National University – Sudan
Faculty of physiotherapy
Academic year 2019-2020
3rd year – Batch 13- Semester 6

Physiotherapy cardio-respiratory Clinic Course

L 16 &17 : Pulmonary Emboli

Dr. Lana Satti
0990997827

Contents

- Definition
- Risk factor
- Classification of PE
- Clinical Presentation
- Signs and symptoms
- Physical signs
- Diagnosis
- Management
- Surgical
- Management of large pulmonary embolism ED

Definition

- usually arise from thrombi that originate in the deep venous system of the lower extremities; however, they rarely also originate in the pelvic, renal, upper extremity veins, or the right heart chambers .
- After traveling to the lung, large thrombi can lodge at the bifurcation of the main pulmonary artery or the lobar branches and cause hemodynamic compromise.

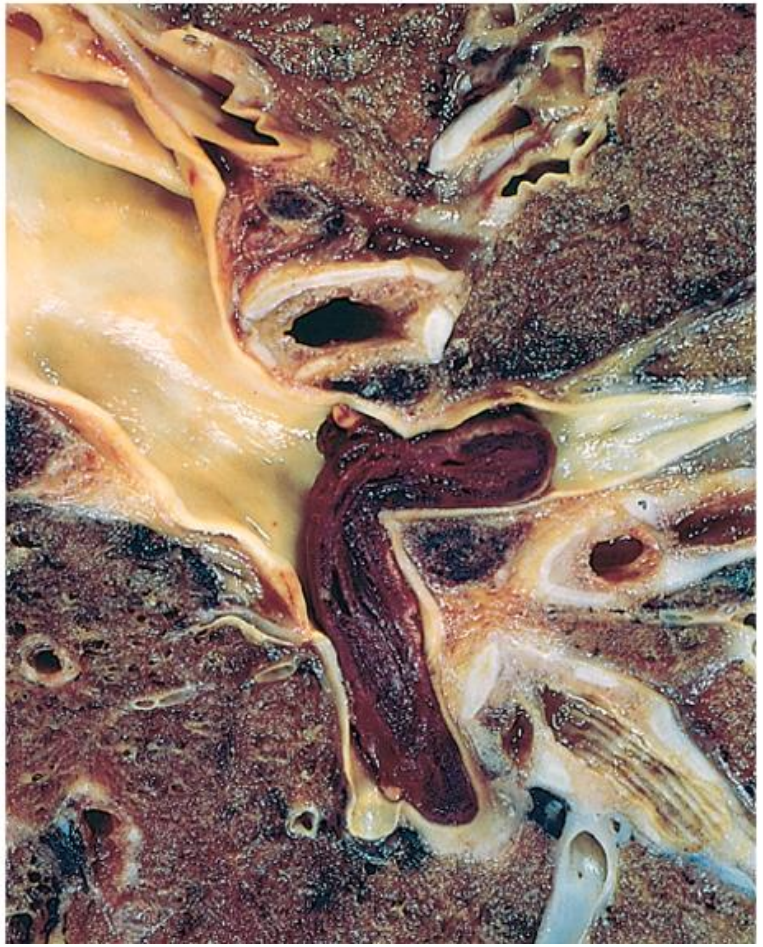
Risk factor

Recent surgery, especially abdominal/pelvic or hip/knee replacement

- Thrombophilia, eg antiphospholipid syndrome
- Leg fracture
- Prolonged bed rest/reduced mobility
- Malignancy
- Pregnancy/postpartum; Pill/HRT
- Previous PE

Classification of PE

- Acute PE can be
  - 1) massive
  - 2) submassive
- Chronic PE



Clinical Presentation

- Massive PE patient presented by:
  - Tachycardia, hypotension and shock due to low COP, Raised JVP , right ventircular gallop rhythm, widely split P2 due to pulmonary hypertension and right ventricular failure
  - Central cyanosis due to disturbance of pulmonary ventilation and perfusion
  - Tachypnea most common sign

Signs and symptoms

- The classic presentation of pulmonary embolism is the abrupt onset of pleuritic chest pain, shortness of breath, and hypoxia.
- haemoptysis; dizziness; syncope However, most patients with pulmonary embolism have no obvious symptoms at presentation.
- Rather, symptoms may vary from sudden catastrophic hemodynamic collapse to gradually progressive dyspnea.
- The diagnosis of pulmonary embolism should be suspected in patients with respiratory symptoms unexplained by an alternative diagnosis.

Atypical symptoms

- Patients with pulmonary embolism may present with atypical symptoms, such as the following:
  - Seizures
  - Syncope
  - Abdominal pain
  - Fever
  - Productive cough
  - Wheezing
  - Decreasing level of consciousness
  - New onset of atrial fibrillation
  - Flank pain
  - Delirium (in elderly patients)

Physical signs

- Physical signs of pulmonary embolism include the following:
  - Tachypnea (respiratory rate >16/min): 96%
  - Rales: 58%
  - Accentuated second heart sound: 53%
  - Tachycardia (heart rate >100/min): 44%
  - Fever (temperature >37.8°C): 43%
  - Diaphoresis: 36%
  - S 3 or S 4 gallop: 34%
  - Clinical signs and symptoms suggesting thrombophlebitis: 32%
  - Lower extremity edema: 24%
  - Cardiac murmur: 23%
  - Cyanosis: 19%

Diagnosis

- Evidence-based literature supports the practice of using clinical scoring systems to determine the clinical probability of pulmonary embolism before proceeding with testing .
- Modified Wells Criteria is the most widely used and studied

PE – Assigning Pretest Probability

Modified Wells Criteria:
Clinical Assessment for Pulmonary Embolism†

Clinical symptoms of DVT	3.0
Other diagnosis less likely than pulmonary embolism	3.0
Heart rate >100	1.5
Immobilization or surgery in the previous four weeks	1.5
Previous DVT/PE	1.5
Hemoptysis	1.0
Malignancy	1.0

Probability	Score
High	>6.0
Moderate	2.0 to 6.0
Low	<2.0

† Data from Wells, PS, et al. Ann Intern Med 2001; 135:98.

Testing

- Routine laboratory findings are nonspecific and are not helpful in pulmonary embolism, although they may suggest another diagnosis.
- A hyper-coagulation workup should be performed if no obvious cause for embolic disease is apparent, including screening for conditions such as the following:
  - Antithrombin III deficiency
  - Protein C or protein S deficiency
  - Lupus anticoagulant
  - Homocystinuria
  - Occult neoplasm
  - Connective tissue disorders

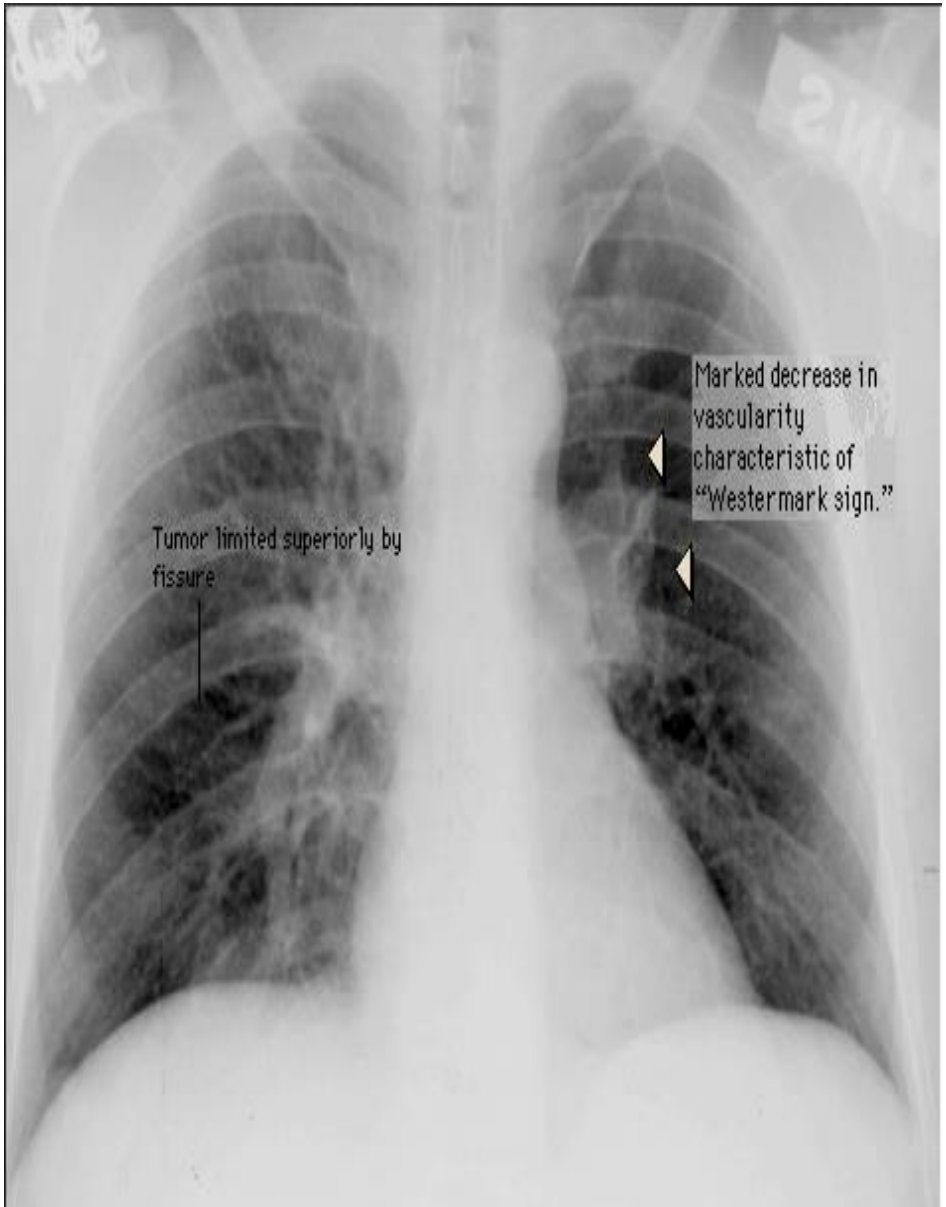
- Laboratory tests in patients with suspected pulmonary embolism include the following:
  - FBC, U&E, baseline clotting, D-dimers Ischemia-modified albumin level
  - White blood cell count
  - Arterial blood gases: ABG may show decrease inPaO2 and PaCO2.
  - Serum troponin levels
  - Brain natriuretic peptide

Imaging studies

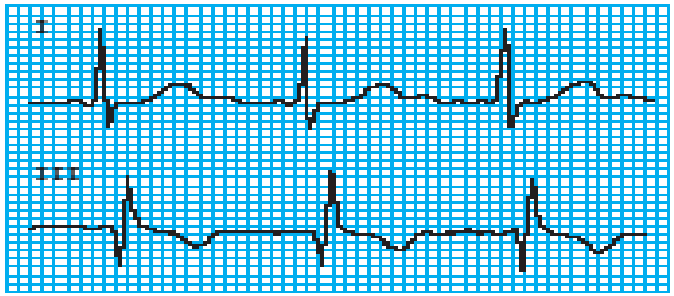
- Computed tomography pulmonary angiography (CTPA) : Multidetector-row CTA (MDCTA) is the criterion standard for diagnosing pulmonary embolism
- Pulmonary angiography: Criterion standard for diagnosing pulmonary embolism when MDCTA is not available
- Chest radiography: Abnormal in most cases of pulmonary embolism, but nonspecific
- V/Q scanning: When CT scanning is not available or is contraindicated
- ECG: Most common abnormalities are tachycardia and nonspecific ST-T wave abnormalities RBBB block, right ventricular
- Strain (inverted T in V1 to V4). The classical SI QIII TIII pattern

CXR FINDINGS

- Hampton's Hump: wedge-shaped configuration at lung periphery due to infarcted lung
- Westermark sign:pulmonary oligemia


Marked decrease in vascularity characteristic of "Westermark sign."
Tumor limited superiorly by fissure

S1Q3T3


I
III

- MRI: Using standard or gated spin-echo techniques, pulmonary emboli demonstrate increased signal intensity within the pulmonary artery
- Echocardiography: Transesophageal echocardiography may identify central pulmonary embolism
- Venography : Criterion standard for diagnosing DVT
- Duplex ultrasonography: Noninvasive diagnosis of pulmonary embolism by demonstrating the presence of a DVT at any site

Management

- Anticoagulation and thrombolysis
- Immediate full anticoagulation is mandatory for all patients suspected of having DVT or pulmonary embolism. Diagnostic investigations should not delay empirical anticoagulant therapy.
- The role of thrombolytic therapy It is used in patients with massive pulmonary embolism who are haemodynamically unstable in patients with extensive deep venousthrombi.
- Thrombolytic therapy should be followed by anticoagulation with heparin for a few days and then by oral anticoagulants to prevent rethrombosis.

- Thrombolytic agents used in managing pulmonary embolism include the following:
  - Alteplase
  - Reteplase
  - Urokinase
  - Streptokinase

- Anticoagulation medications include the following:
  - Unfractionated heparin
  - Low-molecular-weight heparin
  - Factor Xa Inhibitors
  - Fondaparinux
  - Warfarin

- Surgical options: Surgical management options include the following:
  - Catheter embolectomy and fragmentation or surgical embolectomy
  - Placement of vena cava filters

Management of large pulmonary embolism ED

1. Oxygen if hypoxic, 10–15L/min
2. Morphine 5–10mg IV with anti-emetic
3. if the patient is in pain or very distressed
4. If critically ill with massive PE (ie peri-arrest)
5. consider immediate thrombolysis (a 50mg bolus of alteplase)
6. IV access and start heparin
7. either low molecular weight heparin, eg tinzaparin 175U/kg/24h SC
8. or unfractionated heparin ~10,000U IV bolus
9. then ~18U/kg/h IVI as guided by APTT

End