Pneumonies: classification

Pneumonies communautaires

Pneumonies associées aux soins
  Non nosocomiales
  Nosocomiales
    Malade ventilé
      précoces
      tardives
    Malade non ventilé
The concept of Health Care Associated Pneumonia (HCAP)

Kollef M  Chest 2005, 128, 3854

4543 patients with pneumonia in a large US data-base (59 hospitals). ATLAS..

50% with CAP, 20% with HCAP, 30% with HAP or VAP.

Mortality

CAP: 10%  HAP: 18,8%
HCAP: 19,8%  VAP: 29,3%  p<0,0001.
# Bacteriology of Postoperative Pneumonia EOLE Study

Dupont H  ICM 2003, 29, 179-88

<table>
<thead>
<tr>
<th>Bacterium</th>
<th>Count</th>
<th>Bacterium</th>
<th>Count</th>
</tr>
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<tbody>
<tr>
<td>E. Coli</td>
<td>46</td>
<td>H. influenzae</td>
<td>63</td>
</tr>
<tr>
<td>K. Pneumonia</td>
<td>12</td>
<td>Staphylococcus</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coag ⊕</td>
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</tr>
<tr>
<td>Enterobacter</td>
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<td>Coag ⊗</td>
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<tr>
<td>Serratia</td>
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<tr>
<td>Pseudomonas</td>
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<td>S. Pneumoniae</td>
<td>31</td>
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<tr>
<td>Acinetobacter</td>
<td>6</td>
<td>Streptococcus spp</td>
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<tr>
<td>Miscellaneous</td>
<td>80</td>
<td>Yeasts</td>
<td>23</td>
</tr>
<tr>
<td>G. Neg</td>
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EARLY ONSET ICU ACQUIRED PNEUMONIA

↔ Represent 50% of the VAP. They are due to an aspiration happening often before, or just after the ICU admission.
↔ Not related to quality of care
↔ Susceptible strains carried by the normal host (MSSA, pneumococcus, haemophilus..)

↔ The inoculum, the virulence of the bugs, the general and local (lung) defences will condition the occurrence of VAP.
↔ How long could it take ???
Micro-organisms responsible for 408 episodes of ventilator associated pneumonia (VAP) confirmed by quantitative cultures of bronchoalveolar lavage

<table>
<thead>
<tr>
<th></th>
<th>Early-onset VAP (n=191)</th>
<th>Late-onset VAP (n=217)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentially multiresistant</td>
<td>219 (79%)</td>
<td>257 (85%)</td>
<td>0.06</td>
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<tr>
<td>Bacteria</td>
<td>116 (42%)</td>
<td>141 (47%)</td>
<td>0.26</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>93 (33%)</td>
<td>90 (30%)</td>
<td>0.39</td>
</tr>
<tr>
<td>MRSA</td>
<td>6 (2%)</td>
<td>12 (4%)</td>
<td>0.30</td>
</tr>
<tr>
<td>Acinetobacter baumannii</td>
<td>4 (1%)</td>
<td>14 (5%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Stenotrophomonas maltophilia</td>
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</tr>
</tbody>
</table>
UNUSUAL CAUSES
OF NOSOCOMIAL PNEUMONIA

- Anaerobes.
- Ameba-associated microorganisms
  Bergen et al. Emerging ID 2006
  10.5% of 210 patients.
  Acanthamaeba polyphaga
  minivirus: 8, Legionella: 3, other L=4.
- Atypical microorganismas
  chlamydia, Mycoplasma pneumoniae.
- Viruses
  Herpes 1, CMV, VRS:
  Dambin C ICM 2005.
- Aspergillus, Candida.
VIRAL NOSOCOMIAL PNEUMONIA

-left Herpes virus:
  HSP 1  Bruynseels P  Lancet  2003
  CMV  Papazian L  Anesthesiology  1998
  VRS in kids.  Plenty of literature

-left SARS.

-left Influenza:  major cause in LTC Facilities
  H5N1

-left Role of the vaccination of both elderly people and health care practitioners.
Bacteriological diagnosis during severe sepsis

- Diagnostic studies should be performed promptly
  - history
  - physical examination
  - laboratory
  - imaging procedures as appropriate

- Cultures should always be obtained before antibiotic therapy

Invasive versus non Invasive strategies in the management of VAP


Randomized study. Multicentric (n=31).

413 patients

Empiric antibiotic therapy vs BAL or PSB including Gram Strain.

Reduction in mortality 16,2 vs 25,8 (p=0.022)

Reduction in SOFA scores

Decrease antibiotic use: Antibiotic free days 11,5 vs 7,5  p < 0.001.
Why do we urgently need rapid diagnostic methods in ID?

- Gain one or two days as compared to standard (culture) methods.
- Rapid access to the responsible bacteria and resistance profile.
- Detect bacterial components although classical techniques are negative (blood...).
- Avoid inappropriate broad spectrum antibiotic therapies.
Different methods to detect micro-organisms or toxins

- **Gram stain** (urines, meningitis, BAL...).
- **Toxins** : (Clostridium difficile, TSST-1, PVL...)
- **Antigen**: (pneumocococcus, Legionella, aspergillus...)
- **Microorganism**:  
  ° Blood cultures, at the periphery, and via the catheter lines, when needed
- **Immunological tests**: Staph (3M)  
  Real Time PCR  
  Fluorescent amplican length analysis  
  Micro-arrays.
Detection of bacterial or fungal antigens

- Pneumococcus in urines.
- Pneumococcus in liquides or pus.
- Legionella in urines.
- Aspergillus in blood.
- ......
Real time PCR to diagnose bacteremia and fungemia

Directly done on the initial blood sample. Could be difficult and a bit long for several organisms.

Performed within a few hours on a positive blood culture. Septifast, techniques perso..
Rapid diagnosis of aspergillus

- **Cell wall components:**
  - Galactomannan (Elisa)
  - β Glucan.

- **PCR in blood, and BAL:**
  - Sensitivity and specificity of those test remain matter of controversy.
Rapid diagnostic methods and resistance

- Resistant pneumococcus.
- MRSA.
- VRE.
- E. Coli with ESBL.
- Cephalosporinases.
- Carbapenemases.
- ……..
Detection of carriers

- MRSA (Huletsky CID 2005).
- MSSA.

- Streptococcal colonization in Neonates
  Natarajan G Pediatrics 2006
  Colonisation rate 17% with culture
  51% with PCR
  sensitivity 90% PPV 28%
  specificity 80,3% NPV 98,9%.

- Strepto test for pharyngitis.
Identification of Methicillin-resistant staphylococcus aureus carriage in less than 1 hour during a hospital surveillance program


Clin Infect Diseases 2005;40:976-81

Results: The PCR assay MRSA in all 81 samples that were culture positive for MRSA. The PCR assay detected 4 additional MSA-positive specimens, for a specificity of 98.4%, a positive predictive value of 95.3%, and a sensitivity and negative predictive value of 100%.
SMART cyder to detect MRSA Nasal carriage

- 1117 specimens in 836 patients. ICU. Vascular Surg Geriatry. Diabetology
- Comparison between Real Time PCR and 3 culture media
- Sensitivity 97,8% - Specificity 99,9%.
- Positive predictive value: 89,1
- Negative predictive value: 99,8
- 5% of the couples remained unresolved.
Fungi are not fun guys
CLINICAL CASE OF CANDIDA PNEUMONIA

- 78 year old patient
Severe staphylococcus aureus (susceptible) septicemia > 10 PBC
Multiples localisations (knees, right hip, sternum, mediastinum....)
Steroids for septic shock.

Day 13 Pneumonia with clearcut new pulmonary infiltrates. Many positive bronchial samples including PSB 8-10^3 and BAL 6-10^6 with candida albicans + candida glabrata
1 positive blood culture with candida albicans.

Treatment with either Ambisome or Micafungin (Fujisawa Protocol). Recovery.
Nosocomial Aspergillus pneumonia

- 69 year old woman

Biliary peritonitis. Severe septic shock
E. coli septicemia. Bronchial sample =
Admission SAPS II predicts a 69 % mortality

- Treatment
  - High dose epinephrin.
  - Corticosteroids.

Day 11 39°5. ARDS. BAL
Day 20 worsening of clinical status. BAL...
Day 21 Death. BAL and Winberley brush with
Aspergillus fumigatus and P. Aeruginosa

- Serology and antigenemia

- Autopsy
  - large vascular invasion with Aspergillus in lung vessels.
Marqueurs de l’‘inflammation

- Permettent d’éviter de débuter un traitement antibiotique
- Permettent de suivre l’évolution thérapeutique, et de moduler la durée de traitement
- Le plus étudié, et le plus efficient est la procalcitonine