



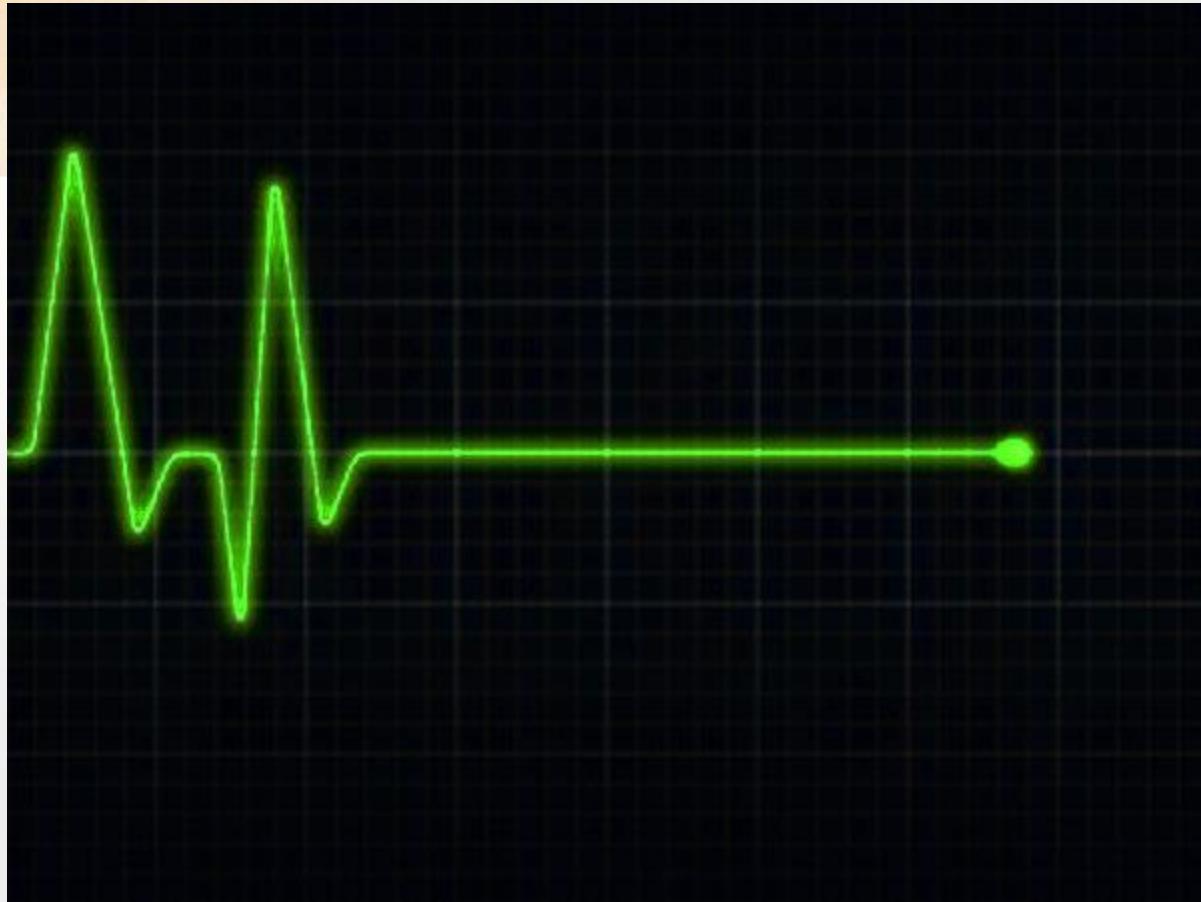
Arrhythmias and Acute coronary syndromes can be challenge in the ER

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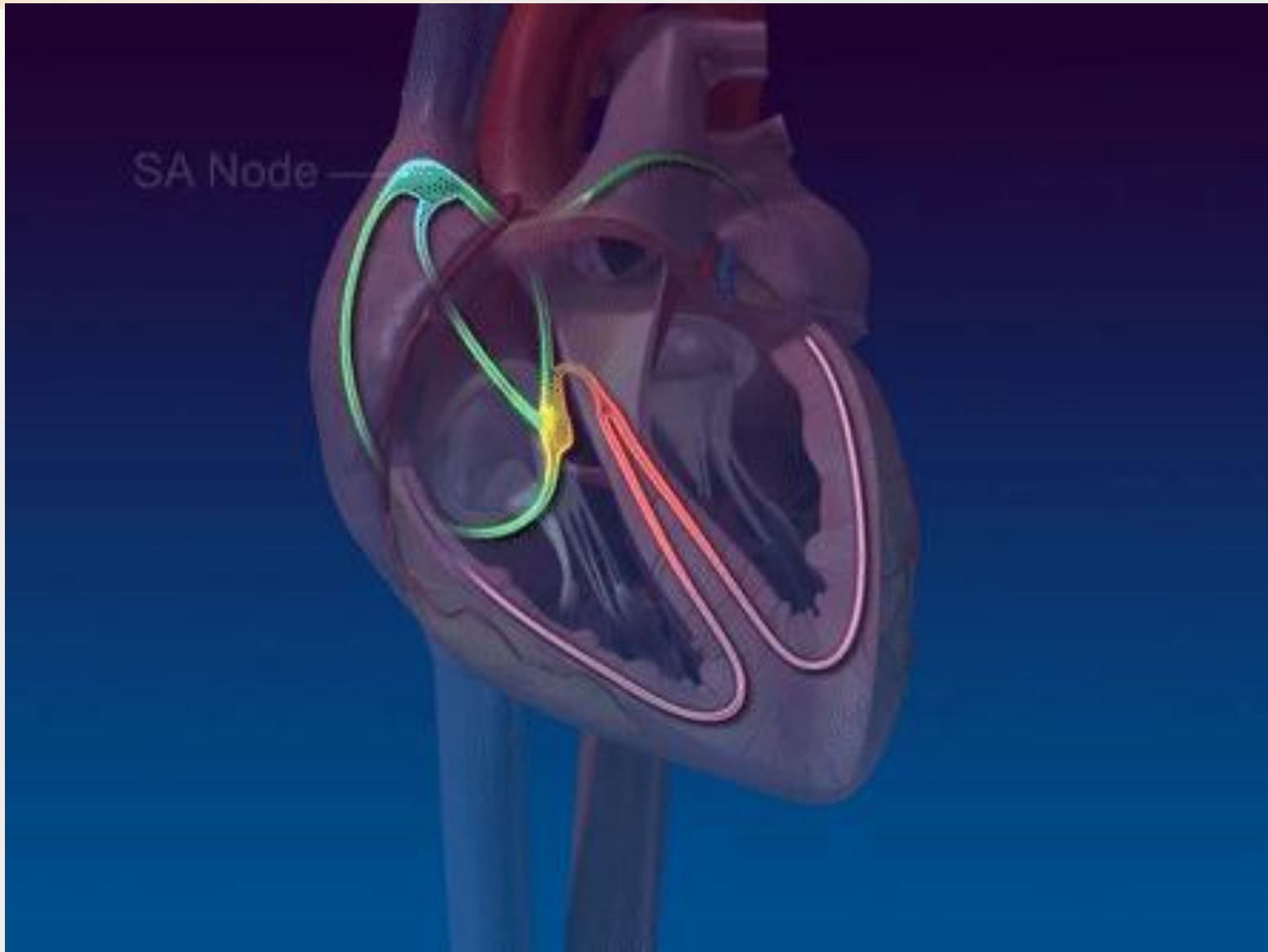


“All arrhythmias straighten themselves out in the end.”

Objectives

1. Becoming familiar with common presentations seen in the emergency department
2. Interpreting the EKG's accompanying each case
3. Reaching a diagnosis and the appropriate treatment in each case.

Normal Heart Conduction



Arrhythmia

- Any abnormality in the normal activation sequence of the myocardium.
- Can be due to :
 - Enhanced or suppressed automaticity
 - Triggered activity
 - Reentry

Signs and Symptoms

- Can range from asymptomatic to loss of consciousness or sudden cardiac death.
 - More severe symptoms are more likely to occur in the presence of structural heart disease.
- Common symptoms include:
 - Lightheadedness, dizziness, fluttering, pounding, shortness of breath, chest discomfort, and forceful extra beats

Diagnosis

- Assessment of Structural Heart Disease
- Holter Monitoring
- Event recording
- Electrophysiologic Testing

Cases and Discussion

Case 1- Sudden Palpitations

A 58- year old female presents to the ER with abrupt onset of palpitations since five hours ago. Her past medical history includes hypertension and takes captopril. She is not in distress. Her vitals were recorded:

- Heart rate: 170bpm
- Blood pressure: 135/75 mmHg
- Respiratory rate: 18/min
- Oxygen Saturation: 97% on room air.

ECG is as follows:

Determine cardiovascular instability

The ALS guidelines list the following as signs of cardiovascular instability patients sustaining a tachyarrhythmia:

- Reduced conscious level
- Systolic blood pressure <90 mmHg
- Chest pain
- Heart failure.

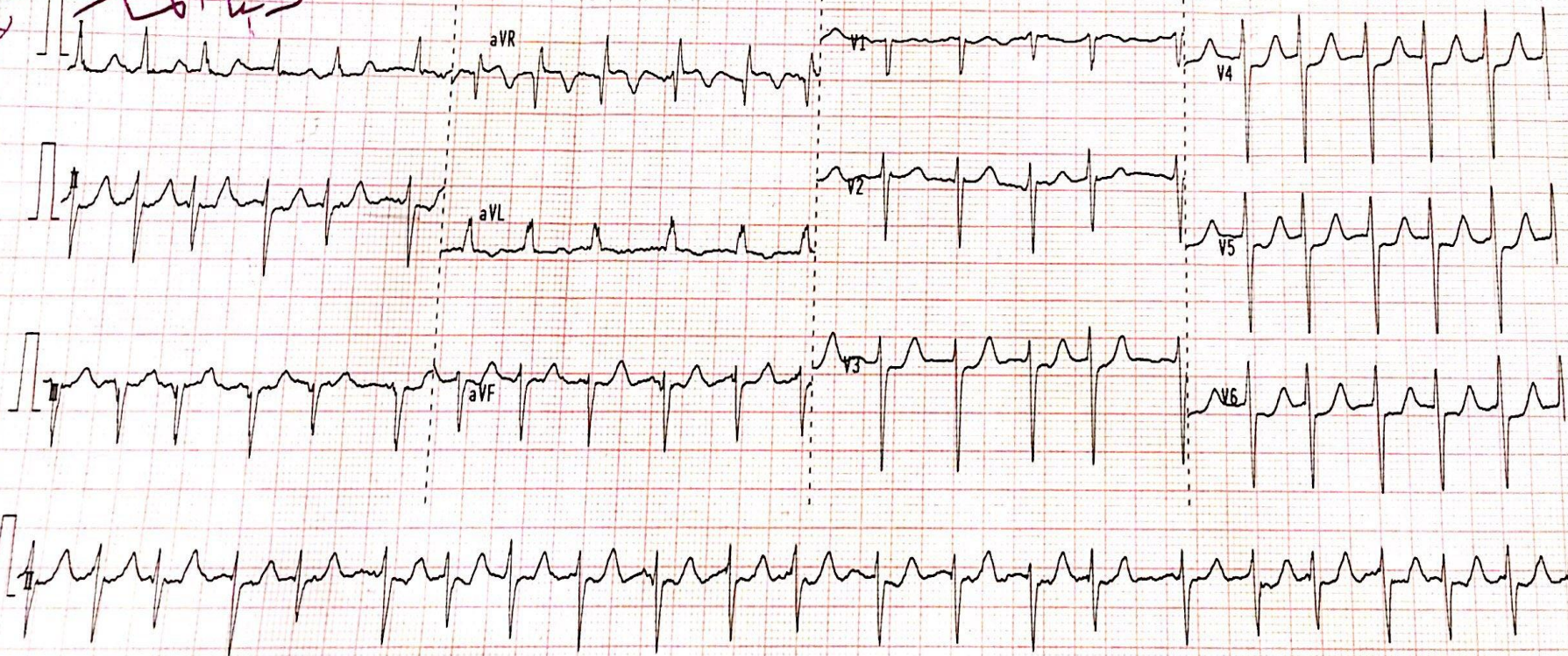
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Patient of doctor Ahmad Aldhann

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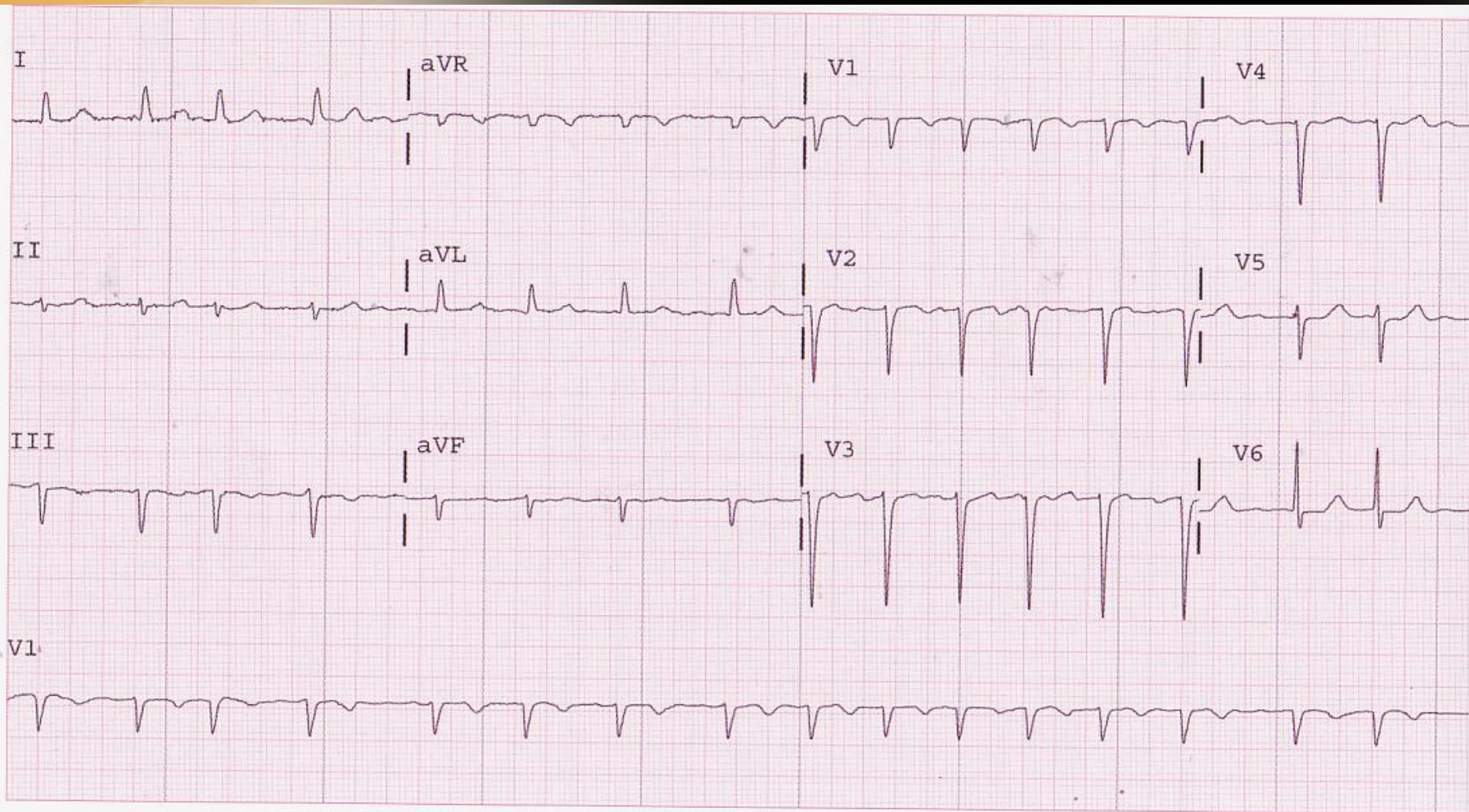
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ECG findings

- Tachycardia of rate 120-160 bpm
- The rate is irregular
- No P waves are seen

The ECG diagnosis is atrial fibrillation (AF) with fast ventricular response.

Causes of Atrial Fibrillation

Cardiac Causes	Non-Cardiac Causes
Ischemic Heart Disease	Hyperthyroidism
Heart failure	Pulmonary embolus
Hypertension	Sepsis
Valvular Heart Disease (mitral)	Alcohol excess or withdrawal
Sick Sinus Syndrome	Hypokalemia
Pericarditis	Hypothermia
Cardiomyopathy	Drug use (cocaine)

Take into consideration

If new onset AF, investigate for possible causes:

- Electrolyte disturbances
- Thyroid function tests for hyperthyroidism
- Calcium and Magnesium
- CBC/CRP to identify occult infection

Treatment-Rate Control

- β -blockers: first-line (if no contraindications present) (e.g. metoprolol 5 mg IV or bisoprolol 5 mg PO)
- Calcium channel blockers (e.g., verapamil 5 mg IV)
 - **if β -blockers are contraindicated** or poorly tolerated (e.g. asthmatics)
- Digoxin 500-750 mcg IV or Amiodarone 300 mg IV over 30-60 minutes followed by an infusion of 900 mg over 24 hours are used where there is evidence of heart failure

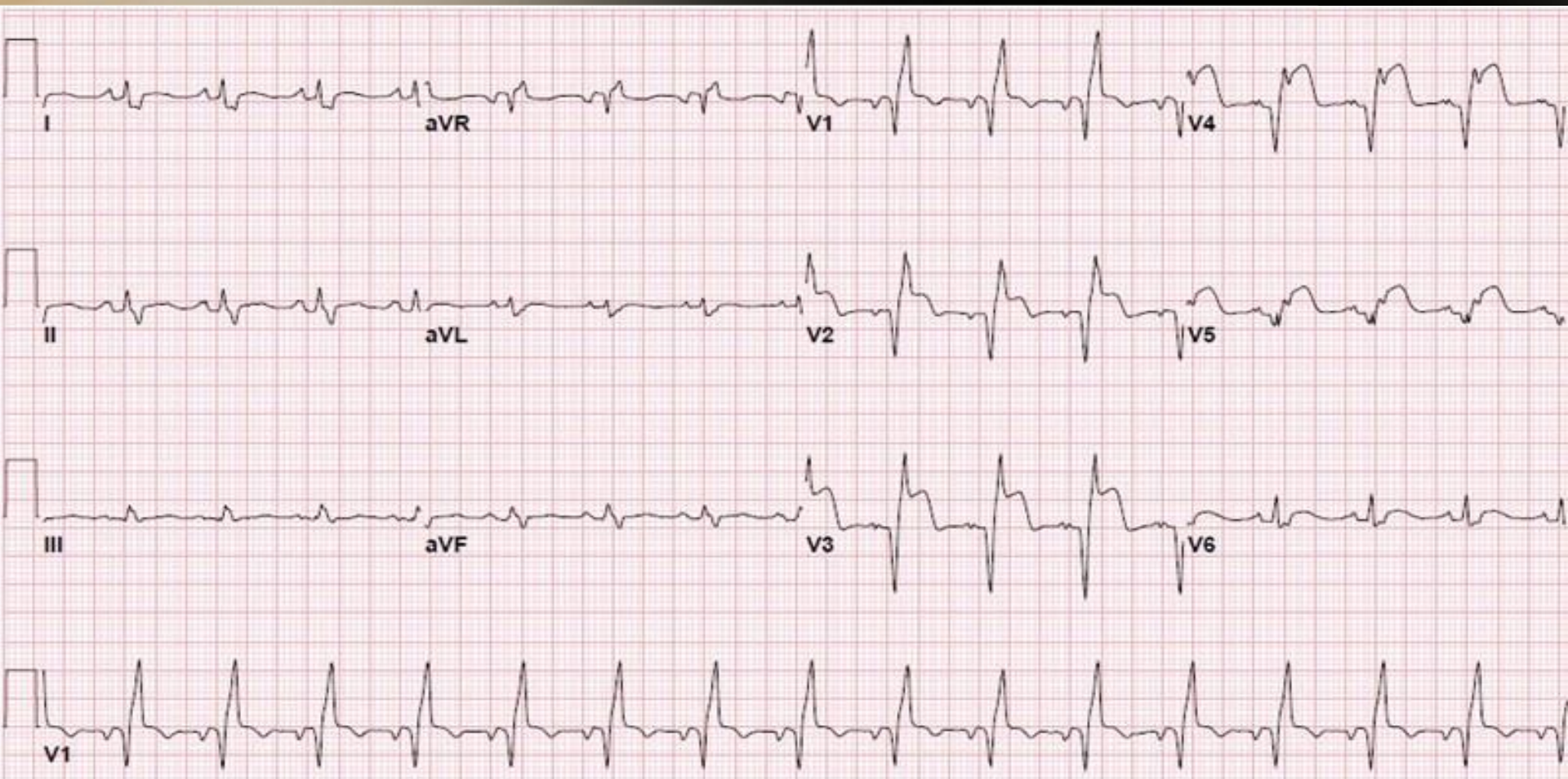
Treatment- Rhythm Control

- Presentation within 48 hours from the onset of AF may make the patient a candidate for rhythm control.
- Advice should be sought from cardiologist or the on-call medical consultant.
 - Elective DC-cardioversion under sedation
 - Chemical cardioversion:
 - Flecainide
 - Amiodarone

Case 3-Chest pain and pregnancy

A 38-year old woman, gravida 1 para 0, 32 weeks pregnant, presents to the ED with central chest pain radiating to her left arm. She has essential hypertension and a strong family history of ischemic heart disease at an early age.

Her ECG is as follows:



ECG findings

- Normal sinus rhythm
- Normal axis
- ST segment elevation in leads V₁-V₄ and reciprocal ST segment depression in leads I and AVL

The ECG diagnosis is an acute anterior ST elevation myocardial infarction (STEMI).

Common causes of chest pain in pregnancy

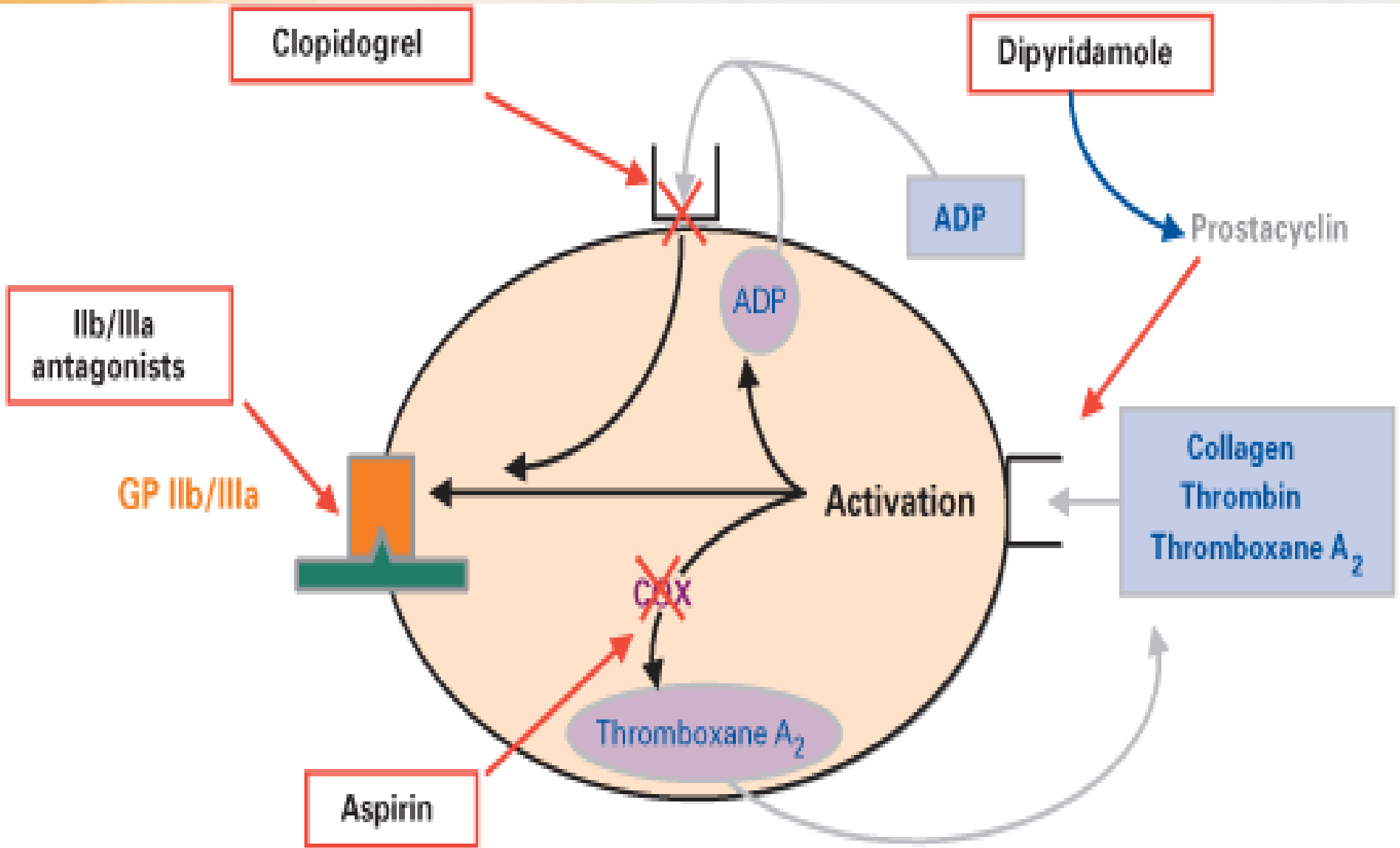
- Gastroesophageal reflux disease
- Pulmonary embolus
- Angina and acute coronary syndrome (increased cardiac workload in pregnancy)
- Thoracic aortic dissection
- Puerperal cardiomyopathy (dilated cardiomyopathy)
- Angina caused by anemia

Treatment

- Percutaneous coronary intervention (PCI) is the definitive treatment
 - Performed with lead shielding, to minimize fetal radiation exposure.
- Tissue plasminogen activator (tPA) can be used as an alternative when PCI is not available, as it does not cross the placental barrier.
 - tPA does, however, substantially increase the risk of maternal hemorrhage

Other modes of treatment

- Consult OBGYN for fetal monitoring
- Supplemental oxygen
- Anti-platelet therapy (aspirin 300 mg PO and clopidogrel 300-600 mg PO)
- Place the patient in the left lateral position to maximize preload and improve cardiac output



Further management in the immediate period

- Opiate analgesia (e.g., morphine 2.5-10mg iv titrated to pain)
- Glyceryl trinitrate (GTN): sublingually initially
 - intravenous infusion if needed
- Low-molecular weight heparin (e.g., enoxaparin 1 mg/kg s/c)
- β -blockers (e.g., metoprolol 50 mg PO).

Caution

Safe during Pregnancy	Unsafe during Pregnancy
Aspirin	ACE inhibitors
Clopidogrel	Angiotensin receptor antagonists (ARB)
GTN	Statins
LMWH	
Beta-blocker	
Glycoprotein IIb/ IIIa	

TIMI risk score for UA/NSTEMI

The Thrombolysis in Myocardial Infarction (TIMI) Score is used to determine the likelihood of ischemic events or mortality in patients with unstable angina or non-ST-segment elevation myocardial infarction (NSTEMI).

- **TIMI Risk Score**
 - Age ≥ 65 years
 - Three or more risk factors for coronary artery disease (CAD) (family history of CAD, hypertension, hypercholesterolemia, diabetes mellitus, tobacco use)
 - Known CAD (stenosis $> 50\%$)
 - Aspirin use in the past 7 days
 - Severe angina (≥ 2 episodes in 24 hours)
 - ST deviation ≥ 0.5 mm
 - Elevated cardiac marker level

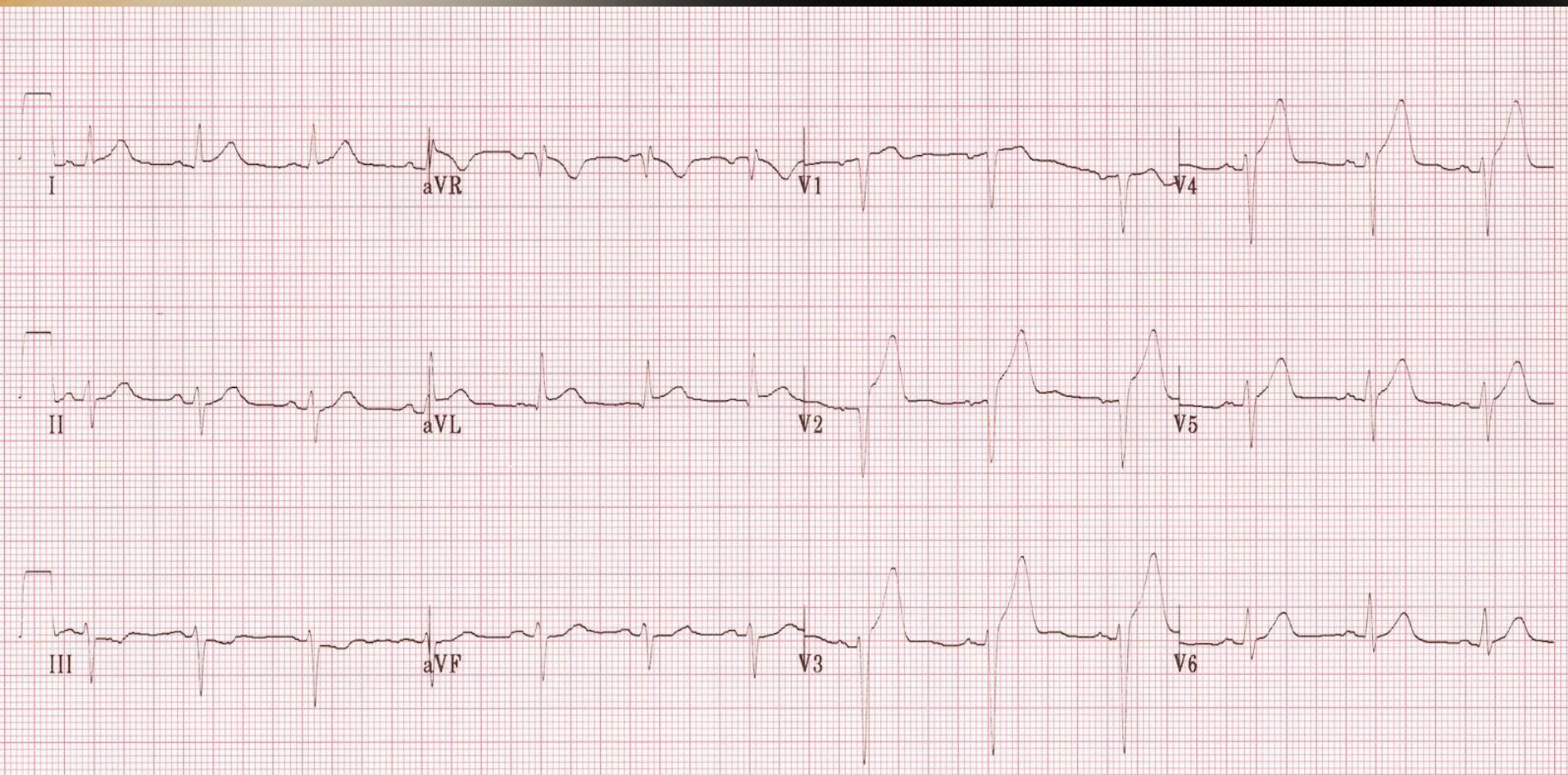
- **TIMI Score and 2 week Death / **MI Risk Death**** / MI / Urgent Revascularization Risk Interpretation:**

- 0-1 Points: 3% ** 5%
- 2 Points: 3% ** 8%
- 3 Points: 5% ** 13%
- 4 Points: 7% ** 20%
- 5 Points: 12% ** 26%
- 6-7 Points: 19% ** 41%

Case 4- Cocaine-induced MI

A 24-year old male presents to the ED with a two-hour history of crushing central chest pain and increasing shortness of breath. His partner mentions to you that he has been snorting cocaine at a club tonight, but is not regular user.

His ECG is as follows:



ECG findings

- Sinus rhythm (rate ~90 bpm)
- ST segment elevation in leads V₂-V₄

This is hyperacute anteroseptal STEMI.

Acute Coronary Syndrome

Diagnosis	ECG changes of ST segment, new onset LBBB	Biochemical evidence of cardiac necrosis i.e. positive troponin
ST segment elevation infarction (STEMI)	Yes	Yes
Non-ST segment elevation myocardial infarction (NSTEMI)	No	Yes
Unstable Angina	No (but other signs of cardiac ischemia may be present)	No

Cocaine-induced cardiac ischemia

Ischemic pain and associated ECG changes due to cocaine can be explained by the following effects of cocaine on the heart:

- 1) Vasoconstriction
- 2) Increase in heart rate and stroke volume to due to increase myocardial oxygen demands.

Treatment

Benzodiazepines are recommended as first-line agents.

- Diazepam, (oral or IV) and titrated to response, eases agitation, reduces cardiac work and relaxes vasospasm.

They also help avert cocaine induced seizures.

Further management

- Oxygen to maintain saturation 94-98%
- Aspirin 300 mg PO
- Nitrates sublingually then followed by IV infusion as required to vasodilate the coronary arteries
- PCI may be necessary, especially in chronic cocaine abusers
 - More likely to have thrombotic disease

Word of Caution

Avoid use of **B-blockers**:

- Unopposed alpha stimulation may exacerbate the hypertension and tachycardia of the stimulant drug.

Take home messages

- A proper history and physical examination are necessary to provide a platform for arrhythmia understanding
- ECG is a *vital* tool to use to interpret the arrhythmia
 - Reading an ECG should be done systemically
- Treatment should be given according to both symptoms and ECG findings.

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Thank you

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