Acute Rhinosinusitis: Diagnostic - Therapy - Complications

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Epidemiology

Seasonal viral infections of upper airways are very common!

- 2-3/year in adults, 6-8 in children
- 90% of infections of upper airway show RS-symptoms
- Mostly managed in primary care, primary cause virus
- Only 0.5-2% of viral infections are complicated by bacterial infection (ABRS)
- But acute RS = 5. most common diagnosis for prescription of antibiotics in US
- Complications of RS are rare but serious and potential dangerous clinical events

Definition of Rhinosinusitis

**Rhinitis** and **sinusitis** usually coexist and are concurrent in most patients, thus the correct terminology is **Rhinosinusitis**.
Definition of Rhinosinusitis in adults

Inflammation of the nose and paranasal sinuses characterised by two or more symptoms:

- nasal blockage/obstruction/congestion
- nasal discharge
- +/- facial pain/pressure
- +/- reduction or loss of smell

(EPOS 2012 position paper, Rhinology suppl 23)
Definition of Rhinosinusitis

and either

• endoscopic signs of
  - nasal polyps
  - mucopurulent discharge (primarily middle meatus)
  - oedema/mucosal obstruction (primarily mid. meatus)

• and/ or CT changes
  - mucosal changes within the ostiomeatal complex
    and/or sinuses

(EPOS 2012 position paper, Rhinology suppl 23)
Definition of RS in children

Inflammation of the nose and paranasal sinuses characterised by two or more symptoms:

- nasal blockage/obstruction/congestion
- nasal discharge
- +/- facial pain/pressure
- +/- cough

(EPOS 2012 position paper, Rhinology suppl 23)
Definition of RS in children

and either

- endoscopic signs of
  - nasal polyps
  - mucopurulent discharge (primarily middle meatus)
  - oedema/mucosal obstruction (primarily mid. meatus)

- and/or CT changes
  - mucosal changes within the ostiomeatal complex
  and/or sinuses
Definition of Rhinosinusitis

**Acute Rhinosinusitis**

< 12 weeks
with complete resolution of symptoms

**Chronic Rhinosinusitis**

≥ 12 weeks
*without* complete resolution of symptoms
Classification of acute RS

Definition of Acute Rhinosinusitis

Increase in symptoms after 5 days or persistent symptoms after 10 days with less than 12 weeks duration

- Common cold
- Viral ARS
- Sy < 10d

Postviral Acute Rhinosinusitis

Increase in symptoms after 5 days

Persistent symptoms after 10 days

Signs of potential acute bacterial rhinosinusitis:
At least 3 of:
- Discoloured discharge
- Severe local pain
- Fever
- Elevated ESR/CRP
- Double sickening*

(*: becoming worse again after initial recovery)

bacterial ARS

(EPOS POSITION PAPER on Rhinosinusitis and Nasal polyps, Rhinology 2012)
Pathophysiology

**Infectious:**
- viral
- viral- bacterial
- bacterial
- fungal (CAVE Immune state)

**Non infectious:**
- allergic
- toxic
- Foreign body
- Tumour
- Systemic diseases
Virus

- Most common: rhinovirus and coronavirus
- Other: influenza- / parainfluenza virus, adenovirus, respiratory syncytial virus and enterovirus
Bacteria (ABRS)

- *Streptococcus pneumoniae* (20-43%)
- *Haemophilus influenzae* (22-35%)
- *Moraxella catarrhalis* (child) (10-20%)
- *S. aureus* (4-8%)
- *Streptococcus ssp, S.pyogenes, anaerobic*
Predisposing factors

- **Anatomical factors:** Ostiomeatal obstruction by anatomical variations, posttraumatic or inflammatory changes, post surgical scars, tumours or foreign bodies, adenoid (children)
- **Dental/ odontogenic infections**
- **On-going allergic inflammation and cigarette smoke (?) (Ciliary impairment)**
- **Environmental exposures, seasonal trends**
- **Role of laryngopharyngeal reflux unclear**
- **Chronic concomitant diseases**
- **Poor mental health, anxiety, depression**
Diagnosis

History!

- **ARS**: diagnosis is clinical and relies on presence and duration of typical symptoms (major and minor symptoms for up to 12 weeks)

- **Differential Diagnosis**: Allergic rhinitis, orodental disease, barosinusitis, facial pain syndrome, vasculitis, acute invasive fungal RS (immuno-suppressed patients)

- Complications are rare but serious: red flag symptoms!
Special forms of ARS

Dentogenic sinusitis

- Aet: infections/granuloma of root of the tooth, fistula after tooth extraction
- often anaerobes (foetide odor)
- typical one side
- diagnosis: consider OPG

Barosinusitis

- Aet: after pressure surges (diving, flights)
- typical history
- Tx: decongestants local and systemic
Diagnosis: clinical examination

Anterior rhinoscopy and nasal endoscopy, inspection of maxillofacial area, temperature
Diagnosis: additional tools

- **Laboratory:** CRP, Lc, Procalcitonin

- **Bacteriology:** not required (but in research settings, atypical recurrent disease, immunosuppressed patients)

- **Imaging:** not required in diagnosis of ARS
  - Plain sinus x-ray: insensitive, of limited usefulness
  - CT or cone-beam CT: imaging of choice in very severe disease, in immunocompromised patients, or suspicion of complication

(Benninger MS et al. Otolarngol Head Neck Surg 2002; 127: 7-12)
Treatment of ARS

- **Nasal decongestants** (xylometazoline)
- **Intranasal corticosteroids** (+)
- Analgetics (NSAID, Aspirin or Paracetamol)
- **Nasal irrigation** (isotonic or hypertonic saline water)
- **Antihistamines** oral or intranasal (-)
- Zinc, Vitamin C, Probiotics (?)
- **Mucolytics** (-)
- **Herbal compounds**
- **Antibiotics** ??
Antibiotics for adults with clinically diagnosed acute rhinosinusitis: a meta-analysis of individual patient data

Jim Young, An De Sutter, Dan Merenstein, Gerrit A van Essen, Laurent Kaiser, and Billie K. Doebbeling

Summary

Antibiotics for sinusitis-like illness

More than 90% of patients with sinusitis-like symptoms are managed without antibiotics. There is a need to further investigate the efficacy and cost-effectiveness of antibiotics such as for C-fluorquinolones or macrolides for the treatment of sinusitis-like illness.

Objectives

Sustained reduction of antibiotic use and low bacterial resistance: 10-year follow-up of the Swedish Strama programme

Review: antibiotics are only slightly more effective than placebo for clinically diagnosed acute rhinosinusitis in adults

Systematic review of antimicrobial therapy in patients with acute rhinosinusitis

Richard M. Rosenfeld, MD, MPH, Michael Singer, MD, and Stacie Jones, MPH, Brooklyn, NY; and Alexandria, VA

Antibiotics: yes or no?
Acute rhinosinusitis in adults Management scheme for Primary Care

2 symptoms: one of which should be nasal obstruction or discoloured discharge
+/- frontal pain, headache
+/- smell disturbance
examination: anterior rhinoscopy
X-ray/CT not recommended

PCP: symptoms less than 5 days or improving thereafter

- common cold
- symptomatic relief: analgesics, nasal saline irrigation, decongestants, selected herbal compounds
- no effect after 10 days of treatment
- consider referral to specialist

PCP: symptoms persistent after 10 days or increasing after 5 days

- moderate (post viral)
- + topical steroids
- no effect after 14 days of treatment
- continue treatment for 7 - 14 days

PCP: severe *
- including bacterial
- topical steroids consider antibiotics
- effect in 48 h
- no effect in 48 h
- refer to specialist

Immediate referral:
- periorbital oedema/erythema
- displaced globe;
- double vision;
- ophthalmoplegia
- reduced vision acuity;
- severe unilateral or bilateral frontal headache;
- frontal swelling;
- signs of meningitis or neurologic signs

* = at least 3 of: discoloured discharge severe local pain fever elevated ESR/CRP double sickening

(EPOS POSITION PAPER on Rhinosinusitis and Nasal polyps, Rhinology 2012)
Acute rhinosinusitis in adults and children management scheme for ENT specialist

- Referral from primary care and paediatricians

  - Moderate symptoms
    - No improvement after 14 days of treatment
      - Reconsider diagnosis
        - Nasal endoscopy
        - Consider imaging
        - Consider culture
      - Nasal corticosteroids
      - Oral antibiotics

  - Severe symptoms
    - No improvement after 48 hours of treatment
      - Consider hospitalization
        - Nasal endoscopy
        - Culture
        - Imaging
        - Nasal corticosteroids
        - Consider i.v. antibiotics
        - Consider oral steroids
        - Consider surgery

  - Complications
    - Hospitalization
    - Nasal endoscopy
    - Culture
    - Imaging
    - I.v. antibiotics and/or surgery

(EPOS POSITION PAPER on Rhinosinusitis and Nasal polyps, Rhinology 2012)
When is it getting «dangerous»?

- High untreatable persistent fever
- Periorbital oedema/erythema
- Displaced globe/ protruding eyeball
- Reduced vision acuity, double vision
- Severe unilateral or bilateral frontal headache, frontal swelling
- Signs of meningitis or neurologic signs

Suspicion of bacterial complication
Complications of RS

**Orbital:**
- preseptal cellulitis
- subperiosteal abscess
- orbital cellulitis and abscess
- (cavernous sinus thrombosis)

**Intracranial:**
- epidural or subdural abscess
- brain abscess, meningitis, encephalitis

**Osseous:**
- osteomyelitis from facial skeleton
Orbital complications

Spread in children from ethmoid sinus

## Orbital complications

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<td>Orbital cellulitis</td>
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<td>Subperiosteal abscess</td>
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<td>(Cavernous sinus thrombosis)</td>
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Preseptal Cellulitis

- Direct or venous spread of infection in preseptal area, **anterior to orbital septum**
- Often as complication of URTI, dacryocystitis or skin infection
- Sy: orbital pain (not always!), eyelid oedema, erythema, (sometimes) fever
- No proptosis, no chemosis, no limit in eye movement
- Clinical diagnosis, CT not always needed
- Tx: oral antibiotics, if not aggressively treated, spread beyond orbital septum

(Bailey JB. Head Neck Surgery, 2001; Pediatric Rhinosinusitis, 956-960)
Subperiosteal abscess

- Infection spread over „osseous barrier“, abscess between periorbit & orbit outside ocular muscles, **extraconal**
- Oedema, erythema, chemosis, proptosis of eyelid, limited ocular motility
- **Diagnostic**: CT scan with contrast and control of visual acuity and pressure!
- **Tx**: in small children with abscess volume <1ml / normal visual: 24-48h antibiotics i.v. Otherwise: surgical drainage

(Caversaccio M, Heimgartner S, Aebi C. Laryngo-Rhino-Otol 2005; 84: 817)
Orbital cellulitis or orbital abscess

- Infection involve the orbit **intraconal**
- Proptosis, chemosis, limitation of ocular motion or ophthalmoplegia, visual acuity diminishes
- Dg: CT scan with contrast, if intracranial complication is suspected MRI
- Tx: AB i.v. and surgery
- **CAVE:** Sepsis, spread intracranial

(Bailey JB. Head Neck Surgery, 2001)
Cavernous sinus thrombosis

- Further spread to cavernous sinus thrombophlebitis causing sepsis and multiple cranial nerve involvement, often bilateral spread
- Oedema, proptosis, chemosis, papilla oedema, complete ophthalmoplegia, spiking fever, meningitis signs
- Dg: MRI and/or CT scan with contrast
- Mortality rate of 30% (adults)!
- Tx: high doses antibiotics iv, anticoagulants (?), surgical drainage of corresponding sinus

(Bailey JB. Head Neck Surgery, 2001)
Endocranial complications

- Mostly spread from frontoethmoidal or sphenoidal infections
- Meningitis, subdural- or epidural abscess, brain abscess, cavernous sinus thrombosis
- Pathogens pass through diploic veins or per continuitatem by eroding sinus bone or haematologically (sinus cav)
- Symptoms can be non-specific!
  - Severe frontal/retro orbital headache
  - High fever
  - Increased intracranial pressure, meningeal irritation, focal neurological deficits (III, VI or VII cranial nerve palsy)
  - Behavioural changes, altered consciousness
Diagnostic:  CT with contrast and/ or MRI
Therapy:  management always multidisciplinary
Bone complications

- Most common: osteomyelitis of frontal bone (spongiosa!) & maxillary (dental?) bone, sphenoidal bone: rare (N III, IV, V, VI palsy)
- Frontal sinus osteitis/osteomyelitis → vascular necrosis → frontal subperiostal abscess („Pott‘s Puffy tumour“) or frontocutaneous fistula
- Posterior wall → via valveless diploic veins → cranial complications°
- Dg: CT with KM +/- MRI
Summary

- In acute uncomplicated RS with mild symptoms: “watch and wait”

- In acute RS with severe or prolonged symptoms:
  - topical corticosteroids and consider antibiotics
  - recheck diagnosis/ differential diagnosis
  - in immune compromised patients think of complications

- Suspicion of complication:
  always CT scan with contrast of paranasal sinus & head +/- MRI