

RESPIRATORY TRACT INFECTIONS

RTI

- ◉ most common ID
- ◉ high morbidity
- ◉ from mild to fatal severity
- ◉ season incidence
- ◉ high costs
- ◉ ATB!!!

RTI - ETIOLOGY

- ◉ more than 200 pathogens
- ◉ viruses
- ◉ bacteria
- ◉ parasites
- ◉ fungi

RTI:

Upper RTI

- ◉ rhinitis, „common cold“
- ◉ sinusitis
- ◉ mesotitis (AOM)
- ◉ tonsillitis, pharyngitis
- ◉ epiglottitis

Lower RTI

- ◉ laryngitis, tracheitis
- ◉ bronchitis, bronchiolitis
- ◉ pneumonia

RTI DIAGNOSTICS

- ◉ blood count, CRP
- ◉ etiology: culture, antigen detection, PCR, serology

Sampling:

- ◉ selection
- ◉ nose /?/ low yield
- ◉ throat - swab, nasopharyngeal washings
- ◉ sputum, BAL
- ◉ paracentesis fluid
- ◉ blood culture
- ◉ CAVE - microbiology testing before ATB

RHINITIS (COMMON COLD)

Characteristics

- ◉ acute viral illness
- ◉ transmission - large droplets, direct contact
- ◉ Incubation: 1 - 3 d
- ◉ all year incidence with peaks in fall and spring

Etiology

- ◉ rhinoviruses (more than 100 serotypes)
- ◉ pikornaviruses, coronaviruses, influenza and parainfluenza viruses, RSV, adenoviruses

RHINITIS:Clinical manifestations:

- ◉ nasal congestion, sneezing, rhinorrhea
- ◉ cefalea, sore throat, cough
- ◉ **no fever** in most cases
- ◉ **5 - 7 days**
- ◉ usually rhinosinusitis

Complications:

- ◉ bacterial sinusitis, otitis
- ◉ sudden death in infants..

RHINITIS:

dif. dg.: allergic rhinitis

Therapy:

- ◉ symptomatic
- ◉ local adrenergic agents
- ◉ antihistamines

SINUSITIS

Most common affection of maxillar sinuses

Etiology

- ◉ rhinoviruses, influenza+parainfluenza v., adenoviruses
- ◉ *H. influenzae*, *S. pneumoniae*
- ◉ **less common**- *M. catarrhalis*, *S. pyogenes*, *S. aureus*

SINUSITISClinical manifestations:

- ◉ initially common cold
- ◉ cefalea, fever, nasa secretion, fatigue, nausea
- ◉ cough, foetor ex ore

Complications

- ◉ purulent meningitis
- ◉ brain abscess
- ◉ recurrent and chronic sinusitis

SINUSITISDiagnostics

- ◉ X ray - presence of fluid is necessary + edema of mucous membrane > 5 mm
- ◉ dif. dg.: alerg. sinusitis, adenoid vegetation

Therapy:

- ◉ amoxicilin (co-amoxicilin), cefalosporines, in allergy - makrolides, 10 - 14 d
- ◉ local therapy

ACUTE OTITIS MEDIA (AOM)Characteristics

- ◉ a frequent disease, children 3 m - 3 y
- ◉ at least 1x - 80 % children
- ◉ complicates other upper RTI
- ◉ progression through the Eustache tube from nasopharynx

Etiology:

- ◉ **viruses** - rhinoviruses, influenza and parainfluenza v., adenoviruses, RSV
- ◉ **bacteria:** *S. pneumoniae*, *H. influenzae*
- ◉ less common - *M. catarrhalis*, *S. pyogenes*, *S. aureus*
- ◉ *M. pneumoniae* (myringitis bullosa)

AOM

Clinical symptoms:

- ◉ Ear pain, fever, anxiety, irritability, cry, vomiting, diarrhoea
- ◉ Spontaneous perforance - decrease of pain + sanguinolent secretion - can be purulent

Complications:

- ◉ hearing deficit
- ◉ brain abscess
- ◉ mastoiditis, facial nerve palsy

AOM

Diagnostics

- ◉ otoscopy
- ◉ culture after paracentesis

Therapy

- ◉ symptomatic therapy
- ◉ If ATB, then 1st choice is amoxicillin 60-90 mg/kg/day
- ◉ If allergy: cef. IInd g., makrolides - 7-10 d
- ◉ Local therapy

Prevention:

- ◉ pneumococcal vaccination

PHARINGITIS AND TONSILITIS

- ◉ very common reason for a GP visit

Etiology:

- ◉ < 3 y - viruses (30-50%) - similar as in common cold + EBV, CMV, HSV-1, enteroviruses, HIV-1
- ◉ *S. pyogenes* (10-20 %)
- ◉ *Arcanobacterium hemolyticum*, *N. gonorrhoeae*
- ◉ *Fusobacterium necrophorum*, anaerobes
- ◉ dif.dg.: tularemia, lues, ARS

TONSILITIS + PHARYNGITIS

Viral pharyngitis:

- ◉ Sore throat, dysphagia, erythema and edema of posterior pharynx, enlarged tonsils, fever
- ◉ herpangina - Coxsackie A virus and other EV
- hand-foot-mouth disease
- ◉ Vesicles on soft palate and tonsils

Streptococcal tonsilitis:

- ◉ *S. pyogenes* (group A) - fever, sore throat, dysphagia, nausea, vomiting
- ◉ pharyngeal erythema, tonsil enlargement, gray-white exudate, cervical lymphadenopathy
- ◉ strawberry tongue
- ◉ absence of cough
- ◉ scarlatiniform rash in scarlet fever

Infectious mononucleosis

- ◉ EBV - fever, sore throat, dysphagia/dyspnoe, pharyngeal erythema, plaques, SM lymphadenopathy, rhinolalia, foetor ex ore
- ◉ Holzel's sign - petechia on the soft palate
- ◉ Bass's sign - eyelid edema
- ◉ CMV mononucleosis (IM syndrom) -
- pharyngitis and lymphadenopathy are less pronounced

TONSILITIS + PHARYNGITIS

Diagnostics:

- clinical picture + laboratory tests (WBC, CRP, liver tests)
- tonsil swab
- heterophil Ab detection - Paul-Bunnell test (Erikson, Monospot etc) - not useful in children < 6 yrs
- serology EBV, CMV

Therapy:

- PNC (V-PNC, P-PNC, G-PNC, Pendepon)
- viral etiol - symptomatic treatment
- corticosteroids - relative indication in severe IM

TONSILITIS + PHARYNGITIS

Complications:

- peri -, paratonsillar abscess, potential progression to retropharyngeal space and mediastinum
- otitis, sinusitis
- rheumatic fever, glomerulonephritis

TONSILITIS + PHARYNGITIS

Diphtheria

- *Corynebacterium diphtheriae* - rare illness in developed countries thanks to immunization
- fever, grey-white plaques on tonsils
rhinolalia, foetor ex ore
- *Collum caesareum* - massive cervical lymphadenopathy
- *diphtheric croup* - laryngeal plaques - can lead to acute suffocation within hours
- flaccid palsies, myocarditis, sudden death
- **therapy** - hyperimmune globulin + P(G)-PNC, macrolides in allergy to PNC

TONSILITIS + PHARYNGITIS

Plaut-Vincent angina (plét-vensán):

- rare disease caused by mixed flora with **anaerobes** - *Fusobacterium sp.*, *Borrelia vincentii*
- unilateral, necrotic tonsillitis, foetor ex ore
- **therapy** - PNC, clindamycin, metronidazole

EPIGLOTTITIS

Characteristics:

- severe, fulminant infection
- flegmona of epiglottis - airway obstruction
- usually in winter
- 2-5 yrs

Etiology:

- *Haemophilus influenzae* typ b
drop in incidence in countries vaccinating against Hib!
- Other: in adults *S. pyogenes*, *S. pneumoniae*

EPIGLOTTITIS

Clinical picture:

- acute fever, alteration, chills, severe dysphagia, salivation, child is not able to drink
- cherry-red epiglottis - **CAVE** - laryngoscopy can worsen obstruction
- **CAVE** - enforced sitting position
- no cry can be present, a child can be quiet
- **auscultation** - no stridor!, different sounds due to stagnation of secretions
- **respiratory distress!**

EPIGLOTITIS

Diagnostics:

- clinical picture + lab test
- blood culture or laryngeal swab
- dif.dg. - subglottic laryngitis, aspiration

Therapy:

- intensive care, oxygenotherapy
- ATB - co-aminoPNC, cefotaxim či ceftriaxon i.v.

Prevention:

- immunization against Hib - routine part of schedules

SUBGLOTIC LARYNGITIS

Characteristics

- = pseudocroup
- narrow subglottic airway due to edema
- winter
- 6 m - 3 y

Etiology

- viruses - parainfluenza, influenza
- less common - RS virus, measles..

SUBGLOTIC LARYNGITIS

Clinical picture

- symptoms of common cold, then sudden paroxysms of cough with inspiration stridor - maximum at night
- inspiration insufficiency (intercostal spaces, supraclavicular and subchondral spaces)
- increased T, irritation, exhaustion, apathy
- CAVE - laryngoscopy

SUBGLOTIC LARYNGITIS

Diagnostics:

- clinical picture + lab tests
- serology
- dif.dg. - epiglottitis, aspiration, influenza..

Therapy:

- oxygenoterapy, symptomatic
- diazepam p.r., hydrocortizon, inhaled adrenalin
- body elevation

BRONCHITIS

Characteristics:

- with tonsilitis most common reason for GP visit
- acute x chronic
- fever + dry cough
- winter, spring
- 90% due to viruses in children, 50% in adults

Etiology:

- viruses - parainfluenza, influenza, adenoviruses, rhinovirus
- bacteria - *H. influenzae*, *S. pneumoniae*, *M. pneumoniae*, *Chlamydia spp.*,
- *B. pertussis* + *B. parapertussis*

BRONCHITIS

Clinical picture

- Dry or productive cough - mild expectoration
- subfebrile temperature
- auscultation - diffuse wheezing, rhonchi
- can last 10-14 days

Diagnostics and therapy

- clinical picture + lab tests
- symptomatic treatment - antitussives, mucolytics
- codein, ambroxol, b2 agonist bronchodilators

PERTUSSIS

Characteristics

- highly contagious
- droplet transmission - cough
50 - 90 % in naive persons
- ID = 7 - 10 d
- 85% deaths in children younger than 2 yrs
(200 000 dětí/za rok)
- catarrhal-necrotic inflammation of mucous membranes

Etiology:

- *Bordetella pertussis*, *B. parapertussis*

PERTUSSIS

- 3 stages
- **Catarrhal stage** - similar to common cold, usually no fever 1-2 weeks, subconjunctival suffusions
- **Paroxysmal stage** - progression to paroxysmal intense coughing with loud whoop in infants apnoe vomiting
30-40 episodes/day, 5-6 weeks
- **Reconvalescence** - cough up to 6 months

PERTUSSIS

Complications:

- pneumonia (primary interstitial x secondary)
- otitis (pneumococcal), seizures, encephalopathy
- epistaxis, hernia, rib fracture, prolaps of rectum
- subconjunctival hemorrhages - periorbital hematoma

PERTUSOID SYNDROM

- similar, but milder and shorter course
- *Bordetella parapertussis*
- **viruses** - parainfluenza, adenoviruses, RS virus
- **next bacteria** - *M. pneumoniae*, *C. pneumoniae*, *H. influenzae*, *M. catarrhalis*

PERTUSSIS

Diagnostics

- Clinical picture + lab tests
- **pertussis** - serology, PCR, culture - very difficult
- **dif.dg.** - pneumonia, asthma

Therapy

- ATB - **macrolides** (effective only in the 1st stage..) - 14 days
- Symptomatic therapy - antitussives

Prevention

- Vaccination in children
- In adults - at least one booster, ideally every 10 years

BRONCHIOLITIS

Characteristics

- = severe febrile illness in infants and toddlers
- respiratory distress
- Obstruction of terminal bronchi and bronchioles - hypoxia
- Winter season
- ID = 4-5 days

Etiology:

- viruses - **RS virus**
- less often - parainfluenza, influenza, *M. pneumoniae*

BRONCHIOLITIS

Clinical picture

- symptoms of common cold
- severe cough, fever, tachypnoe, dyspnoe with retractions, wheezing
- dyspnoe develops several days
- **Auscultation** - wheezing and crackles
- cyanosis

BRONCHIOLITIS

Diagnostics

- clinical picture
- Ag detection - lavage fluid, NPF secretion - ELISA, IF, PCR
- serology
- **dif.dg.** - epiglottitis, subglottic laryngitis

Therapy

- oxygenotherapy, symptomatic therapy - mucolytics
- intensive care, intubation
- prognosis is good

FLU - INFLUENZA:

Characteristics

- = highly contagious with sudden onset
- season - winter, spring
- droplet infection
- ID = 18-24hrs

Etiology

- Influenza virus type A a B
- 2 surface antigens hemagglutinin, neuraminidase
- **chřipka A** - známo 5H a 2N

INFLUENZA

- **antigen drift** - small change (point mutation)
- **antigen shift** - more significant change of surface antigens - rekombination among human and animal viruses

INFLUENZA:

Clinical picture:

- Fever 38-40°C, chills, headache, myalgia, arthralgia, fatigue
- loss of appetite, nausea, vomiting
- Dry cough, chest pain

Complications:

- flu pneumonia
- bacterial superinfection - secondary pneumonia (*S. pneumoniae*, *S. aureus*, *H. influenzae*)

INFLUENZA

Diagnostics

- Clinical picture
- Direct detection - antigen from washing
- PCR
- serology

Therapy

- symptomatic
- virostatics - oseltamivir, zanamivir
- Intensive care

Prevention

- vaccination!!

PNEUMONIA

Definition

- = acute inflammation of lung tissue (bronchiols, alveols, interstitium)
- Infiltration on X ray picture

Presence of clinical symptoms

- fever
- cough
- dyspnoe, tachypnoe
- chest pain during breathing
- leukocytosis with left shift
- typical auscultation

PNEUMONIA - TYPES

Etiology

- infectious (viral, bacterial, mykotic)
- noninfectious (aspiration)

Pathological-anatomical finding:

- Lobar, bronchopneumonia, interstitial, miliar, abscedans

Clinical picture:

- typical (pneumococcal, Hemophilus sp....)
- atypical (viral, mycoplasma)

Where:

- Nosocomial x CAP x ventilator

Time course:

- acute x subacute x chronic
- primary x secondary

DIAGNOSTICS

Clinical picture

Laboratory tests:

- WBC+Diff, AST, ALT, urea, krea, CRP, PCT
- X-ray

Microbiology:

- Sputum - culture, PCR
- BAL, lung punctate (pleuropneumonia)
- Blood culture
- Indirect - serology

PNEUMONIA - „TYPICAL“

Etiology

- *Streptococcus pneumoniae*
- in COPD- *H. influenzae*
- other: *K. pneumoniae*, *S. aureus*

Clinical picture

- Adventitious breath sounds, such as rales/crackles, rhonchi, or wheezes
- Decreased intensity of breath sounds
- Egophony
- Whispering pectoriloquy
- Dullness to percussion

PNEUMONIA - ATYPICAL, INTERSTITIAL

Etiology:

- Intracellular microorganisms incl. viruses
- frequent: *Mycoplasma pneumoniae*,
Chlamydomphila pneumonie
Legionella pneumoniae
- viruses: myxoviruses (influenza!),
adenoviruses, coronaviruses,
RS virus, VZV, measles virus,
CMV pneumonia u HIV/AIDS

Therapy:

- ATB
- initial - *S.pneumoniae* coverage
- amoxicilin 70-90 mg/kg/day p.o., co-amoxicilin,
tetracyklins, macrolides
- hospital - beta-lactams i.v. - G-PNC, cephalosporins IIIrd gen,
macrolides, respiratory fluorochinolons
- atypical pneumonia - *Mycoplasma pn.*, *Legionella sp.*
makrolidy, respiratory fluorochinolons
- Severe pneumonia - dual therapy - beta-lactam+macrolide/chinolons
- Oxygenotherapy /if O2 saturation below 92%)
- Rehydration
- Bronchodilatans, mukolytics

PNEUMONIA - FUNGAL AND PARASITIC

Characteristics:

- ◉ usually opportunistic infection
- ◉ immunosuppression (oncology, AIDS, transplantations, malnutrition)
- ◉ candidosis, cryptococcosis, mukormycosis

Pneumocystis jiroveci (previously *carinii*)

- ◉ first manifestation of advanced HIV infection
- ◉ high fever horečky, dyspnoe, weakness, cough
- ◉ **X ray:** irregular infiltrates, perihilar od diffuse parahilózně
- ◉ co-trimoxazol i.v.
- ◉ prophylaxis with co-trimoxazole or pentamidin if CD4<200

RESPIRATORY INFECTIONS

Conclusions:

- ◉ Most respiratory infections are viral
- ◉ Rx ATB only if a strong suspicion on bacterial etiology
- ◉ valid microbiological testing
- ◉ optimal empirical therapy based on patient history, clinical picture, local resistance profile