Allergic occupational diseases of the respiratory tract and lungs

Allergic rhinitis and **bronchial asthma** belong to the category of occupational allergic diseases.

Occupational allergic rhinitis

- It is defined as an i**nflammatory disease** of the nasal mucosa that arises in response to an airborne allergen occurring in the workplace. An estimated 15-20% of the population suffers from allergic rhinitis, the proportion of occupational rhinitis cannot be estimated.
- Allergens are either common substances that are at an increased rate in the workplace (bakery flour, cereal dust...) or they are **allergens specific to the given working environment** (acid anhydrides in the formation of plastics...). In general, they are either *high molecular weight* (proteins, cereal dusts, insect antigens, latex...) or *low molecular weight* (diisocyanates, anhydrides, rosin substances, ATB...).

Professional exposure

Similar to asthma: flour processing (bakers, millers), grain handling (farmers), animal care, disinfection contact (paramedics), woodworking.

Etiopathogenesis

- Repeated contact with the allergen leads to **IgE-dependent mast cell activation** → **vasodilation**, edema, nasal obturation.
- Inflammation mediators stimulate afferent nerve endings → itchy nose, **sneezing**.
- The accumulation of inflammatory cells is characteristic.

Pathology

Edematous mucosa with profuse serous exudation, the chronic form has a hyperplastic or atrophic character.

Clinical course

Acute

- **Itchy and irritated** nose, sneezing and watery secretions, and is often accompanied by itching in the throat, eyes and ears. Asthma is often added to the symptoms.
- These are type I reactions → symptoms appear within minutes, they go away quickly.

Chronic

- In unrecognized and untreated recurrent acute rhinitis, they may become chronic after months to years.
- Dominated by a **stuffy nose** and thick mucus, there may be chronic conjunctival changes, and tearing. Sneezing and itching are usually absent.

Examination methods

- ENT examination,
- **intradermal skin tests** - a basic range of inhaled allergens (house dust, feathers, mites...),
- increase in serum IgE,
- identification of professional specific IgE antigens,
- nasal swabs - cytological analysis (**predominance of eosinophils**),
- **rhinomanometry** - measures the resistance of nasal passages by quantitative measurement of nasal flow and pressure,
  - active anterior rhinomanometry is usually used,
  - it is also used in assessing the response to provocation tests,
  - positive rhinoprovocation test - after contact with the allergen, nasal flow decreases by at least 40% and nasal resistance increases by 60%.
- Assessment of professionalism - we must demonstrate inhalation exposure to an allergenic substance in the workplace.
  - the clinical picture and the specific immunological response decide,
  - people often neglect this disease and go to the doctor after a long time.

Differential diagnosis

- In particular, rhinitis of other origins (allergic seasonal, perennial...), it is necessary to think about other pathologies in the nasal cavity.

Occupational bronchial asthma

- Asthma caused by **inhalation of harmful nox at work**,
- they are not at all different from classic asthma,
- estimate of the share of professionalism in asthma - 2–15%, the figure is probably **significantly underestimated**, doctors often do not consider professionalism at all.
- Factors:
  - **high molecular weight** (animal and vegetable proteins),
  - **low molecular weight** (isocyanates, anhydrides, platinum salts),
  - **inhalable chemicals** (chlorine, ammonia),
  - pharmacologically active substances (**insecticides**),
  - physical factors (**cold**).

Professional exposure

- The most common allergens:
  - **flour** (amylase) - millers, bakers, confectioners,
  - grain dust - silo workers, farmers,
  - **urine and fur** of laboratory and livestock - research laboratory staff, farmers, breeders,
  - disinfectants - paramedics,
  - natural and synthetic fibers - textile industry,
  - **wood dust** - saws, furniture industry,
  - proteolytic enzymes - food industry, production of washing powders,
  - rosin fumes and other welding fumes - fine mechanics, welding,
  - isocyanates, acrylic resins, paint pigments - chemical production.

Etiopathogenesis

- **Chronic inflammatory disease**, main cells involved - **mast cells** and eosinophils,
  - inflammation increases bronchial reactivity, **bronchospasm** (obstruction) occurs,
  - **mild asthma** - there is no obstruction between the attacks, but there is **hyperreactivity**,
  - **severe asthma** - **obstruction** present even between attacks.

Types of occupational asthma

Immunological occupational asthma

- occurs in a small number of exposed,
- after an initial asymptomatic period, by inhalation of substances previously well tolerated by the worker,
- there is a **specific immune response** to the substance,
- are caused by two types of substances, depending on the different courses,
  - **high-molecular-weight substances** - induce an IgE response, it starts quickly,
  - **low-molecular-weight substances** - an unknown mechanism (probably a type III or IV response), **onset later** (often only after returning from work), disappears after 24 hours.

Irritation-induced asthma
: The mechanism of origin is not entirely clear (probably plays a role in the **release of neurotransmitters**). It is formed **after exposure to irritating substances** (dust, aerosol, vapors, smoke).

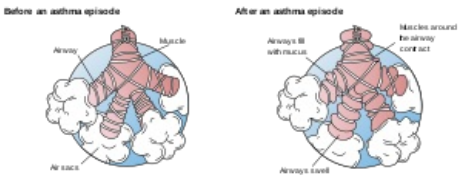
RADS (reactive airways dysfunction syndrome)
: It arises from short-term intensive exposure,

Reflex bronchoconstriction
: Non-immunological response (without inflammation), when stimulating neuroreceptors with cold, dust, aerosols, fumes.

Pharmacological bronchoconstriction
: It is formed by inhalation of substances that cause pharmacological bronchoconstriction, such as **organophosphates**.

Pathology

Wall remodelling occurs - thickening of the bronchiole wall (muscle hypertrophy), high epithelium, a lot of goblet cells, sometimes even squamous metaplasia, goblet cell hyperplasia occurs.



The difference between a normal and asthmatic bronchiole

Clinical picture

- Feeling of shortness of breath, wheezing with a maximum in the expiration (often audible at a distance - distance phenomena).
- **Coughs** occur only at the workplace or in connection with work (after work).
- Often still **eye complications**, rhinitis...
- Symptoms get better on weekends and holidays.

Examination methods

- **Spirometry** - obstructive ventilation disorder,
- **non-specific bronchoprovocation test** - acetylcholine or histamine,
  - we find non-specifically that bronchi are hyperreactive.
  - **Positivity criteria**
    - decrease in FEV1 by 20%, MEF 25-75 by 30%, increase in resistance by 100%,
- Specific inhalation **bronchoprovocation tests** - we administer specifically a certain substance that we suspect, either we administer commercially manufactured preparations or in an exhibition cabin (we will make the conditions of the workplace),
  - the positivity conditions are as for the non-specific test,
  - is potentially more dangerous (we give the allergen, not the body's own substance...),
    - only for people who do not rest obstruction and during hospitalization.
- **Elimination test** - evaluation of health status after long-term exclusion from exposure.
- **Re-exposure test** - after performing the previous one, we will re-engage in the process and find out the health condition.
- **Skin tests**, ID spec. IgE, BAL...

Differential diagnosis

It is necessary to **rule out other causes of obstruction** - tumors, foreign bodies, laryngeal nerve paresis... The basic problem is the distinction between occupational asthma and pre-existing asthma aggravated by work.

Treatment

Exclusion from exposure, corticoids, β-2 mimetics, anticholinergics, **theophylline**, antiallergics.

Links

References

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