Chapter 5
CARDIOVASCULAR EMERGENCY

Learning Objectives:

- An approach to patient with chest pain
- An approach to ECG interpretation
- Identify and treat cardiac emergencies seen in ER including:
    - Cardiac dysrhythmias
    - Acute coronary syndrome
    - Acute heart failure
    - Hypertension
    - Cardiac tamponade & Aortic catastrophes
    - Arterial occlusive disease
    - Venous occlusive disease

INTRODUCTION

Chest pain that is cardiac or not is an important symptom to differentiate in Emergency Room (ER) and is challenging for doctors taking care of these patients. This module is to introduce a method to approach such patients, order appropriate diagnostic studies, interpret ECGs and know treatment for common and emergent chest pain aetiology.

APPROACH TO A PATIENT WITH CHEST PAIN

- Initial approach
- Prompt triage
- Place on cardiac monitor on patient with visceral type of chest pain (discomfort, heaviness, or aching), abnormal vital signs, and dyspnoea.
- ECG performed within 10 minutes of ER visit.
- Establish IV line and supplemental oxygen if SpO2< 93 %
- Focus on immediate life threat and stabilize airway, breathing and circulation
- Take focused history concerning on character of pain, presence of associated symptoms, and history of other cardiopulmonary conditions.
- Be aware of atypical chest pain like radiation to right arm, epigastric pain, chest wall tenderness, dyspepsia.
- Rule out other life-threatening conditions like aortic dissection, pulmonary embolism, pneumothorax, pericarditis, pericardial tamponade, pneumonia and oesophageal rupture.

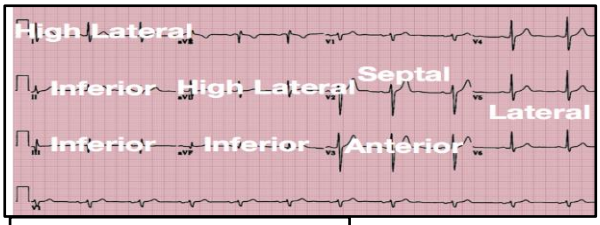
Investigation:

- 12 lead ECG: within 10 minutes of ED arrival and interpreted by ER doctor. Serial ECGs for persistent pain or changes in pain. Focus on ECG changes like T wave changes, ST segment changes of >0.5 mm, pathological Q waves, new or presumably new bundle branch block or sustained Ventricular tachycardia.
- Chest X- ray to assess wide mediastinum indication aortic dissection or consolidation for pneumonia.
- Point of care echocardiography– if available

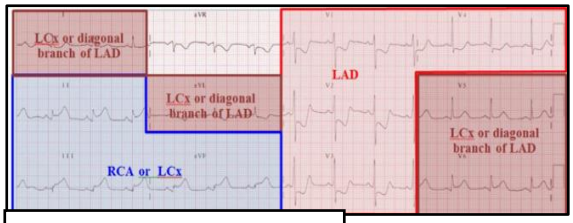
APPROACH TO ECG INTERPRETATION

1. Wide vs narrow
2. Fast vs slow
3. Regular vs irregular
4. Ischaemia
5. Rhythm
6. Axis
7. Intervals

Steps 1-3: identify fatal arrhythmias
Step 4: identify MI or cardiac ischemia
Steps 5-7: provide hints of underlying cardiac etiologies.



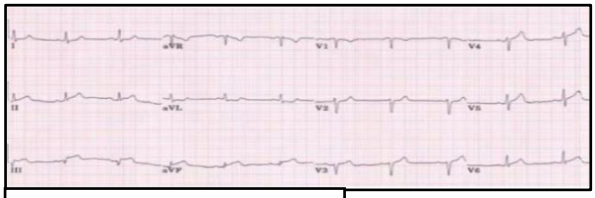
Cardiac Anatomy



Cardiac Anatomy by vessel

New LBBB with STEMI

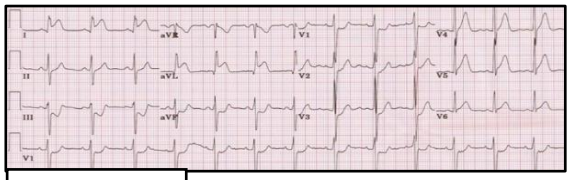
Wellen syndrome



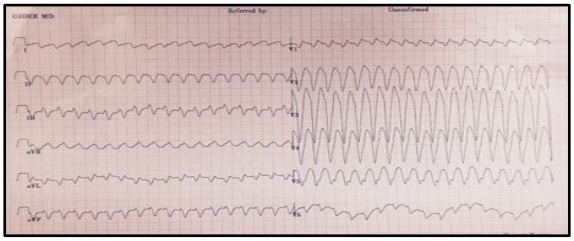
Inferior STEMI

Posterior STEMI

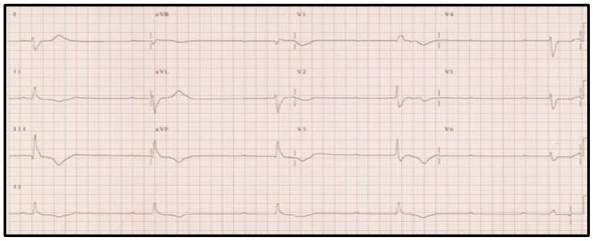
Septal/Anterior STEMI



Lateral STEMI



Ventricular Tachycardia



Junctional Bradycardia

TREATMENT

Antiplatelet therapy:

- **Tablet Aspirin** Initial dose PO 300mg & maintenance 75-162mg
- **Tablet Clopidogrel**: Loading dose of PO 300 mg and 75 mg OD, no loading dose if patient is > 75 years& receiving fibrinolytics.

Antithrombins for UA and NSTE-ACS:

- **Injection Enoxaparin** 30 mg IV bolus and followed by 1 mg/kg S/C 12 hourly.
- **Unfractionated heparin:** 60 units/kg bolus followed by infusion of 12 units/kg (titrate to aPTT of 1.5-2.5 X control).

Fibrinolytic Agent for STEMI- TRANSFER:

- Injection Streptokinase: 1.5 million unit over 1 hour.

- **Other anti-ischemic therapy:**
- **Nitro-glycerine:** S/L 0.4 mg Q5 minutes X 3 or IV start at 10 mcg/min titrate to being chest pain free.
- Injection Morphine.
- Tablet metoprolol or Atenolol.
- Enalapril.

ACUTE HEART FAILURE

presents acutely as a result of acute pump dysfunction from acute MI. History and Physical examination: Patient may complain of chest pain, dyspnoea, orthopnea, edema. May have signs of altered mental status, signs of end organ hypoperfusion, narrow pulse pressure, decreased urine output, increased heart rate, and raised JVD.

Diagnosis:

- ECG
- Chest X-ray
- Blood CBC, RFT and electrolyte, cardiac markers
- Echocardiography

Treatment:

- Supplemental oxygen
- Non-invasive ventilation (NIV) for moderate to marked respiratory distress
- Endotracheal intubation for patient with marked respiratory distress who do not tolerate NIV.

Medication:

- ✓ Vasodilation for AHF: IVI Nitroglycerin 0.2-0.4 mcg/kg/min starting dose titrate to MAP 25 % reduction.
- ✓ Diuretics for AFH: IV Frusemide 40 mg
- ✓ Inotrope IV Dobutamine or Dopamine

Aortic Dissection

Consider it in a patient with severe tearing chest pain, radiating to the back. Can be hyper/hypotensive. Goal: BP control with a Beta Blocker is best then transfer.

Cardiac Tamponade

Consider in patients with shortness of breath, chest pain or giddiness especially if they have a history of or are at risk of having. A pericardial effusion (pericarditis, ESRD patients). IV fluid bolus may help temporize the blood pressure until patient is transferred for definitive care.

Arterial Occlusive Disease

Consider ischemic limb in painful, discoloured, cold and pulseless limb; high risk in patients with an embolic source: A-fib, etc

Venous Occlusive Disease

Consider DVT in unilateral swollen, discoloured, warm and tender – particularly lower extremities. Remember to think of Pulmonary Embolism.

POINT OF CARE ECHOCARDIOGRAPHY

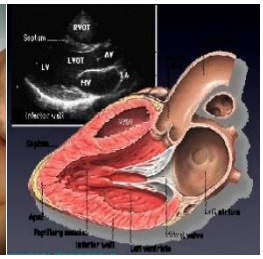
It has become an extension of physical examination and can provide timely information to arrive at diagnosis.

Can identify:

- Pericardial effusion/Cardiac tamponade
- Cardiac chambers and ejection fraction
- Inferior vena cava status – to help assess volume status

Four Views:

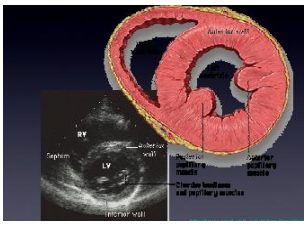
Left para sternal long axis:

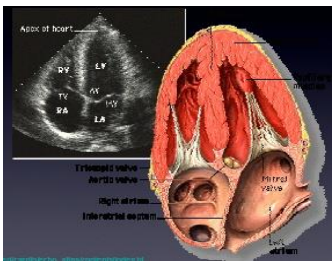
Near sternum, 3rd or 4th left intercostal space, with probe marker pointed to patient's right shoulder. Rotate enough to elongate cardiac chambers.

Left parasternal short axis:

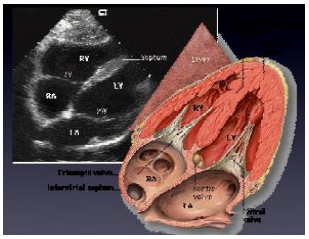
Obtained by 90° clockwise rotation of the probe towards the left shoulder from parasternal long axis. Sweep the beam from the base of the heart to the apex.

Apical/four chamber view:

At apical beat with probe marker pointing towards Lt Axilla.

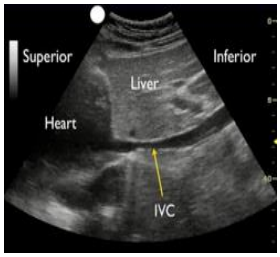



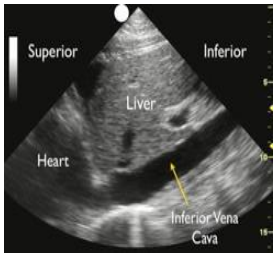
Subxiphoid/subcostal view:

Place the probe just below the xiphoid process with probe marker pointing toward left side diresting towards heart.

Inferior Vena Cava (IVC): Place the probe longitudinally just below the xiphoid process with probe marker pointing to patient head.

Volume Status:





Pericardial effusion & cardiac tamponade:
Diastolic collapse of RA/RV (scalloping of RV) - dilated IVC.

References

1. AFEM - https://afem.africa/resources/
2. Dr Smith's ECG Blog: http://hqmeded-ecg.blogspot.com/
3. SullivanGroup-www.thesullivangroup.com