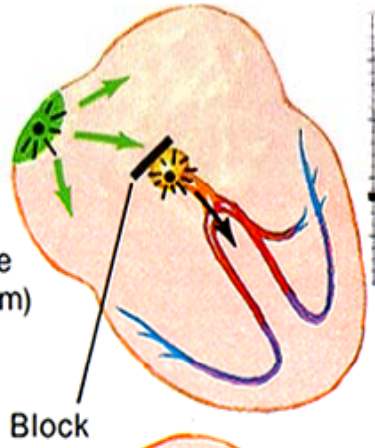
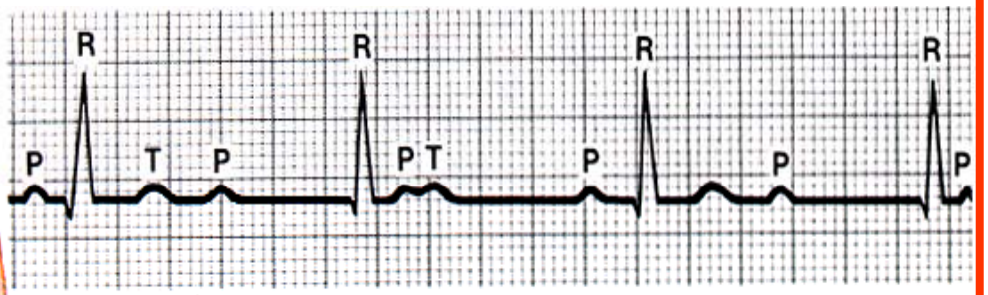
Third Degree AV Block

G. No relationship between P waves and QRS complexes: QRS rate *slower* than P rate

Third-degree (complete) AV block

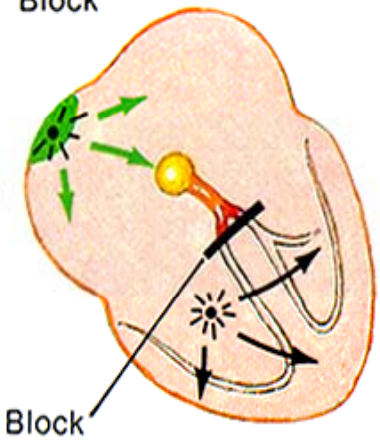
1. Impulses originate at both SA node (P waves) and below site of block in AV node (junctional rhythm) conducting to ventricles

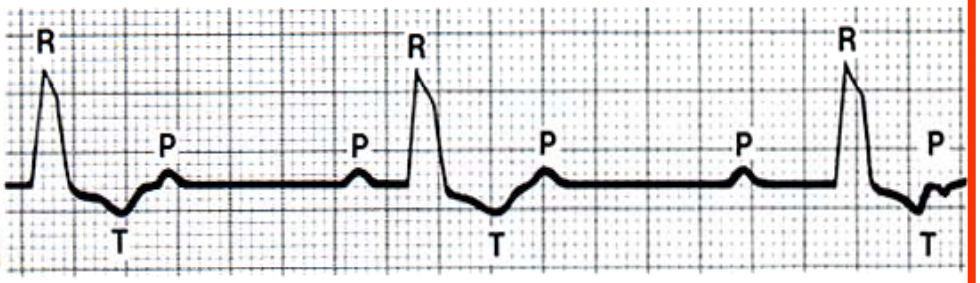




Atria and ventricles depolarize independently. QRS complexes less frequent; regular at 40 to 55/minute but normal in shape

2. Impulses originate at SA node (P waves) and also below site of block in ventricles (idioventricular rhythm)



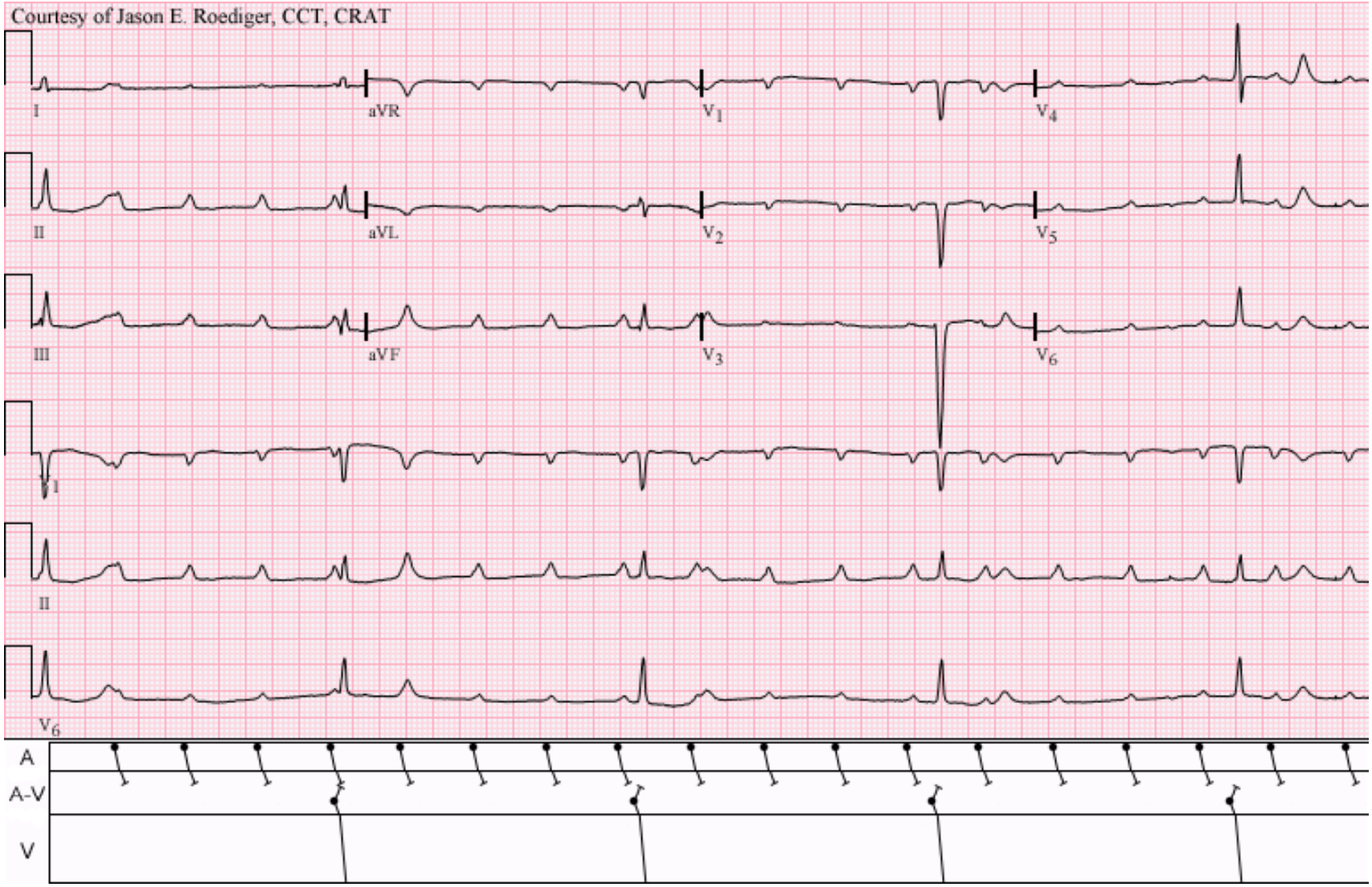


Atria and ventricles depolarize independently. QRS complexes less frequent; regular at 20 to 40/minute but wide and abnormal in shape

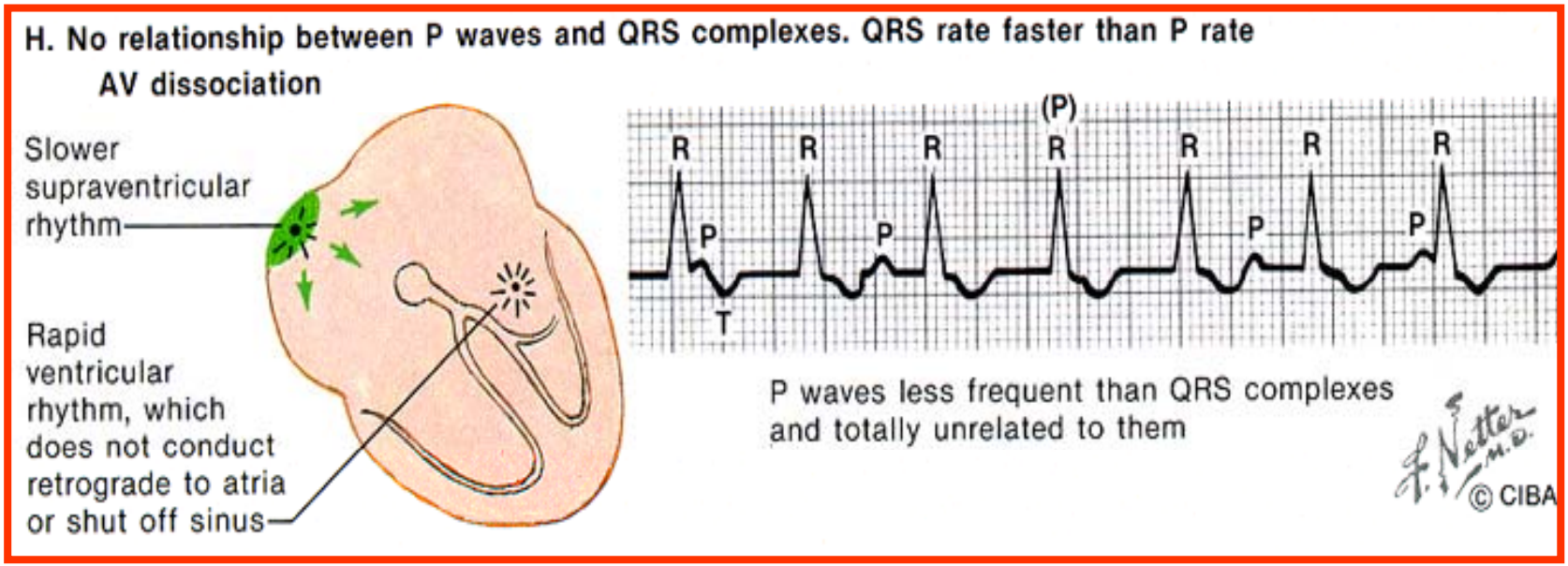
Third degree AV block (Complete Heart Block)

- EKG
  - P wave และ QRS complexes ไม่สัมพันธ์กัน โดยที่จำนวน P wave จะ มากกว่า QRS complexes (atrial rate > ventricular rate; PP inteval < RR interval)
  - PP interval = regular ; RR interval = regular; totally variable PR interval
- Atrial impulse ไม่สามารถผ่านลงมากระตุ้น ventricle ได้โยสิ้นเชิง
  - QRS เกิดจากจุดไฟฟ้าสำรองต่ำกว่า AV node
- สาเหตุ : AV node conduction abnormality
  - Coronary ischemia : most common
  - Degenerative process (fibrosis, calcification): common
  - Infiltrative disease
  - Inflammation/autoimmune disese
  - Infection: Infective endocarditis -> valve ring abscess
  - Mechanical injury : post op, post RF ablation
  - Congenital
- If unstable → need immediate pacing therapy

Third degree AV block with escape junctional rhythm



AV Dissociation

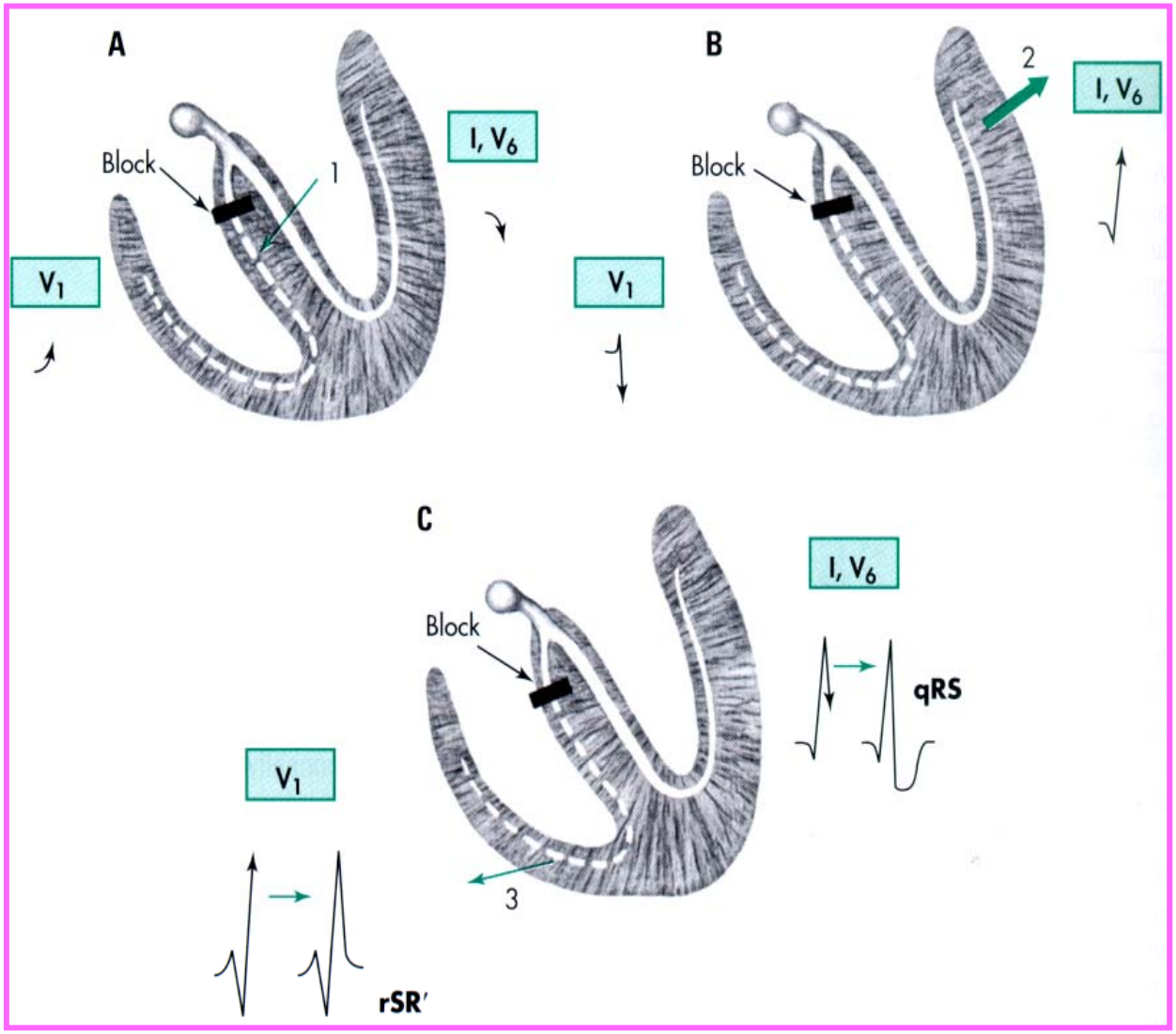


Helpful in diagnosis of ventricular tachycardia

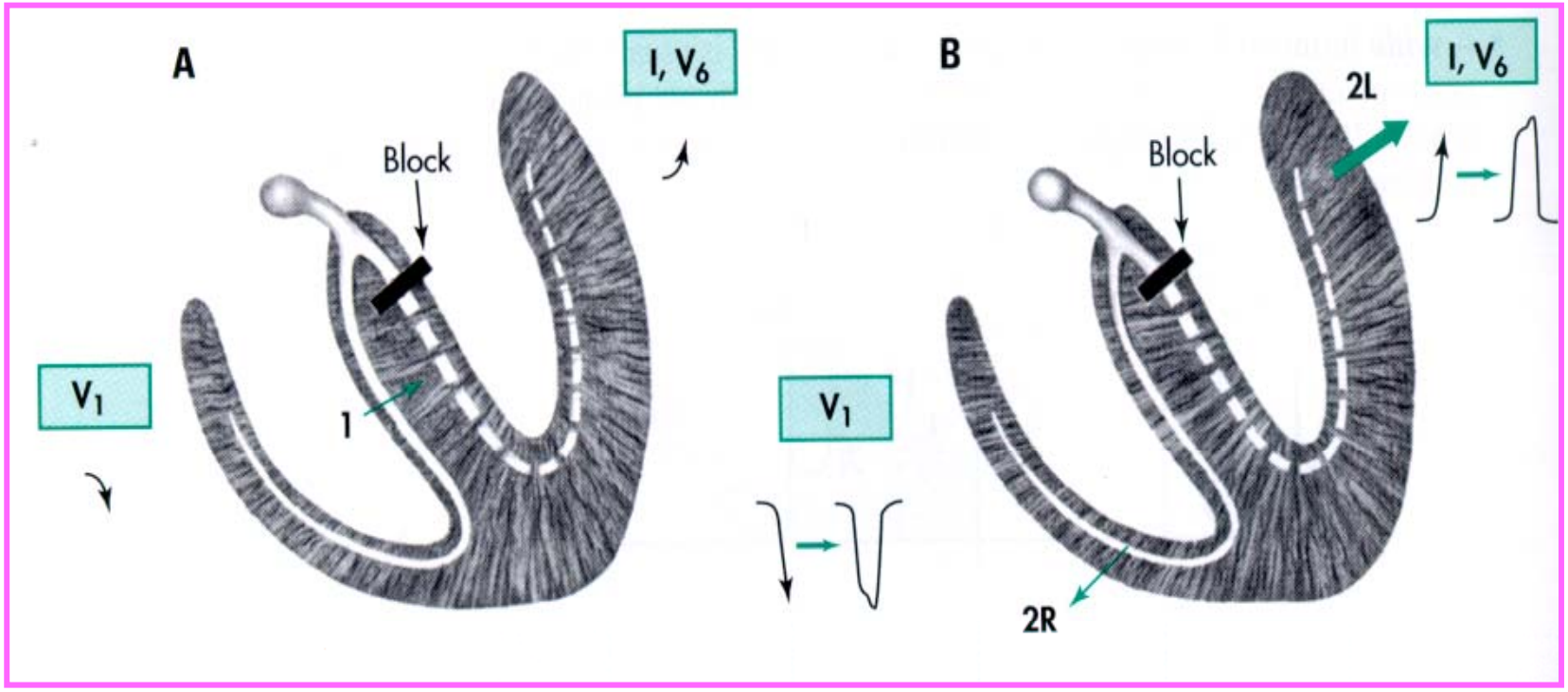
Indication for pacing in AV block

Asymptomatic	Indication
1st degree	Pacing not indicated
2nd degree	Pacing not indicated in type I with narrow QRS Electrophysiological study in type I with wide QRS Pacing in type II
3rd degree	Pacing
Symptomatic	Pacing regardless of type

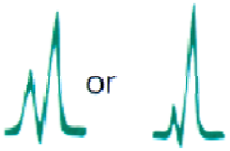
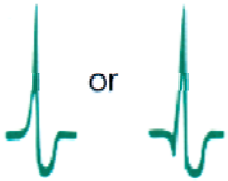
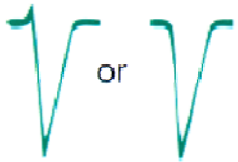
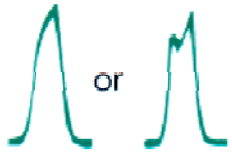
Right Bundle Branch Block (RBBB)



Left Bundle Branch Block (LBBB)



RBBB, LBBB, IVCD

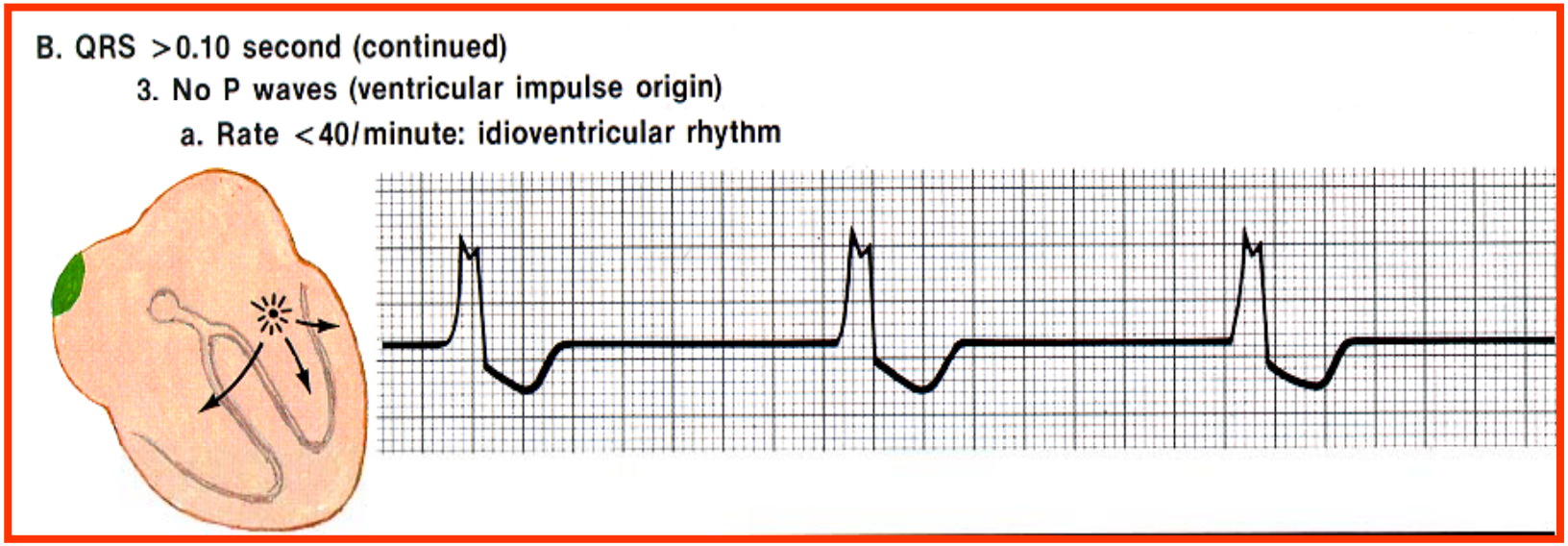
	Lead V_1	Leads I and V_6	QRS duration
Typical RBBB			≥0.11 sec
Typical LBBB			≥0.12 sec
IVCD	Neither typical RBBB nor LBBB morphology in the three key leads		≥0.11 sec

Ventricular Arrhythmia

Ventricular rhythm

- Wide QRS complex (QRS duration > 120 ms)
  - Idioventricular rhythm (escape ventricular rhythm) : rate < 40 BPM
  - Accelerated idioventricular rhythm (slow VT) : rate 40 – 120 BPM
  - Ventricular tachycardia : rate > 120 BPM
    - Monomorphic Vs Polymorphic
    - Sustained (> 30 sec) Vs Non-sustained (<30 sec)
    - Pulseless (unstable) Vs non-pulseless (stable)
- Fibrillatory QRS → Ventricular fibrillation (VF)

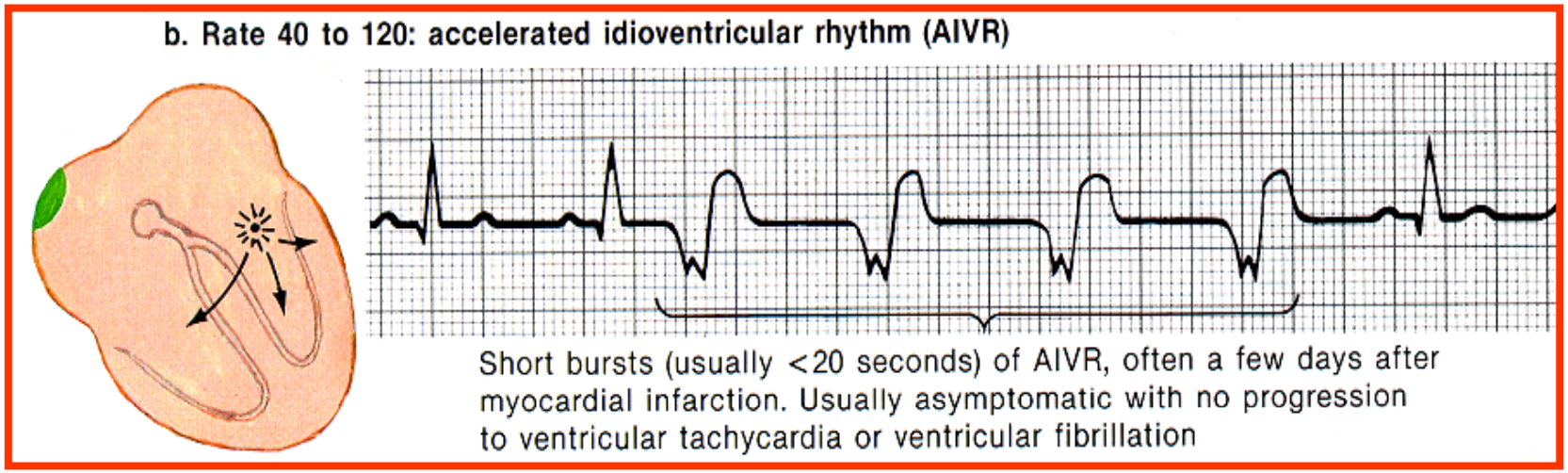
Idioventricular Rhythm



Escape ventricular rhythm

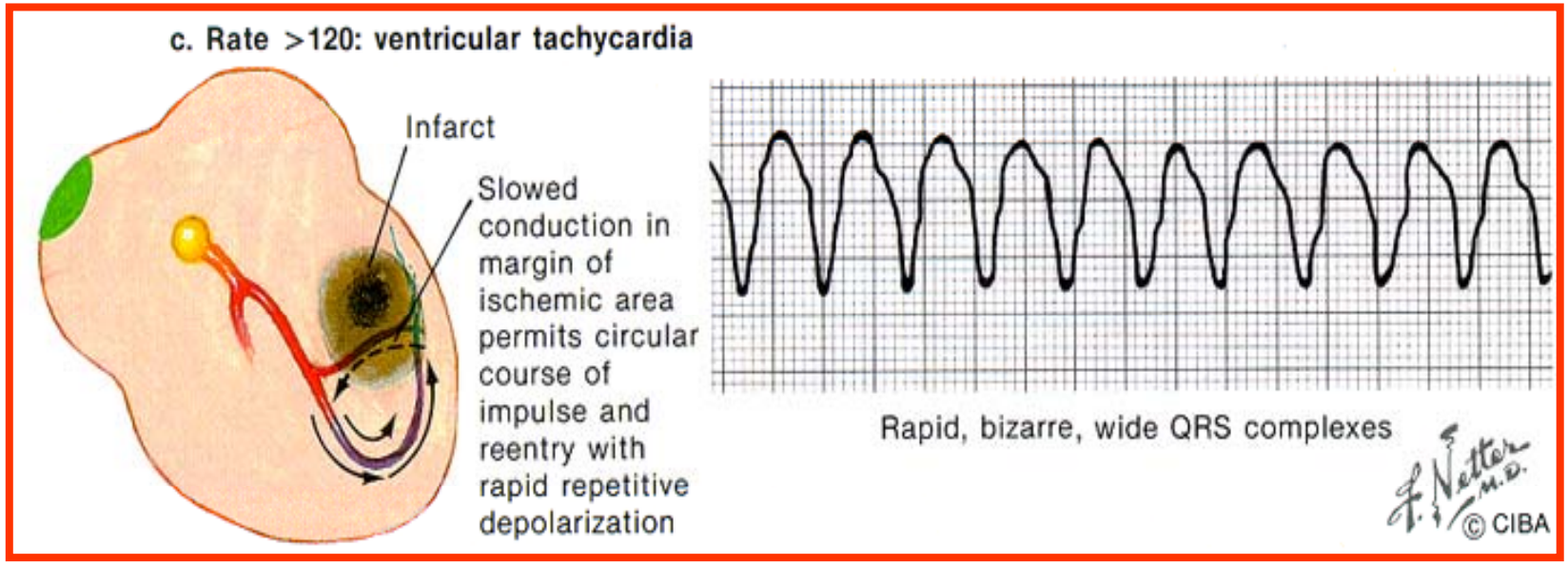
Usually seen in dying heart or severe metabolic imbalance
e.g. severe hyperkalemia, severe acidosis

Accelerated Idioventricular Rhythm

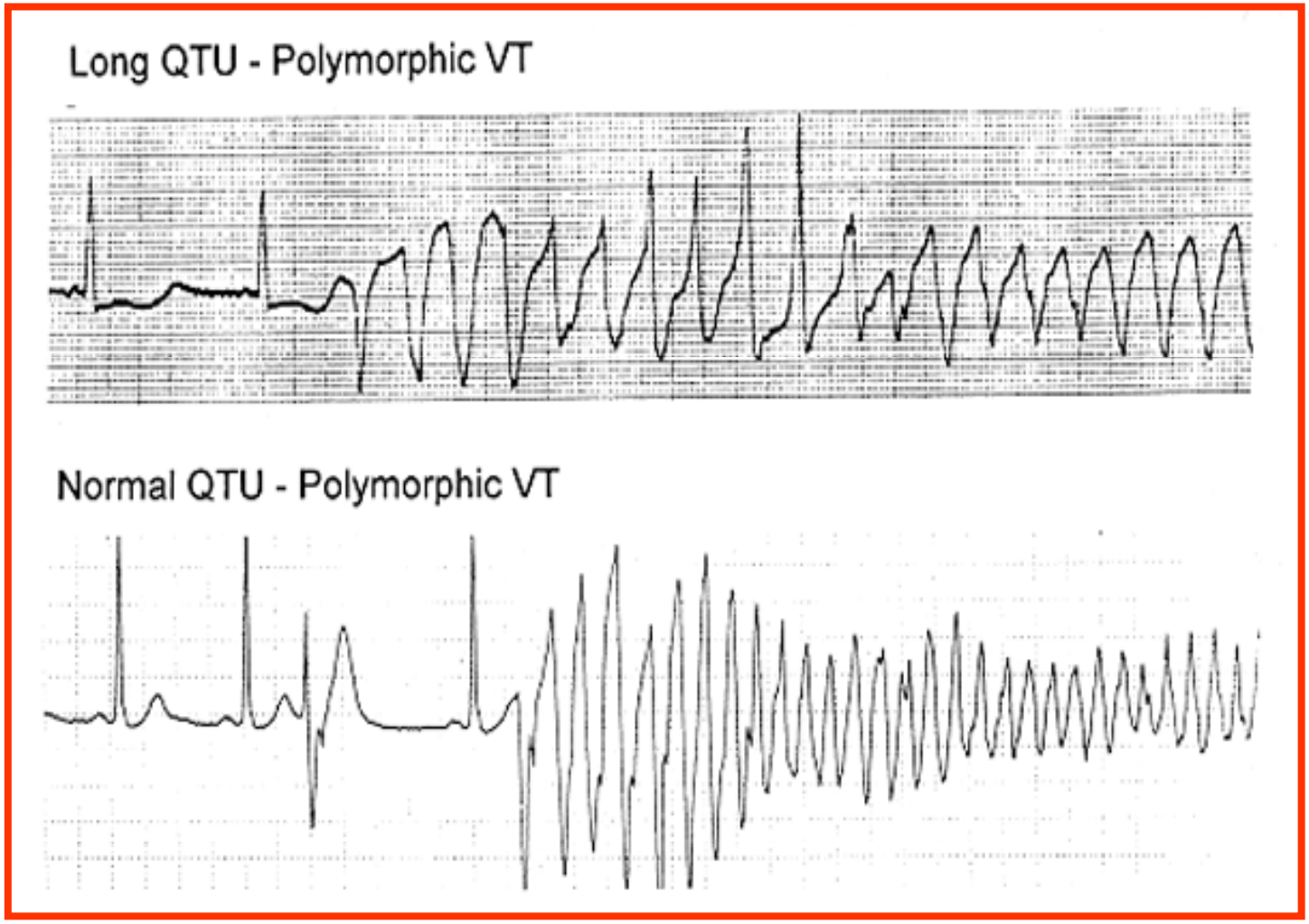


Usually associated with reperfusion during myocardial infarction

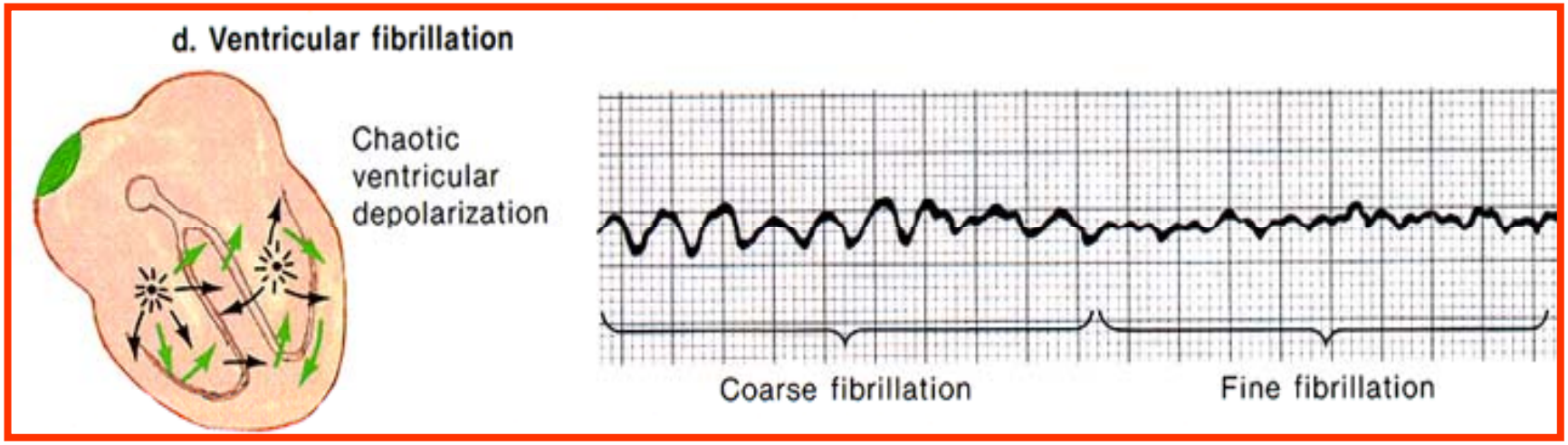
Ventricular Tachycardia (VT)



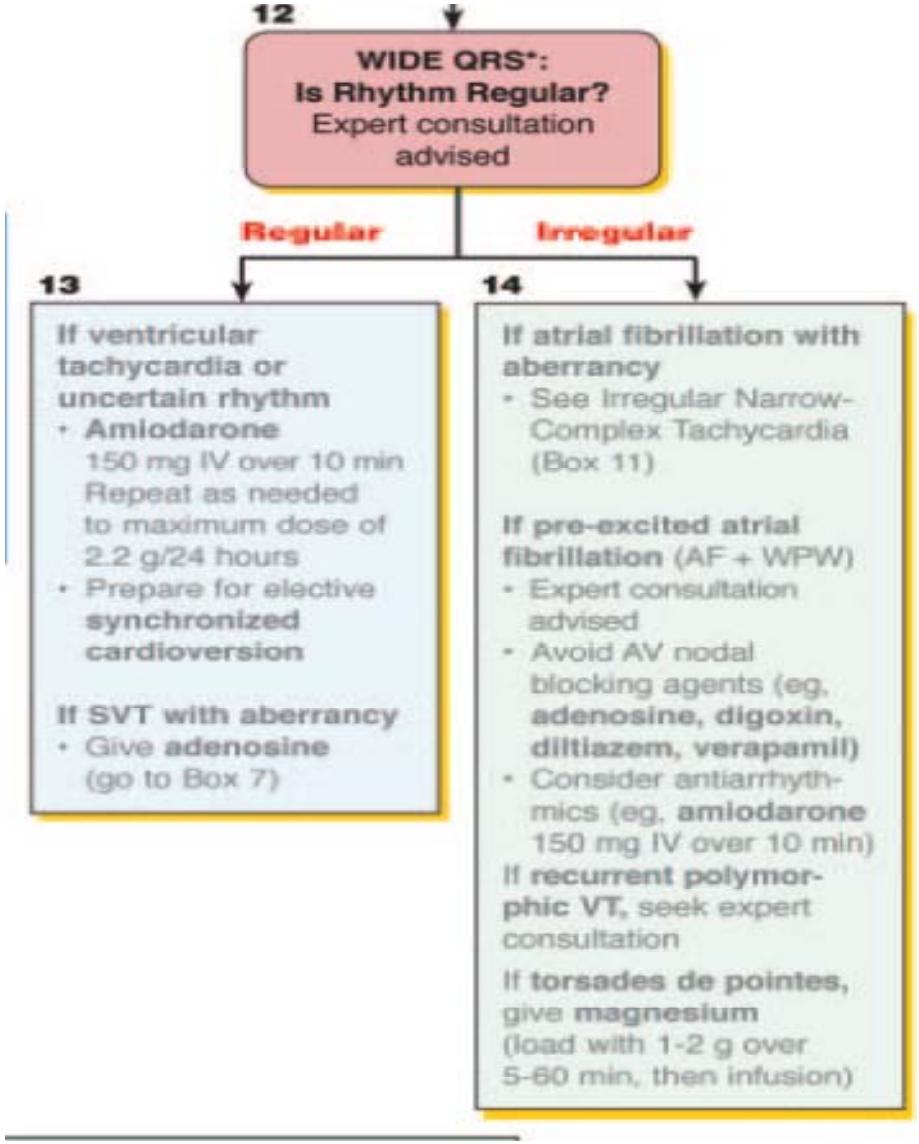
Polymorphic VT



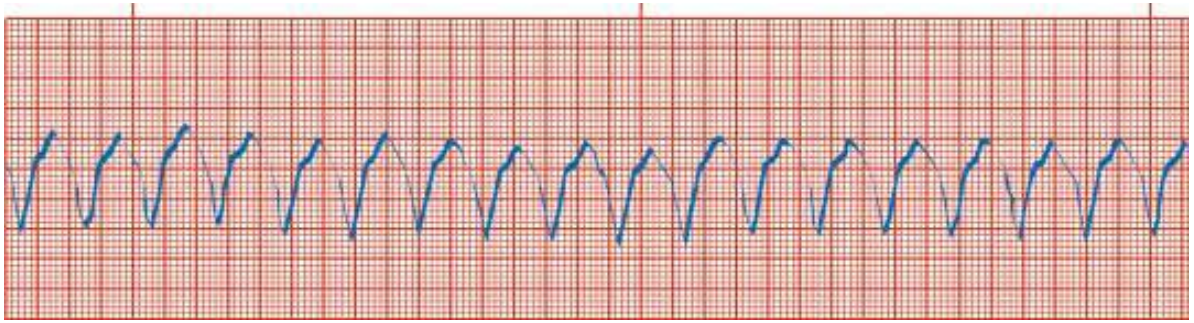
Ventricular Fibrillation (VF)



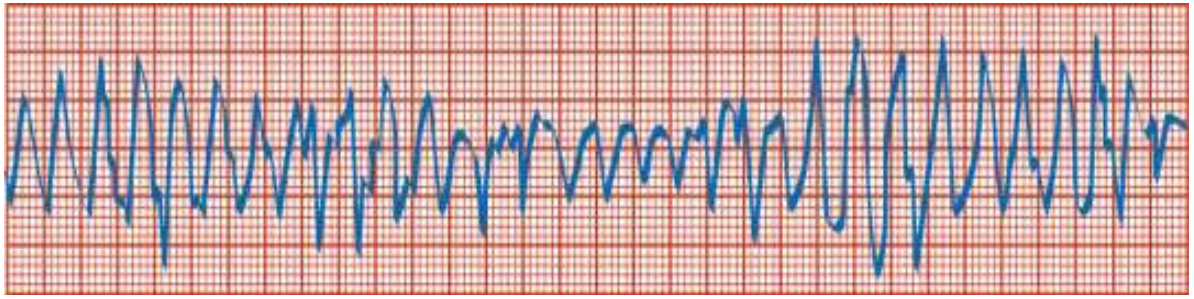
Wide Complex Tachycardia



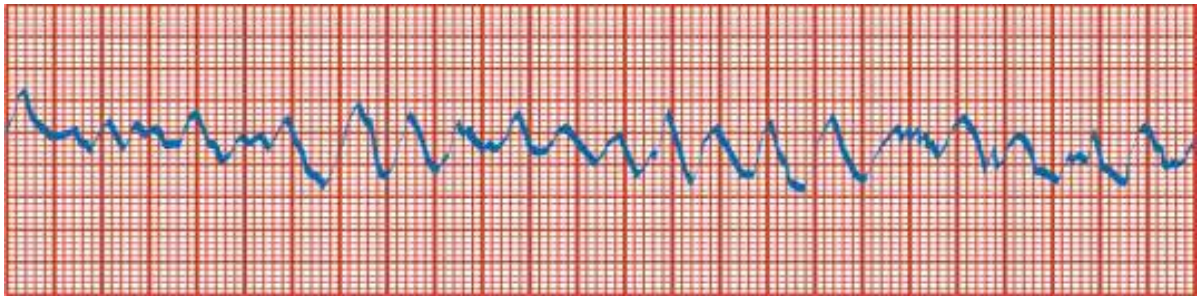
Defibrillation :Shockable Arrhythmia



VT : Ventricular Tachycardia (Monomorphic)



VT : Ventricular Tachycardia (Polymorphic)



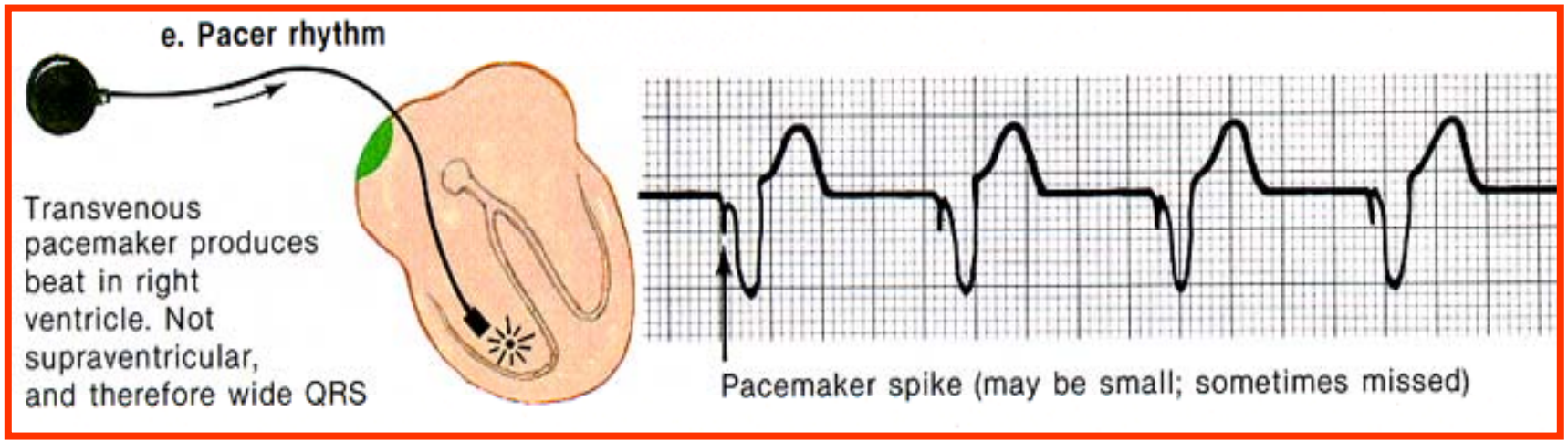
VF : Ventricular Fibrillation

Differential Diagnosis for Ventricular Rhythm

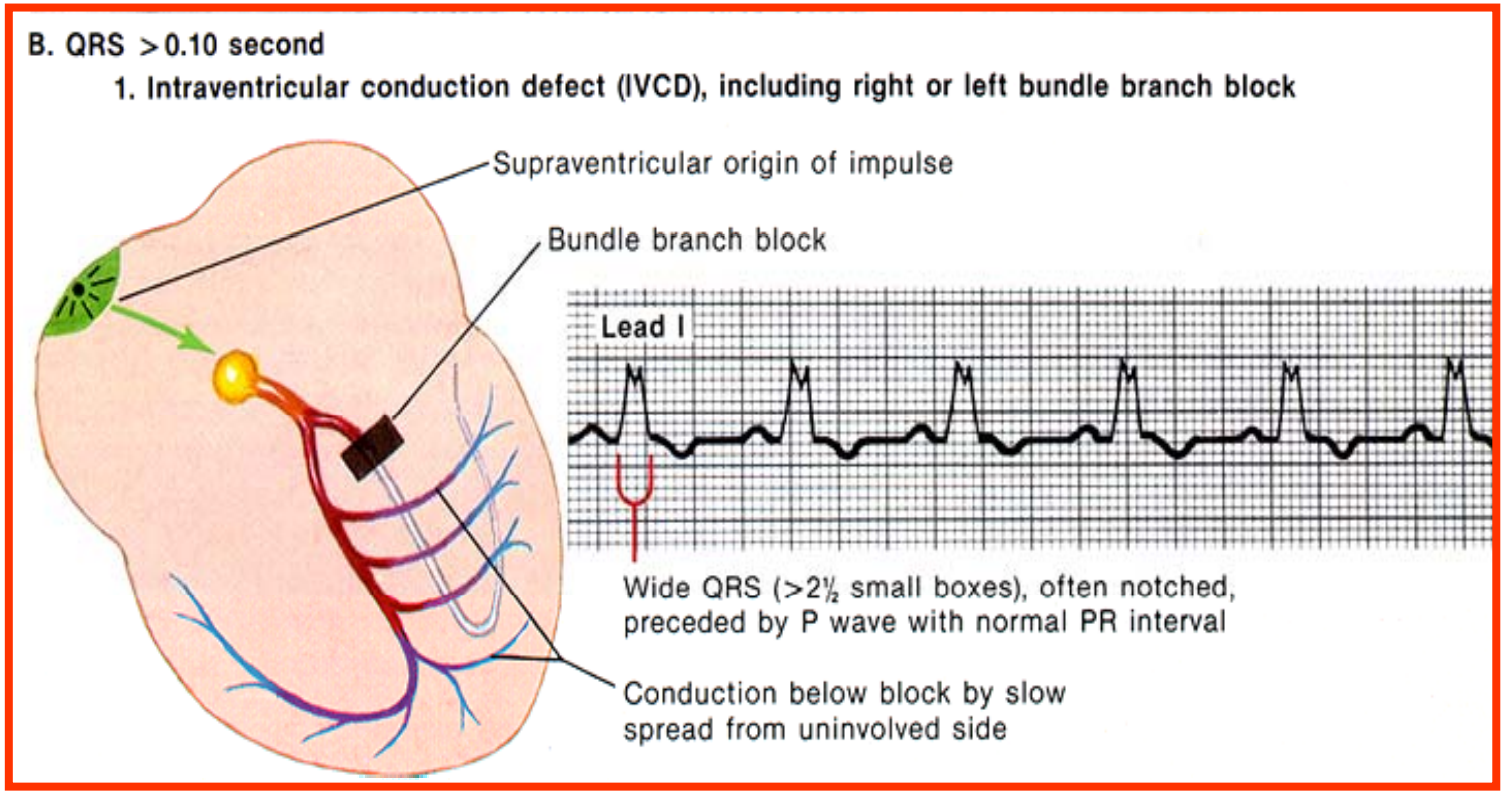
1. Pacemaker rhythm (ventricular pacing)
2. SVT/AF with aberrant conduction
3. SVT/AF with pre-existing bundle branch block
4. SVT/AF with pre-excitation (Wolf-Parkinson-White syndrome:WPW)

บางครั้ง ECG ในกรณี 2,3,4 อาจจะแยกจาก VT ได้ยากมากหรือแยกไม่ได้เลยจาก ECG เพียงอย่างเดียว ถ้าไม่แน่ใจโดยเฉพาะถ้าผู้ป่วยมี unstable wide complex tachycardia พิจารณารักษาเหมือน VT

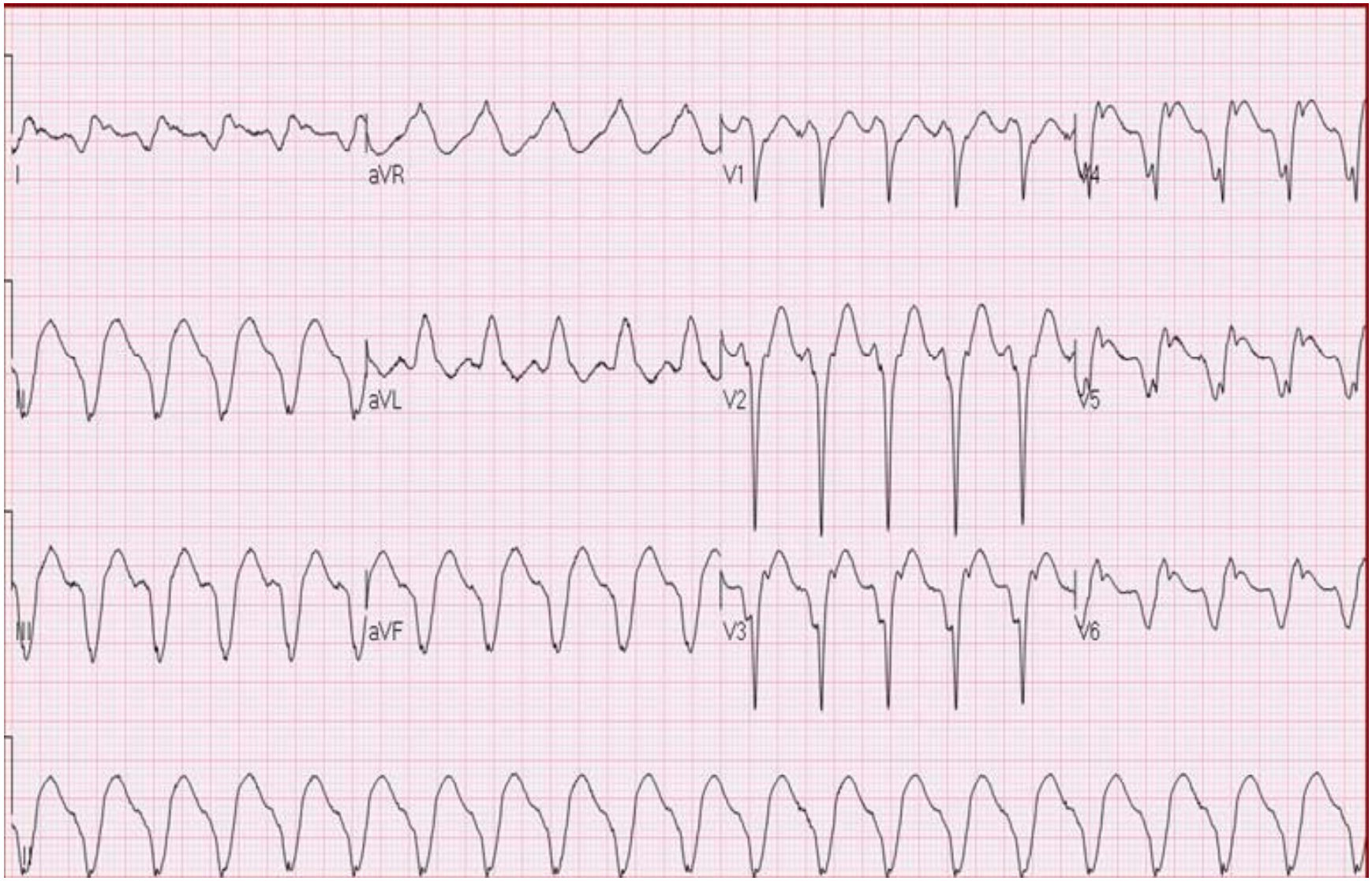
Ventricular Pacing Rhythm



Supraventricular Rhythm with

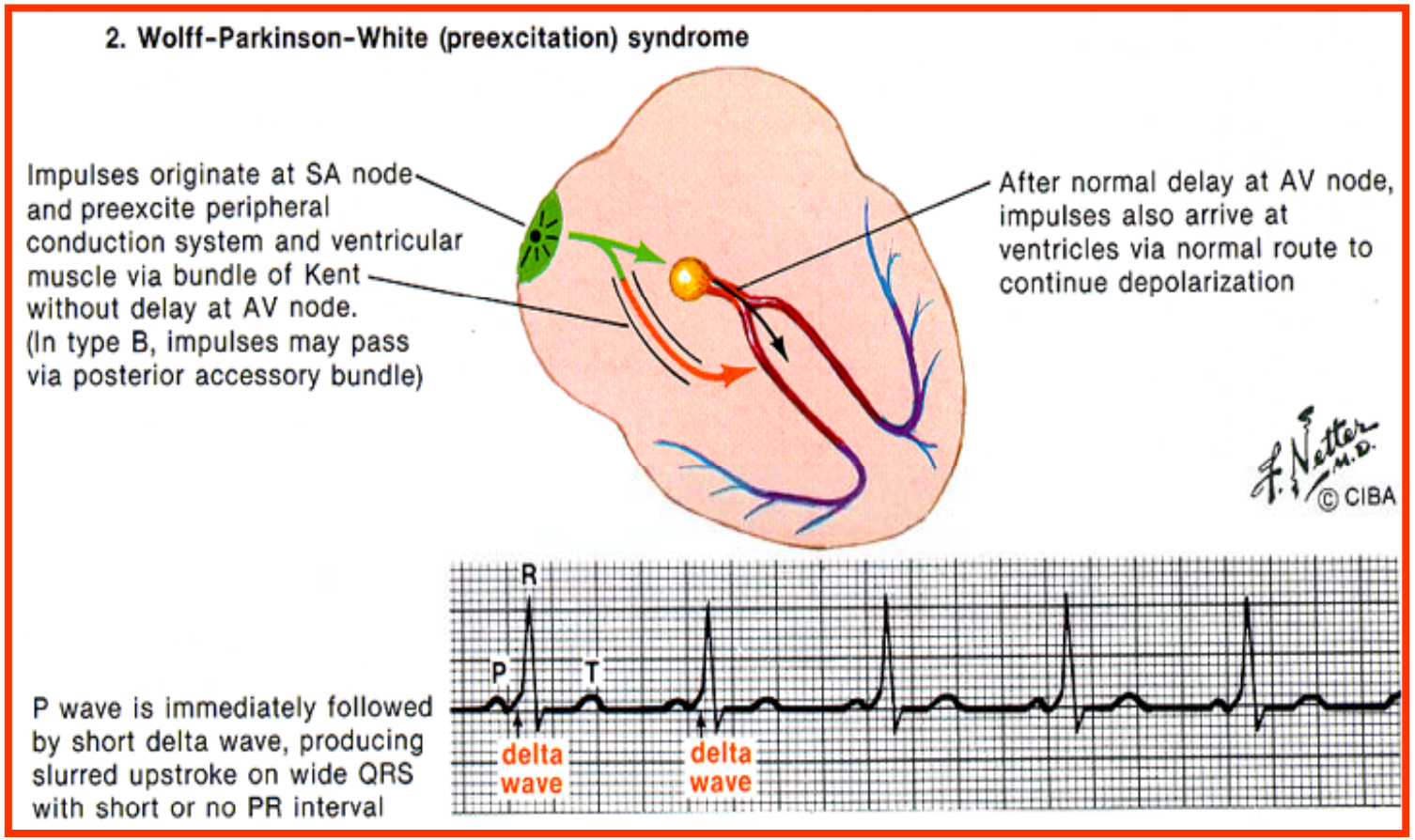


SVT with aberrant conduction

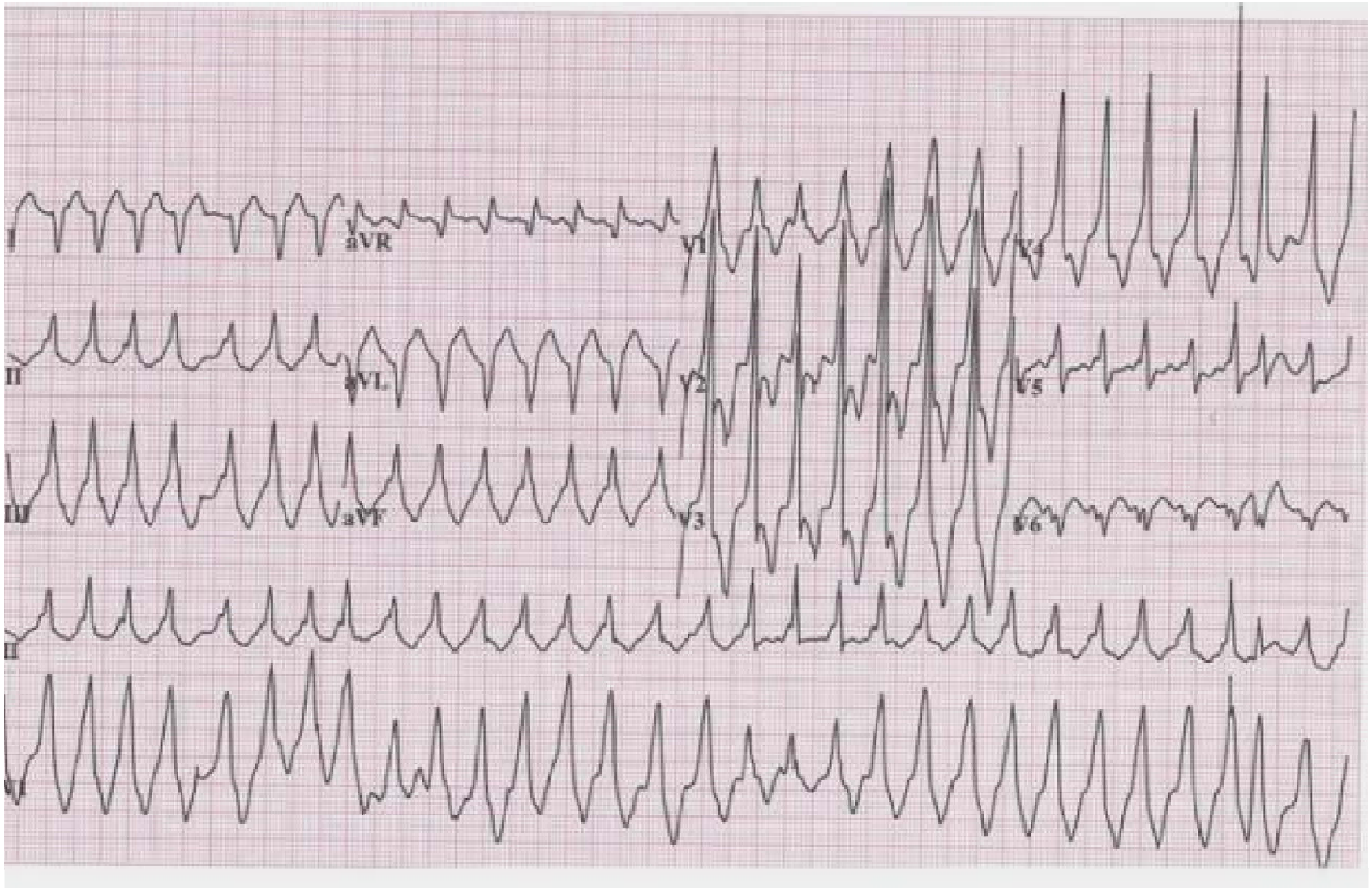


AF with pre-existing LBBB

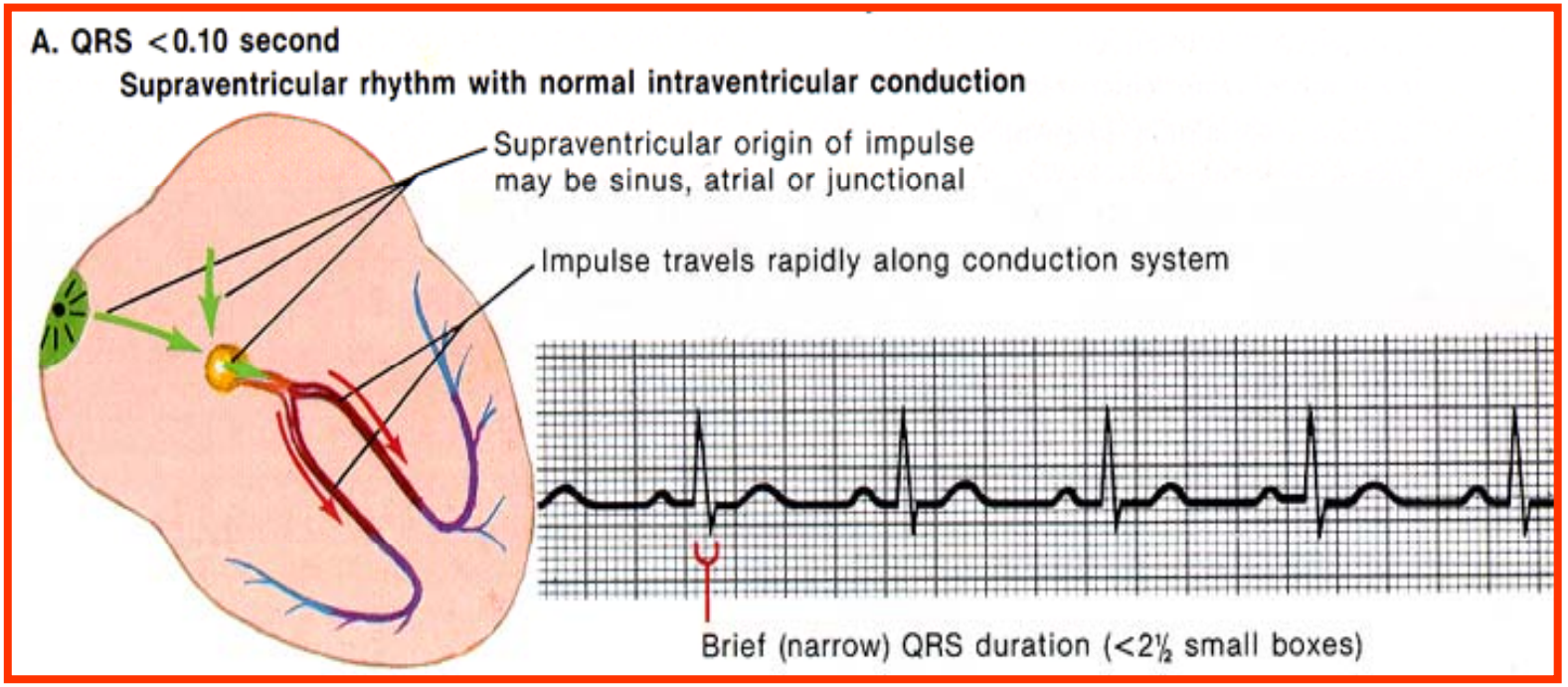
Supraventricular Rhythm with



AF with WPW



Supraventricular Rhythm with



Quick Approach to Rhythm

- Look for QRS
  - No QRS identified : Asystole, VF, connector problems
  - QRS identified → Identify heart rate
    - Normal resting heart rate: 60 – 100 bpm
    - Tachycardia: >100 bpm
    - Bradycardia: <60 bpm
  - Regular or irregular
    - Totally irregular → likely AF
  - Wide or narrow QRS complex
    - Wide QRS complex : Ventricular rhythm e.g. VT; pre-existing BBB or aberrant conduction; pre-excitation (WPW), pacemaker rhythm

Quick Approach to Rhythm

- Look for P wave and association of P wave to QRS (PR interval)
  - P wave : not identified
    - P wave hidden in T wave, QRS complex, small P wave
    - No P wave with flat line : sinus arrest, sinus block
    - No P wave with fibrillation/flutter wave: AF, A flutter
  - P wave: identified
    - Is it sinus P wave? – P wave + in II, III, aVF
      - Not sinus P wave : ectopic atrial rhythm (bradycadia or normal HR), atrial tachycardia (tachycardia)
    - Retrograde P wave?
      - Junctional rhythm, SVT, VT
    - Association of P wave to QRS -- > PR interval is consistent?
      - No association : AV Block Vs AV dissocitation
      - Some associtation but not consistent : 2nd degree AVB
      - Consistent association but long PR: 1st degree AVB