

Bacterial Pneumonia

Pneumonia is an infection that inflames respiratory bronchi, alveolar sacs and interstitium.

Symptoms

- acute fever, cough, tachypnoea
- immunocompetent patients may not seem severely ill (higher temperature, signs of toxic effect, cough - dry, later changes to productive, shortness of breath)
- predisposition to bacterial pneumonia are immunodeficiency, congenital lung anomalies, cystic fibrosis, ciliary dysfunction...

Diagnosis

- auscultation - bronchial breath sounds, crackles, rales, percussion dullness, increased pectoral fremitus
- combined with pleural pathology - tight chest, shallow breathing, pain, pleural friction
- when an effusion is present - percussion dullness, shallow or compressive breathing
- sometimes it can manifest as abdominal pain or meningism
- higher WCC - higher than $15 \times 10^9/l$
- chest X-ray: lobar consolidation, interstitial and air space opacification
 - when an effusion is present - opacity in lower and lateral parts of the lungs
 - it is important to make an image of the patient lying down and on the patient's side

Differential Diagnosis

- atelectasis (X-Ray - concave border, lobar pneumonia has convex border)
- pleural effusion, lung, mediastinal or pleural tumors, foreign body aspiration, aspiration of gastric contents, lung infarction, lung congestion, chronic interstitial lung disease,...

Complications

- lung abscess, empyema (staphylococci, beta-hemolytic streptococci group A)
- meningitis, otitis media, sinusitis, pericarditis, septicemia
- immunocompromised patients (for example splenectomy,...) - predisposition to sepsis

Therapy

- antibiotics targeted against the agent
- it is important to have an X-Ray, age of the patient, patient's immune status
- pneumococcus - PNC, amoxicillin, ampicillin, erythromycin, clindamycin
 - symptoms of toxicity with breath shortness - crystal PNC i.v.
- haemophilus influenzae - ampicillin, cephalosporins (7–10 days parenteral, 10–14 days oral),
- staphylococcus - antistaphylococcal PNC (oxacilin, cloxacillin, methicillin), then cephalosporins and aminoglycosides
 - vancomycin for resistant staphylococcus
- empyema - thoracentesis or chest drainage
- oxygen therapy, rehydration

Prognosis

- usually good if the diagnosis and therapy is fast
- mortality of a pneumonia without complications - lower than 1%

Prevention

- vaccination,
- children under 2 years, patients after splenectomy - pneumococcal vaccination

Staphylococcal Pneumonia

- nowadays rare, more common with infants compared to older children
- severe because of its progressive course and tendency towards complications - abscesses, pyopneumothorax
- staphylococcus aureus - virulence factors - enzymes, toxins (hemolysin, leukocidin, staphylokinase, coagulase)
- bronchogenic or hematic spread of the infection

Pathophysiology

- inflammatory deposits merge, s. aureus quickly grows and destroys its surroundings, small abscesses are

- formed
- rupture of a subpleural abscess creates pyopneumothorax
- partial obstruction of small bronchi can lead to pneumatocoles' formation
- septic thrombus can be formed in pulmonary veins

Symptoms

- acute fever, shortness of breath
- staphyloiderma may appear
- infants - peracute, sepsis
- physical examination: in the early stages is the same as for pneumonia, when empyema or pyopneumothorax is formed then shallow breathing
- laboratory tests: leukocytosis, neutrophilia, anemia, a left shift in blood count, high ESR and CRP, positive blood culture
- chest X-Ray (lungs + heart): at first small bronchopulmonary deposits, they quickly grow and merge
 - exudate formation
 - abscesses – form cavities with with a wide border (filled with air after emptying the content into the bronchus)
- complications: rare with targeted ATB therapy, younger infants - staphylococcal pericarditis, meningitis, osteomyelitis, metastatic abscesses

Diagnosis

- complicated during early stages
- anamnesis - information about staphyloiderma or mother's mastitis
- clinical symptoms, X-Ray, cultivation
- differential diagnosis: pneumonias that could be complicated by empyema (agents: streptococci, klebsiella, haemophilus)

Therapy

- antistaphylococcal ATB - oxacillin, vancomycin (3-4 weeks)
- i.v. application of Ig or antistaphylococcal serum
- empyema – chest drainage (max. 7 days)
- prognosis – high mortality, it is influenced by the health status of the patient before the illness and by complications

Typical and Atypical Pneumonia

PARAMETR	TYPICAL PNEUMONIA	ATYPICAL PNEUMONIA
Basic Characteristics	significant physical findings	poor physical findings
Agents	(extracelular) <i>Streptococcus pneumoniae</i> , <i>Haemophilus influenzae</i> <i>Haemophilus parainfluenzae</i> , <i>Staphylococcus aureus</i> , <i>Klebsiella pneumoniae</i> , <i>Escherichia coli</i> a <i>Pseudomonas aeruginosa</i>	(intra/paracelular) <i>Mycoplasma pneumoniae</i> , <i>Chlamydophila pneumoniae</i> , <i>Chlamydophila psittaci</i> , <i>Legionella pneumophila Coxiella burnetii</i> , viruses – RSV, influenza, <i>Pneumocystis carinii</i>
Disease Onset	acute	after an upper respiratory tract infection, slow
Extrapulmonary Symptoms	mild	common - headaches, myalgias, vomiting, diarrhea
Fever	septic fever	higher temperature
Shivering	yes	rare
Cough	productive	dry
Heart Rate	tachycardia is possible	normal
Patient looks	ill	"okay, fine"
Physical Examination	crepitus, bronchial breath sounds, rales	rarely rales
X-Ray	segmental/lobar opacification (alveoli defect)	reticulonodular interstitial pattern (interstitial defect)
ESR	high	slightly increased
Inflammatory Markers	high	slightly increased
Blood Test	leukocytosis	lymphocytosis
Therapy	penicillins	macrolides

Reference

- BENEŠ, Jiří. *Studijní materiály* [online]. [cit. 2010]. <<http://jirben.wz.cz>>.