

Emergency in allergology

Plan of the lecture

- **1. Definition, etiologic factors, diagnostics, treatment of urticaria and allergic edema**
- **2. Layel syndrome (toxic- allergic bullous epidermal necrolysis)**
- **3. Stevens-Jones syndrome**
- **4. Serum disease**
- **5. Anaphylactic shock**
- **6. Emergency**

Urticaria – is a disease manifested by itching skin rash like spots, papule, vesicle with clear edge ranges in size from several mm to 10 and more sm. Rash appear quickly, elements can conjugate, spread throughout the body. Elements exist for several hours and then steadily disappear and again recur in another locus

If urticaria exist more than 24 hours, it's necessary differentiate it with allergic vasculitis or delayed urticaria due to pressing.



Angioneurotic edema– is acute rapidly developed with comparatively fast resolution edema of skin, subcutaneous tissue and/or mucous membranes



Etiologic factors of urticaria (U) and allergic edema (AE) are:

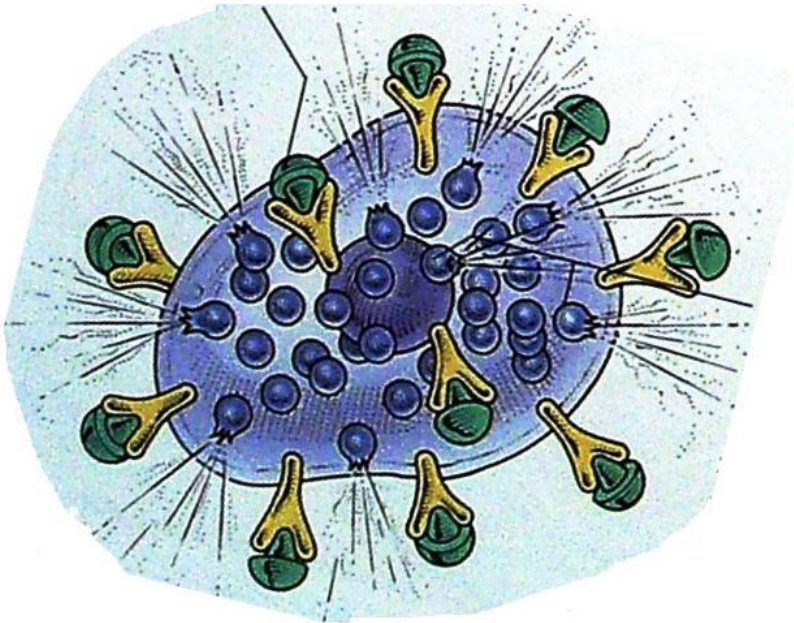
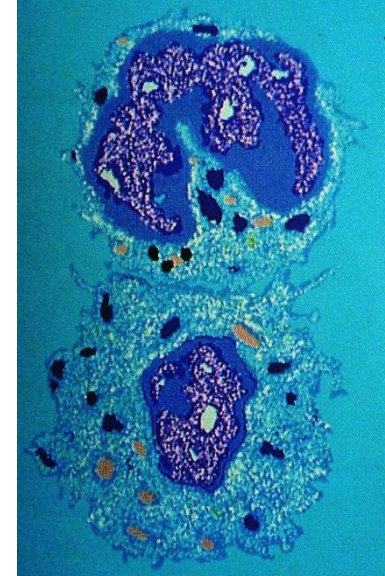
- **IgE-mediated factors**
 - Food or injected allergens (medications, food ingredients)
 - Anti- IgE-antibodies
 - Latex
- **Complement-mediated factors**
 - C3b–inactivator deficiency
 - Urticarial vasculitis
 - Serum disease

- **Substances of direct action on mastocytes**
 - **opiates**
 - **Contrast remedies for X-ray**
 - **curare, tobaccocurine chloride**
 - **Substances that disrupt arachidonic acid metabolism**
 - **Aspirin**
 - **Nonsteroid drugs**
 - **Some inhibitors of cyclooxygenase -2**
- **Physical stimuli**
 - **dermatographism**
 - **Heat and cooling**
 - **vibration**
 - **Water contact**
 - **pressure**
 - **Sun light, ultraviolet**
 - **Physical training (cholinergic)**

- **Autoimmune disease of mastocytes**
 - **IgG- antibodies**
 - **IgE IgG- antibodies against Fc (highly adapted receptor for IgE on mastocytes)**
- **idiopathic**
- **Another: food additives, ACE inhibitors.**

Separately is defined inherited factor K characterized with chronic recurrent angioneurotic edema due to inherited deficiency of C1 – first component of complement system (C1-INH)

SKIN BIOPSY OF URTICARIA ELEMENTS REVEAL VENE DILATION, EDEMA AND MASTOCYTES DEGRANULATION, MONONUCLEAR OR EOSINOPHYL INFILTRATION. In the case of acute U cell infiltration is absent, in chronic one perivascular infiltration by cells exist.



Mastocytes degranulation produce arachidonic acid derivatives, histamine, pro-inflammatory cytokines (α-TNF, IL-3, IL-5, IL-8) releasing .

Diagnositics

- Common blood test
- Common urine test
- Stool test
- Microbial stool test
- Complement components (C3 и
- Functional liver tests
- Ultrasound diagnostics of inner organs
- Specific allergen diagnostics
- Another specific tests for excluding of
 - Autoimmune diseases (antinuclear antibodies, circulated immune complexes,)
 - Malignancies
 - Chronic infections and parasite diseases (hepatite, Ebstein-Barr virus, fungi, helminth)
 - Thyroid gland disease
 - GI disease
- Skin biopsy if urticarial vasculitis is suspected



Treatment

Main goal is acute urticaria complete resolution and choice of proper therapy

- Hospitalization indications— severe forma of acute urticaria, allergic edema of pharynx with risk to asphyxia, all cases of anaphylactic reactions
- Hypoallergic diet, patient training

Medications

- Antihistamine drugs H1-blockers of 1, 2 and 3 generation
- Corticosteroids: prednisone 2-3-5 mg/kg
- Sorbents

Layel syndrome

(toxic- allergic bullous epidermal necrolysis)

- **The most severe form of allergic skin disorders**
- **More frequently it's caused by medications like antibiotics, barbiturates, analgetics and NSAID**
- **Infectious process can precede Layel syndrome**

Clinical presentation

- **Disease develops several hours or days later medication intake**
- **Prodromal period presents with fever, malaise, head ache, myalgia, skin hyperesthesia, itching of conjunctiva**
- **Hyperthermia 39-40 C, macular or maculo-petechial or urticarial rash appear on trunk that turn into vesicular**
- **First rash can appear on mucous membranes of mouth, nose, genitalia or eyes. Several days later erythrodermia appear and then epidermolysis or skin exfoliation develops with erosion formation**

- **Positive Nickolsky symptom**
- **Very painful erosions and affected sites of skin**
- **Progressive condition worsening, dehydration symptoms appear**
- **Disease course is very similar to burns (burn skin affection symptom)**
- **Mucous membranes are affected in 90% of cases**
- **Prognosis is dependant of necrosis extension**
- **Lethality ranges to 30%**



Treatment

- **In emergency department**
- **The main task is sustain normal fluid-electrolyte and protein balance, topical therapy of skin erosions and affections**
- **Antibiotics and corticosteroids 5-15mg/kg**
- **Topical therapy – corticosteroid aerosols, antibacterial lotions to soaking sites, cream of solkoseril or patenol**

Stevens-Jones syndrome

- **The most severe form of polymorphic exudative erythema with affection of mucous membranes together with skin and 2 or more inner organs**

- **Causative factors – penicyllines, NSAID, antyconvulsant drugs**



Clinical presentation

- **Acute onset**
- **Hyperthermia**
- **Arthralgia**
- **Sometimes flu-like syndrome as prodromal period**
- **Mucous membranes affection- vesicule, erosions with white or hemorrhagic coverings and crusts**
- **Eyes are affected in the form of purulent or catarrhal keratoconjunctivitis**
- **In 1/2 of cases – genitourinary mucous can be affected**
- **Rare bronchiolitis, colitis, proctitis**

Differential diagnostics of Layel and Stevens-Jones syndromes

Sign	Stevens-Jones syndrome	Layel syndrome
Disease onset	Common infectious process onset like ARVD	Affection of respiratory tract can be absent
Skin damage	Rash appear 4-6 days later after fever onset	Rash appear 24-48 hours after medication intake
	Coefficient of affected skin to unaffected is 30-40%	Coefficient of affected skin to unaffected is 80-90% (total affection)

There are isolated elements together with confluent ones. Rash is polymorphic

Elements has tendency for confluence. Rash at the beginning is erythematous-papular, then bullous

Vesicles predominantly strained, different sizes situated by groups. Colour is violet-bluish. Nickolsky symptom (-)

Vesicles easily damaged producing symptom of "Scald skin", epidermis is easily exfoliated after any pressure. Skin from wrists and foots can be removed like socks or gloves

<p>Mucous membranes affection</p>	<p>Is the first sign as for appearance and severity More frequently oral mucous membranes and genitalia are affected</p>	<p>Predominantly skin damage</p>
<p>Affection of inner organs</p>	<p>Cardiovascular, nervous systems affection</p>	<p>High sensibilization, joints affection, and Quinke edema</p>
<p>Outcome</p>	<p>Recovery</p> <p>Frequent seasonal recurrence</p> <p>Death in 20-45% with signs of meningoencephalitis and myocarditis</p>	<p>Recovery without complications or with of keloid scars formation, recurrence is very rare</p> <p>Death in 25-75% may be due sepsis, bleeding from erosion surfaces, kidney or liver failure</p>

Serum disease

- **Serum disease is allergic disease caused by heterogeneous or homogeneous serum or medications injections that produce inflammatory affection of vessels and connective tissue**
- **Term is proposed by C.Pirquet, B.Schick (1905)**

- **Predominantly immune complex mechanisms are responsible for inflammatory process in vessels and connective tissue**
- **Main serum quantity is prepared from hyperimmunized hoarse blood, proteins of hoarse serum are the causative factor of SD (heterogeneous substances)**
- **Nowadays these serums are subsided by homogeneous protein medications like plasma or its components (albumin, globulin)**

Clinical signs

- **Different symptoms due to difference of antibodies types and quantities**
- **Incubative period after initial serum injection ranges from 7-10 days to 3 weeks**
- **In prodrome period** initial symptoms are present: skin hyperesthesia, lymph nodes enlargement, rash around sites of injection.

- **Acute period: fever , hyperthermia to 39-40C; polyarthralgia, articular stiffness**
- **Rash like urticaria or maculo-papular type, excessive itching (temperature decreases after rash appearance)**
- **Hemodynamic disturbances (weakness, heart beating, cardiac pain, BP decreasing, decreasing of voltage by ECG), face edema**
- **In severe course GI, kidney (glomerulonephritis), lungs (emphysema, lung edema), liver (hepatitis), nervous system (Giyenn- Barre syndrome) disorders can appear.**

Anaphylactic shock

- ✓ **Asphyxia**
- ✓ **Circulatory**
- ✓ **Abdominal**
- ✓ **Cerebral**
- ✓ **Mixed**

Course

- ✓ **Acute benign**
- ✓ **Acute malignant**
- ✓ **Lingering**
- ✓ **Recurrent**
- ✓ **Abortive**

Emergency

- **Stop medication injection**
- **Lay down patient, turn his head to the side, pull mandibular forward, fix tongue. Provide fresh air access or moisturize oxygen**
- **It's necessary to stop further allergen admission**

In the case of parenteral allergen penetration:

- ✓ to inject the site of allergen injection (or bite) by 0,1 % solution of epinephrine 0,1 ml/per year in physiologic solution and put ice on this site**
- ✓ Proximal tourniquet overlapping (if possible) for 30 min, without pressing to artery**
- ✓ If reaction appear due to penicilline inject 1 mln IU of penicillinaze diluted in 2 ml of physiologic solution**

- If anaphylactic reaction is due to instillation into nose or eyes it's necessary wash out mucous by big quantity of water;
- If it is due to oral allergen intake it's necessary to wash out stomach if condition of child is opportune
- Immediately inject IM:
 - 0,1% sol. of epinephrine in dosage 0,05-0,1 ml/per year (not more 1 ml) and
 - 3% sol of prednisone 5 mg/kg into muscles of oral cavity bottom
 - Antihistamine medications: 1% sol. dimedrol 0,05 ml/kg, not more than 0,5ml to infants and 1 ml to older children) or 2% sol of suprastin 0,1-0,15 ml/per year)

Usage of diprasin (pipolfen) is prohibited due its excessive hypotension effect ! Obligatory Ps, RR, and BP control.

- After fulfilling all first aid actions find vein and IV inject 0,1% sol of epinephrine in dosage 0,05-0,1 ml/per year diluted in 10 ml of physiologic solution
- IV inject corticosteroids:
 - 3% prednisone sol. 2-4 mg/kg (in 1 ml of sol is 30 mg) or
 - Hydrocortisone 4-8 mg/kg (1 ml of suspension contains 25 mg) or
 - 0,4% dexamethasone 0,3-0,6 mg/kg (in 1 ml – 4 mg)
- Starting solution for infusions is 0,9% NaCl or Ringer 20 ml/kg for 20-30 min.

Later if circulation isn't stable colloid solution – rheopolyglucin 20 ml/kg. Infusion quantity and velocity dependent on BP, central venous pressure, and patient's condition.

- If BP become low – inject alfa-adrenomymetics IV every 10-15 min
 - 0,1% epinephrine sol. 0,05-0,01 ml/year (total not more than 5 mg) or
 - 0,2% norepinephrine sol. – 0,1 ml/year (not more than 1 ml) or
 - 1% mesaton sol.- 0,1 ml/year (not more than 1 ml)
- If effect is absent IV injection of dophamine 8-10mcg/kg/min with BP and HR control
- In the case of bronchospasm development or respiratory disturbances:
 - Oxygen therapy
 - Euphyllin 2,4% sol 5-1 мл/year (not more than 10 ml) IV in 20 ml of physiologic sol.
 - Discharge mucus from trachea and oral cavity
 - In stridor immediate intubation or conicotomia.

- If necessary provide cardio-pulmonary emergency rehabilitation**
- Symptomatic treatment**

Hospitalization after providing all emergencies

Elimination of acute anaphylactic signs doesn't mean successful ending of this pathologic process.

Only 5-7 days later acute reaction prognosis for patient can be positive

Questions physician must ask before any medication prescription

- **If patient or his relatives has any allergic disease?**
- **If patient admit this medication previously?
Has patient any side effect to this medication?**
- **What medications were consumed for a long time?**
- **Has patient been injected serums and vaccines?**
- **Has patient skin and nail mykosis (epidermophytus, trychophytus)**
- **Has patient professional contact with medications?**
- **Has patient allergic reactions or worsening of another disease after contact with animals?**

Main approach for medication allergy

- ✓ **Hypoallergenic diet, parenteral feeding**
- ✓ **Stop intake of all medications (leave only those medications that are necessary to maintain life**
- ✓ **Allergen elimination**
- ✓ **Sorbents, enema**
- ✓ **Antihistamine drugs**
- ✓ **Corticosteroid medication**
- ✓ **Symptomatic therapy (cardiotonics, broncholytics etc.)**

Medication allergy prevention

Before prescribing any medication doctor must answer to questions :

- if really this medication necessary
- What can happen if this medication will be prescribed
- What do I really want get from this medication
- What side effects can be due to this medication intake?

- **Primary prophylaxis of medication allergy:**

Avoid polypragmasia, medication doses must be correct for age and weight, strict intake recommendations

- **Secondary prophylaxis in persons with allergic diseases. Doctor must teach patient and give special recommendations for allergic patient**

Questions

- To determine the etiology and pathogenesis of allergic disease (urticaria, angioneurotic edema, Langel syndrome, Stevens-Jones syndrome, serum disease, anaphylactic shock) in children
- To classify and analyse the typical clinical picture of allergic disease in children
- To make the plan of inspection and analyse information of laboratory and instrumental inspections at typical motion of allergic disease in children: common blood test and biochemical blood test; immunological researches and order; skin testing with mixed allergens; cells inspection to the smudge-imprint from nasal secret; X-ray
- To demonstrate the domain of emergency, treatment, rehabilitation and prophylaxis of allergic disease in children
- To carry out the prognosis of life at allergic disease in children.
- To demonstrate the skills of moral and deontology principles of medical specialist and principles of professional deference to the rank in allergology.