Upper Respiratory Tract Infections

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Upper Respiratory Tract Infections

- the most common reason for primary care visit
- typically mild illnesses
- high incidence and transmission rate - leading cause of time lost from work
- minority of cases (<25%) are caused by bacteria
  - despite that, are leading indication of antibiotics prescription outpatient
  - rise in antibiotic resistance among community-acquired pathogens
  - mostly caused by viruses; distinguishing is difficult
Common Cold or Acute Rhinitis, Rhinopharyngitis

- or Nasopharyngitis or Nonspecific Infection of the Upper Respiratory Tract
- no prominent localizing features
- etiology:
  - nearly all are caused by viruses
  - Rhinovirus (30-40%)
  - Influenza virus
  - Parainfluenza virus
  - Coronavirus
  - Adenovirus
  - Respiratory syncytial virus (RSV)
  - rarely: Enteroviruses, Rubella virus, Varicella-Zoster virus
Common Cold

- **clinical manifestations**
  - no pronounced localization to one particular anatomic location (e.g. pharynx, sinuses)
  - acute, mild and self-limited catarrhal syndrome, median duration 1 week
  - diverse, variable symptoms and signs:
    - rhinorrhea; with or without purulence
    - nasal congestion
    - cough
    - sore throat
    - hoarseness
    - sneezing
  - fever, malaise (more common in infants, children)
  - myalgia, fatigue (influenza, parainfluenza)
  - conjunctivitis (adenovirus, enterovirus)
Common Cold

- objective findings
  - nonspecific and unimpressive

- <2% complicated by secondary bacterial superinfection
  - high-risk: infants, elderly, chronically ill patients
  - rhinosinusitis; otitis media; pneumonia
  - prolonged course, increased severity, localization of signs and symptoms
  - purulent secretion

- treatment
  - antibiotics: no in uncomplicated nonspecific upper respiratory tract infection
    - in absence of clinical evidence of bacterial superinfection
  - symptomatic
    - decongestants, non steroidal anti-inflammatory drugs, topical anesthetic for sore throat
    - vitamin C, zinc, echinacea (no EBM benefit)
Sinusitis

- inflammatory condition involving the four paired structures surrounding the nasal cavity (sinuses)
  - maxillary sinus is the most commonly involved, next in frequency is ethmoid, frontal, sphenoid
  - most cases involve more than one sinus

- physiology
  - respiratory epithelium, produces mucus, transported out by ciliary action through the sinus ostium into nasal cavity; mucus does not accumulate normally
  - sinuses remain sterile despite their adjacency to nasal cavity

- obstruction of sinus ostium
  - or impairment of ciliary transport
  - retention of secreted mucus, leads to typical symptoms of sinusitis
  - retained secretion may become infected by viruses, bacteria, fungi
Acute Sinusitis

- sinusitis of < 4 weeks duration
- typically consequence of preceding viral nonspecific upper respiratory tract infection
- distinguishing bacterial and viral sinusitis on clinical grounds is difficult
  - antibiotics are prescribed frequently (in 85-98% of cases)
- etiology
  - infectious and noninfectious factors leading to acute obstruction of the sinus ostia or impairment of ciliary clearance, with consequent sinusitis
    - noninfectious: allergic rhinitis (oedema, polyp), barotrauma, chemical irritation
    - tumors, granulomatous diseases, cystic fibrosis
    - infectious: variety of pathogens; viruses, bacteria, fungi
Acute Infectious Sinusitis

- viral is rhinosinusitis is far more common than bacterial sinusitis
  - viral:
    - rhinovirus
    - parainfluenza virus
    - influenza virus
  - bacterial (community-acquired)
    - Streptococcus pneumoniae, Haemophilus influenzae (50-60%)
    - Moraxella catarrhalis (children)
    - less common other Streptococcal species, Staphylococcus aureus
    - anaerobes occasionally in association with infection of roots of premolar teeth (maxillary sinuses)
  - nosocomial cases
    - S. aureus, Pseudomonas aeruginosa, Serratia marcescens, Klebsiella pneumoniae, Enterobacter spp.; often polymicrobial
Acute Sinusitis

- clinical manifestation
  - present together, or after viral nonspecific upper respiratory tract infection (common cold)
  - bacterial sinusitis complicates only 0,2 - 2% of viral infection
  - nasal drainage and congestion; thick, purulent or discolored nasal discharge (nonspecific)
  - facial pain or pressure, headache (localized to involved sinus)
  - cough, sneezing, fever, halitosis
  - tooth pain (often the upper molars)
  - rare complications:
    - thrombosis of the cavernous sinus, orbital cellulitis
    - meningitis, epidural abscess, cerebral abscess
    - fungal sinusitis
      - pressure effects, nasopharyngeal ulcerations, epistaxis, headaches
      - orbital pain, bony erosions, n. V and VII involvement
Acute Sinusitis

- **diagnosis**
  - distinguishing viral from bacterial sinusitis is difficult
    - duration; bacterial uncommon in duration < 7 days
  - X-ray, CT
    - not recommended routinely in early stages
    - otolaryngologist examination
      - biopsy
      - sinus aspirate for culture
Acute Sinusitis

- treatment
  - most patients improve without antibiotic therapy
    - short duration, mild symptoms
    - facilitating sinus drainage: topical decongestants, nasal saline lavage
    - local glucocorticoids in patients with a history of chronic sinusitis or allergies
  - duration > 7 days (children > 10-14 days), severe symptoms: antibiotics
    - Streptococcus pneumoniae, Haemophilus influenzae
    - amoxicillin, fluoroquinolones
    - sinus aspiration and lavage
    - nosocomial: broad-spectrum antibiotics: S. aureus, gram-negatives
Chronic Sinusitis

- symptoms of sinus inflammation lasting > 12 weeks
- most commonly associated with bacteria or fungi
  - clinical course is difficult; repeated antibiotic treatment and surgeries; resistant pathogens
Chronic Sinusitis

Chronic Bacterial Sinusitis

- impairment of mucociliary clearance from repeated infections
- pathogenesis is not completely clear and understood
- chronic obstruction of sinus drainage, impairment of ciliary action, immune dysfunction
- constant nasal congestion and sinus pressure, with episodes of greater severity, which may persist for years
Chronic Sinusitis

Treatment

- culture-guided courses of antibiotics, even for 3-4 weeks
- intranasal glucocorticoids
- nasal saline irrigation
- sinus surgery
Chronic Sinusitis

Chronic Fungal Sinusitis

- Aspergillus species, Curvularia, Bipolaris spp.
- repeated failures of antibiotic treatment
- endoscopic surgery is usually curative
Infections of the External Ear

- **Auricular cellulitis**
  - infection of the skin overlying the external ear, typically follows a minor local trauma
  - erythema, tenderness, swelling, warmth of external ear; without ear canal involvement
  - treatment: warm compresses, oral antibiotics
    - typical skin and soft-tissue pathogens: Staphylococcus aureus, Streptococci
    - cefazolin, nafcillin, dicloxacillin

- **Perichondritis**
  - infection of the perichondrium of the auricular cartilage, typically follows local trauma (e.g. piercing, burns, lacerations)
  - occasionally progress to chondritis
  - erythema, swelling, extreme tenderness
  - Pseudomonas aeruginosa, S. aureus
  - treatment: piperacillin, nafcillin+ciprofloxacin; incision and drainage
Infections of the External Ear

- **Otitis Externa**
  - involving primarily the auditory meatus
  - retained moisture, heat, desquamation, maceration of epithelium is usual pathogenesis
  - predominantly bacterial; most commonly Pseudomonas aeruginosa, Staphylococcus aureus

- **acute localized otitis externa - furunculosis**
  - outer third of ear canal - cartilage, hair follicles
  - S. aureus usually pathogen
  - incision, drainage, antibiotics

- **acute diffuse otitis externa**
  - heat, humidity, loss of cerumen, excessive moisture, skin maceration and irritation
  - dominant pathogens: Pseudomonas aeruginosa, other Gram negatives
  - itching, pain, erythema, swollen ear canal, with scant white clumpy discharge
  - cleaning the canal, locally alcohol, acetic acid, Burow, glucocorticoids
  - antibiotics: topically mostly effective; neomycin, polymyxin
Infections of the External Ear

- chronic otitis externa
  - repeated local irritation
    - mostly from chronic middle-ear infection
    - rare: syphilis, tuberculosis, leprosy
  - erythematous, scaling dermatitis, pruritus rather then pain
  - dif.dg.: atopic dermatitis, seborrheic dermatitis, psoriasis, dermatomycosis

- invasive otitis externa, necrotizing otitis externa
  - aggressive progressive disease; elderly, immunocompromised, esp. diabetics
  - purulent otorrhea, erythema, swollen ear canal, otalgia
  - granulation tissue in posteroinferior wall of ear canal, progressive (over months) can migrate to the base of skull, with osseous erosion leading to osteomyelitis, meningitis, brain - with high mortality; cranial nerve involvement (n. facialis), thrombosis of sigmoid sinus
  - Pseudomonas aeruginosa, S. aureus, S. epidermidis, Aspergillus, Actinomycyes, other GN
  - cleaning, biopsy; iv antibiotics (piperacillin, ceftazidime, aminoglycoside, fluoroquinolones)
  - surgical debridement in severe cases
Infections of the Middle Ear

- **acute otitis media**
  - inflammatory condition of middle ear structures, that result from dysfunction of eustachian tube
    - leads to fluid collection in middle ear and mastoid cavities
  - pathogens from nasopharynx are introduced into fluid collections in middle ear
  - typically follows viral upper respiratory tract infection
    - RS virus, influenza, rhinovirus, enterovirus
  - viral infection or secondary bacterial infection
    - Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis, MRSA
  - fluid in the middle ear - confirmed by the pneumoatic otoscopy (impairment of tympanic membrane movement), erythematous, bulging or retracted tympanic membrane, occasionally spontaneously perforated
  - local symptoms: otalgia, otorrhea, diminished hearing
  - systemic symptoms: fever, occasionally vertigo, nystagmus, tinnitus
Infections of the Middle Ear

- acute otitis media
  - treatment
    - most cases resolve without antibiotics in 1 week
    - although antibiotics have benefits
      - amoxicillin
      - cefuroxime, ceftriaxone
      - clindamycin
    - tympanocentesis with culture in severe cases, refractory to therapy
    - decongestant, antihistamine
Infections of the Middle Ear

- chronic otitis media
  - chronic suppurative inflammation - persistent or recurrent purulent otorrhea in setting of tympanic membrane perforation
  - usually conductive hearing loss
  - central perforation of tympanic membrane - drainage of purulent fluid
  - surgical treatment: mastoidectomy, myringoplasty, tympanoplasty
Infections of the Middle Ear

- **mastoiditis**
  - acute mastoiditis is relatively common in children
  - mastoid air cells are connected with the middle ear
  - fluid collection and infection from middle ear
    - purulent exudate
    - may lead to erosion of bone, formation of abscess-like cavities
  - pain, erythema, swelling of the mastoid process, displacement if the pinna
  - usually with symptoms of otitis media
  - rare complications: subperiosteal abscess, bone erosion, deep neck abscess, septic thrombosis of lateral sinus
  - treatment: same spectrum as acute otitis media
    - severe prolonged cases: Staphylococcus aureus, Pseudomonas aeruginosa
    - surgery: mastoidectomy: complicated, treatment failures
Oropharyngeal infections

- acute pharyngitis
  - “sore throat” most common presenting symptom
  - majority of cases are caused by typical respiratory viruses
    - rhinovirus, coronavirus
    - influenza, parainfluenza, adenovirus
    - less common herpes simplex virus 1, 2, coxsackie virus, CMV, EBV
    - acute HIV infection can present as acute pharyngitis
  - clinically important is infection with group A beta-hemolytic Streptococcus (S. pyogenes)
    - associated acute glomerulonephritis and acute rheumatic fever
    - primarily childrens 5-15 years, uncommon <3 years
  - rare bacterial pathogens:
    - Neisseria gonorrhoeae, Corynebacterium diphtheriae, secondary syphilis
  - peritonsillar or retropharyngeal abscess
    - possible anaerobic bacterias
Oropharyngeal infections

- **acute pharyngitis**
  - clinical manifestations
    - signs and symptoms are not good predictors of etiologic agent, although
    - mild nonspecific (rhinovirus, coronavirus)
      - fever is rare, no cervical adenopathy and pharyngeal exudates
    - influenza
      - more severe pharyngitis
      - likely associated with fever, myalgias, arthralgias, headache, cough
      - pharyngeal exudate difficult to distinguish from streptococcal pharyngitis
  - HSV pharyngitis
    - can also mimic streptococcal pharyngitis
    - vesicles and shallow ulcers on palate
  - herpangina (coxsackie virus)
    - small vesicles on soft palate and uvula, rupture - white ulcers
Oropharyngeal infections

- acute pharyngitis
  - clinical manifestations
    - EBV and CMV
      - exudative pharyngitis
      - with fever, fatigue, generalized lymphadenopathy, and splenomegaly
        (infectious mononucleosis)
    - HIV (acute primary infection)
      - fever and pharyngitis, malaise, myalgias, lymphadenopathy later, mucosal ulcers
    - Streptococci groups A, C, G
      - from mild pharyngitis to clinically severe cases with pain, fever, chills
      - hyperemic pharyngeal membrane, tonsillar hypertrophy, exudate
      - tender anterior cervical lymphadenopathy usually
      - erythrogenic toxin - scarlet fever (erythematous rash, strawberry tongue)
  - gonococcal, diphtherial, yersinial
    - nonspecific
Oropharyngeal infections

- acute pharyngitis
  - diagnosis
    - separate acute streptococcal pharyngitis from other etiologies (esp. viral)
    - effective antibiotic treatment to whom they are beneficial
    - no standards
    - throat swab cultures
      - infection vs colonization
    - antigen-detection tests
  - cultures or rapid antigen tests available for
    - influenza virus, adenovirus, HSV
  - EBV, CMV: detection of antibodies
Oropharyngeal infections

- acute pharyngitis
  - treatment
    - antibiotic treatment of S. pyogenes pharyngitis
      - decrease in the risk of rheumatic fever
      - penicillin, amoxicillin, erythromycin
    - symptomatic
    - HSV: acyclovir
    - influenza: oseltamivir, amantadine, zanamivir
  - complications
    - rheumatic fever
    - acute glomerulonephritis
    - peritonsillar abscess
    - otitis media, sinusitis
Oropharyngeal infections

- **oral infections**
  - HSV
    - can infect tongue, buccal mucosa, forming irritating vesicles
  - Candidiasis
    - immunocompromised, prolonged antibiotic or glucocorticoid treatment
    - sore throat, burning tongue, white or gray plaques on gingival, tongue, oral mucosa
  - Vincent's angina - acute necrotizing ulcerative gingivitis
    - dramatic form of gingivitis; painful inflamed gingiva with ulcerations, bleeding, halitosis caused by oral anaerobes
    - usually fever, malaise, lymphadenopathy
    - treatment: debridement, penicillin + metronidazole / clindamycin
Oropharyngeal infections

- oral infections
  - Ludwig's angina - rapid progressive potentially fulminant cellulitis of sublingual and submandibular spaces
    - typically originates from infected or recently extracted tooth, most commonly lower second and third molars
    - dysphagia, odynophagia, edema in sublingual region
    - potential airway obstruction (forcing tongue up and back), asphyxion
    - fever, dysarthria, drooling
  - treatment
    - closely monitoring, intubation, tracheostomy in case of airway obstruction
    - antibiotics (streptococci and anaerobes): ampicillin/sulbactam, penicillin and metronidazole
Laryngitis

- acute laryngitis
  - inflammatory process involving the larynx
  - commonly caused by viruses, same as responsible for other upper respiratory tract infections
    - most cases occur during viral URI
    - rhinovirus, influenza, parainfluenza, adenovirus, coxsackie virus, coronavirus, RSV
    - possible bacterial causes: Streptococci, C. diphtheriae, Moraxella catarrhalis
    - rarely: Mycobacterium tuberculosis, Histoplasma, Blastomyces, Candida, Cryptococcus
  - hoarseness or aphonia; usually with other URI symptoms
  - laryngeal erythema and edema
  - treatment:
    - humidification, voice rest
    - antibiotics not recommended (unless bacterial etiology proven)
Epiglottitis

- acute epiglottitis
  - acute rapidly progressive cellulitis of the epiglottis and adjacent structures
  - can lead to potentially fatal airway obstruction - medical emergency
  - Haemophilus type b was common cause, with peak incidence in 3-4 years old
    - widespread vaccination reduced incidence by >90%
  - other bacterial pathogens
    - group A Streptococcus, S. pneumoniae, Haemophilus parainfluenzae, S. aureus
  - no viruses
- clinical manifestation
  - rapid onset <24h duration of symptoms: fever, severe sore throat, systemic toxicity
  - drooling while sitting forward
  - respiratory obstruction: dyspnea, inspiratory stridor, respiratory distress
  - direct visualization not recommended - risk of laryngospasm
- treatment: securing the airways even if diagnosis is suspected
  - antibiotics i.v.: betalactams, cephalosporins, clindamycin
The End

Thank You.