Interstitial Syndrome

Ground glass attenuation
miliary and nodular images
Linear images

Dr Etienne Leroy-Terquem
Centre hospitalier de Meulan les Mureaux. France
French-cambodian association for pneumology (OFCP)
Acinus and primary lobule

1. Terminal bronchiol;
2, 3, 4. respiratory bronchioli (BR1, BR2, BR3);
5. alveolar canal;
6. alveola sac;
7. alveola.

There are 14 divisions between the trachea and terminal bronchiol.

Lobule: morphological unit.
Dimension: 10 to 25 mm.
it is composed of 3 to 5 acini (functional unit) (7.5 mm); 30 to 50 primary lobules (0.5 to 1 mm).
1 et 1'. centrolobular Bronchiol and artery;
2. terminal bronchiol and artery;
3. respiratory bronchiol;
4. canal;
5. sac;
6. alveolar;
7. perilobular vein and lymphatic vessels.
• The different parts of interstitial tissue:
  
  - Intra-lobular tissue
  - Peri-lobular tissue
  - Under-pleural tissue
  - Axial or peri-broncho vascular tissue

(according to Dr. Bernadac)
• The different parts of interstitial tissue:
  
  – Intra-lobular

(according to Pr. Bernadac)
Intra-lobular interstitial tissue images:

- Ground glass attenuation
- Miliary: micronodules <3mm
- Nodules: between 3 and 7 mm
- Macronodules > 7mm
Ground glass attenuation

Normal chest X ray
Ground glass attenuation: Main etiologies

- Cardiac failure (initial state before alveolar oedema)
- Viral or atypical bacterial infections
- Lymphoma, haemopathy....
- **Pneumocystosis**
Pneumocystosis: one of the main opportunistic lung diseases in AIDS cases
Ground glass attenuation:

pneumocystosis
pneumocystosis

normal chest radio
Man, HIV+, severe dyspnea, nearly normal auscultation, SaO2 86%;
It is pneumocystosis.

Radiologic features in acute phase:
- ground glass or alveolar picture
- diffuse and bilateral
- no retraction, no systematisation
Pneumocystosis: improvement after treatment with cotrimoxazole
Miliary
Miliary: diffuse micronodules < 3mm

Normal chest radio
M, 25 years old
Non-productive cough
T° 39°C
Dyspnea with effort
AFB – in sputum

Miliary
Improvement
with anti-TB treatment
Miliary is often barely visible
Male, 68 years old, African, t° 40°C, weight loss, dyspnea, miliary left predominant, AFB negative in sputum

AFB+ in bronchoscopic aspiration
Miliary and bilateral adenopathies. This could be a tuberculosis case. It is sarcoidosis
Man, 30 years old, non-smoker, dyspnea and cough progressively increasing.  
2 chest x-ray with 2-month interval. AFB -

It could be tuberculosis or sarcoidosis
Woman, 20y
HIV+
Cough, dyspnea, t° 38.5°C
AFB -

BAL: Histoplasmosis
Diagnostic of miliary TB:

- Requires an excellent quality radio and very attentive analysis by the physician
- The images are often barely visible, in contrast with the importance of general signs (asthenia, dyspnea, fever, weight loss)
- AFB in sputum is usually negative
- **The primary diagnosis is TB**

Main differential diagnoses (miliary and nodules<7mm) are:
- fungal infection, particularly in cases of AIDS, (histoplasmosis, cryptococcosis, ...)
- **sarcoidosis** (incidence in developing countries?)
- **carcinomatosis miliary**
- **pneumoconiosis** (incidence in developing countries?)
  - auto-immune affection, haemopathy, immuno-allergic pneumopathy...
Nodules
Main etiologies of diffused nodules >7mm

- **Tuberculosis**
- **Pulmonary metastasis**
- Less frequent etiologies:
  - silicosis
  - sarcoidosis
  - lymphoma
  - fungal infection
  - multiple abcesses by septic emboly
  - hydatid cyst
  - bronchiolo-alveolar cancer and multiple bronchial cancers
  - vascularitis, Wegener, auto-immune disease, histiocytosis…
Man
55 years old

Reported left pleural effusion

Hemoptoic sputum

AFB+
Notice the excavation. This explains why this patient is AFB positive.
Woman 55 years old, cough and dyspnea trigged by physical exercise Tobacco >1pack/ day
Bronchial adenocarcinoma with lung metastasis
Bronchial carcinoma with carcinomatous miliary
Carcinomatosis nodules
Man, 55 years old, moderate dyspnea increasing progressively, good condition
This is sarcoidosis with nodules and adenopathies.

It could be also tuberculosis
Sarcoidosis
Man, 65 years old, asthenia, no respiratory symptoms except mild cough. Reported rectal cancer treated by surgery...
Chest radio 6 months later
Balloon release: pulmonary metastasis of rectum cancer
Balloon release: pulmonary metastasis (primary cancer: melanoma)
Silicosis
Silicosis in an older mineworker
Silicosis in an older mineworker
• The different parts of intestinal tissue:

– Under-pleural tissue

( according to Pr. Bernadac )
The pathology of under-pleural tissue is characterized by linear images called Kerley A or B lines.
Kerley lines: main etiologies

• Cardiac failure (B kerley lines)
• Viral infections

• Less frequent:
  - carcinomatous lymphangitis
  - Fibrosis, regardless of the etiology (toxic, auto-immune, allergic, idiopathic..)
  - pneumoconiosis
  - haemopathy
  - …
Kerley A lines
oblique lines, inside and downward direction, in the superior and middle part of the lungs
Kerley B lines
more frequent than Kerley A lines
lateral and inferior part of the lungs
initial state of cardiac failure +++
• The different parts of interstitial tissue:

  – Peri-lobular tissue

( according to Pr. Bernadac )
The increasing thickness of the peri-lobular septa and their intersection produce reticular opacities which line polyedric spaces: « Meshed net » aspect. The main etiology is pulmonary fibrosis, regardless of the etiology (idiopathic, toxic, autoimmune...)
Idiopathic fibrosis
Idiopathic fibrosis
Woman, 70 years old, increasing dyspnea bilateral crepitation (1)
Immuno-allergic pneumopathy to pigeon dejecta: Improvement after corticoid treatment and eviction of the birds. However, persistence of crepitation, consequence of a persistent fibrosis
• The different parts of interstitial tissue:

Axial or peribronchovascular tissue

(according to Dr. Bernadac)
The pathology of peri-bronchovascular tissue is characterised by linear opacities from the hilus to the periphery of the lungs.

Main etiologies are:
- Carcinomatous lymphangitis
- Fibrosis regardless of the etiology (idiopathic, auto-immune, allergic, toxic)

Courtesy of Dr. Anthoine
Man, 60 years old. Dyspnea triggered by physical exercise, poor condition and jaundice.

The association of nodular and linear images suggests in this context a carcinomatous lymphangitis (pancreatic origin).
Conclusions

• The Interstitial pathology is complicated
• The etiologies are numerous
• The intrication with alveolar pictures is frequent (cardiac failure, TB, infections..)
• The interpretation requires a very good quality chest radiography (especially for miliary)