



# Recognition and Management of Cardiac Arrhythmias in the Hospitalized Patient

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# Disclosure

I have no relevant relationships with commercial interests to disclose



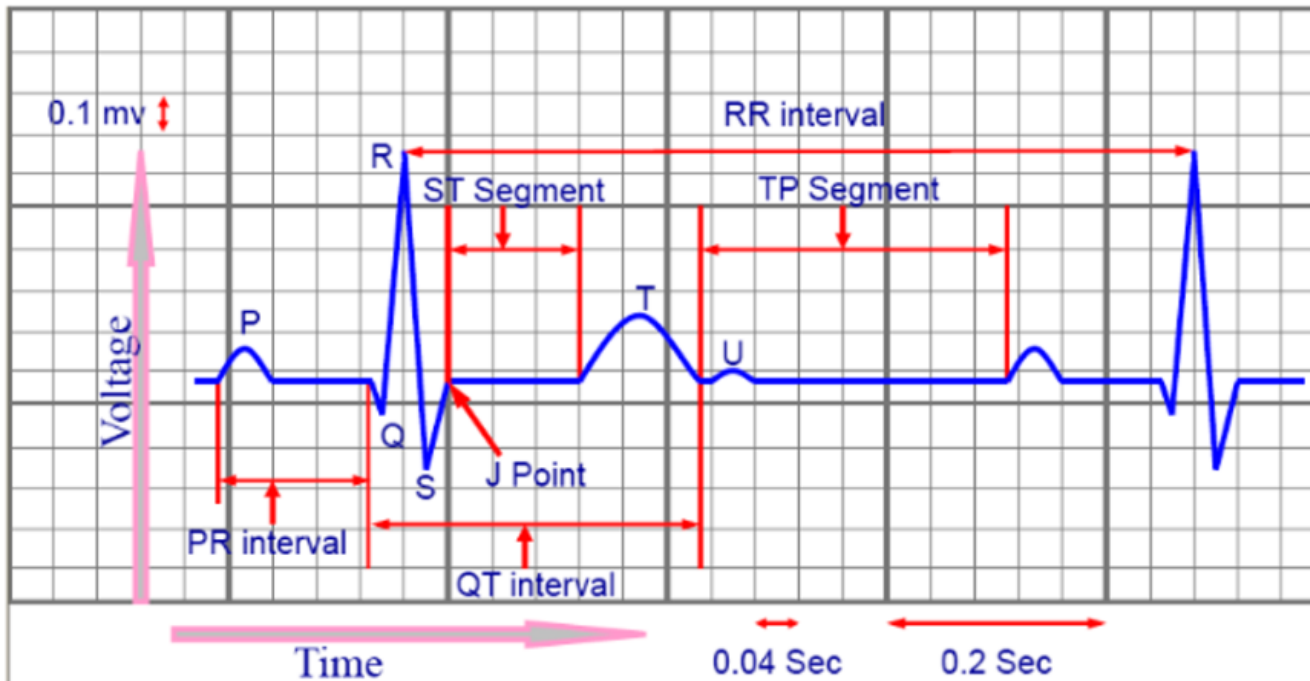
# Objective

Recognize and Treat the following:

- Atrial Fibrillation/Flutter
- SVT
- Ventricular Tachycardia
- Ventricular Fibrillation
- 2<sup>nd</sup> and 3<sup>rd</sup> degree heart block



# Basic EKG Review



- PR interval 0.12 – 0.20 sec
- QRS duration 0.08 – 0.10 sec

- QT interval 0.4 – 0.43 sec
- RR interval 0.6 – 1.0 sec



# Atrial Fibrillation: Diagnosis

- Irregular rate and rhythm with no “P” waves and variable R-R intervals



# Atrial Fibrillation: Classification

## Paroxysmal

- Intermittent < 7 days

## Persistent

- > 7 days

## Long-standing

- > 1 year

## Permanent

- Accepted



# Atrial Fibrillation: Symptoms

## Stable

- May range from no symptoms to palpitations

## Unstable

- Dizziness, syncope, CP(Angina) and/or HF s/s



# Atrial Fibrillation: Treatment

- Stable vs Unstable
  - Underlying medical conditions
- CHADS2VASc
  - \*note that CHADS2VASc score should only be used for non-valvular A.fib/A.flutter.





# Treatment/Anticoagulation

<b>CHA<sub>2</sub>DS<sub>2</sub>-VASc</b>	<b>Point</b>
<b>Congestive Heart Failure</b>	<b>1</b>
<b>Hypertension</b>	<b>1</b>
<b>Age ≥75 years</b>	<b>2</b>
<b>Diabetes mellitus</b>	<b>1</b>
<b>Prior stroke/TIA/Thromboembolism</b>	<b>2</b>
<b>Vascular disease</b>	<b>1</b>
<b>Age 65-74 years</b>	<b>1</b>
<b>Female</b>	<b>1</b>
	<b>Max score of 9</b>

# Treatment/Anticoagulation

CHA <sub>2</sub> DS <sub>2</sub> -VASc score	Adjusted stroke rate (% per year)
0	0%
1	1.3%
2	2.2%
3	3.2%
4	4.0%
5	6.7%
6	9.8%
7	9.6%
8	6.7%
9	15.2%



# Treatment/Anticoagulation

CHA <sub>2</sub> DS <sub>2</sub> -VASc score	Gender	Anticoagulation Recommendation
0	Male	No anticoagulation recommended
1	Male	Anticoagulation considered
≥ 2	Male	Anticoagulation recommended
0-1	Female	No anticoagulation recommended
2	Female	Anticoagulation considered
≥ 3	Female	Anticoagulation recommended

# Treatment/Anticoagulation

Contraindications of DOAC use in A. fib:

- Mechanical Aortic or Mitral valve replacement
- Known strong thrombophilias (eg. APS, AT deficiency, Protein C or S deficiency)
- Moderate to severe mitral stenosis or significant rheumatic heart disease
- Child-Pugh C Classification for cirrhotic patients
  - Can consider Apixaban in Child Pugh A&B classification and Rivaroxaban for Child-Pugh A classification
- Rivaroxaban in the setting of hemodialysis and CrCl <15ml/min
  - Note it should be dose adjusted in CrCl 15-50ml/min



# Treatment/Anticoagulation

Contraindications of DOAC use in A. fib cont...

- Drug-Drug interactions (combined P-gp and strong CYP3A4 inhibitors) such as carbamazepine, azoles, rifampin, HIV protease inhibitors
- Caution use in patients with bariatric surgery
- Any active bleeding
- Hypersensitivity to the medication
- Relative Contraindications: triple therapy or use with newer P2Y12i (eg. Ticag +DOAC or prasugrel +DOAC) and GI cancer



# Atrial Fibrillation: Treatment

## If Unstable

- Anticoagulation with Heparin/Lovenox
- Cardioversion (TEE prior if able to r/o LA appendage thrombus)
  - Ideally patient should be anticoagulated with DOAC or Warfarin with therapeutic INR (2-3) 3 weeks prior and 4 weeks post cardioversion



# Atrial Fibrillation: Treatment

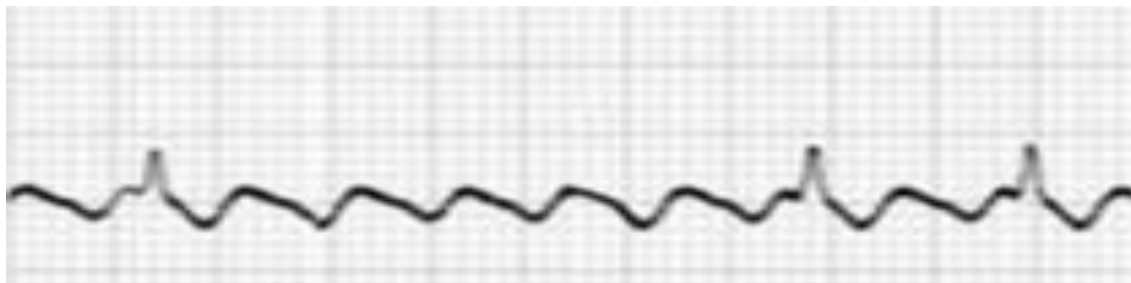
## If Stable

- Anticoagulation per CHADS2VASc score
- If EF>40% and no HF
  - Rate control: Diltiazem (contraindicated with HF or EF<40%), BB, digoxin or Amiodarone (can cause chemical cardioversion)
  - Rhythm Control: Ablation vs Cardioversion with TEE prior



# Atrial Flutter: Diagnosis

- Rapid, regular or variable “Saw toothed” atrial activity with narrow ventricular complexes





# Aflutter: Treatment

- Essentially same as Afib
  - Anticoagulate based off of CHADS2VASc score
  - Rhythm vs Rate management



# Supraventricular Tachycardia: Diagnosis

- Regular, Narrow tachycardia with 1:1 A/V relationship



# SVT: Symptoms

## Stable

- May range from no symptoms to palpitations

## Unstable

- Dizziness, syncope, CP(Angina) and/or HF s/s



# SVT: Treatment

## Stable

- Vagal maneuvers
- Adenosine IV 6mg → 12mg → 12mg

## Unstable

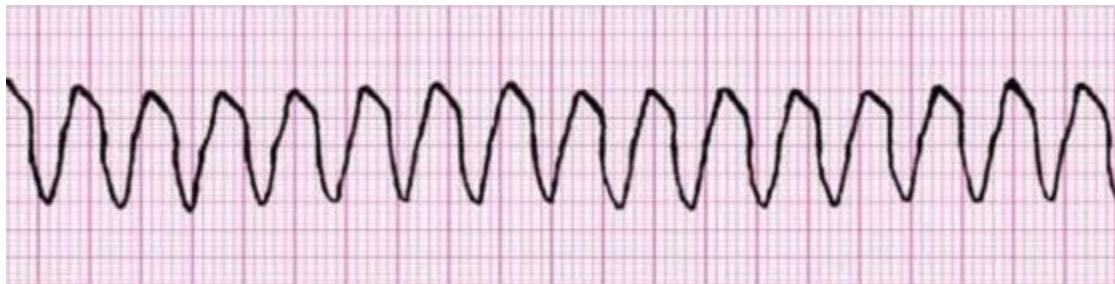
- Synchronized Cardioversion



# Ventricular Tachycardia: Diagnosis

QRS complexes  $>0.12$  sec at rate  $>100$ bpm

Monomorphic: same QRS complexes



# VT: Diagnosis

- Polymorphic: Varied shaped QRS complexes (Torsades de pointes)



# Ventricular Tachycardia: Diagnosis

## Sustained vs. Non-sustained VT

- Sustained  $>30$  secs
- Non-sustained  $< 30$ secs



# VT: Treatment

## Stable:

- Non-sustained/Sustained
- Asymptomatic

Reversible causes: Electrolytes, Ischemia, medications (QT prolongation) and Toxins





# VT: Treatment

## Stable

- Medications: Beta Blockers or Amiodarone
- Consider Synchronized Cardioversion
- Consider ischemic evaluation



# VT: Treatment

- Unstable
  - Non-sustained/Sustained
  - Symptomatic: Hemodynamically unstable, CP HF s/s
- Immediate Defibrillation (ACLS)
- Reversible causes: Ischemia, Electrolytes, medications (QT prolongation) and Toxins
- Will likely need coronary angiogram once stable



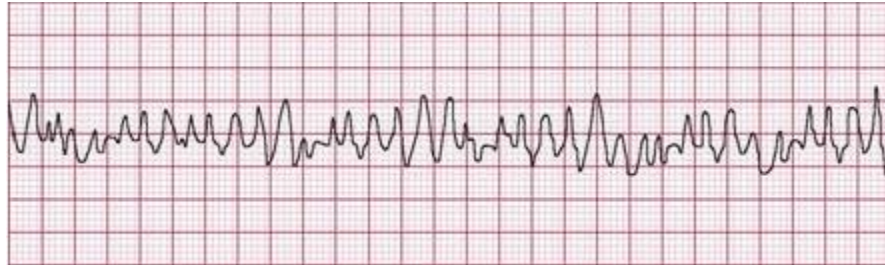
# VT: Treatment

- Torsades de pointes (usually 2/2 QT prolongation)
- Reversible causes
- IV Magnesium
- Defibrillation
- ACLS



# Ventricular Fibrillation: Diagnosis

- Chaotic irregular rhythm with no discernable QRS complexes



# Ventricular Fibrillation: Treatment

- Immediate Defibrillation
- ACLS
- If patient survives, will likely need Coronary Angiogram and ICD



# 2<sup>nd</sup> degree HB Mobitz type I: Diagnosis

- Mobitz type I (Wenckebach)
  - Gradually prolonged PR interval with each QRS complex with an eventual drop of a QRS complex



# 2<sup>nd</sup> degree HB (Mobitz type I: Symptoms

- Usually asymptomatic



## 2<sup>nd</sup> degree HB (Mobitz type I): Treatment

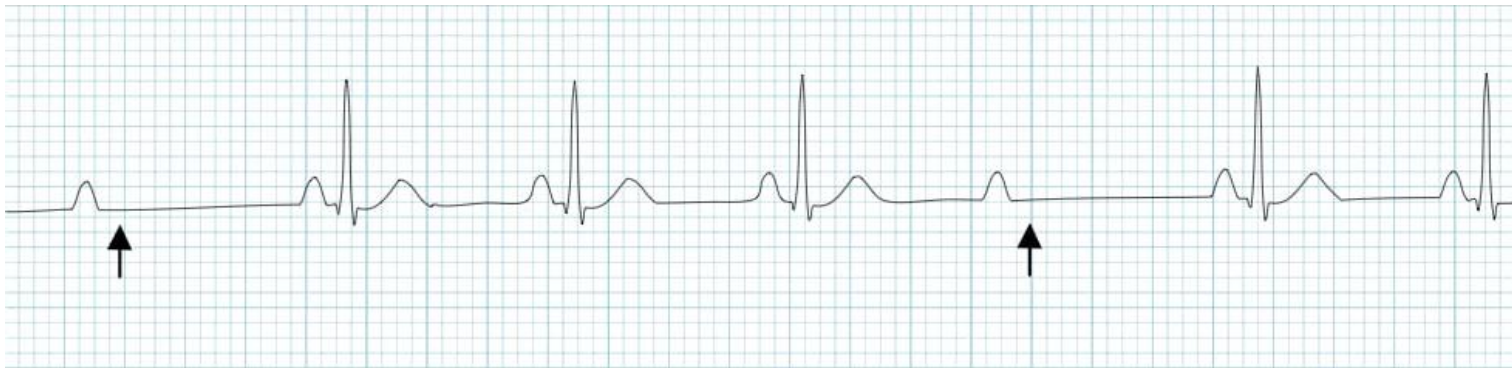
- Usually benign with no treatment required
- Look for reversible causes
- Stop AV Nodal blocking medications
- Can consider Atropine





# 2<sup>nd</sup> degree HB Mobitz Type II: Diagnosis

- Mobitz type II
  - Sudden intermittent loss of QRS complex without a gradual lengthening of the PR interval



# 2<sup>nd</sup> degree HB: Symptoms

- May be asymptomatic
- Dizziness
- Syncope
- Fatigue



# 2<sup>nd</sup> degree HB (Mobitz type II): Treatment

Assess for reversible causes

- Discontinue all AV blocking medications
- Consider Medical Therapy
- Place pacemaker pads
- Consider temporary venous pacemaker (TVP)
- Consider permanent pacemaker (PPM)



# 3<sup>rd</sup> Degree HB: Diagnosis

Complete HB with no P wave or QRS association.



# 3<sup>rd</sup> Degree HB: Symptoms

- Dizziness
- Syncope
- Fatigue



# 3rd Degree HB: Treatment

- Assess for reversible causes
- Discontinue all AV blocking medications
- Place pacemaker pads
- Consider temporary venous pacemaker (TVP)
- Consider permanent pacemaker (PPM)





# Case Study I

# Case Study

A 52-year-old man is evaluated in the emergency department for palpitations that developed abruptly 30 minutes ago. He has no significant medical history and takes no medications.

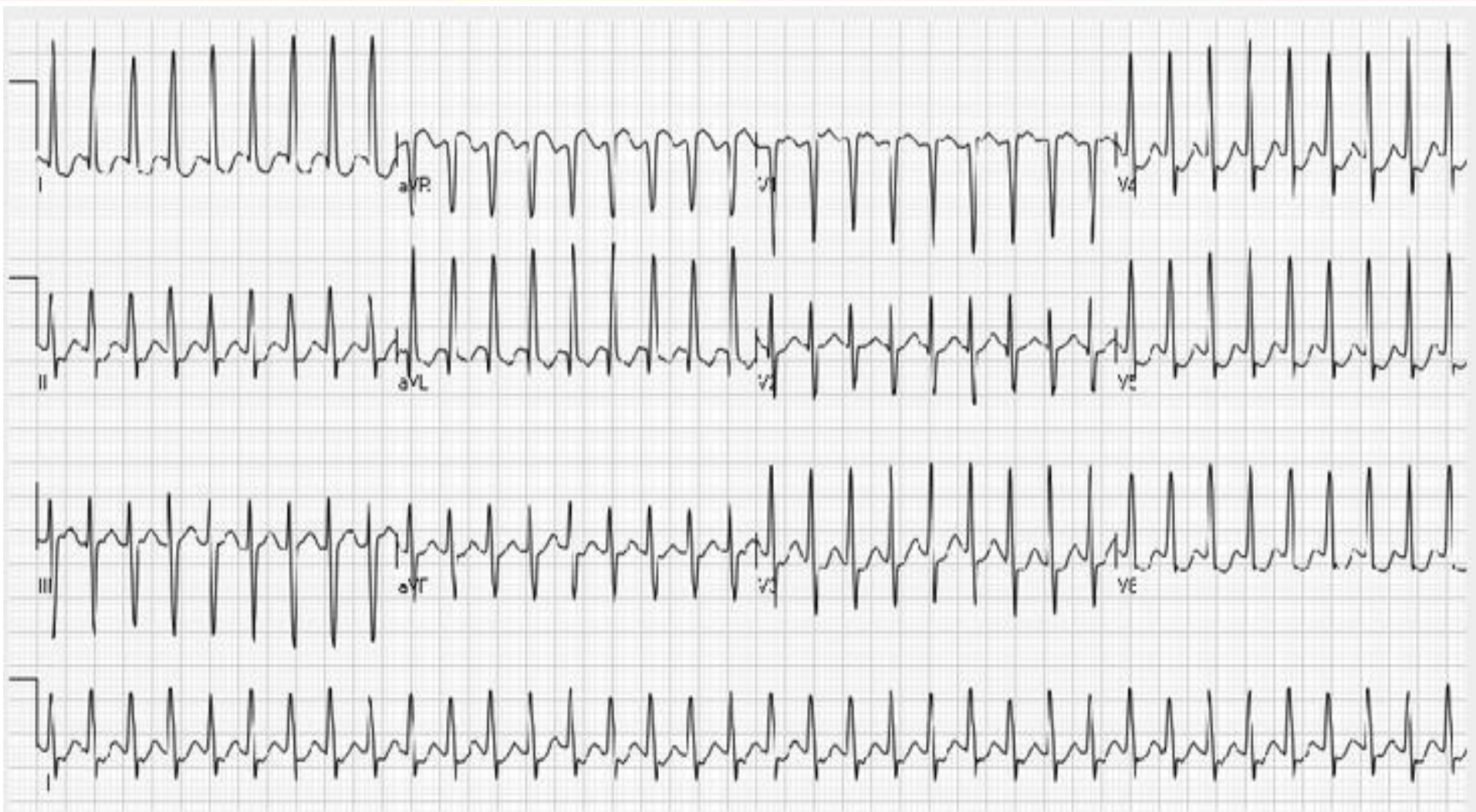
On physical examination, blood pressure is 110/48 mm Hg, and pulse rate is 216/min; other vital signs are normal. Cardiac examination reveals a rapid and regular heart rate. The  $S_1$  does not exhibit variable intensity. The rhythm does not change with a Valsalva maneuver.

A 12-lead electrocardiogram obtained in the emergency department is shown:





# Case Study



# Case Study

What is the rhythm?

- A) Sinus Tachycardia
- B) Atrial Fibrillation
- C) SVT
- D) Atrial Flutter



# Case Study

A) Sinus Tachycardia

B) Atrial Fibrillation

**C) SVT**

D) Atrial Flutter



# Case Study

Which of the following is the most appropriate next step in treatment?

- A. Adenosine
- B. Amiodarone
- C. Metoprolol
- D. Synchronized cardioversion



# Case Study

Which of the following is the most appropriate next step in treatment?

**A. Adenosine**

B. Amiodarone

C. Metoprolol

D. Synchronized cardioversion



# Case Study

A 68-year-old woman is evaluated in the emergency department for a 1-hour history of chest pain. Medical history is significant for hypertension and a 20-year history of type 2 diabetes mellitus. Medications are metformin, quinapril, and aspirin.

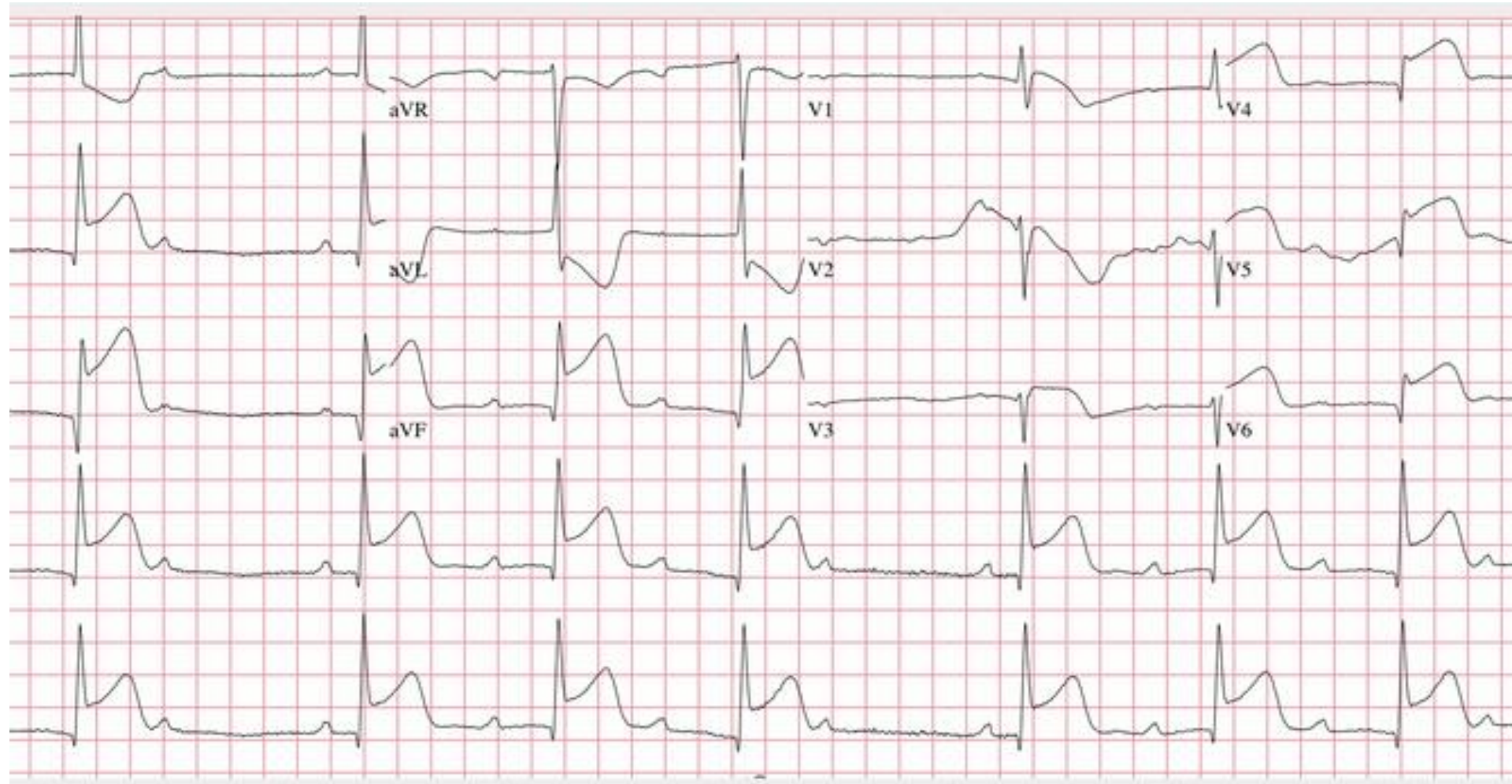
On physical examination, blood pressure is 95/60 mm Hg, pulse rate is 50/min, and respiration rate is 16/min. The patient is alert and conversant. The precordial cadence is not regular. There is no evidence of pulmonary or peripheral congestion, and the extremities are warm.

Laboratory studies reveal a serum troponin T level of 1.1 ng/mL (1.1  $\mu\text{g/L}$ ).

An electrocardiogram is shown.



# Case Study



# Case Study

Which of the following is the most appropriate next step in management of this patient's arrhythmia?

- A. Cardiac catheterization
- B. Echocardiography
- C. Permanent pacemaker implantation
- D. Temporary pacing





# Case Study

Which of the following is the most appropriate next step in management of this patient's arrhythmia?

- A. Cardiac catheterization
- B. Echocardiography
- C. Permanent pacemaker implantation
- D. Temporary pacing

AV block in the setting of ACS (STEMI). Always first fix reversible causes!!



# Case Study

76 year old male with pmhx of DM, HTN and sleep apnea who presents with 5 day history of fatigue and palpitations.

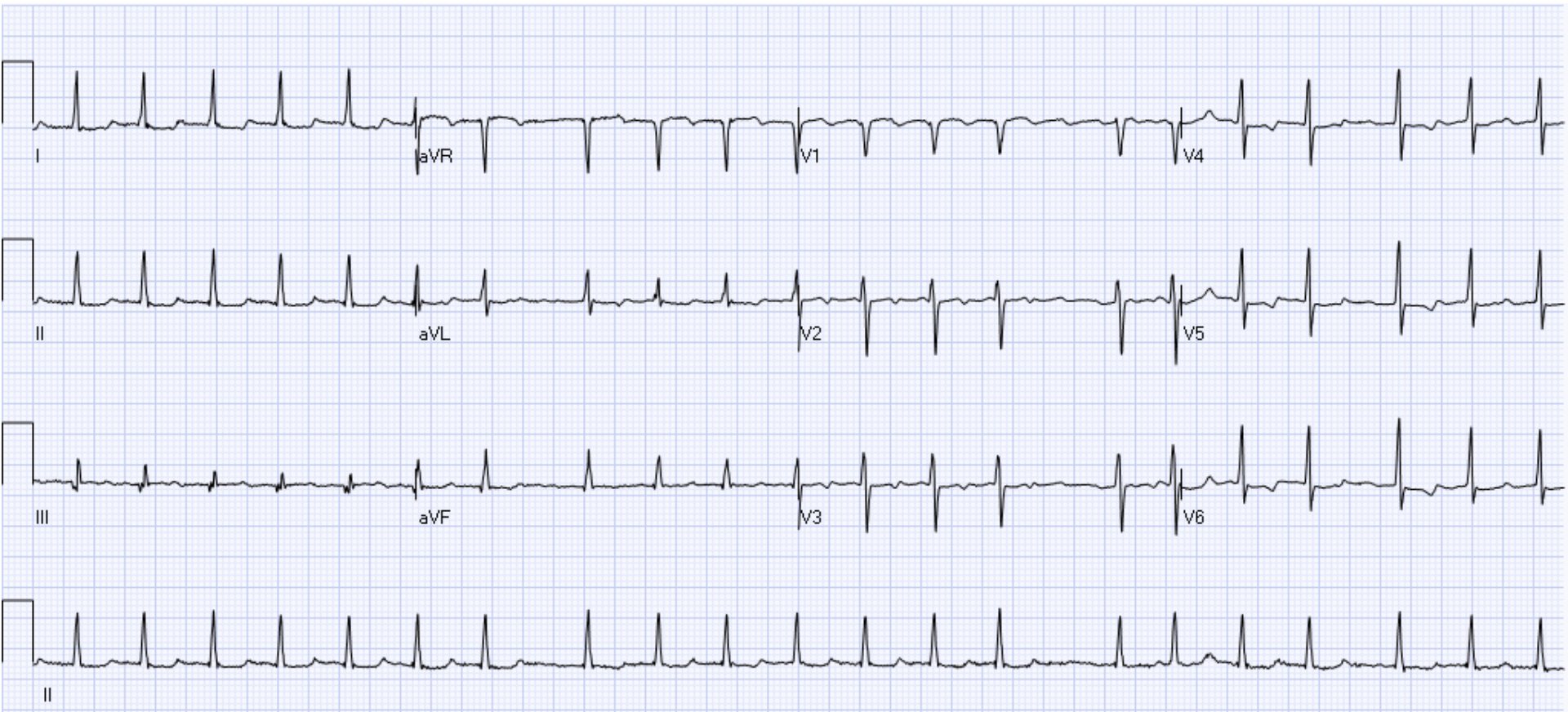
Electrolytes and renal function WNL

Echocardiogram shows EF 55% with no WMA and noted severe mitral valve stenosis

EKG done shows the following:



# Case Study



# Case Study

What is the rhythm?

- A) Sinus Tachycardia
- B) Atrial Fibrillation
- C) SVT
- D) Atrial Flutter



# Case Study

A) Sinus Tachycardia

**B) Atrial Fibrillation**

C) SVT

D) Atrial Flutter



# Case Study

What anticoagulation is most appropriate at this time?

- A. ASA
- B. Warfarin
- C. Apixaban
- D. Lovenox



# Case Study

What anticoagulation is most appropriate at this time?

A. ASA

**B. Warfarin**

C. Apixaban

D. Lovenox



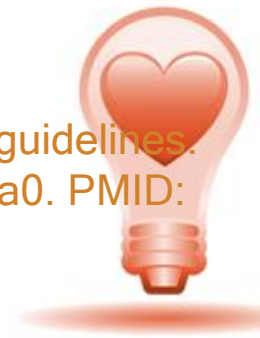


**THANK YOU!**



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