ALLERGIC AND NONALLERGIC RHINITIS

Abdulrahman al naji
May 14, 2014
Defined as inflammation of the nasal mucosa characterized by two or more of the following symptoms:

- nasal congestion
- anterior/posterior rhinorrhoea
- sneezing
- itchy nose
ALLERGIC RHINITIS

- Prevalence
  - 400 million suffers worldwide
  - > 20% of population in UK

- All ages are affected, peaks in teens

- Boys more affected than girls but equalizes after puberty
30% of patients with AR have asthma

The majority of patients with asthma have AR

AR is a major risk factor for poor asthma control

All patients with AR should be assessed for asthma
Allergic Rhinitis and Other Comorbidities

- Up to 80% of patients with bilateral chronic sinusitis have AR
- Otitis media
- Conjunctivitis
- Lower respiratory tract infections
- Dental problems – malocclusion, discoloration
- Sleep disorders
ALLERGIC RHINITIS AND ITS IMPACT ON QUALITY OF LIFE

- **In USA**
  - 2 million school days lost per year
  - 4 million work days lost per year
  - 28 million impaired work days

- **In UK**
  - Performance in school exams in 15-16 yr olds worsened by AR
Allergic reaction is an exaggerated or inappropriate immune reaction and causes damage to the host.

Type I immediate hypersensitivity reaction mediated by IgE antibodies, which trigger the mast cells and basophils to release pharmacologically active agents.
**Allergic response:**

Ag exposure --------------- Ag presenting cells (macrophage)
Then, helper T cells --- recognize on these complex
Then, T cell ----------- release IL-4 & IL-13
Then, IL-4 & IL-13 ---- favor --- B cell transformation to
----- sensitized Plasma cells ---- produce IgE
Then IgE bind to mast cell --- degranulation --- release:
- Histamine.
- Serotonin.
- Protease
The mediators ----- cause vasodilatation
Type I immediate hypersensitivity

IgE mediated immediate
Primary ( early ) reaction phase :
• Mast Cells degranulation ------ release the histamine
• Occur within 2-5 minutes.
• Peak 15 minutes.

Secondary ( late ) reaction phase :
• Mediator release ------ Neutrophil & Eosinophil is hallmark of allergic response
• Occur 4-6 hours after acute phase. ------ obstruction
• Leukotriens ( IL-5 ) -- increase Eosinophil -- increase edema & secretion
• Main interleukin in allergy
  IL 4, 5, 13

• 3 types of histamine receptors :
  H1 ----------- airway.
  H2 ----------- Gut, skin
  H3 ----------- ubiquitous , brain .

• 3 main effect of histamine :
  1. VD.
  2. Increase vascular permeability
  3. Bronchi construction
Rhinitis

Allergic
- Seasonal
- Perennial
- Intermittent
- Persistent

Non-allergic
- Idiopathic
- NARES
- Infectious
- Occupational (irritant)
- Drug induced
- Hormonal
- Irritant
- Food
- Emotional
- Atrophic
- Gastroesophageal reflux
Rhinitis phenotypes
most common forms

- Allergic
- Infectious: Viral (acute), bacterial, fungal
- Non-Allergic, Non-Infectious, Rhinitis
  (vasomotor rhinitis)
- Non-Allergic Rhinitis with Eosinophilia Syndrome
  (NARES)
Occupational: May be allergic or non-allergic

Drug-induced: Aspirin, some vasodilators

Hormonal: Pregnancy, menstruation, hormonal contraceptives, thyroid disorders

Food-induced (gustatory)

Cold air-induced (skier’s nose)

Atrophic (rhinitis of the elderly)
Non-allergic rhinititis

- allergic symptoms in absence of allergy
- Rhinitis not caused by IgE mediated events.
Infection Rhinitis

1- viral

AKA ------------ common cold.

**Common viral pathogens:**
- rhinovirus (most common) ---- 30-50%.
- Corona virus -------------- 10-15%

**Diagnosis:** clinical Hx. & exam

**Treatment:**
1. No cure
2. Antibiotics --- if suspected bacterial infection
3. Decongestant.
4. Antihistamine.
5. NS irrigation.

2- bacterial

typically secondarily infected viral rhinitis

**Common Bacterial Pathogens:**
Pertussis, Diphtheria, Group A Streptococcus, Chlamydia

**Dx:** clinical history and exam

**Rx:**
A. antibiotic regimen.
B. symptomatic therapy similar to viral rhinitis
Irritative-toxic (occupational) rhinitis

**Definition:**
Rhinitis secondary to exposure to airborne irritants or toxic agents @ work

**Includes:**
chemicals; smoke; solvents
Direct irritation rather than immune-mediated

**Treatment:** Avoidance
Gustatory rhinitis

- Food ----------- hot/spicy
- Alcohol ---------------- cause vasodilation
- Spicy food ------ watery rhinorrhea ------ vagal mediated
Hormonal rhinitis

**E.g.:**
- Hypothyroidism --- myxedema
- Pregnancy.
- OCP
- Menstrual cycle

**Rhinitis of pregnancy:**
Most common is associated with pregnancy:
- 22% of non-smoking pregnant women.
- 69% of smoking pregnant women.

**Pathophysiology:**
- Increased estrogen levels inhibits acetylcholinesterase activity, leads to increased Ach in parasympathetic nervous system, causes swelling & edema of nasal mucosa.

Most common during late stages
Resolve after delivery

**Diagnosis:**
- Avoid skin testing (risk of anaphylaxis)
- RAST testing.
- Nasal cytology

**Treatment:**
1. NS irrigation.
2. Local steroid (class C).
3. Avoidance of allergens.
4. Avoid decongestant (fetus risk)
Drug-induced rhinitis

- Anti hypertensive ---- (most common)
  - ACE inhibitors;
  - β-blockers

- OCPs;
- topical decongestants; psychotropic meds; NSAIDs; antidepressant, antithyroid; cocaine
Rhinitis medicamentosa

Rhinitis secondary to prolonged use of topical nasal decongestants (vaso-constrictive) sprays.

**Pathophysiology:**
Down regulation of α-2 adrenergic ---- cause rebound congestion & lead to refractory vasodilatation by the following:
- Decrease vasomotor tone
- Increase parasympathetic.
- Increase vascular permeability.
- Decrease ciliary activity.

**Treatment:**
- avoid by limiting topical decongestants to 3–5 days
- discontinue topical decongestants.
- aggressive saline irrigation.
- oral decongestants.
- nasal steroid spray.
Idiopathic (vasomotor) rhinitis

Definition:
Increase parasympathetic activity secondary to environmental condition lead to change in vascular tone & permeability of mucosa ------ resulting chronic rhinitis

SSx: similar to allergic rhinitis.

Dx: diagnosis of exclusion, negative allergy work-up & low eosinophil counts.

Medical Management
- anticholenergic nasal sprays (ipratropium bromide)
- corticosteroid nasal sprays
- hypertonic saline nasal sprays
- may consider short course of oral and topical decongestants or antihistamines

Surgical Management: indicated for refractory cases:
- Correct septal deviation -- mechanical area of irritation
- Turbinate reduction --------- (SMR, cautery, cryo, etc.)
- Vidian neurectomy ---- division of parasympathetic
Non-allergic rhinitis with eosinophilia (NARES)

**Definition** ------ nasal eosinophilia without allergy.

**Etiology** -------- unknown

**SSx:** Similar to allergic rhinitis:

**Diagnosis:**
- Positive allergic symptoms with
- Negative allergic test
- > 20% eosinophilia on smears

**How to detect eosinophilia on nasal smears**
- Acquire sample of nasal mucus (wax paper or swab), smear on slide
- Stain with Hansel stain (eosin methylene blue)
- Positive criteria: >25% eosinophil content, or if eosinophils, mast cells & goblet cells are present
ALLERGIC RHINITIS (ARIA)

- Subdivided into intermittent (IAR) v. persistent (PER)

- Severity classified as mild v. moderate/severe
**ALLERGIC RHINITIS**

**ARIA**

**Intermittent symptoms**
- < 4 days per week
- Or < 4 weeks

**Persistent symptoms**
- > 4 days per week and > 4 weeks

**Moderate-severe one or more items**
- Abnormal sleep.
- Impairment of daily activities, sport, leisure.
- Problems caused at school or work.
- Troublesome symptoms.

**Mild**
- Normal sleep.
- Normal daily activities.
- Normal work and school.
- No troublesome symptoms.
<table>
<thead>
<tr>
<th></th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>• &lt; 4 days / week</td>
<td>• &gt; 4 days / week</td>
</tr>
<tr>
<td></td>
<td>• or &lt; 4 weeks</td>
<td>• or &gt; 4 weeks</td>
</tr>
<tr>
<td>Mild</td>
<td>• Sleep: normal</td>
<td>Moderate-severe</td>
</tr>
<tr>
<td></td>
<td>• Daily activities (incl. sports):</td>
<td>• Sleep: disturbed</td>
</tr>
<tr>
<td></td>
<td>normal</td>
<td>• Daily activities: Restricted</td>
</tr>
<tr>
<td></td>
<td>• Work-school activities:</td>
<td>• Work and school activities:</td>
</tr>
<tr>
<td></td>
<td>normal</td>
<td>disrupted</td>
</tr>
<tr>
<td></td>
<td>• Severe symptoms: no</td>
<td>• Severe symptoms: yes</td>
</tr>
</tbody>
</table>
Seasonal allergic rhinitis ≠ intermittent perennial allergic rhinitis ≠ persistent

<table>
<thead>
<tr>
<th></th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal Allergic Rhinitis (n=193)</td>
<td>133</td>
<td>60</td>
</tr>
<tr>
<td>Perennial Allergic Rhinitis (n=208)</td>
<td>151</td>
<td>57</td>
</tr>
</tbody>
</table>

• House dust mites
• Grass, tree and weed pollen
• Pets
• Cockroaches
• Molds
DIAGNOSIS

- Detailed personal and family allergic history
- Intranasal examination – anterior rhinoscopy
- Symptoms of other allergic diseases
- Allergy skin tests and/or
- In vitro specific IgE tests
Avoid antihistamine 48-72 hours prior to testing.

- detect presence of IgE-mediated allergy.
- takes little time to do (~1 hr), but uncomfortable, risk of anaphylaxis

**Prick test**

**Intradermal test**
In vitro testing

Direct measurement of allergen-specific IgE in serum
Serum incubated with known antigens on a matrix; excess serum washed off, and residual complexes incubated with anti-IgE and a marker

(1) **Radioactive marker:**

**Radio-Allergo-Sorbent test (RAST):**
- It is a blood test used to determine to what substances a person is allergic.
- Ag-specific IgE quantification is more useful.

(2) **Fluorescent marker:**

**Enzyme-Linked Immuno-Sorbent Assay (ELISA):**
- is a test that uses antibodies and color change to identify a substance.
- similar to RAST except fluorescing agents are used for markers of antigen-IgE complexes
  More specific but less sensitive
### Immunoassay vs Skin Test for Diagnosis of Allergy

<table>
<thead>
<tr>
<th>Immunoassay</th>
<th>Skin Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not influenced by medication</td>
<td>Higher sensitivity</td>
</tr>
<tr>
<td>Not influenced by skin disease</td>
<td>Immediate results</td>
</tr>
<tr>
<td>Does not require expertise</td>
<td>Requires expertise</td>
</tr>
<tr>
<td>Quality control possible</td>
<td>Cheaper</td>
</tr>
<tr>
<td>Expensive</td>
<td></td>
</tr>
</tbody>
</table>
Management of Allergic Rhinitis: ARIA Guidelines

- Mild intermittent
  - Avoidance of allergens, irritant and pollutants

- Moderate intermittent
  - Intranasal decongestant (<10 days) or oral decongestant
  - Oral or local nonsedative H1-blocker
  - Leukotriene receptor antagonists

- Mild persistent
  - Intranasal steroid

- Moderate severe persistent
  - Immunotherapy
EDUCATION/ALLERGEN AVOIDANCE
PHARMACOTHERAPY
IMMUNOTHERAPY
Others – Nasal douching
SURGERY
EDUCATION/ALLERGEN AVOIDANCE

- Explanation of disease, progress (atopic march), treatments
- Breastfeeding
- Parental smoking
- Allergen avoidance
## PHARMACOTHERAPY

<table>
<thead>
<tr>
<th>Topical Nasal Treatments</th>
<th>Oral Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Corticosteroids</td>
<td>- Antihistamines</td>
</tr>
<tr>
<td>- Antihistamines</td>
<td>- Corticosteroids</td>
</tr>
<tr>
<td>- Chromones</td>
<td>- Antileukotrienes</td>
</tr>
<tr>
<td>- Anticholinergics</td>
<td>- Decongestants</td>
</tr>
<tr>
<td>- Decongestants</td>
<td></td>
</tr>
</tbody>
</table>
## PHARMACOTHERAPY

<table>
<thead>
<tr>
<th></th>
<th>Oral antihistamines</th>
<th>Nasal antihistamines</th>
<th>Cys-LT1 receptor antagonists</th>
<th>Nasal steroids</th>
<th>Nasal decongestants</th>
<th>Oral decongestants</th>
<th>Nasal ipratropium</th>
<th>Nasal cromones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhinorrhea</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>0</td>
<td>0</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Congestion</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Sneezing</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Pruritus</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>+++</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Ocular symptoms</td>
<td>++</td>
<td>0</td>
<td>++</td>
<td>++</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Onset of action</td>
<td>1 hr</td>
<td>15 min</td>
<td>48 hr</td>
<td>12 hr</td>
<td>5-15 min</td>
<td>1 hr</td>
<td>15-30 min</td>
<td>-</td>
</tr>
<tr>
<td>Duration</td>
<td>12-24 hr</td>
<td>6-12 hr</td>
<td>24 hr</td>
<td>12-48 hr</td>
<td>3-6 hr</td>
<td>12-24 hr</td>
<td>4-12 hr</td>
<td>2-6 hr</td>
</tr>
</tbody>
</table>
IMMUNOTHERAPY

• Involves repeated administration of an allergen extract to induce a state of immunological tolerance

• **Mechanism:**
  • Stimulate formation of IgG which then compete with IgE for binding sites on mast cells & basophils.
  • More effective in limited spectrum of allergies in particular seasonal pollen allergy
  • Severe symptoms failing to respond to usual Px
  • Subcutaneous injection/sublingual route
  • Studies indicate that 3 years therapy necessary
OTHER TREATMENTS

Nasal douches
- adjuvant to other treatments
- studies indicate can be useful in children with seasonal rhinitis
- pregnancy
ARIA RECOMMENDATIONS

- Topical corticosteroids and oral antihistamines (non-sedating) form the mainstay of treatment

- The newer topical steroids e.g. Mometasone furoate and Fluticasone propionate were highest recommended

- Other drugs should only be considered as second-line treatment

- Immunotherapy in selected patients can be highly effective.
• 4 years and older should be treated as for adults
• Children (>4) with AR and Asthma can be treated with combination of newer generation topical and inhaled corticosteroids with low risk of complications
• Diagnosis in smaller children is difficult as can have up to 6 to 8 colds per year
• Small children – oral antihistamines, saline sprays and corticosteroids if symptoms severe
ALLERGIC RHINITIS IN PREGNANCY

- FDA considers no drugs are considered completely safe
- FDA RISK Categories for drugs in pregnancy (based on good studies in pregnant women)
  A - safe to baby in 1st trimester
  B - safe in pregnant animals, no human studies
  C - drugs show foetal problems in animal studies but benefits may outweigh the potential risks
  D - clear risk to foetus but there may be instances
  X - should not be used in pregnancy
ALLERGIC RHINITIS IN PREGNANCY

- Nasal Saline
- **Nasal corticosteroids** – all Category C except Budesonide which was recently reassigned B – nasal steroid of choice
- Antihistamines – usually not very effective but older antihistamine chlorpheniramine, loratadine and cetirizine are -------- B
- Oral steroids -------- C
- Decongestants -------- C
Thank you