Radiological syndromes

Alveolar syndrome
Bronchial syndrome
Interstitial syndrome
Vascular syndrome
Mediastinal Syndrome
Alveolar syndrome
Pulmonary architecture: Morphological unit is the **lobule**

15-25mm
**Lobule**

Lobule: morphological unit, smallest anatomical unit, ventilated by the centro lobular bronchiole accompanied by the centro lobular artery
dimension: 1 à 2,5 cm
composed of 3 to 5 acinus

**Acinus**

Acinus: functional unit

14 divisions between the trachea and the terminal bronchiole

1 et 1‘ bronchiole & centro lobular artery
2. bronchiole & terminal artery
3. respiratory bronchiole
4. Alveolar duct
5. Alveolar bag
6. Alveolus
7. Perilobular vein + lymphatic vessels
Features of alveolar syndrome

- Blurred, heterogeneous opacity
- Not well limited (except if there is contact with one fissure, then the consolidation is “systematised“)
- With sometimes aeric bronchogram
- No retraction in acute phase (but retraction is possible if chronic evolution)
Alveolar consolidation

Blurred, heterogeneous
Not well limited

But sharp boundary
if contact with a fissure

Right Upper Lobe
Pneumonia
Systematised opacity with aeric bronchogram
**Acute alveolar syndrome - Main etiologies**

*The more frequent*

**Infections (bacterial, viral)**
- Tuberculosis
  - Localized pulmonary oedema
  - Lung infarctus and embolism
  - Lung traumatism
  - Post radiotherapy (acute phase)
  - Mycosis
  - Loeffler syndrome
  - Alveolar sarcoidosis
  - Bronchoalveolar cancer

> 90% of cases

**Located**

**Infections (bacterial, viral, opportunistic)**
- Tuberculosis
  - Pulmonary oedema

> 90% of cases

**Diffuse**

- Traumatism (contusion, fat embolism)
- Angeitis
- Pulmonary haemorrhage
- Loeffler syndrome, eosinophilic lung
- Hypersensibility pneumonia (allergic alveolitis)
Chronic* alveolar syndrome - Main etiologies

* Much less common than acute should be referred to a pulmonologist

Chronic pneumonia
Chronic pneumonia with eosinophilia
Bronchiolo-alveolar cancer
Lymphoma and haemopathy

Diffuse bronchiolo-alveolar damage
Lymphoma and haemopathy
Sarcoidosis
Pulmonary alveolar proteinosis
Lipidic pneumonia
desquamative interstitial pneumonia

Located
Young man with no medical history
Fever, chills, **sudden onset** with right chest pain and purulent sputum

Right upper lobe pneumonia
*(Streptoccocus pneumoniae)*

- Heterogeneous
- Sharp boundary in contact with a fissure
- Aeric bronchogramme
- No retraction in *acute* phase
Right lower lobe pneumonia
(S. pneumoniae)
Bacterial pneumonia are often caused by ear-nose-throat and dental infections and by Flu
F. 50 y Day 6 of a Flu
t° 40°, cough and sore spot right chest
very limited area of crackles in right scapular region

Right upper lobe pneumonia
Rapid clinical improvement with Amoxicillin
Slower radiological improvement

Evolution day 10
Bifocal infection: RUL external segment and left lower lobe
Bilateral tuberculosis pneumonia

Cough, asthenia, loss of weight since 4 weeks

AFB (acid fast bacilli) + in sputum

Bilateral tuberculosis pneumonia
Retractile evolution with treatment
TB pneumonia is frequent in countries with high incidence of TB in HIV + patients, but also in HIV -

In case of AIDS: mediastinal adenopathies are often associated and TB pneumonia is often located in the lower lobes.

If the immunosuppression is severe, the cavities are rare.
Man 30 y old HIV+

Right upper lobe and middle lobe pneumonia
Hilar and mediastinum adenopathies
AFB sputum negative

Bronchial aspiration and BAL (bronchiolo alveolar lavage):
AFB +

Fistulised node on endoscopic view

This image is typical of TB/HIV
African officer in internship in France, t° 37°8C, stable condition, no functional or respiratory signs

Excavated opacity of the inferior lobe, apical segment, AFB+
Pneumonia with aortic bronchogramme

Cavern

Micro nodules
Man, 50 years old, fever, cough, dyspnea, headache, abdominal pain. Worsening despite amoxicillin treatment.

Legionnaires’ disease

*Legionella pneumophila*
Man, 35 years old, dyspnea and severe hypoxemia. Treatment by amoxicilline 3 g per day. (1)
Worsening at J4. Modification of treatment and introduction of erythromycin IV 3g/24h. Improvement in few days: *Mycoplasma pneumoniae* (2)
Alveolar form of pneumocystosis
RARE

Broncho Alveolar Lavage : PJP

Aeric bronchogramme

PJP - Allergy to Bactrim
=> dapsone
Improvement S3
If patient does not improve under amoxicilline and has not evident TB (AFB neg in sputum +/- Xpert negative)

- Consider to switch to macrolides
- Do not use fluoroquinolones
- Ask for HIV status

**If the alveolar syndrome is chronic**
You must consider an alternative diagnosis

Lymphoma, bronchiolo-alveolar carcinoma, ....
and refer to a pulmonology ward
Bronchiolo-alveolar carcinoma
Bronchiolo-alveolar carcinoma
Pulmonary oedema → alveolar syndrome

2 physiopathological mechanisms:

- **Hemodynamic oedema**: result of left ventricular failure
- with pulmonary arterial hypertension, of post-capillar type.
- Medical treatment is usually effective (O2, diuretic, TNT..)
- There is no anatomic lesion of the “alveolar capillary barrier“

- **Lesional edema** also called Acute Respiratory Distress Syndrome (ARDS):
  The “alveolar capillary barrier“ is more or less irreversibly altered.
  The prognosis is most often dismal. Death may occur by refractory hypoxemia.
  The etiologies are varied:
  - infectious (viral or bacterial)
  - toxic (for example inhalation of toxic gases)
  - complication of shock whatever the cause
Typical pulmonary cardiogenic oedema
Hemodynamic pulmonary edema radiological features

- Alveolar picture
- Perihilar predominant
- Bilateral but sometimes asymmetric
- Always with acute dyspnea, cough and clear sputum (although sometimes blood in sputum)
- Crepitant rales ("crackles") at the auscultation
Acute pulmonary oedema: “butterfly wings” image
Acute pulmonary oedema

After furosemide
Acute pulmonary oedema
Note the asymmetry of the image
Asymmetric cardiogenic edema
Two examples of ARDS
Woman, 7\(\frac{1}{2}\) months pregnant. Fever and dyspnea with rapid deterioration in few days. No improvement despite amoxicilline then erythromycin.
Worsening at D2 then D3: lesionnal oedema probably with a viral origin
F 27 y., fever, dyspnea and diffuse pain with quick onset. No improvement with antibiotic therapy - D1: admission in intensive care unit. Tamiflu treatment. Bronchial and nasopharyngeal sample for H5N1 virus PCR.
D2: no improvement => Non invasive ventilation - PCR + for H5N1
Typical ARDS
D4: mechanical ventilation with intra tracheal tube;
Note chest tube for left pneumothorax drainage

Progressive improvement D 8 to D25
ARDS lesional edema during a H5N1 flu in a young woman
Slow improvement after management in ICU
Alveolar syndrome

Easy to diagnose:
Blurred opacity, heterogeneous, ill-defined, except in contact with a fissure (systematized) non retractile with air bronchogram

Must especially evoke:
Localized: Bacterial pneumonia, TB pneumonia
Diffuse: acute pulmonary edema, infection (bacteria, TB, virus, fungus)