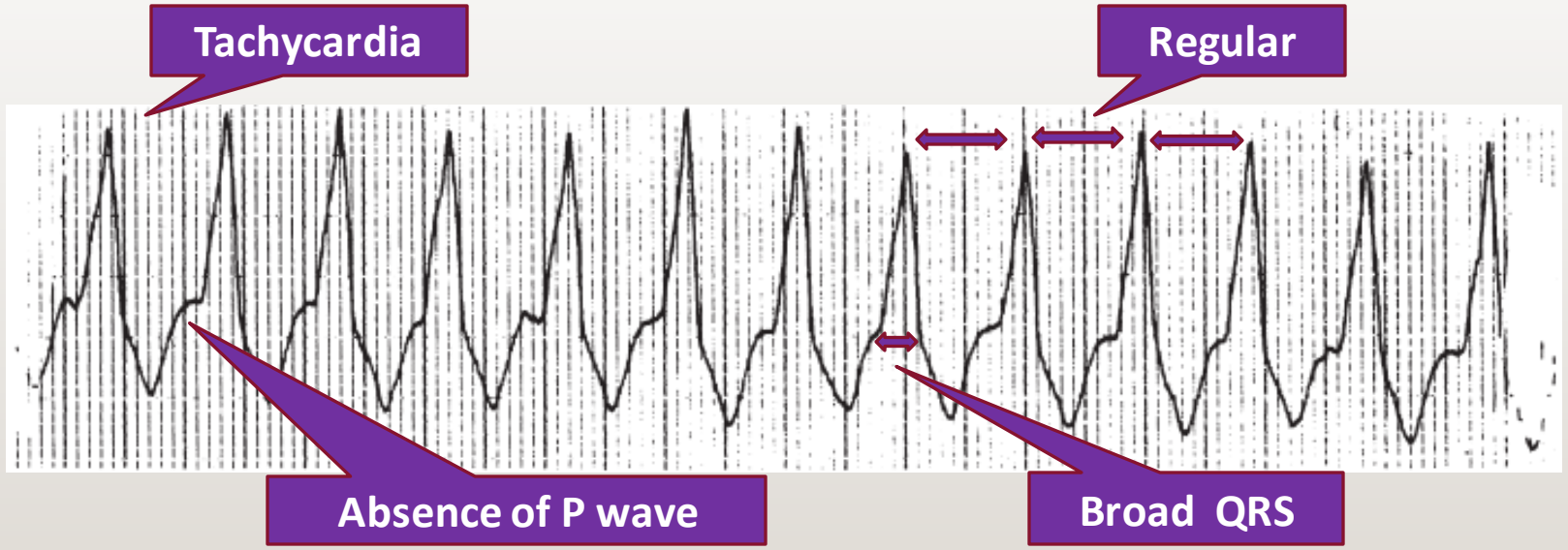
SUPRAVENTRICULAR TACHYCARDIA AVNRT

- SVT are often recurrent, occasionally persistent, and a frequent cause of visits to emergency rooms and primary care physicians.
- Atrial rates between 140 and 250 bpm, and narrow (normal) QRS complexes unless *aberrant conduction*
- Common symptoms : palpitations, anxiety, light-headedness, chest pain, pounding in the neck and chest, and dyspnea.



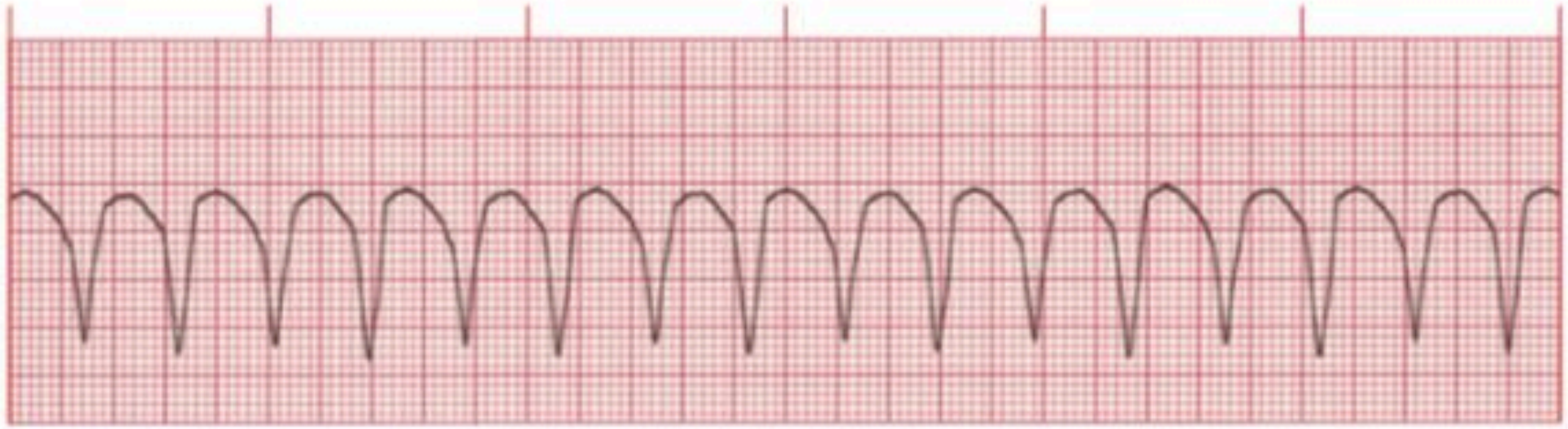
VENTRICULAR TACHYCARDIA

- VT is a series of three or more VPC
- ***Sustained VT*** → persists for more than 30 sec, produces severe symptoms such as syncope, or requires termination by cardioversion or administration of an antiarrhythmic drug and self-terminating episodes are termed ***nonsustained VT***
- When every QRS complex appears the same and the rate is regular, it is referred to as **monomorphic VT**
- When the QRS complexes continually change in shape and the rate varies from beat to beat, the VT is referred to as **polymorphic**



Ventricular Tachycardia (VT): Monomorphic

- In monomorphic VT, QRS complexes have the same shape and amplitude.



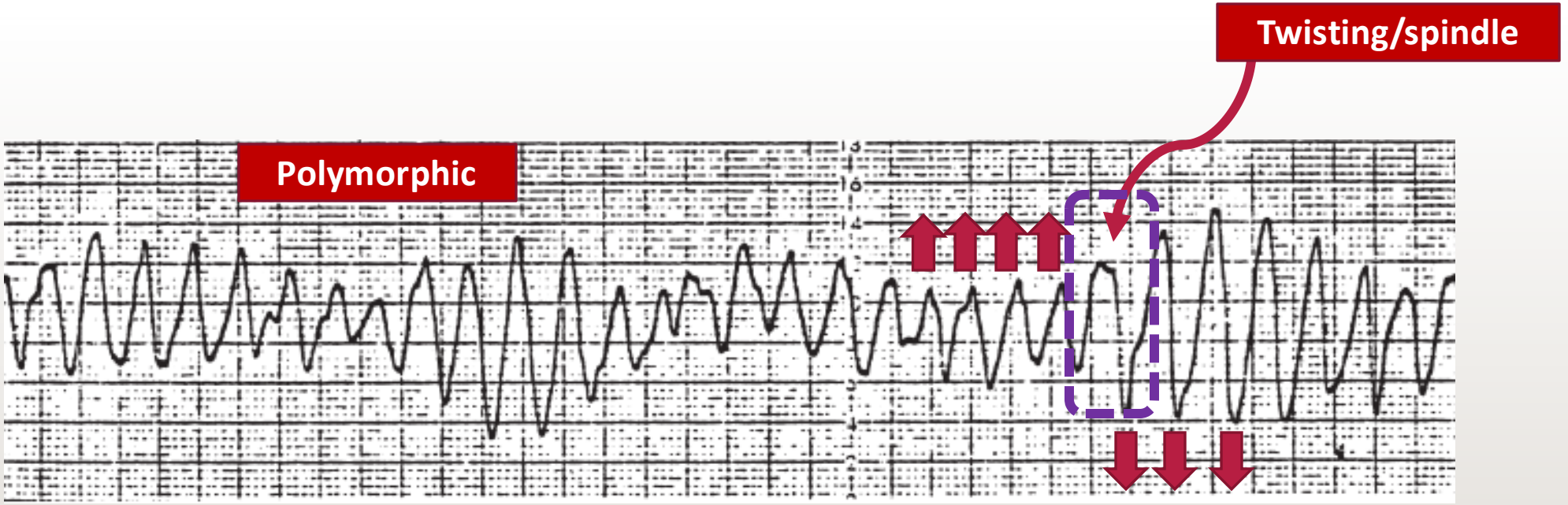
Rate: 100–250 bpm
Rhythm: Regular
P Waves: None or not associated with the QRS
PR Interval: None
QRS: Wide (>0.10 sec), bizarre appearance

Clinical Tip: It is important to confirm the presence or absence of pulses because monomorphic VT may be perfusing or nonperfusing.

Clinical Tip: Monomorphic VT will probably deteriorate into VF or unstable VT if sustained and not treated.

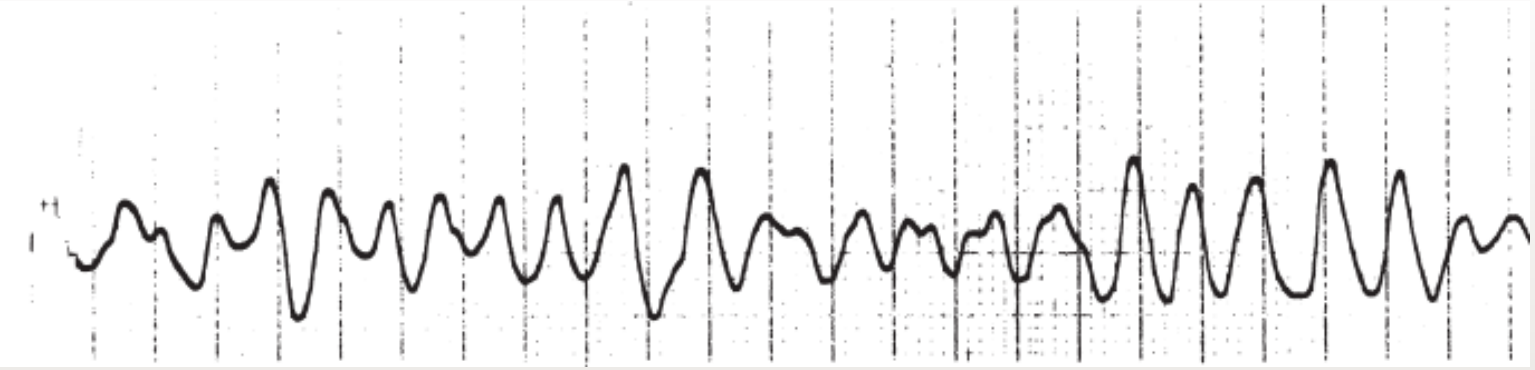
TORSADES DE POINTES

Torsades de pointes ("twisting of the points") is a form of polymorphic VT that presents as varying amplitudes of the QRS, as if the complexes were "twisting" about the baseline



VENTRICULAR FIBRILLATION

- VF is an immediately life-threatening arrhythmia
- It results in disordered, rapid stimulation of the ventricles with no coordinated contractions. The result is essentially cessation of cardiac output and death if not quickly reversed.

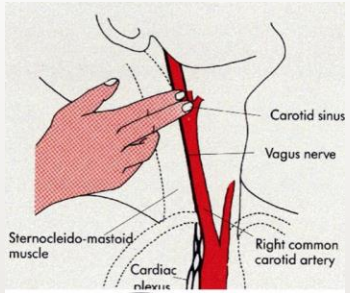


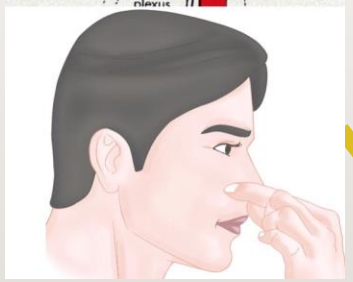
- Irama : Kacau
- Rate : Tidak bisa ditentukan
- Gelombang P: tidak ada
- PR Interval: Tidak ada
- QRS: Tidak Ada

ALGORITMA TAKIKARDIA

Nilai kesesuaian dengan kondisi klinis
Denyut jantung biasanya ≥ 150x/menit jika takiaritmia

Identifikasi dan atasi penyebab
- Jaga patensi jalan napas; bantu napas jika diperlukan
- Terapi oksigen (jika hipoksemia)
- Identifikasi irama; monitor tekanan darah dan saturasi oksigen





Apakah takiaritmia menyebabkan:
- Hipotensi?
- Penurunan kesadaran?
- Tanda-tanda syok?
- Nyeri dada iskemik?
- Gagal jantung akut?

Ya → ***Synchronized cardioversion***
- Pertimbangkan sedasi
- Jika kompleks QRS sempit dan regular, pertimbangkan adenosin

Kardioversi. Rekomendasi dosis inisial:
- QRS sempit teratur: 50-100 J
- QRS sempit tidak teratur: 120-200 J bifasik atau 200 J monofasik
- QRS lebar teratur: 100 J

Amiodaron IV:
- Dosis inisial 150 mg IV 10 mnt.
- Diulang bila terjadi VT kembali.
- Dilanjutkan dosis rumatan 1 mg/mnt 6 jam pertama.

Tidak

QRS lebar ≥ 0.12 detik

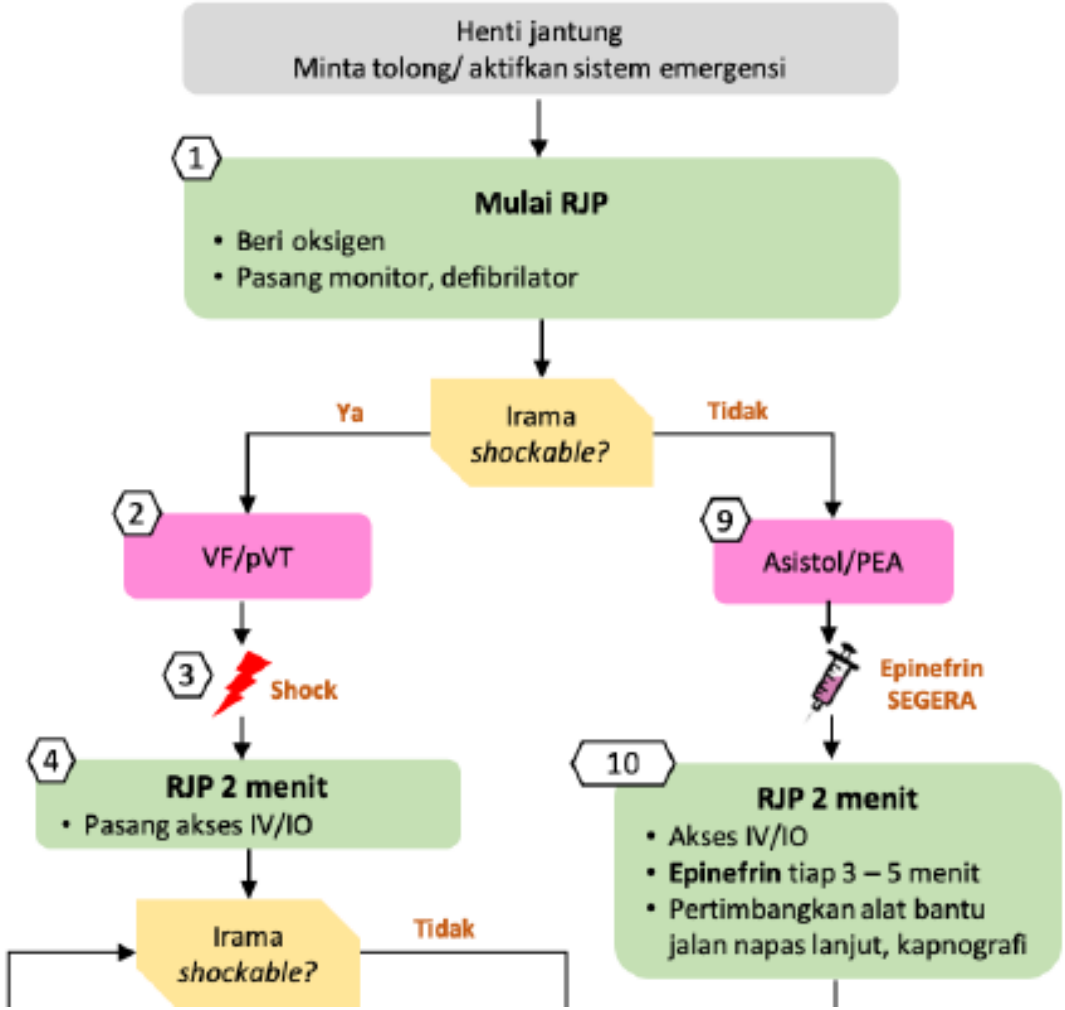
Ya →
- Akses IV dan EKG 12 sadapan jika tersedia
- Pertimbangkan adenosin. Hanya jika QRS kompleks regular dan monomorfik
- Pertimbangkan infus obat antiaritmia
- Pertimbangkan konsultasi ahli

Tidak →
- Akses IV dan EKG 12 sadapan jika tersedia
- MANEUVER vagal
- Adenosin (jika QRS kompleks teratur)
- *Beta blocker* atau *calcium channel blocker*
- Pertimbangkan konsultasi ahli

Adenosin IV
- Dosis 1: 6 mg IV bolus cepat, *flush* NS.
- 2: 12 mg IV bila

- **VerapamilDiltiazem**
- **metoprolol, atenolol, esmolol dan labetalol.**

ALGORITMA HENTI JANTUNG



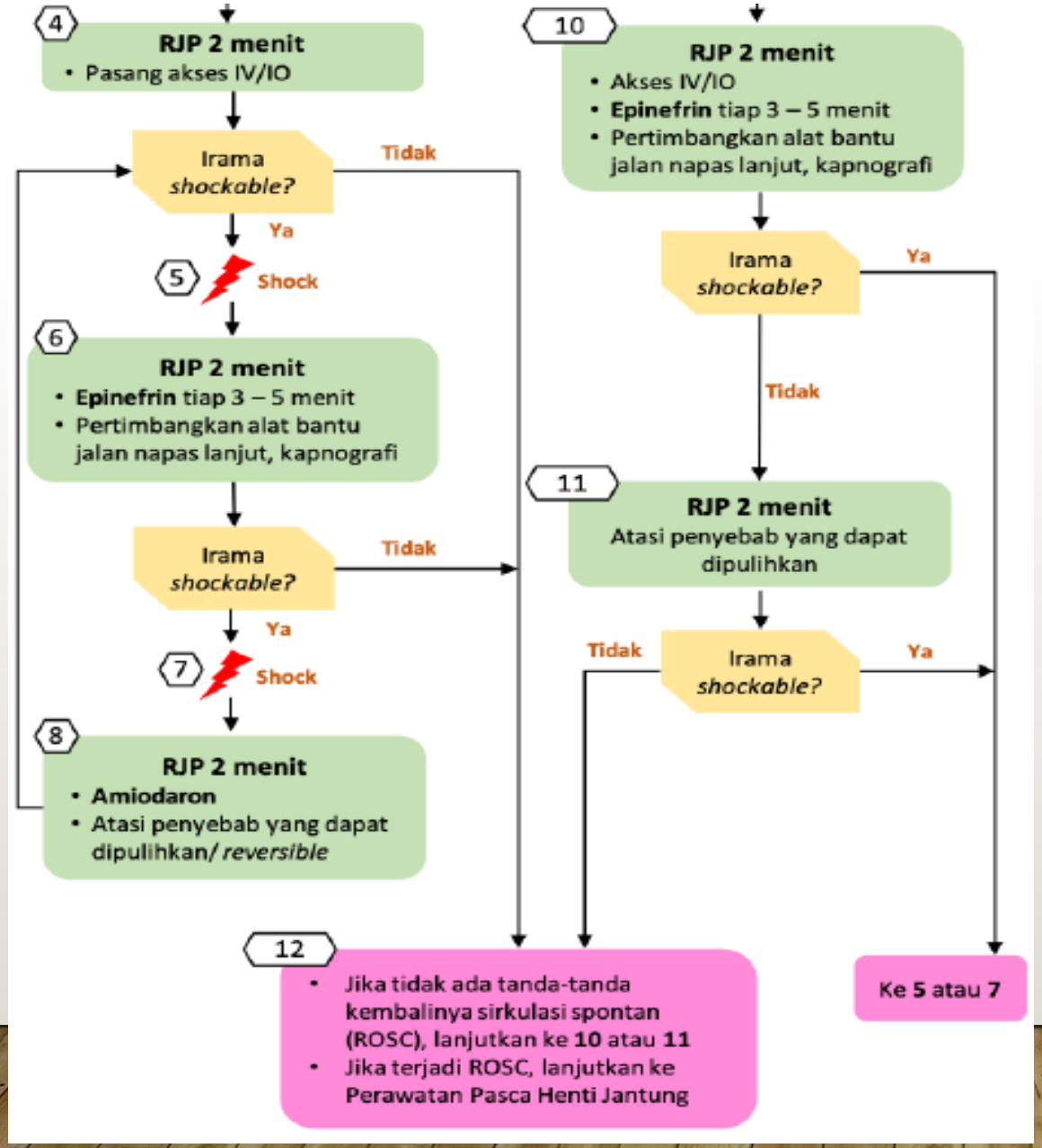
Kualitas RJP

- Tekan kuat (setidaknya 5 cm) dan cepat (100 - 120 kali / menit), beri kesempatan dada untuk rekoil sempurna.
- Minimalkan interupsi saat kompresi.
- Ganti kompresor tiap 2 menit, atau lebih cepat bila penolong kelelahan.
- Bila *advanced airway* belum terpasang, rasio kompresi-ventilasi 30:2.
- Kapnografi gelombang kuantitatif
  - Jika $PetCO_2$ rendah atau menurun, nilai ulang kualitas RJP

Energi *shock* untuk defibrilasi

- **Bifasik**: Ikuti rekomendasi pabrik (co: dosis inisial 120-200 J); bila tidak diketahui gunakan dosis tertinggi. Dosis kedua dan selanjutnya sebaiknya sama, pertimbangkan pemberian dosis lebih tinggi
- **Monofasik**: 360 J

ALGORITMA HENTI JANTUNG



Terapi obat

- **Dosis epinefrin IV/IO:** 1 mg setiap 3-5 menit
- **Dosis amiodaron IV/IO:**
  Dosis pertama: 300 mg bolus.
  Dosis kedua: 150 mg.
  atau
  Dosis lidokain IV/IO:
  Dosis pertama: 1-1.5 mg/kg
  Dosis kedua: 0.5-0.75 mg/kg

Saluran napas tingkat lanjut

- Intubasi endotrakea atau alat bantu napas lanjutan supraglotis
- Kapnografi gelombang atau kapnometri untuk mengonfirmasi dan memantau posisi pipa endotrakea
- Jika saluran napas tingkat lanjut telah terpasang, berikan 1 napas tiap 6 detik (10 napas/menit) dengan kompresi yang terus berlanjut

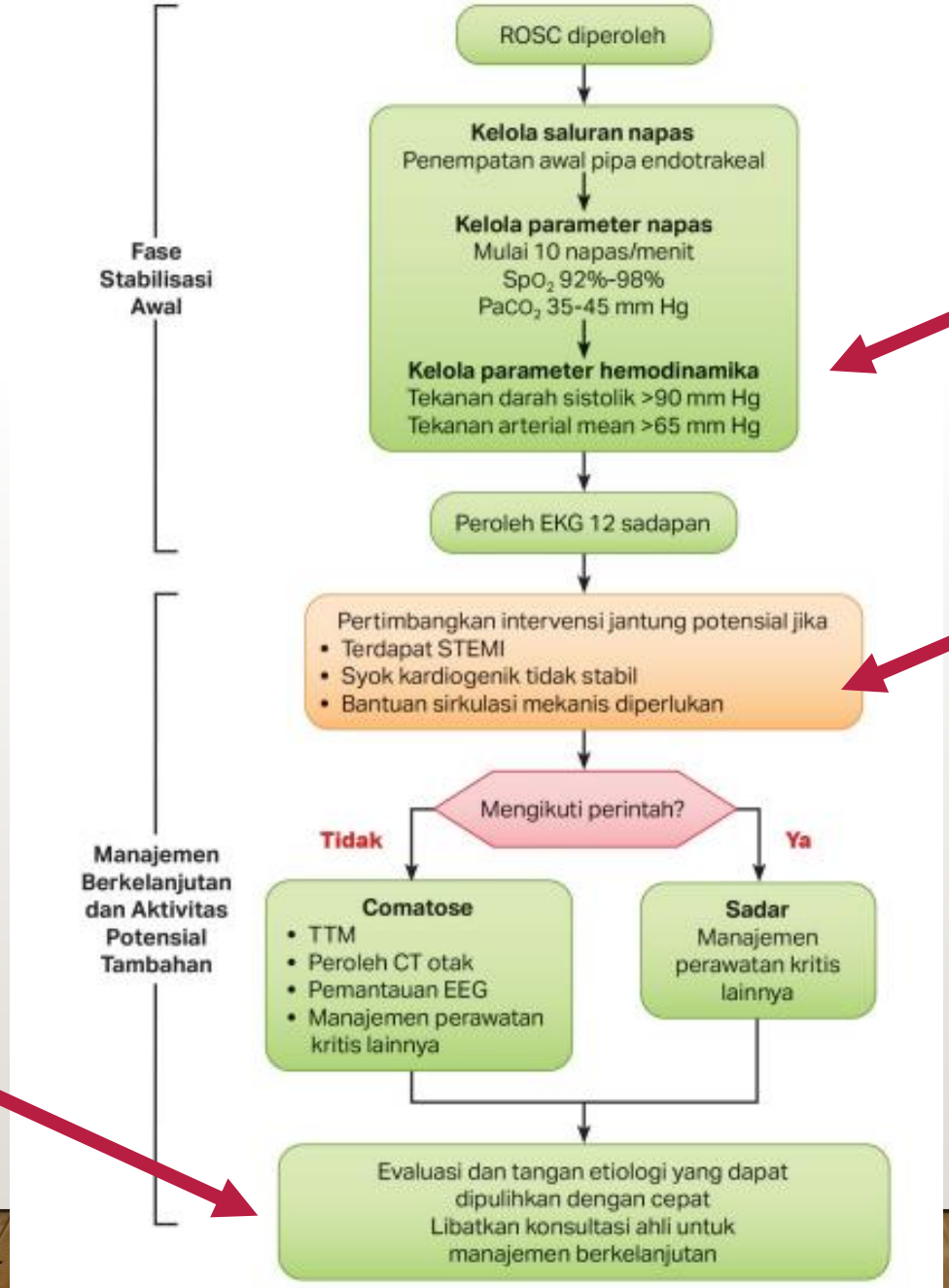
Penyebab yang dapat pulih

- **H**ipovolemia
- **H**ipoksia
- Ion hidrogen (asidosis)
- **H**ipoglikemia
- **H**ipo/hiperkalemia
- **H**ipotermia
- Tension pneumothorax
- Tamponade jantung
- Toksin
- Trombosis, pulmoner
- Trombosis, koroner

PERAWATAN PASCA HENTI JANTUNG

5H dan 5T

- Hipovolemia
- Hipoksia
- Ion hidrogen (asidosis)
- Hipokalemia/ hiperkalemia
- Hipotermia
- Tension pneumotoraks
- Tamponade, jantung
- Toksin
- Trombosis, pulmonal
- Trombosis, koroner



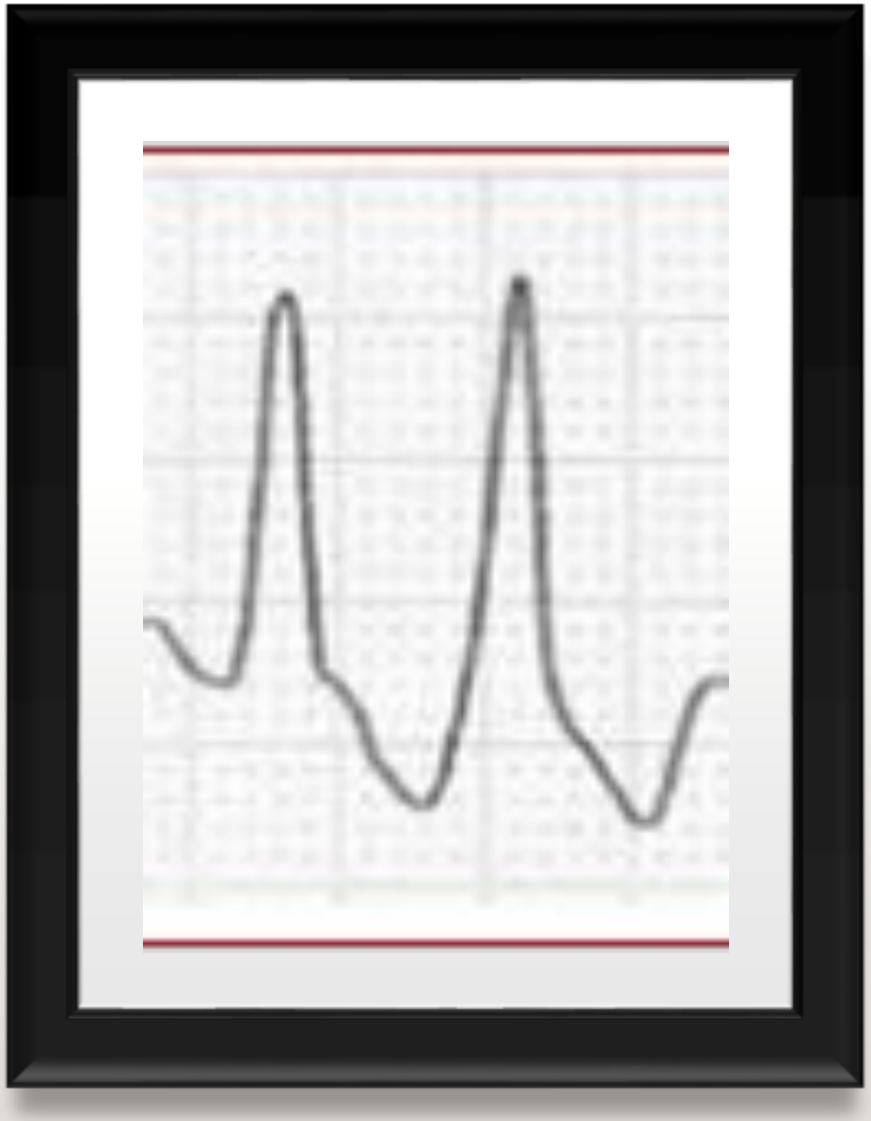
- Fluid challenge 2-4 cc/kgBB dalam 10 menit
  - NaCl 0.9% / RL
- Dobutamin drip:
  - 2-20 µg/kg BB/menit
- Dopamin drip:
  - 5-20 µg/kg BB/menit
- Norepinefrin IV:
  - 0.1–0.5 µg/kg BB/menit

Manajemen berkelanjutan

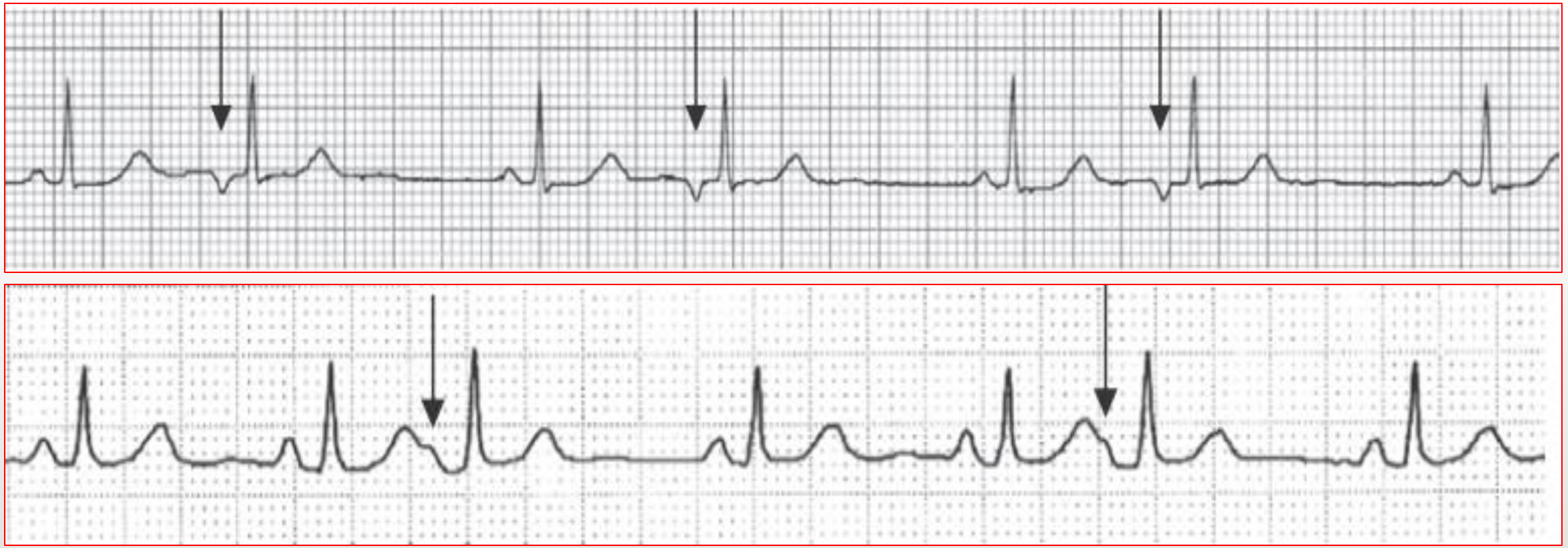
Evaluasi berikut dilakukan bersamaan agar TTM mendapatkan prioritas tertinggi dalam intervensi:

- Intervensi jantung emergensi: Evaluasi dini EKG 12 sadapan; pertimbangkan hemodinamik untuk membuat keputusan mengenai intervensi jantung
- TTM: Bila pasien tidak dapat mengikuti perintah, mulai TTM sesegera mungkin; mulai dengan 32-36°C selama 24 jam menggunakan alat pendingin dengan siklus umpan balik
- Manajemen layanan kritis lainnya:
  - ✓ Pemantauan suhu inti berkelanjutan (di esofagus, rektum, kandung kemih)
  - ✓ Pertahankan normoksia, normokapnia, dan euglikemia
  - ✓ Pemantauan EEG berkelanjutan atau intermiten
  - ✓ Pemberian ventilasi untuk melindungi paru

EXTRA SYSTOLE



Premature Ventricular Contraction (PVC)



Premature Atrial Contraction (PAC)

THANK YOU