

Arrhythmias in the ICU Setting

Case Study

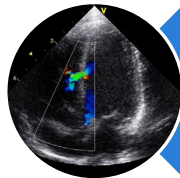
- 32 year old female, severe mitral stenosis, NYHA class III , 28 week-pregnant, transferred from Bemidji!
- Shortness of breath, hypoxemic, pneumonia, intubated on MV with sedation
- Rhythm is irregular with tachycardia and SBP in the 90's



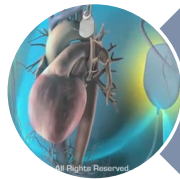
What is the best intervention?



Amiodarone 150 mg then infusion



Echocardiography



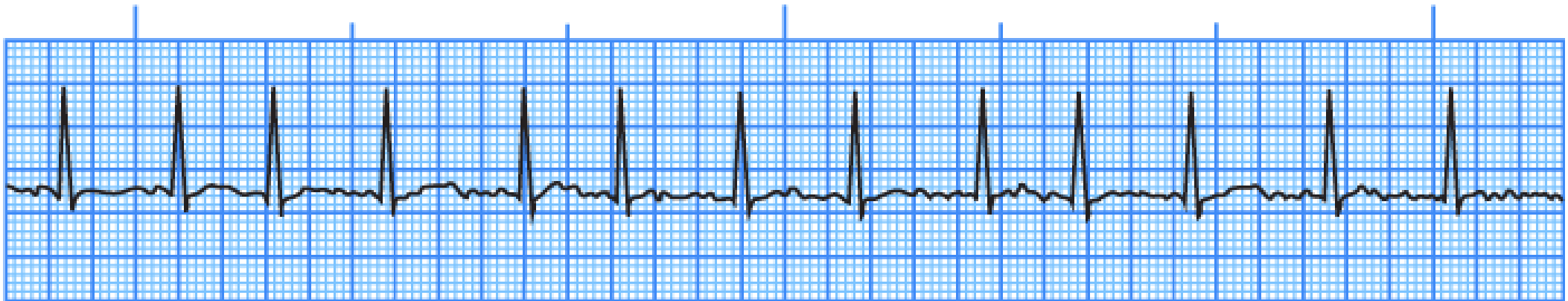
Electrical cardioversion



Beta blockers

Case Study

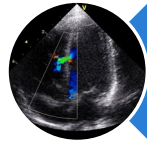
- 62 year old male with PMH of HTN and DM.
- Admitted with sepsis and septic shock secondary to urinary tract infection
- Intubated and on mechanical ventilation requiring norepinephrine at 0.5 mcg/kg/min
- Developed irregular rhythm with tachycardia and SBP in the 90's



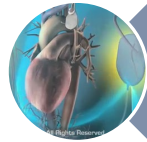
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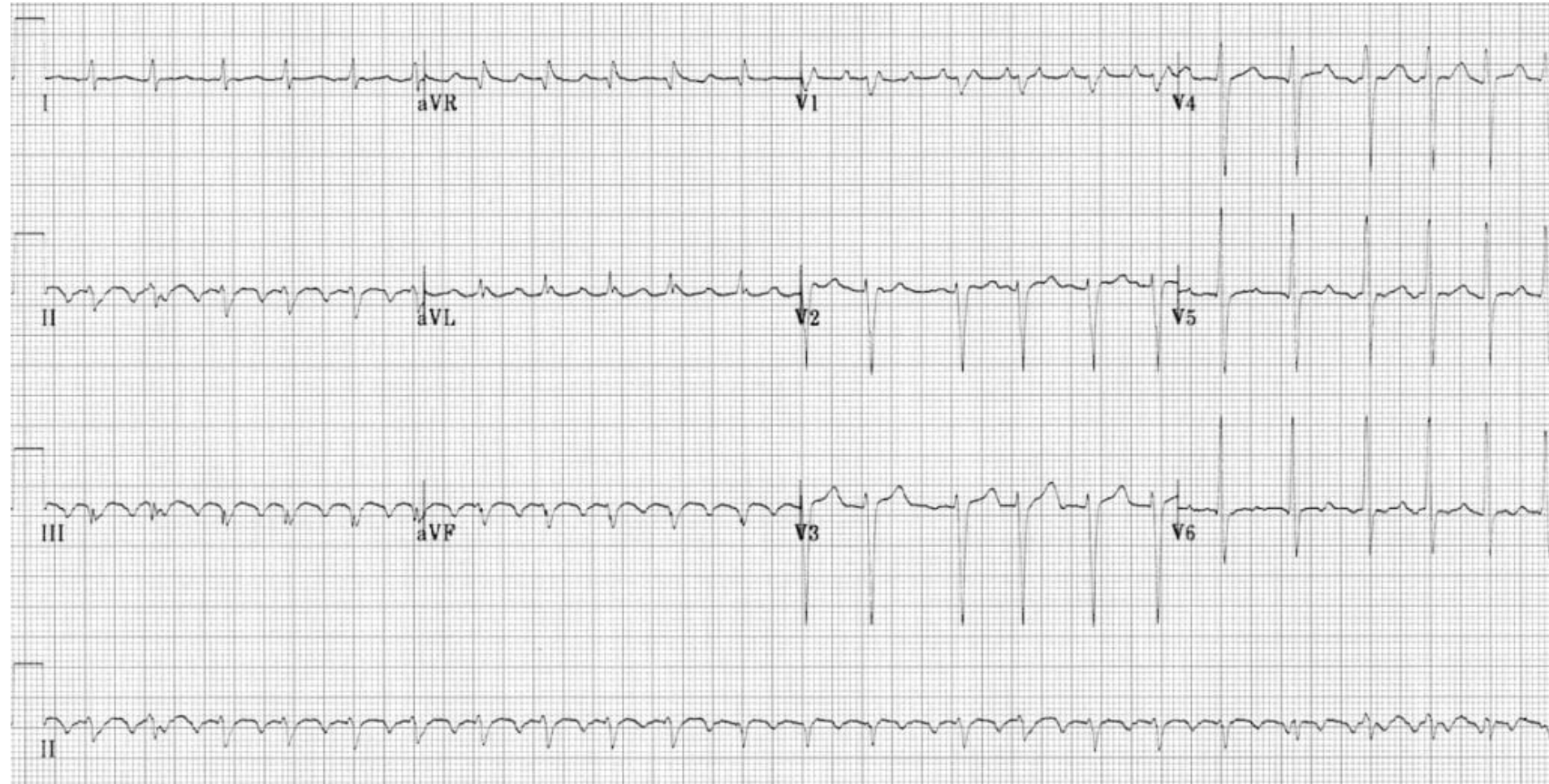
Beta blockers



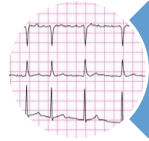
Add vasopressin and decrease norepinephrine



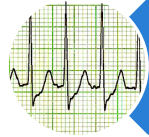
Case Study



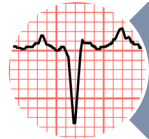
What is the rhythm?



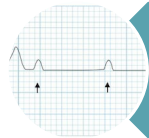
Atrial fibrillation



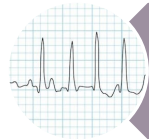
Supraventricular tachycardia



Atrial Flutter



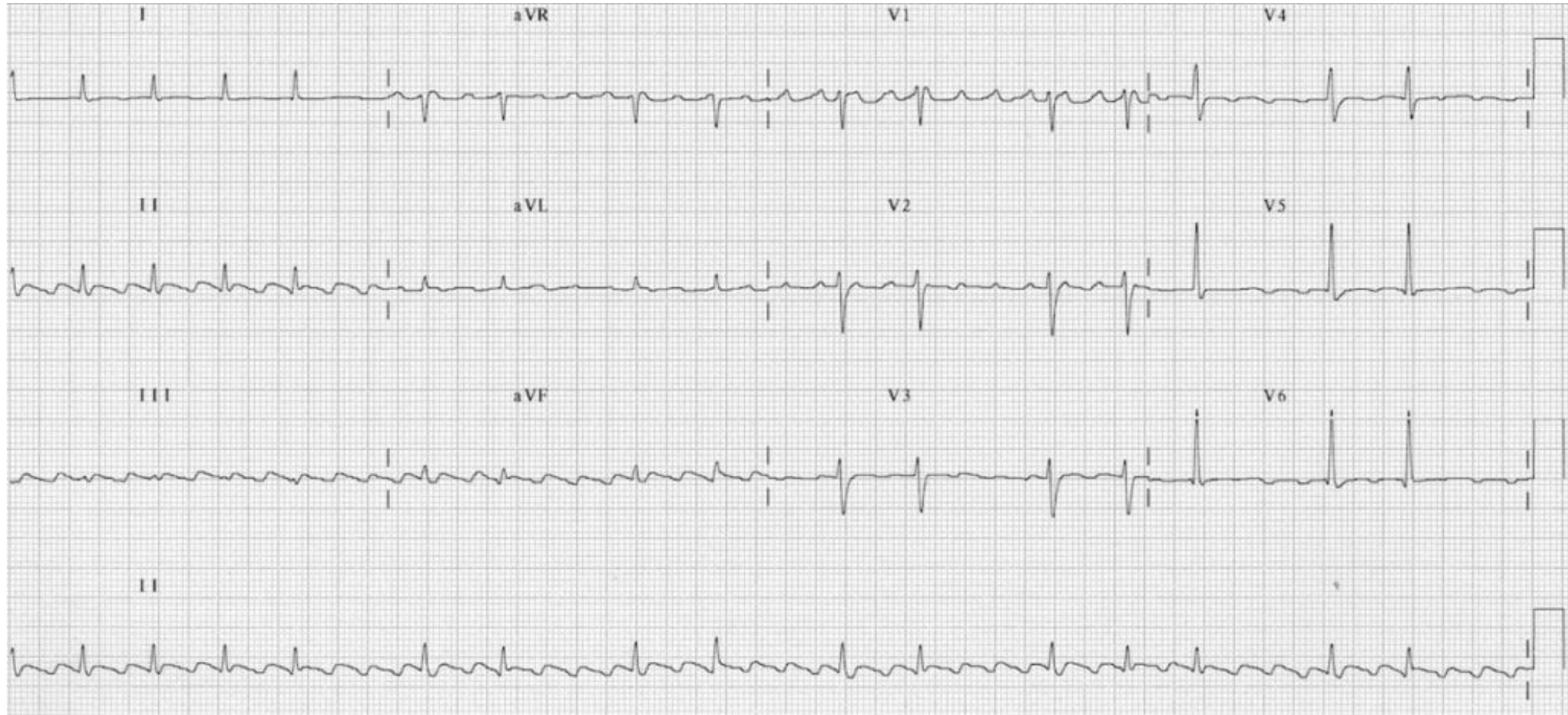
Complete AV block



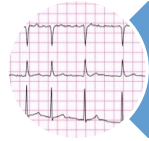
Multifocal Atrial Tachycardia



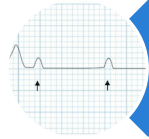
Case Study



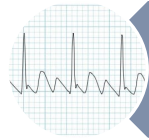
What is the rhythm?



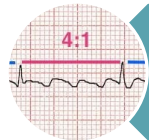
Atrial fibrillation



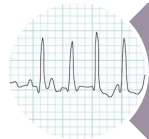
Complete AV block



Atrial Flutter with 2:1 AV block



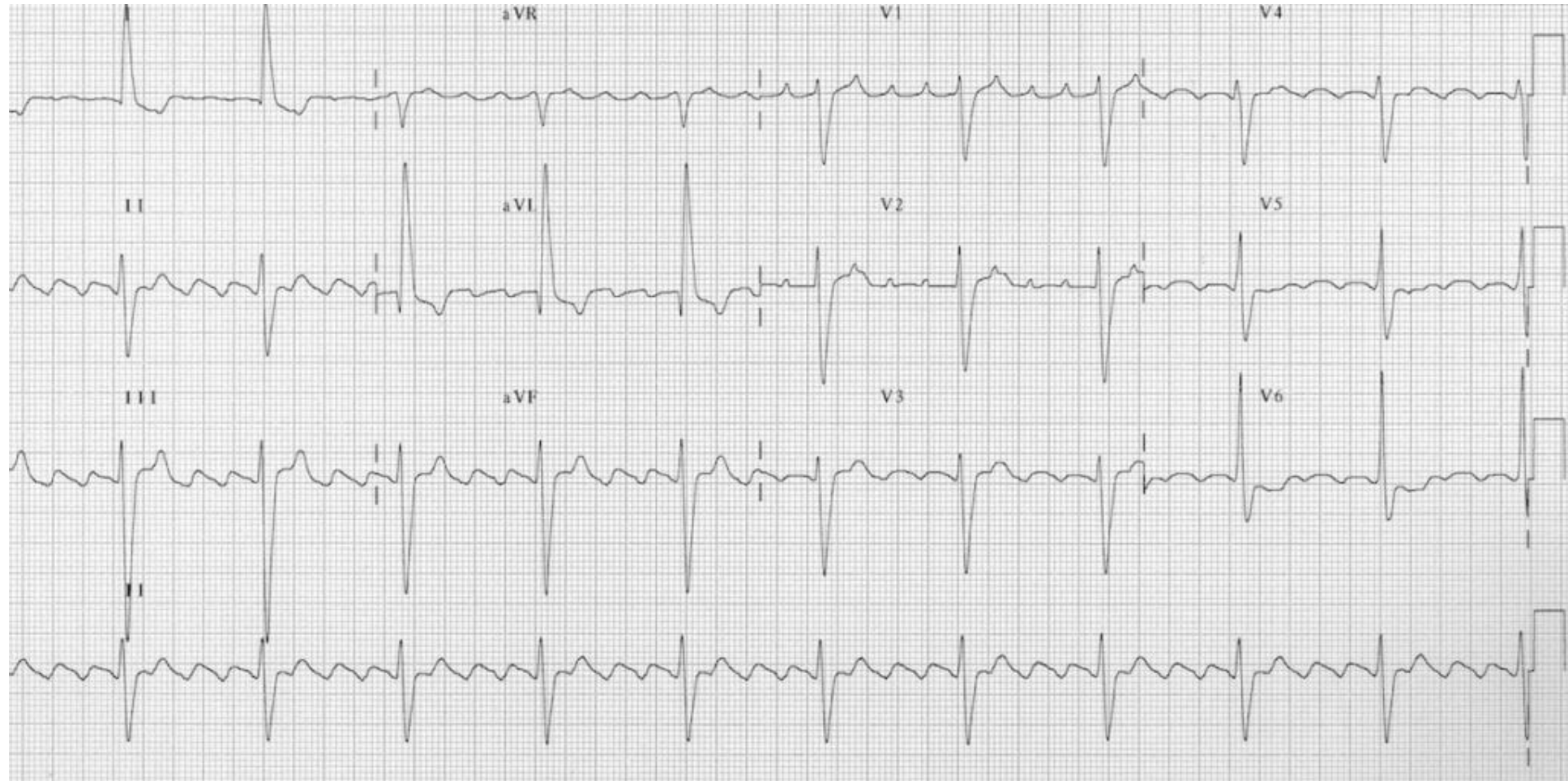
Atrial Flutter with variable AV block



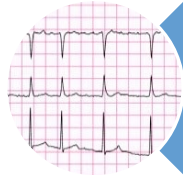
Multifocal Atrial Tachycardia



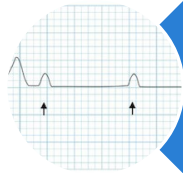
Case Study



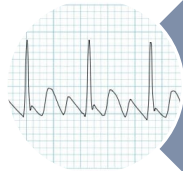
What is the rhythm?



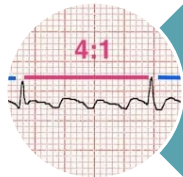
Atrial fibrillation



Complete AV block



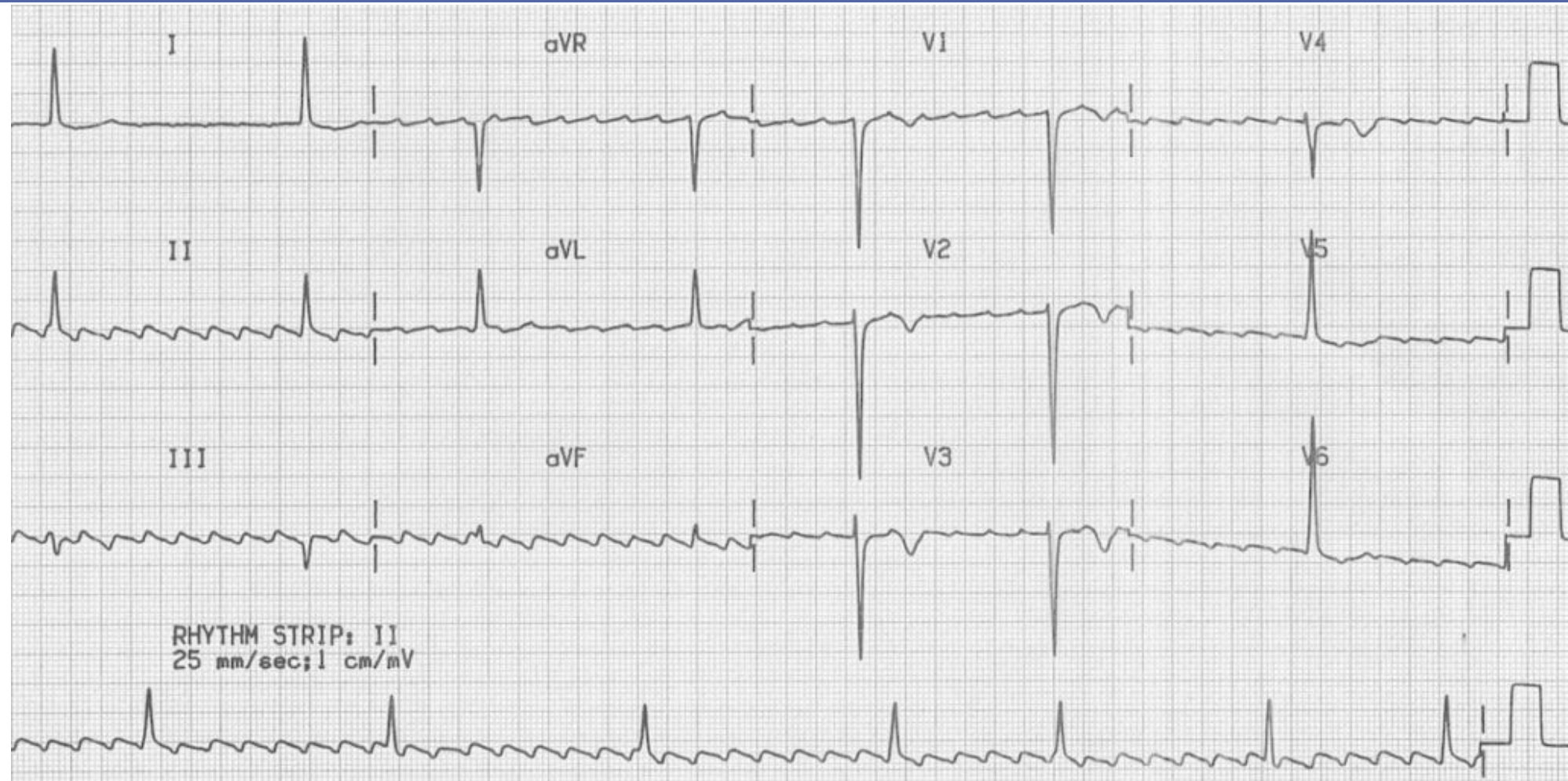
Atrial Flutter with 3:1 block



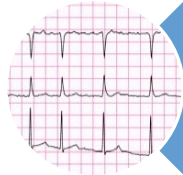
Atrial Flutter with 4:1 block



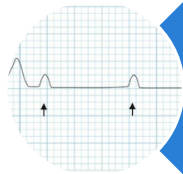
Case Study



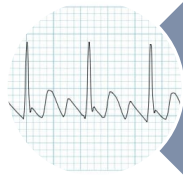
What is the rhythm?



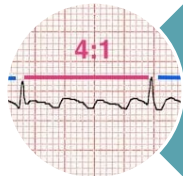
Atrial fibrillation



Complete AV block



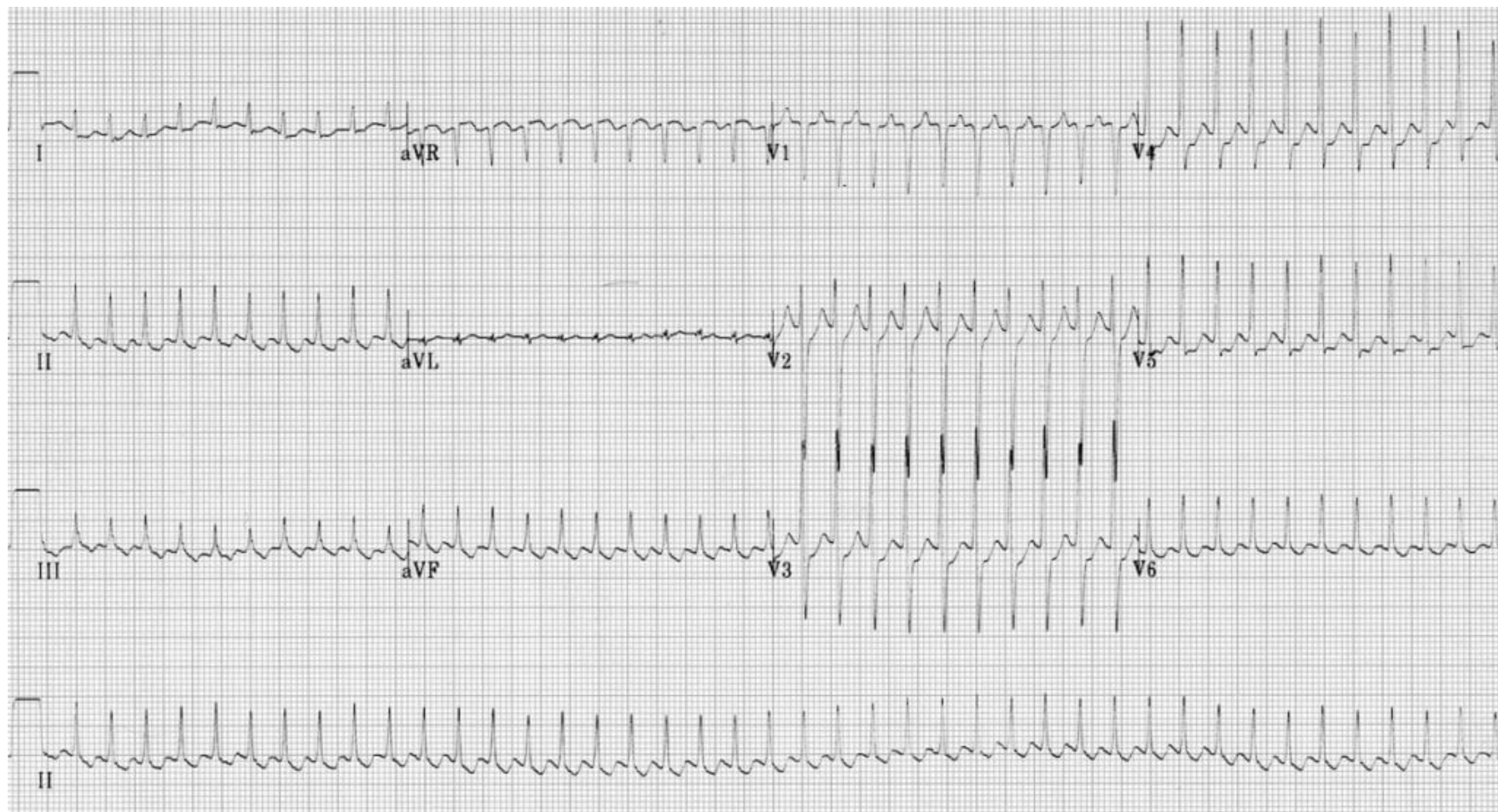
Atrial Flutter with high degree AV block



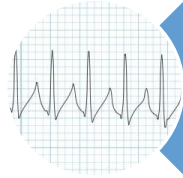
Atrial Flutter with 4:1 block



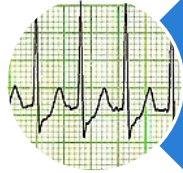
Case Study



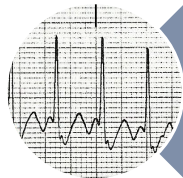
What one is not?



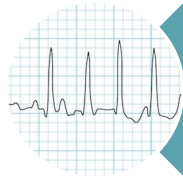
Narrow-complex Tachycardia



Supraventricular Tachycardia (AVNRT)



Atrial Flutter with 1:1 Conduction



Multifocal Atrial Tachycardia

Atrial Fibrillation in the ICU



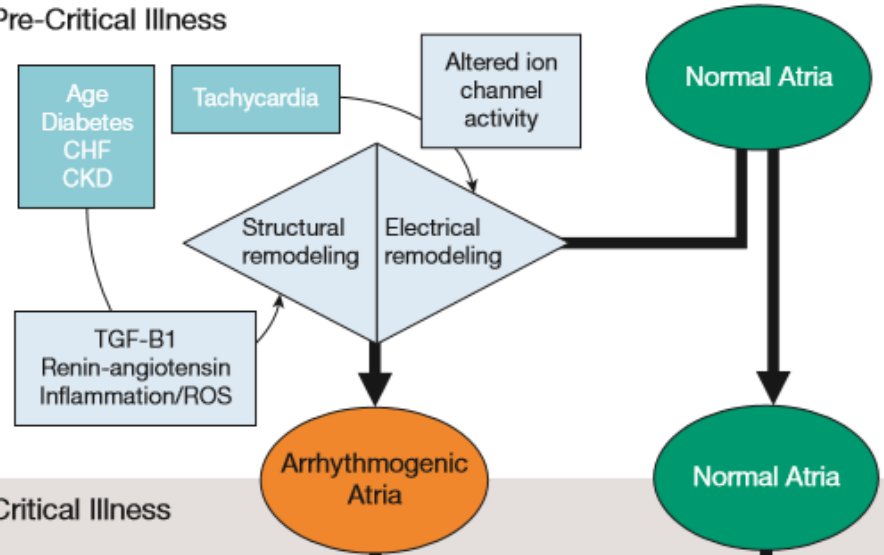
Nicholas A. Bosch, MD; Jonathan Cimini, BS; and Allan J. Walkey, MD

Atrial fibrillation (AF) is the most common arrhythmia encountered in the ICU. Preexisting AF is highly prevalent among older patients with chronic conditions who are at risk for critical illness, whereas new-onset AF can be triggered by accelerated atrial remodeling and arrhythmogenic triggers encountered during critical illness. The acute loss of atrial systole and onset of rapid ventricular rates that characterize new-onset AF often lead to decreased cardiac output and hemodynamic compromise. Thus, new-onset AF is both a marker of disease severity as well as a likely contributor to poor outcomes, similar to other manifestations of organ dysfunction during critical illness. Evaluating immediate hemodynamic effects of new-onset AF during critical illness is an important component of rapid clinical assessment aimed at identifying patients in need of urgent direct current cardioversion, treatment of reversible inciting factors, and identification of patients who may benefit from pharmacologic rate or rhythm control. In addition to acute hemodynamic effects, new-onset AF during critical illness is associated with both short- and long-term increases in the risk of stroke, heart failure, and death, with AF recurrence rates of approximately 50% within 1 year following hospital discharge. In the absence of a strong evidence base, there is substantial practice variation in the choice of strategies for management of new-onset AF during critical illness. We describe acute and long-term evaluation and management strategies based on current evidence and propose future avenues of investigation to fill large knowledge gaps in the management of patients with AF during critical illness.

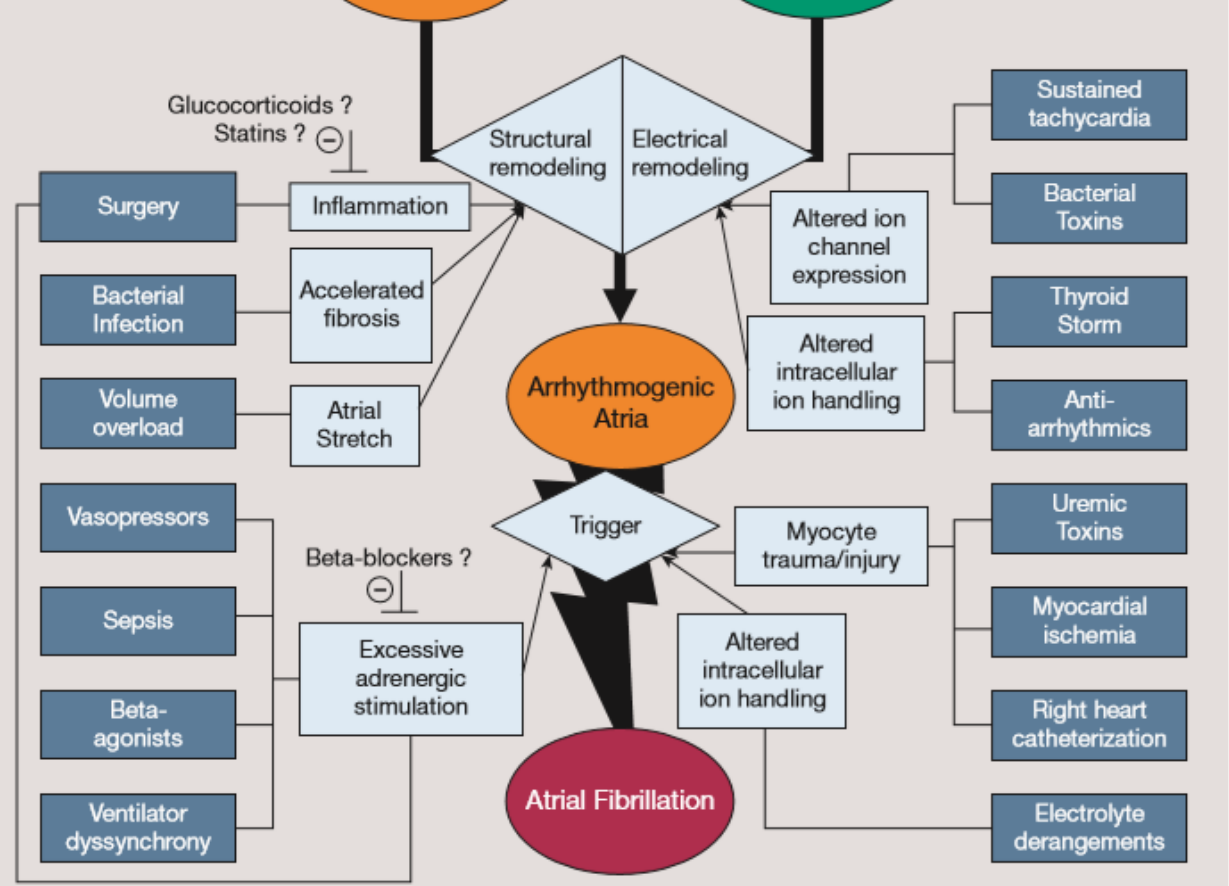
CHEST 2018; 154(6):1424-1434

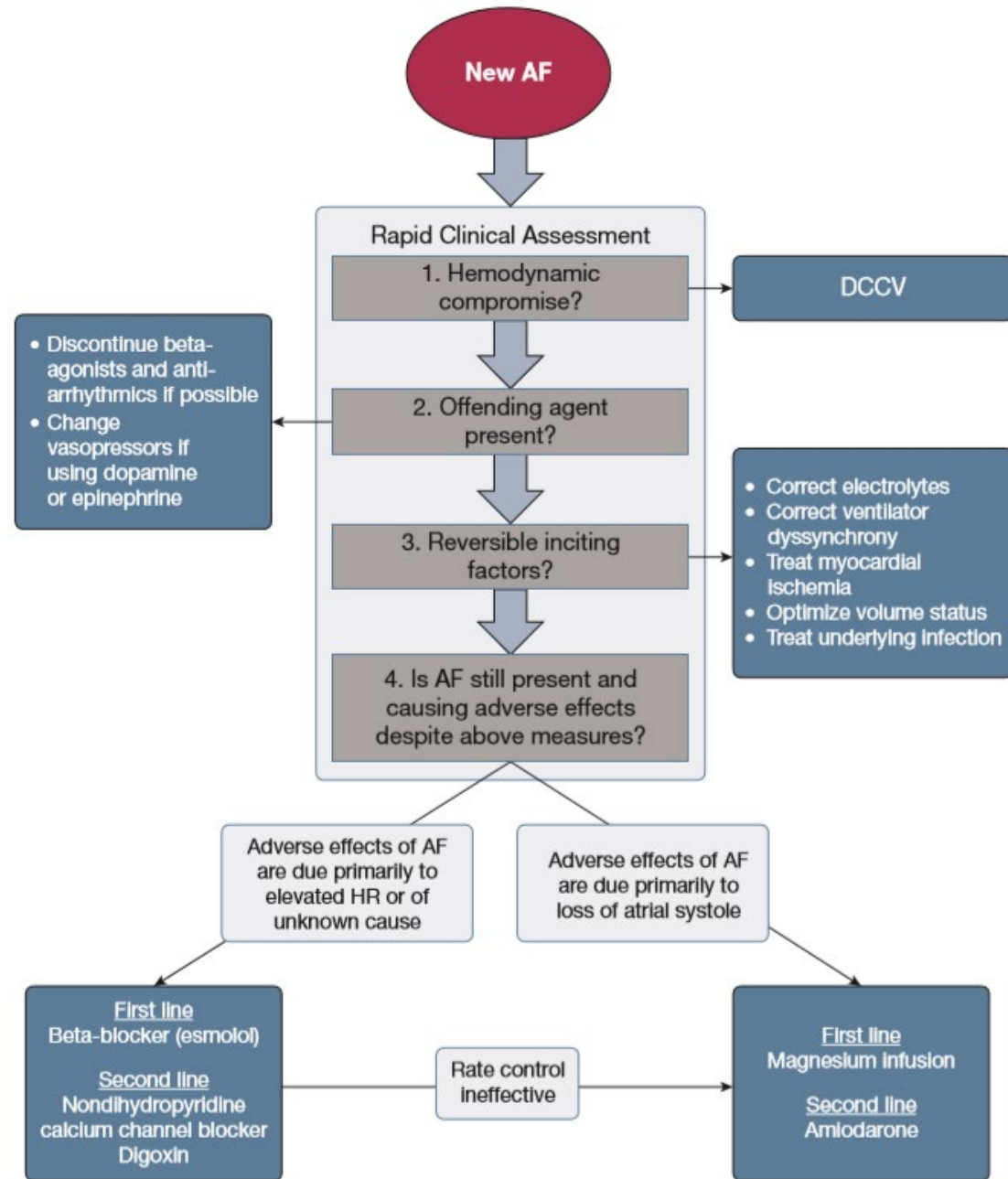
KEY WORDS: atrial fibrillation; critical illness; sepsis

Pre-Critical Illness

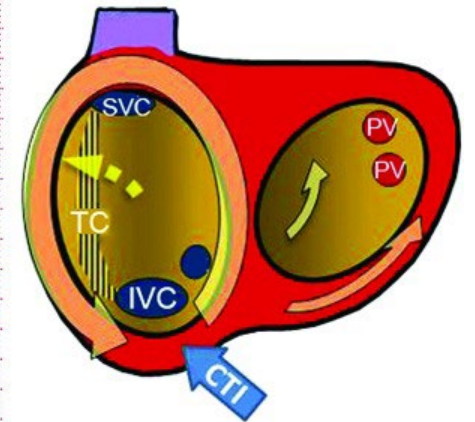
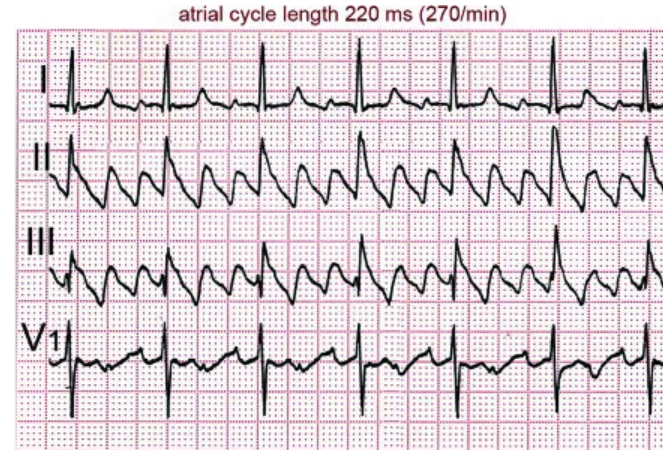
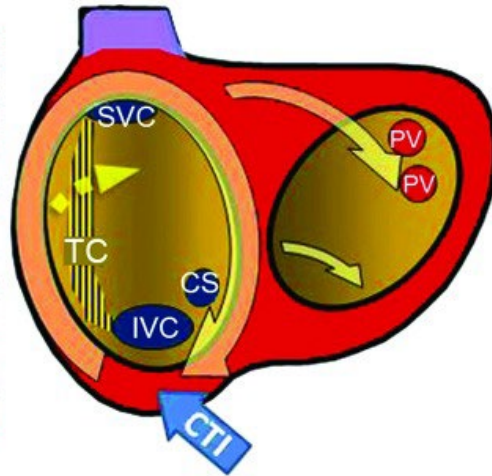
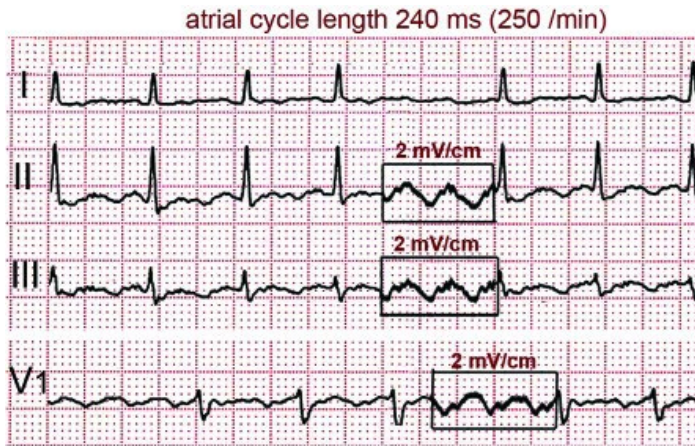


Critical Illness





Re-entry Mechanism in Atrial Flutter



ACC/AHA/HRS GUIDELINE

2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society

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*Developed in Collaboration With
the Society of Thoracic Surgeons*

ACC/AHA Task Force Members,
see page e142



Case Study!

72 year old
potassium c

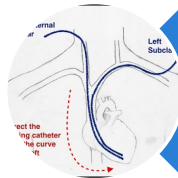


is 1.7 and
n developed

In addition to potassium replacement, what is the next step?



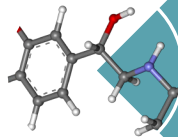
Magnesium Sulfate 1 to 2 grams IV over 15 min



Temporary transvenous overdrive pacing



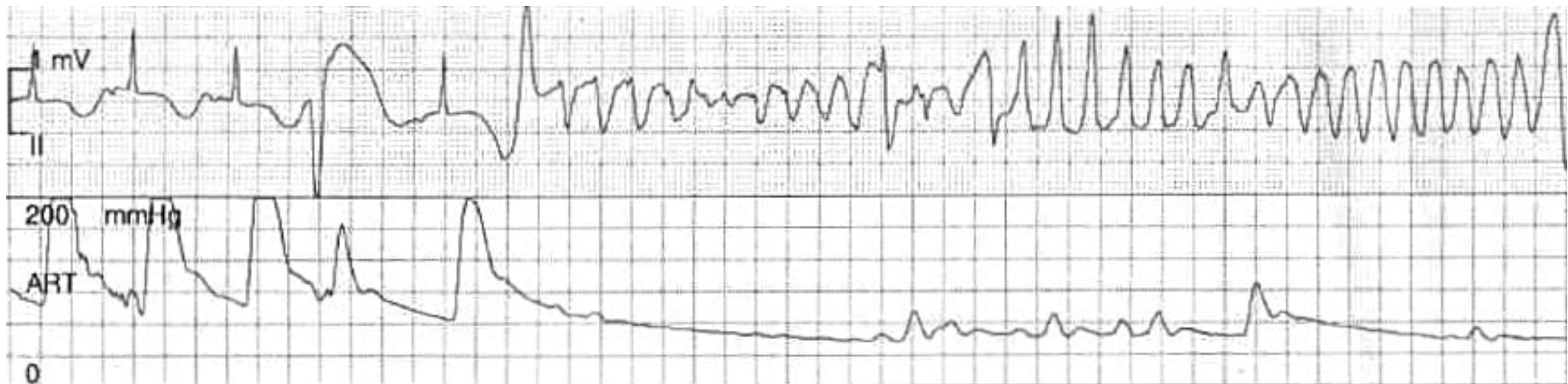
Prompt defibrillation



Isoproterenol 0.05 to 0.1 mcg/kg/min

Case Study!

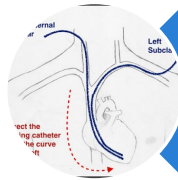
57 year old is admitted to ICU with acute myocardial ischemia, QTc ~480ms and patient suddenly developed the following rhythm associated with no perfusion:



What is the next step?



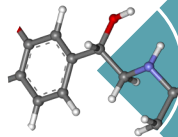
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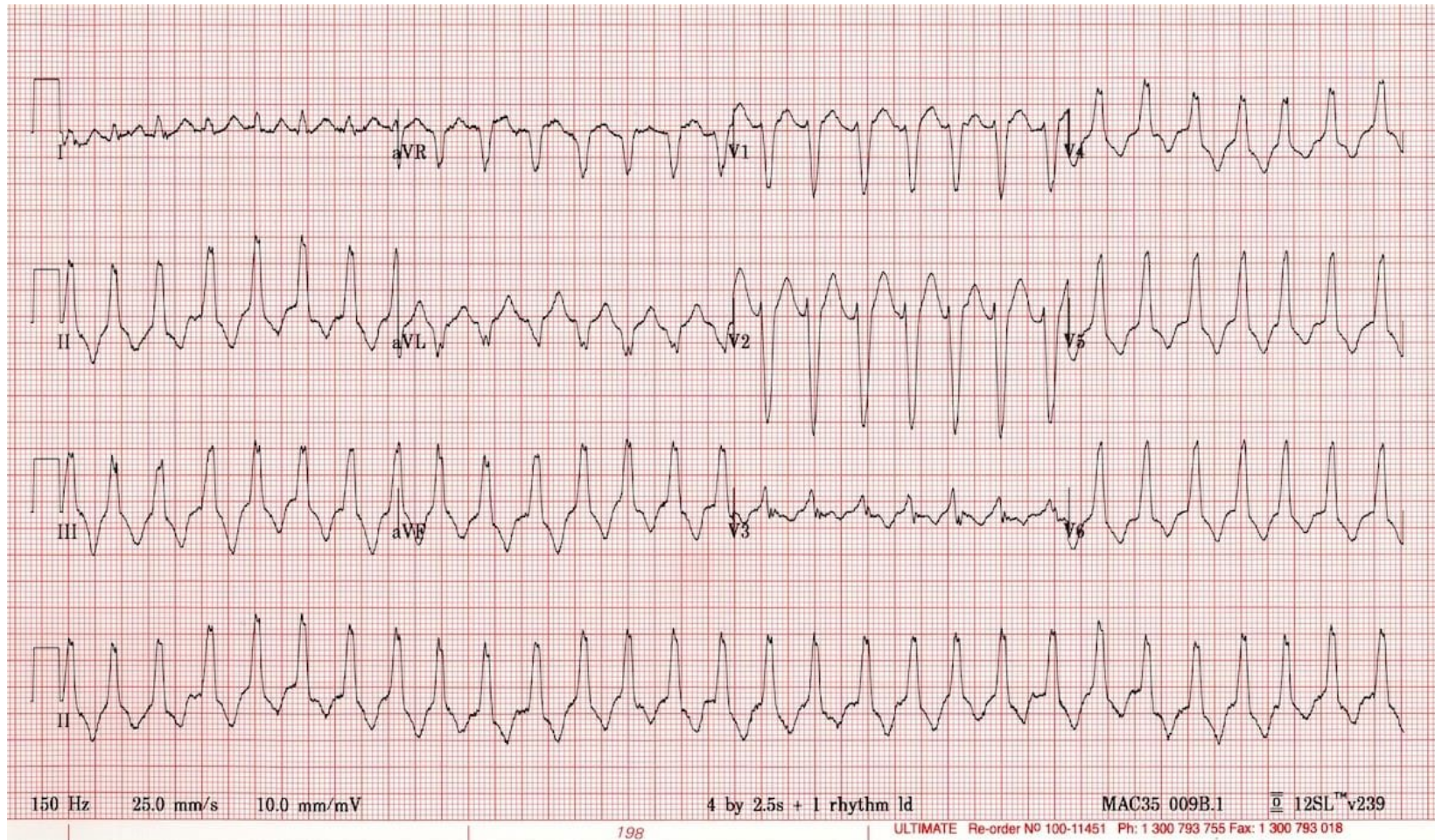


Prompt defibrillation

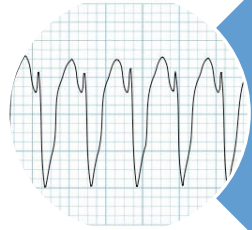


Isoproterenol 0.05 to 0.1 mcg/kg/min

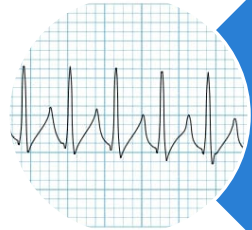
How do you interpret this ECG?



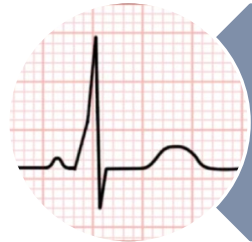
Your choice?



Ventricular tachycardia (VT)

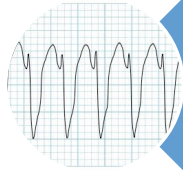


Supraventricular tachycardia (SVT) with aberrant conduction due to bundle branch block

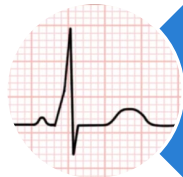


SVT with aberrant conduction due to the Wolff-Parkinson-White syndrom

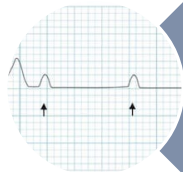
Which of the following is consistent with SVT?



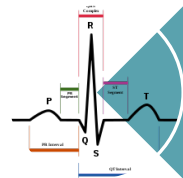
Fusion beat



Capture beat

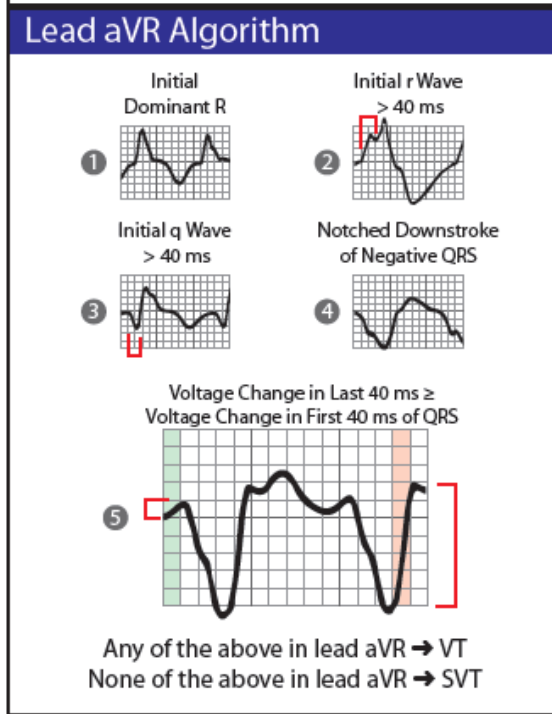
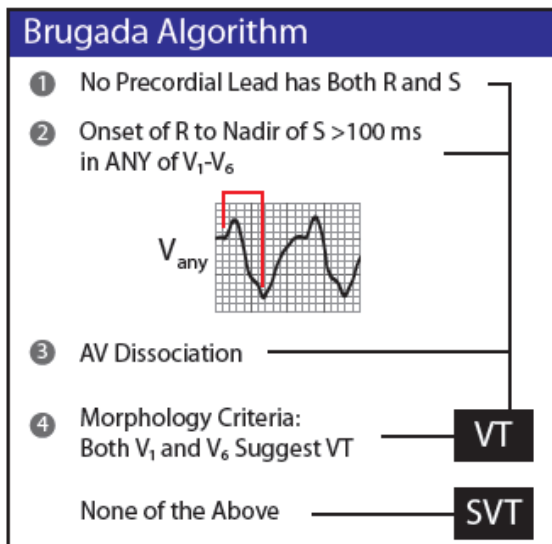
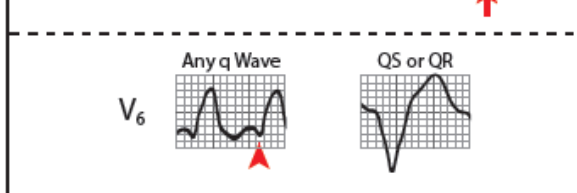
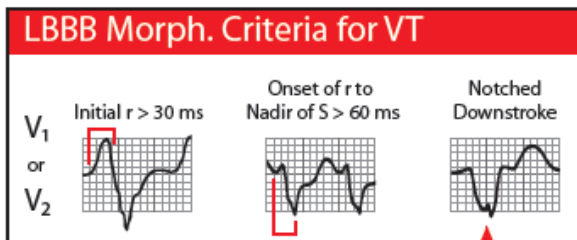
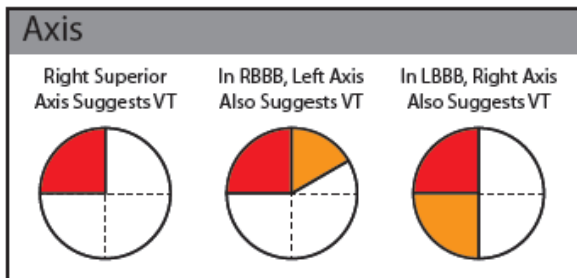
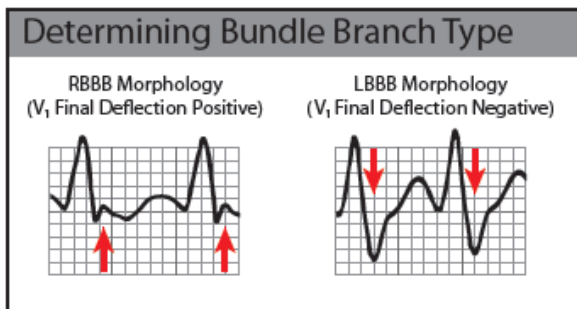
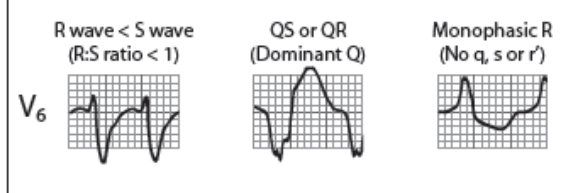
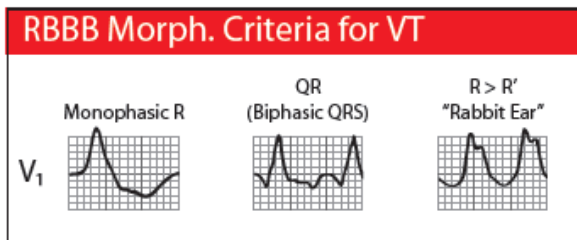
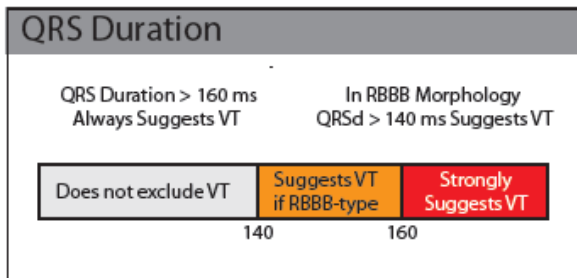
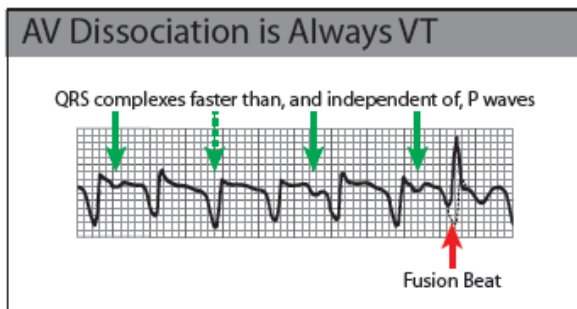


AV Dissociation

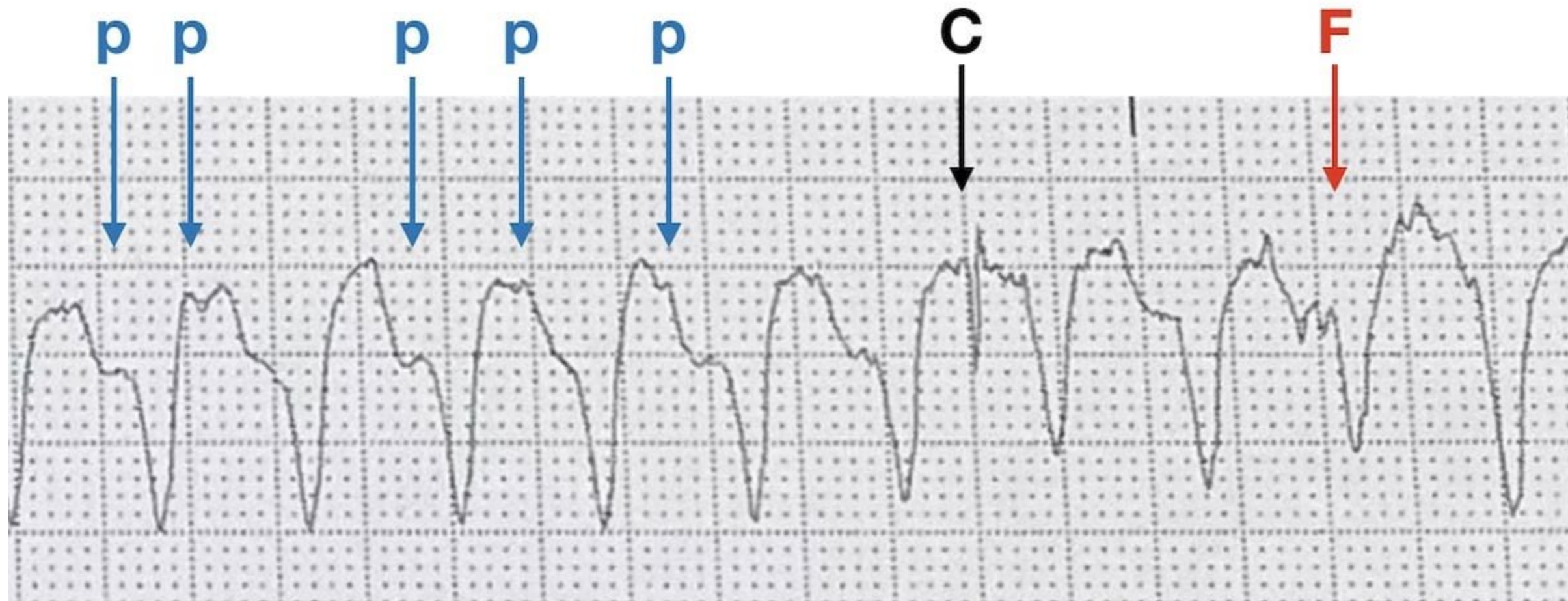


QRS <140 ms

Figure 1: Morphological Criteria for Discriminating Ventricular Tachycardia from Supraventricular Tachycardia with Aberration



AV = atrioventricular; aVR = augmented vector right; LBBB = left bundle branch block; RBBB = right bundle branch block; SVT = supraventricular tachycardia; VT = ventricular tachycardia.

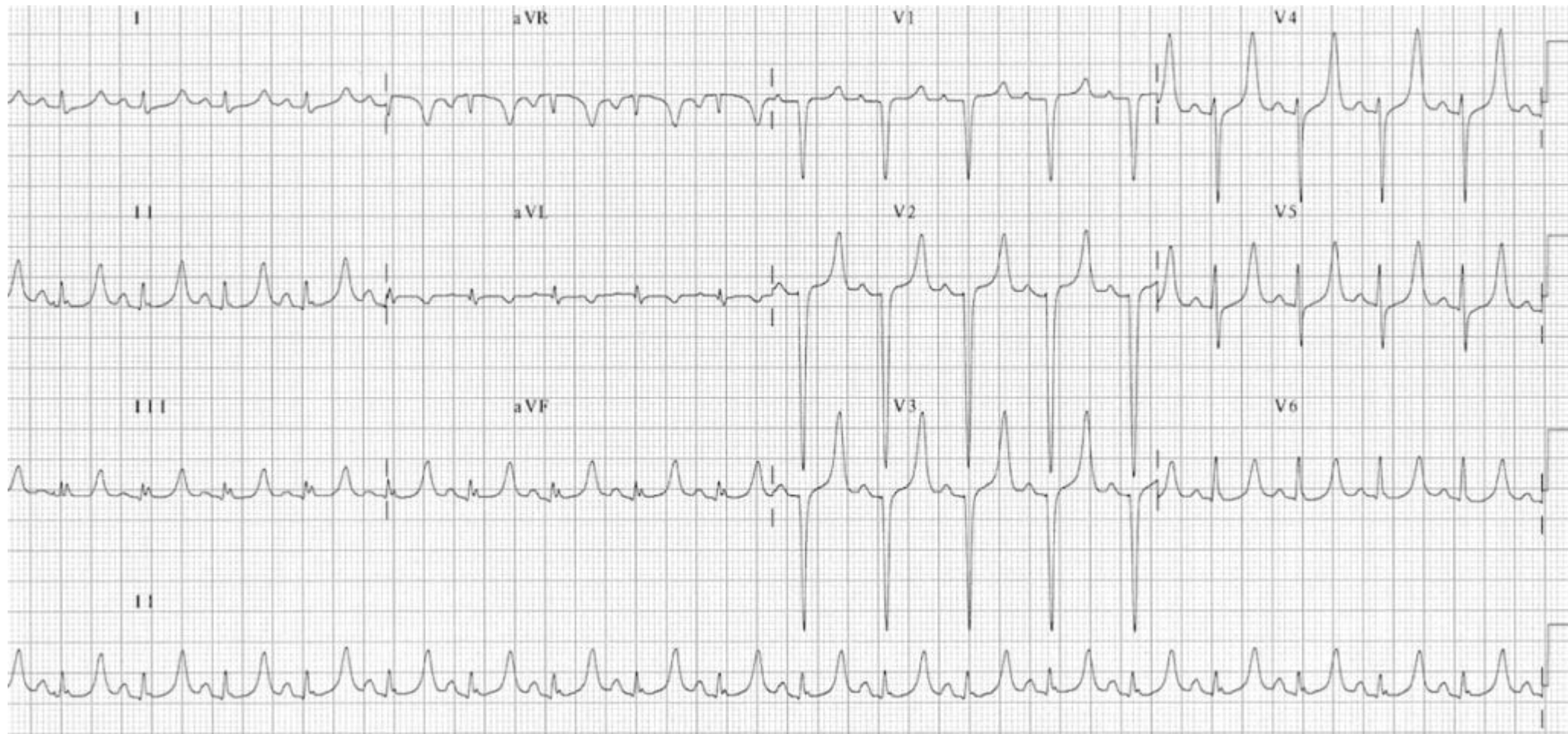


p p waves in AV dissociation

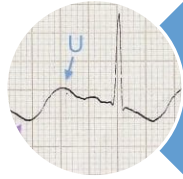
C Capture beat

F Fusion beat

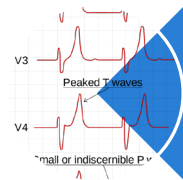
Case Study



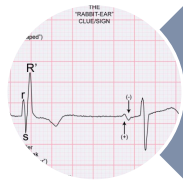
Which is the diagnosis?



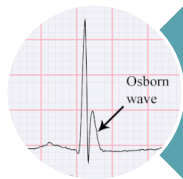
Hypokalemia



Hyperkalemia



Hypocalcemia



Hypercalcemia

EKG changes with Hyperkalemia

K > 5.5

- Peaked T waves

K > 6.5

- P wave widens and flattens
- PR segment lengthens
- P waves eventually disappear

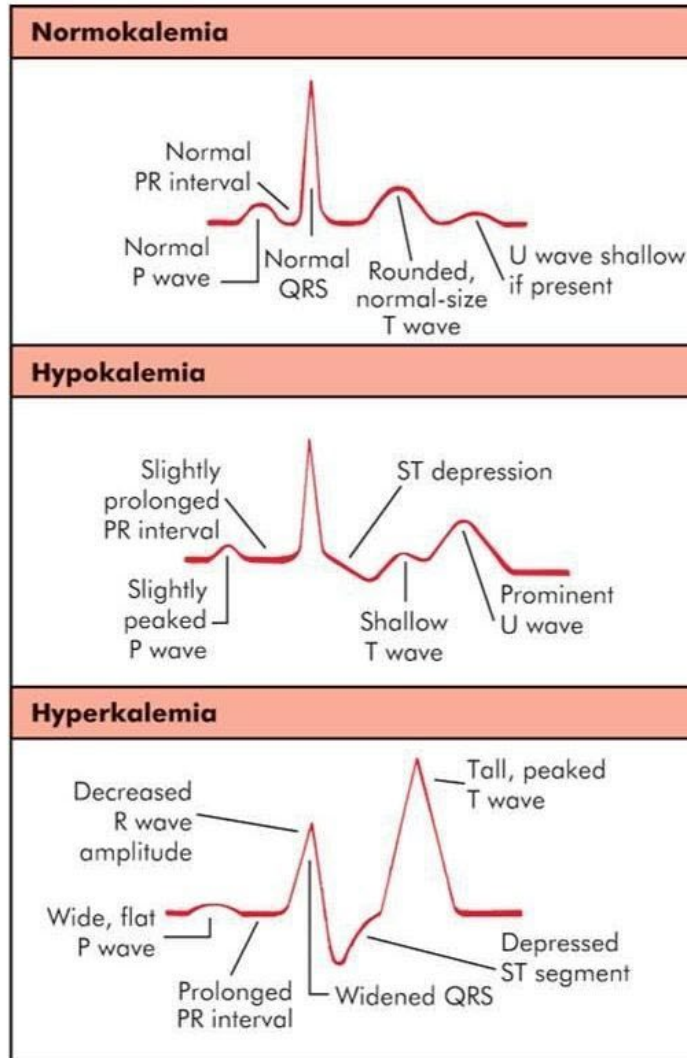
K > 7.0

- Prolonged QRS interval with bizarre QRS morphology
- High-grade AV block with slow junctional and ventricular escape rhythms
- Any kind of conduction block (bundle branch blocks, fascicular blocks)
- Sinus bradycardia or slow AF
- Development of a sine wave appearance (a pre-terminal rhythm)

K > 9

- Asystole
- Ventricular fibrillation
- PEA with bizarre, wide complex rhythm

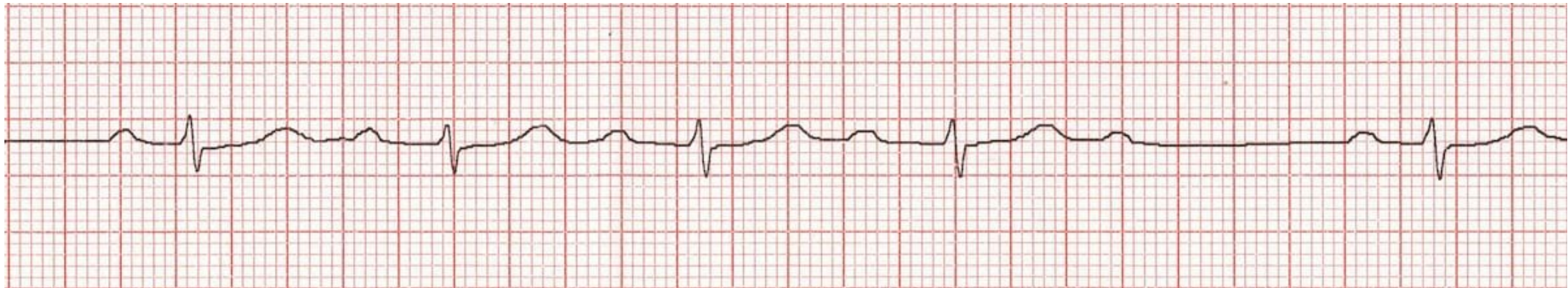
ECG Changes with Potassium Imbalance



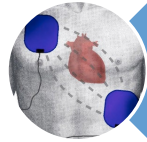
ECG EKG Changes in Hypokalemia and Hyperkalemia

Case Study

- 57 year old female with PMH of DM.
- Admitted with acute viral myocarditis
- The following rhythm strip is noticed
- Patient is free of chest pain, systolic blood pressure is 96 mm Hg



Other than ischemic workup, what is the next step?



Transcutaneous pacing



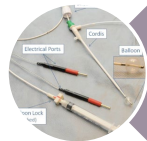
Atropine



Dopamine

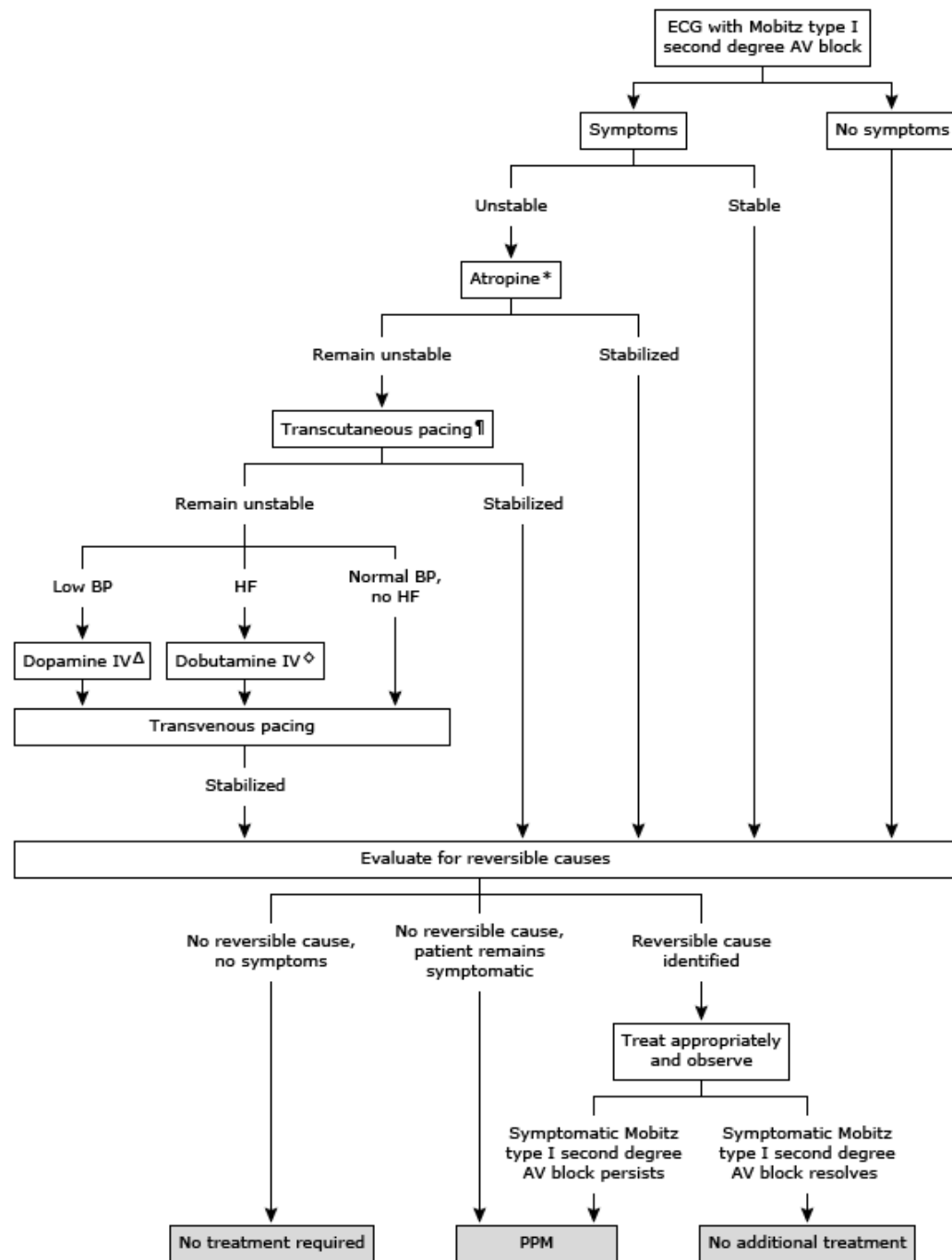


Observation



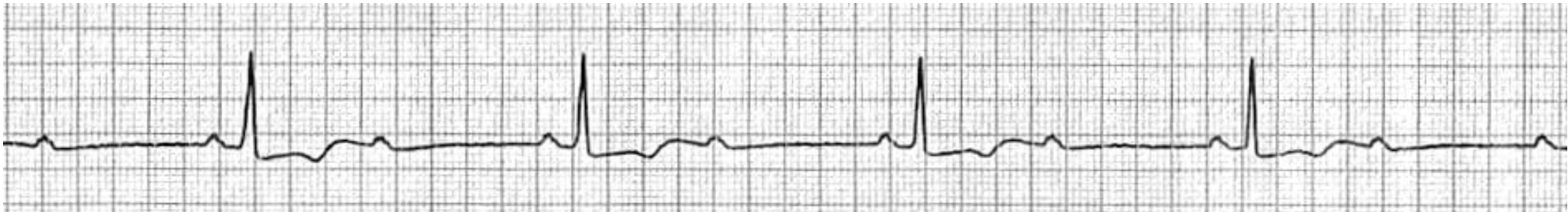
Temporary transvenous pacemaker

Management of 2nd Degree AV Block (Mobitz Type I)

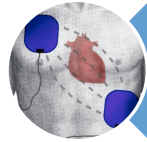


Case Study

- 65-year-old male with PMH of HTN and DM.
- Admitted with NSTEMI and elevated troponin
- The following rhythm strip is noticed
- Patient is free of chest pain, systolic blood pressure is 56 mm Hg



Other than ischemic workup, what is the next step?



Transcutaneous pacing



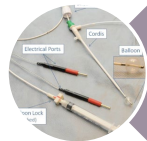
Atropine



Dopamine

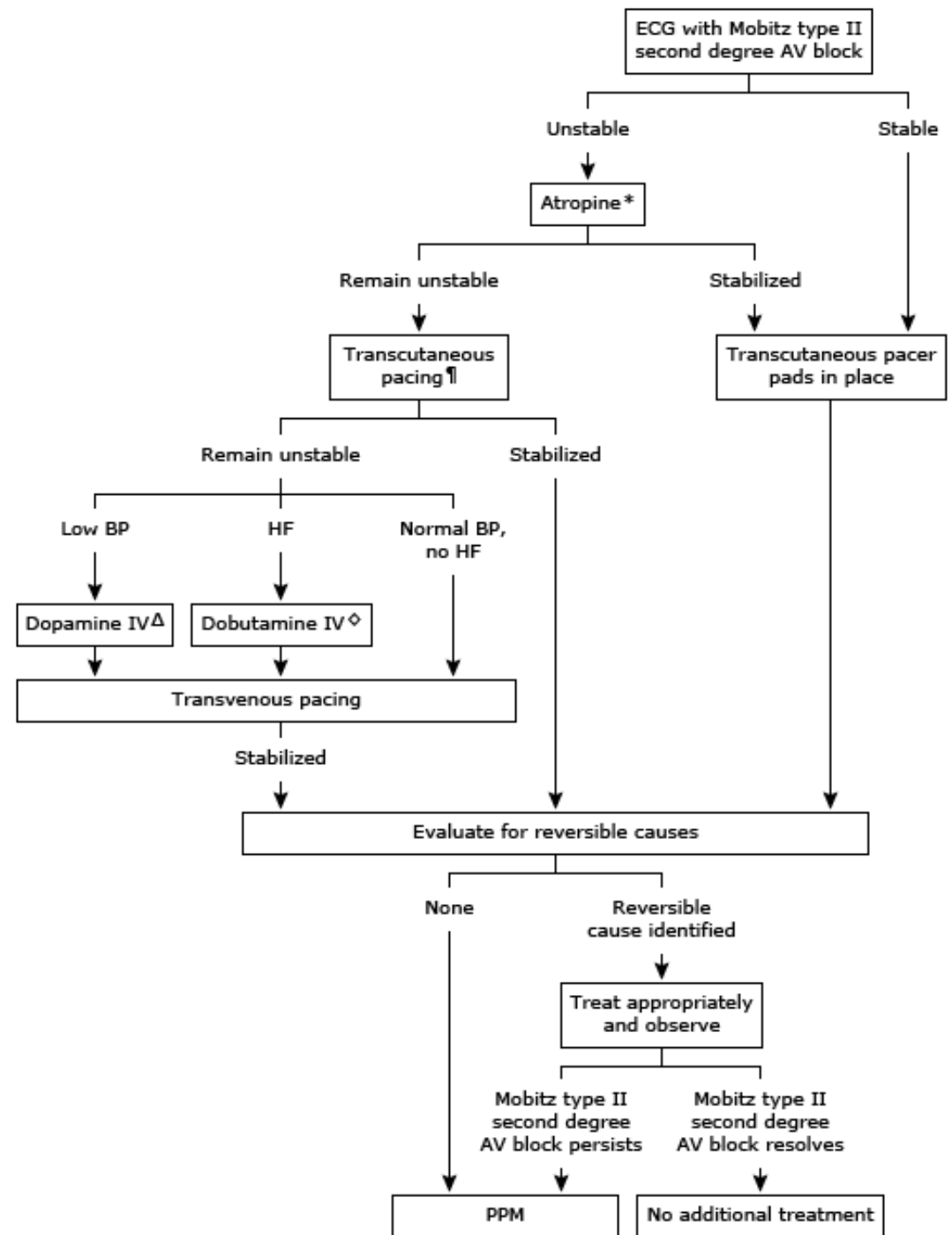


Dobutamine



Temporary transvenous pacemaker

Management of 2nd Degree AV Block (Mobitz Type II)

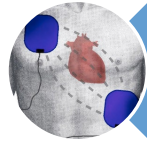


Case Study

- 65 year old male with PMH of HTN and DM.
- Admitted with acute inferior myocardial infarction
- The following rhythm strip is noticed
- Patient is free of chest pain, systolic blood pressure is 106 mm Hg



Other than ischemic workup, what is the next step?



Transcutaneous pacing



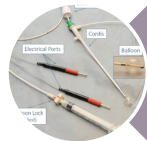
Atropine



Dopamine

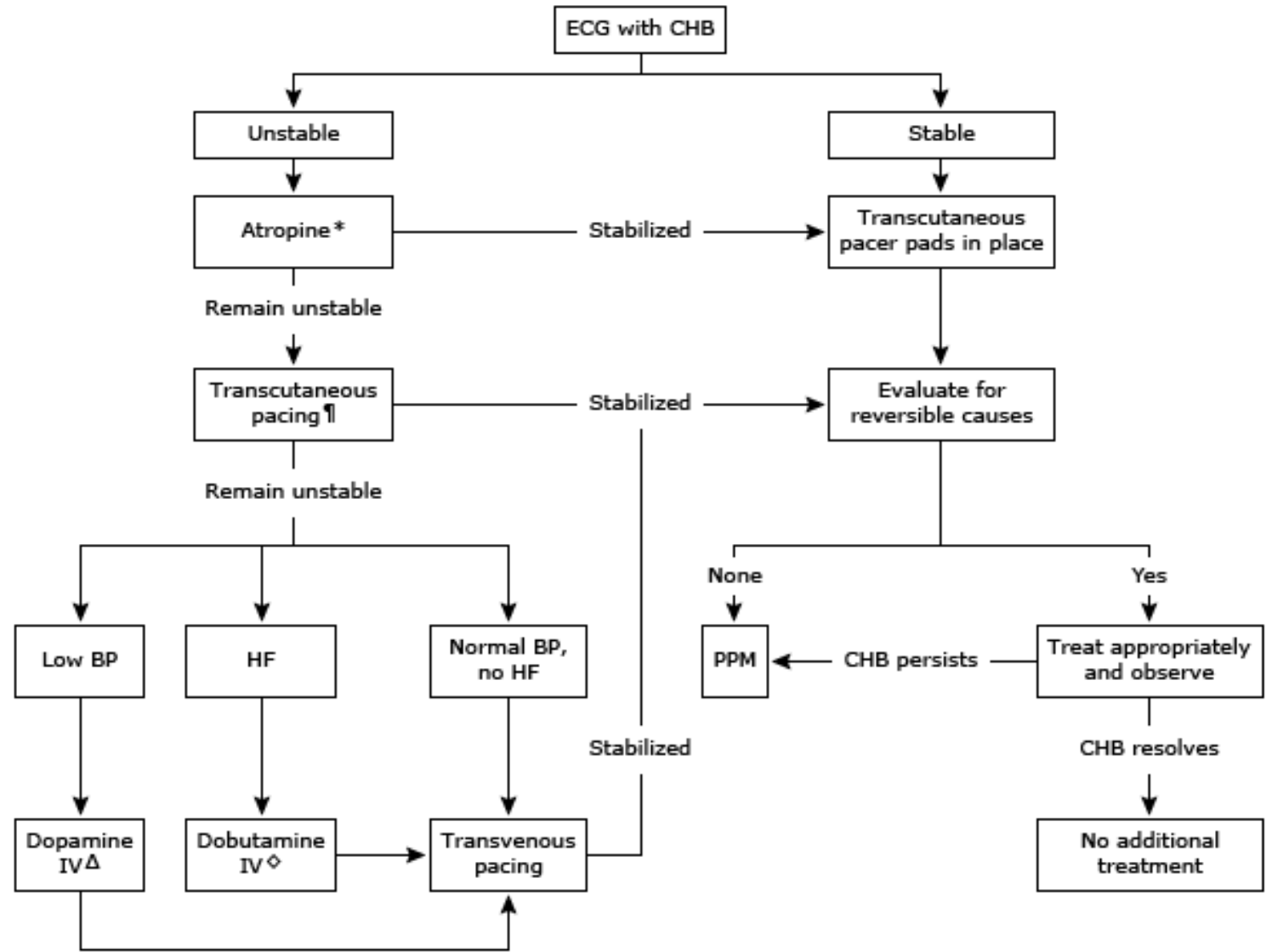


Dobutamine



Temporary transvenous pacemaker

Management of Complete AV Block



Thank You
