Lungs and AIDS from Radiological point of view

Dr. Etienne Leroy Terquem – Pr Pierre L’Her

SPI / ISP
Soutien Pneumologique Internatinal / International Support for Pulmonology
“Support needing populations through medical assistance and the transfer of knowledge to local medical practitioners.”

Our vision for the Medical Assistance & Medical Education (MAME) Programs
Lungs and AIDS From Radiological point of View

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Global TB Burden

• In 2012,
  8.6 million people were estimated to have TB but only 5.7 millions newly diagnosed cases reported to TB programmes.

• Therefore, about 3 million people with TB were missed either because they are not diagnosed or they were diagnosed but not reported
TB Burden in Myanmar

A major public health problem;

- One of the 22 TB high burden countries,
- One of the 27 high MDR TB burden countries
- One of the 41 high TB/HIV burden countries

(WHO report 2009)
Incidences of TB: HIV (+) vs HIV (-)

- HIV (+)
  - 3-13% every year
  - >30% lifetime
  - Increased risk of TB disease in HIV

- HIV (-)
  - 5% first 2 years
  - <10% lifetime

World Health Organization
More difficult to treat TB disease

• Adverse drug reactions
• May increase default rates in TB programs
• May increase overall mortality rate in TB programs
More difficult to diagnose TB in HIV

• TB infection
  – False positives and false negatives from tuberculin skin test in HIV

• TB disease
  – Typical symptoms may be missing
  – Sputum smear may be negative
  – Chest x-rays may be normal or atypical
More extra pulmonary TB in case of HIV co infection.

PTB, pulmonary TB
EPTB, extrapulmonary TB
LNTB, lymph node TB
MTB, miliary TB
DTB, disseminated TB
TBM, meningeal TB
ABDTB, abdominal TB
GU TB, genitourinary TB

The global answer to TB/HIV: We will do with Collaborative activities
Cascade of infections and cancers that develop as immune function is depleted
HIV/AIDS prevention and treatment. NIH Stefano Bertozzi and coll.
<table>
<thead>
<tr>
<th>CD4+ cell count (× 10^6 cells l⁻¹)</th>
<th>Pulmonary pathology</th>
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<tbody>
<tr>
<td>&gt;500</td>
<td>Bacterial pneumonia</td>
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<td>TB (re-infection)</td>
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<td>Lung carcinoma</td>
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<td>200–500</td>
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<td>50–200</td>
<td>Bacterial pneumonia</td>
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<td>TB (primary)</td>
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<td>Lung carcinoma</td>
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<td>PCP</td>
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<td>Lymphoma</td>
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<td>Fungal infections</td>
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<td>Toxoplasmosis</td>
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<td></td>
<td>Bacillary angiomatosis</td>
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<tr>
<td>&lt;50</td>
<td>Bacterial pneumonia</td>
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<tr>
<td></td>
<td>TB (atypical appearances)</td>
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<tr>
<td></td>
<td>MAC</td>
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<td></td>
<td>CMV</td>
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TB, Tuberculosis; PCP, Pneumocystis carinii pneumonia; KS, Kaposi's sarcoma; MAC, Mycobacterium avium complex; CMV, cytomegalovirus.
ANRS* study on lung diseases and AIDS in East Asia

Cambodia:

- 39% TB
- 30% PCP
- 16% Bacterial inf.
- 6% Mycosis
- 5% atypical mycobacteria
- 4.7% Strongyloïdiasis
- 0.3% Cancer

Vietnam: similar but very few fungal infections, no atypical mycobacteria or anguillulosis

*French national agency for scientific research in AIDS
The respiratory diseases are frequent (80% of the cases) and severe during the course of HIV infection.
The respiratory diseases are frequent (80% of the cases) and severe during the course of HIV infection.

• They can occur at every phase of the evolution: from the beginning of AIDS until death.
• The respiratory diseases are numerous:
  ➢ **infectious** <= immunodepression
  ➢ tumourous
  ➢ others

• The ARV have modified the situation in wealthy countries, and also in developing countries, but, in these countries, lung diseases associated with AIDS remain frequent and severe, and their diagnosis and treatment continue to be difficult.
HIV and Lungs (TB): Double Trouble

Lung = target for many severe infections with high incidence of death

• This natural evolution can be modified by:
  – prophylactic treatment => effective on some pathologies (eg: cotrimoxazole and pneumocystosis or toxoplasmosis)
  – The use of antiretroviral treatments: they are very effective against HIV and can remain effective for a long time if the treatment is correctly adapted and if the patient is compliant.
3 main pathologies for 80% of pulmonary infectious diseases in AIDS:

- Tuberculosis
- Pneumocystosis
- Bacterial pneumopathies
Respiratory diseases in patients not receiving ARV

Infectious diseases

- Pneumocystosis (PCP)
- Tuberculosis
- Bacterial Pneumoniae
- Parasitic pneumoniae
- Fungal pulmonary diseases
- Atypical mycobacteriae
- Viral diseases
Respiratory diseases in patients not receiving ARV

*Infectious diseases*

- Pneumocystosis
- Tuberculosis
- *Bacterial pneumoniae*
- Parasitic pneumoniae
- Fungal pneumoniae
- Atypical mycobacteriae
- Viral diseases

- *Streptococcus pneumoniae*
- *H. influenzae*
- *others*
  - *Staph. aureus*
  - *Ps. aeruginosa*
  - Legionnaires’ disease
  - *Nocardia asteroides*
  - *Rhodococcus equi*....
Respiratory diseases in patients not receiving ARV

*Infectious diseases*

- Pneumocystosis
- Tuberculosis
- *Bacterial pneumonia*
- *Parasitic pneumoniae*
- Fungal pneumoniae
- Atypical mycobacteriae
- Viral diseases

- Toxoplasmosis
- Anguillulosis
- Leishmaniosi
- Cryptosporidiosis
- Strongiloïdiasis…
Respiratory diseases in Patients not receiving ARV

Infectious diseases

- Pneumocystosis
- Tuberculosis
- Bacterial pneumonia
- Parasitic pneumonias
- Fungal pneumonias
- Atypical mycobacteria
- Viral diseases

Cryptococcosis
Aspergillosis
Histoplasmosis
Coccidioïdomyces
Penicilliosis
Respiratory diseases in patients not receiving ARV

**Infectious diseases**

- Pneumocystosis
- Tuberculosis
- Bacterial pneumonias
- Parasitic pneumonias
- Fungal pneumonias
- **Atypical mycobacteria**
- **Viral diseases**

- Mycobacterium avium
- M. kansassii
Respiratory diseases in patients not receiving ARV

**Infectious diseases**

- Pneumocystosis
- Tuberculosis
- Bacterial pneumoniae
- Parasitic pneumoniae
- Fungal pneumoniae
- Atypical mycobacteriae
- **Viral diseases**
  - CMV
Many Pathologies

• Who can help to Physician to get early Dx for TB and Lungs diseases????

• Clinical Sign/Symptoms PLUS
• Investigations ; Microscopy, Radiological points ( X ray, CT ,..)
  and/or Bronchoscopy or BAL

• For us, X ray---???
• Let’s try to find out some Radiological finding in lungs diseases
Possible etiologies according to radiological appearance

- Normal chest Rx with clinical respiratory signs
  - Focalised condensation
    - Diffuse lesions
1. Normal chest Rx with clinical respiratory signs

Frequent pathology
- Bacterial infection of superior airways
- Opportunistic infection at the beginning (Pneumocystosis)

Possible pathology
- bronchial tuberculous infection or TB miliary at the beginning
- other opportunistic infections at the beginning (aspergillosis)
- endo-bronchial tumour
- lymphocytic interstitial pneumonia (T CD8 in BAL)

differential diagnosis
- pulmonary embolism
- bronchospasm
- lactic acidosis (ARV complications)
2. Focalised condensation

Frequent pathology
- common bacterial infection

possible pathology
- Tuberculosis
- mycosis (aspergillosis, cryptococcosis…)
- atypical mycobacteria
- others bacterial infections (Nocardia, Actinomyces, Rhodococcus equii..)

courtesy of Mayaud in Girard, Katlama, Pialoux “VIH 2001 “, éd. Douin Paris

rare pathology
- lymphoma
- toxoplasmosis

differential diagnosis
- lung cancer
3. Diffuse lesions

**frequent pathology**
- pneumocystosis
- Kaposi’s disease
- tuberculosis

**possible pathology**
- mycosis (aspergillosis, histoplasmosis, cryptococcosis)
- mycobactérioses atypical mycobacteria
- others infections (toxoplasmosis...)
- usual bacterial infections

**rare pathology**
- interstitial lymphoïd pneumonia

**Différential diagnosis**
- pulmonary œdema
- iatrogenic pneumopathy
<table>
<thead>
<tr>
<th>Chest X ray  TB HIV(-) and HIV+ CD4&gt;200</th>
<th>Chest X ray  TB HIV+ ( CD4 &lt; 200 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>- more frequent in superior lobes</td>
<td>- cavitation is rare</td>
</tr>
<tr>
<td>- caverns</td>
<td>- Frequency of TB pneumoniae and adenopathies (often associated)</td>
</tr>
<tr>
<td>- typical nodular infiltrates (in the apex and more or less excavated)</td>
<td>- Lesions in inferior and superior lobes</td>
</tr>
<tr>
<td></td>
<td>- Frequency of miliaries</td>
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<tr>
<td></td>
<td>Frequency of extra pulmonary TB</td>
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</tbody>
</table>
CXR in case of patients TB/ HIV+

- not too severe immunodepression
  - CD4>200
- Severe immunodepression
Male 30 years old Soldier HIV +

Pneumonia of right superior and middle Lobes

Hilar adenopathies AFB x3 negative

Bronchial aspiration and BAL : AFB+ +

Bronchial endoscopy Aspect of fistula from adenopathy
TB bilateral pneumonia and mediastinal adenopathies in a patient with AIDS. CD4 level: 50/mm3. No excavation.
TB, HIV+: double tuberculous pneumonia; middle lobe and left superior lobe. Mediastinal adenopathies
R L lobe and middle lobe TB pneumonia in context of severe immunodepression

Inferior lobe TB are not rare in case of AIDS
TB of middle or inferior lobes pneumoniae are common in cases of AIDS.

External segment of middle lobe pneumonia
Tuberculous miliary: HIV+ young woman, CD4 level: 60/mm3
Mediastinal adenopathies are frequent in AIDS cases

Endobronchial fistula with bronchogenic dissemination is possible
Immune reconstitution inflammatory syndrome: clinical examples
Male HIV +, CD4 level: 50/mm3
October 2006. AFB (-)

Case 1
Dec 2006: AFB + in sputum. Beginning of TB treatment
Beginning of anti retroviral treatment
Chest X ray on 28/02/2007 (After 3 weeks of ARV treatment)
Chest X ray on 04/04/2007: 7 weeks of antiretroviral and continuing TB treatment. (Favourable issue after few weeks of associated cortico-steroid treatment)
Paradoxical reactions in the immune reconstitution inflammatory syndrome

- Fever
- Adenopathies
- Ascites
- Pleural or pericardic effusion
- Pulmonary infiltrate or pneumoniae
- Encephalic diseases (tuberculoma)

-Soon after introduction of ARV
- The severity is correlated with the initial Immunodepression (base line CD4 level)
Several micro-organisms are responsible for lung diseases in AIDS. Therefore, differential diagnosis of TB in HIV patients are many, and especially pneumocystosis.

Frequency of pneumocystosis
Pneumocystosis

- Unknown HIV infection status (80% of cases)
- No prophylaxis with Cotrimoxazole (100% of cases)
- Fever: 38° - 40°C
- Normal pulmonary auscultation (90% of cases)
- No extra-pulmonary signs (90% of cases)
- Interstitial/ alveolar diffuse opacities (100% of cases)
- **Hypoxia** (SaO2 < 90%) 100% of cases

Courtesy of Chan Sarin ANRS1260
Interstitial picture: ground glass attenuation image
Male, HIV +, severe dyspnea, normal auscultation, SaO₂ 86%
interstitial and alveolar diffuse lesions
Male 42 years old, cough, exertional dyspnea, SaO2 92 %; HIV+
BAL: pneumocystosis
Chest X ray: could be considered as normal. Possible ground glass attenuation image

Normal chest X ray
Interstitial and diffuse pneumonia with ground glass attenuation

Hypoxemia $\text{SaO}_2 < 90\%$

Without cotrim. prophylaxis

Cotrimoxazole +/- cortisone + oxygen are mandatory to prevent death

$=$ PCP
National TB Program strategy for TB case finding

Respiratory +/- general symptoms
→ AFB-sputum X 2/3 cups (within 2 days)
↓
If negative → antibiotic (amoxycillin) X 10 days
If patient not improved and new smears negative
↓
CXR (after 2 or 3 weeks)

If it was PCP, the patient will be dead
In HIV infected patients, CXR should be performed early
non TB bacterial pneumonias are frequent in case of HIV infection

- *Streptococcus pneumoniae*
- *H. influenzae*
- autres
  - *Staph. aureus*
  - *Ps. aeruginosa*
  - Légeonéllose
  - *Nocardia asteroides*
  - *Rhodococcus equi*....

Mild Immunodépression

Severe immunodepression
Non TB bacterial pneumonia are frequent in HIV infection with moderate immunodepression: Str. Pneumoniae, hemophilus….

They are often bilateral
Nocardiosis

bilateral opacities
With excavated nodules

Infectious disease and aids ward, khmero russian hospital
PhnomPenh
One can also see fungal infections:
Cryptococcosis
Histoplasmosis
*Penicillium marneffei*
Invasive aspergillosis
Disseminated histoplasmosis to *H. capsulatum* in an HIV+ patient

BAL: fungal micro-organisms in the macrophages
W. 20y. HIV+, cough, dyspnea, t° 38°5C
Miliary

AFB -

BAL : Histoplasmosis
Sometimes in AIDS: poly-pathology
Kaposi illness: various lesions on chest Xray

- Diffuse micro or micronodules
- Alveolar condensation, lower lobes predominant
- Pleural effusion
- Possible mediastinal adenopathies
- Frequent (but not constant) association with cutaneous or mucosis lesions, which can help for diagnosis

Possible confusion with TB
Kaposi illness
Courtesy of Dr Difenthal. Tanzania
Kaposi illness
Courtesy of Dr Difenthal, Tanzania

- Diffuse micro or micronodules
- Alveolar condensation, lower lobes predominant
Lymphocytic interstitial pneumonias:
- 2 to 5 years old HIV children (20% of HIV+ children in developed countries)
- Less frequent in adults. Diagnosis is difficult: One must eliminate opportunistic infection (Bronchio-alveolar lavage and lung biopsy)
Lymphoma
Lymphoma

• Rarely confined to chest only

• When seen in the chest it presents as typical mediastinum nodal enlargement, or mass in the anterior mediastinum (*as in the previous slide*) pleural or pericardial effusion, pulmonary infiltrates or pulmonary mass
Other Investigation to dx TB

In cases of acute respiratory disease in AIDS with AFB(-) in sputum,

Bronchial endoscopy and BAL are useful for diagnosis if a reliable bacteriological laboratory is available…
HIV infection is increasing the risk of very severe TB.

TB treatment is the same in HIV(+) and HIV(-) cases but with more risk of complications and more risk of associated opportunistic infections.

Mortality rate of lung disease in AIDS stays at a high level.

Collaboration between National TB program and HIV/AIDS program is crucial in countries with high TB/VIH prevalence.
CXR can give informations for diagnosis especially if AFB neg

(Important of CXR interpretation with case example!!!!)

Diagnostic of opportunistic infections can be difficult and NEED training for Radiology)

Physicians working in TB program or in TB field should be correctly trained to CXR interpretation
One Interesting Message

• SPI/ISP will have Radiological training to TB doctors soon.

• If you are interested, Please contact with Dr Ni Ni (she is also a facilitator).

Ok with our Dr Ni Ni??
• Welcome for some advices!!
Thank you