CARDIO-VASCULAR SYNDROME

Dr Etienne Leroy-Terquem
Centre hospitalier de Meulan les Mureaux, France
French-cambodian association for pneumology (OFCP)
Estimate of cardiac volume: measure of the cardio-thoracic index: C/T
Hypertrophy of the right ventricle

on the front view the RV pushes back the LV, and on the lateral view the RV fills the retro-sternal clear space
Hypertrophy of the right ventricle

Normal chest x-ray
Left ventricle hypertrophy

Increase of the inferior left arch.
The cardiac apex sinks in the left diaphragm.
Increase of cardio-thoracic index.
Left ventricle hypertrophy

Normal chest x-ray
Left ventricle hypertrophy

Normal chest x-ray
Hypertrophy of right auricle
thrombo-embolic disease with chronic pulmonary heart
Hypertrophy of right auricle

Normal chest x-ray
Hypertrophy of the left auricle
Hypertrophy of the left auricle (RM)
(courtesy of Dr. Anthoine)
Mitral disease. Notice the hypertrophy of the left middle arch, Hypertrophy of the LV. Hypertension of the pulmonary artery post capillar type.
Left auricle
(Mitral stenosis)
Ascending aorta dilatation (aneurysm)
Pulmonary oedema

*Pulmonary oedema* is the consequence of an abnormal accumulation of extra-vascular liquid, more or less rapidly, initially in the interstitial spaces (interstitial oedema), then in the alveolar cavities (alveolar oedema and acute pulmonary oedema).
Pulmonary oedema

One can distinguish 2 physiopathological mechanisms:

• **Hemodynamic oedema**: cardiac origin, consequence of a left cardiac failure, with pulmonary arterial hypertension of post-capillar type. Usually the situation is reversible with adapted treatment (O2, diuretic, TNT...). There is no anatomic lesion of the «alveolar-capillary barrier»

• **Lesional oedema**: diverse etiologies: infectious (viral or bacterial), toxic (inhalation of toxic gas or ingestion of toxic substances), or complication from shock regardless of the etiology. The prognosis is very often dismal: irreversible hypoxemia. The «alveolar -capillary» is definitively altered. Recovery is sometimes possible with sequela (pulmonary fibrosis).
Hemodynamic pulmonary oedema
Pulmonary hypertension

Pre-capillary hypertension

Post-capillary hypertension

Interstitial oedema if cap. pressure > 20 mm hg
Alveolar oedema if cap. pressure > 30 mm hg
Pulmonary oedema

- If the capillary pressure is > 20mmHg: the oedema is interstitial:
  - A and B Kerley lines
  - Blurred opacities around the hilus
  - Sometimes blurred opacities around bronchi (ring shadow sign)
  - Small pleural effusion
  - Round glass attenuation
Intersticial edema

Kerley B lines
Interstitial edema

Kerley B lines
Intersticial oedema

Blurred opacities around the hilus. The vascular limits are not clear.
Interstitial edema

Ring shadow sign
Around the bronchus
Mitrál disease. Notice the hypertrophy of left superior arch (left auricle), left ventricle hypertrophy and intersticial oedema (ground glass attenuation) (hypertrophy and blurring of the hili).
Acute pulmonary oedema: alveolar oedema. The capillary pressure is > 30mmHg (butterfly wings picture)
Pulmonary arterial hyperpression
Pre-capillary type

Pulmonary hyperpression
Post-capillary type (ring shadow sign)
Post-capillary pulmonary hyperpressure
Pulmonary hypertension

Interstitial oedema if cap. pressure > 20 mm hg
Alveolar oedema if cap. pressure > 30 mm hg

Pre-capillary hypertension
Post-capillary hypertension

RA        RV
VC

Pre-capillary obstacle
Pulmonary capillaries
LA
PV
RM
LV

Interstitial oedema if cap. pressure > 20 mm hg
Alveolar oedema if cap. pressure > 30 mm hg
Pre-capillary hypertension (emphysem)
Chronic pulmonary heart
Pre-capillary hypertension
Pericarditis  

After puncture
Pericarditis

Cardiomegaly with hypertrophy of the left ventricle
Pulmonary embolism
Possible images of pulmonary embolism on the chest radiography:

- Nothing…
- Pleural effusion
- Additional height of one hemi diaphragm
- Localised hypo-vascularisation
- Triangular picture with vertex toward the hilus (post-embolic pulmonary infarctus)
- Round picture (post-embolic pulmonary infarctus)
Don’t forget:

A normal chest radiography does not exclude Pulmonary embolism
Male, 45 years old, acute and severe dyspnea, thoracic pain. Tachycardia (110/mn), O2 Sa 89%.
Angioscanner
Angioscanner: severe and bilateral pulmonary embolism.
Additional height of the left diaphragm

Additional height of the right diaphragm with small pleural effusion
Round pulmonary infarctus (decubitus position)
male, pain during deep inspiration

t° 37°8- 38°C in evening. Initial treatment with amoxi./ Ac. Clav.

New chest x-ray 14 February 01
Pulmonary embolism
Female, 44 years old. Antecedent: phlebitis (familial deficiency in S protein).

Pain in the left calf and acute dyspnea.
massive pulmonary embolism, in right inferior pulmonary artery
Female

12.08.00 flight Chicago-Paris
16.08.00 left thoracic pain
17.08.00 CXR in the emergency room
Pulmonary embolism
Woman, 35 years old, thoracic pain left side, tachycardia and dyspnea.

History of smoking 10 Pack-years.

Has taken an oestro-progestative contraceptive for 5 years.
The diagnosis of pulmonary embolism is difficult without an angioscanner

- Indicative clinical context
- Indicative clinical signs (thoracic pain, tachycardia, acute dyspnea) and no other evident pathology (infection, cardiac disease....)
- Sometimes indicative ECG (acute pulmonary heart signs)
- Sometimes, but not always, the CXR may be indicative...