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# **"RICKETTSIOSIS"**

# Plan of lecture

- Overview
- **Etiology**
- **Epidemiology**
- **Pathogenesis**
- **Manifestations**
- **Diagnosis**
- **Therapy and Prevention**

**Rickettsioses are group of acute infectious diseases caused by especial organisms - *Rickettsia* and transmitted by insects.**

## **Rickettsioses of human are divided into five groups.**

**1. Typhus group - epidemic typhus (Louse-Borne typhus), Brill-Zinsser disease and the endemic typhus (Murine typhus).**

**2. Spotted fever group - Rocky Mountain spotted fever, Boutonneuse (Marseilles fever), North-Asian tick-borne typhus, Queensland tick typhus, rickettsialpox.**

**3. Tsutsugamushi group - scrub typhus.**

**4. Q-fever group.**

**5. The group of the paroxysmal rickettsioses - trench fever (volynian fever).**

# EPIDEMIC TYPHUS FEVER

Synonyms - jail fever, ship fever, putrid fever, petechial fever, typhus exanthematicus.

**Epidemic typhus fever** is an acute infections disease caused by *Rickettsia prowazekii*.

Epidemic typhus fever is characterized by development of generalized thrombovasculitis, meningoencephalitis, severe common intoxication, by appearance of rash, enlarged liver and spleen. It is transmitted by the lice, *Pediculus kumanus*.

# Etiology

The etiologic agent is *Rickettsia prowazekii*, an obligate intracellular bacterium that is closely related antigenically to the agent that causes murine typhus (*Rickettsia typhi*). The organism is cocobacillary but has inconstant morphologic characteristics. Reproduction is by binary fission and diplobacilli are produced that are frequently seen in tissue sections. Special staining (Giemsa) provides good visualization of the organisms in the cytoplasm of cells.



# Epidemiology

- The source of infection is a sick man.
- Epidemic typhus (Louse-Borne typhus) is transmitted from person to person by the body louse (*Pediculus humanus corporis*). The louse feeds on an infected, rickettsemic person. The organism in the louse infects its alimentary tract and results in large numbers of organisms in its feces within about 4-5 days.

**Close personal or clothing contact is usually required to transmit lice to others. When the louse takes a blood meal, it defecates. The irritation causes the host to scratch the site, there by contaminating the bite wound with louse feces. Human infection might also occur by mucous membrane inoculation with contaminated louse feces.**



- **Human conditions that foster the proliferation of lice are especially common during winter and during war or natural disasters - where clothing is not changed, crowding occurs, and bathing is very infrequent.**
- **In epidemic the susceptibility is high for all age groups.**

# Pathogenesis

- After local proliferation at the site of the louse bite, the organism spreads hematogenously. *Rickettsia prowazekii*, as with most rickettsia, produces a vasculitis by infecting the endothelial cells of capillaries, small arteries, and veins.
- The process results in fibrin and platelet deposition and then occlusion of the vessel.
- Perivascular infiltration with lymphocytes, plasma cells, histiocytes, and polymorphonuclear leukocytes occurs with or without frank necrosis of the vessel.
- The angiitis is most marked in the skin, heart, central nervous system, skeletal muscle, and kidneys.

**The mechanism of the development of epidemic typhus may be represented by the next phases:**

- 1. Penetration of *Rickettsia prowazekii* into organism and reproduction in the endothelial cells of the vessels.**
- 2. Destruction of endothelial cells and penetration of rickettsia into the blood - rickettsiemia, toxinemia.**

**3. Functional violations of the vessels in all organs and tissues - vasodilatation, slowdown of the stream of the blood.**

**4. Destructive and proliferative alterations of the capillaries with formation specific granulemas (nodules).**

**5. Formation of immunity.**

# Clinical manifestations

- Epidemic typhus is cyclic infectious disease.
- There are the next periods in the course of the disease: incubation period (it's duration is from 6 till 25 days).
- Initial period till appearance of the rash (it's duration is 4-5 days), period of climax - from appearance of rash till normalization of the temperature (it's duration is from 4-5 days till 8-10 days) and period of reconvalescence (it's duration is 2-3 weeks).

**After an incubation period an abrupt onset with intense headache chills, fever and myalgia is characteristic. There is no eschar.**

**The fever worsens quickly and becomes unremitting and the patient is soon prostrated by the illness. Giddiness, backache, anorexia, nausea are observed in the patients.**



**The appearance of the patient is typical.**

- **The face is edematous, flushed.**
- **Eyes are brilliant with injected sclera ("rabbit's eyes").**
- **Enanthema (small hemorrhages) on the basis of uvula is marked on the second-third day of the disease (symptom of Rosenberg).**

- **The petechial rash may be revealed on transitive folds of conjunctiva from the third-forth day (symptom of Kjary-Aucyne).**
- **The early sign is tremor of the tongue, it's declining to the side (symptom Govorov-Godelj'ae) due to bulbaric disorders.**
- **Splenomegaly is marked on the 3-4 day of the disease in the majority of the patients.**

**Climax period is characterized by development of all clinical manifestations of the disease.**

- The temperature is definite high level (febris remittans). Temperature decreases frequently on the 3-4, 8-9 and 12-13 day of the disease and then the temperature increases again.
- Climax period is accompanied with intoxication and damage of central nervous system.
- The appearance of the rash is an important sign of climax period. A rash begins in the axillary folds and upper part of the trunk on about the fifth day of illness and spread centrifugally.

- **Initially, the rash consists of no confluent, pink macules that fade on pressure, may be rose- and petechial like.**
- **Within several days, the rash becomes maculopapular, darker, petechial and confluent and involves the entire body, palms and soles but never the face.**
- **Disappear with decreasing of temperature.**

## *Circulatory system.*

Very outspoken is cardiac weakness due to myocardial degeneration.

The heart sounds are very weak and the pulse feeble, rapid and irregular.

The blood pressure often is very low, especially the diastolic, and may remain so throughout the disease.

Bradycardia may be marked during convalescence.

## **Respiratory system.**

**Cough may appear in the first days, but usually is first troublesome about the time of the eruption.**

**By the end of a week, the cough becomes loose and rales of various types may be noted.**



## **Alimentary tract.**

Constipation is usually noted.

Very marked is the tendency of the mouth and tongue to become dry and sordes to collect on the teeth. It is often difficult to get the patient to protrude his tongue when told to do so.

In the patients with epidemic typhus splenomegaly and hepatomegaly (from one second week) are marked.

## **Nervous system.**

**Clouding of the consciousness may be as marked in this disease.**

**Dull aching frontal headache is common and is an early predominating symptom.**

**It frequently diminishes before the eruption appears. A dull stupor us state soon comes on.**

**Delirium is marked in some cases. There are often the faces and mental state of alcoholic intoxication.**

**There may be meningitis, eningoencephalitis.**

- In epidemic typhus fever it may be leucocytosis, neutrophilosis, monocytosis in the blood. ESR is accelerated.

**Variants of the disease course.**

**There are mild, medium serious and serious course of the epidemic typhus fever.**

**During the mild course of the disease the occurrences of intoxication are expressed insignificantly.**

- **The temperature increases till 38 °C. The consciousness is no changed.**
- **The rash predominates as roseoles.**
- **The liver and spleen increases in a third of patients.**
- **The duration of fever is till 9 days.**
- **The mild course is observed in 10-20 % patients.**

- **The moderate serious course of the disease occurs more frequently (60-65 % of patients). The temperature increases till 38-39°C. The duration of the fever is 12-14 days. The signs of the intoxication are expressed temperate.**

- **During the severe course of the epidemic typhus fever expressive intoxication, hypotonia, tachycardia (till 140 beats per minute) are observed.**
- **The tones of the heart are muffled. There is acrocyanosis. The dyspnea occurs, it may be violation of the rhythm of the breathing.**
- **The cramps of the muscles, the violation of the swallowing are marked.**
- **The temperature increases up to 40-41 °C. The rash is petechial, it may be hemorrhage.**
- **The severe course occurs in 10-15 % patients.**
- **The serious and very serious course of the disease takes place in elderly people.**



## **Complications**

- **Bronchitis, pneumonia, otitis media, parotitis, nephritis, tromboses of various. vessels, both abdominal and peripheral may occur.**

## **Diagnosis**

- **The methods of the laboratory diagnostic are serological: indirect hemagglutination, indirect immunofluorescence, complement fixation.**

## Differential diagnosis

- **Nonrickettsial infections at some time during the course, may mimic louse-borne typhus include meningococcemia, measles, typhoid fever, bacterial meningitis, secondary syphilis, leptospirosis, relapsing fever, infectious mononucleosis, and rubella.**
- **During the period of onset of the disease the differential diagnosis is performed with grippe, pneumonia, meningitis, hemorrhagic fevers. During the period of the climax the differential diagnosis is performed with typhoid fever, ornithosis, drug disease, leptospirosis, infectious mononucleosis, trichinellosis.**

# Treatment

- Preparations of tetracyclines - tetracyclin, metacyclin, doxycyclin are most effective.
- Laevomycetin, erythromycin has less expressed action.
- At severe course of disease infuse antibiotics in vein or in muscle. Course of treatment carry out during all period of fever and 2 days of normal body temperature.

- **With desintoxication purpose in vein infuse solution of glucose, solution of Ringer-Loc, donor albumin, reopoliglyc, polyvitamin, ascorutin.**
- **At psychomotor exaltation and deliriums - aminasin, fenobarbital, sodium hydroxybiturat, sibazon (seduxen); for rising a tone of cardiovascular system and disorders of circulation - cordiamin, coffein-sodii benzoat, sulfocamphocain, ephedrini hydrochlorid, corglykon or strophanthin are indicated.**

- At rising of intracranial pressure and the phenomena of meningism dehydration with due to furosemid (lasix), mannit is administered, sinapismuses or pepper emplastrum on nape and thorax, gastrocnemius muscle, feet, simultaneously intensive desintoxicative therapy and correction of hydro-electrolytic structure of a blood are also effective.
- At severe and very serious current of typhus use glucocorticoid preparations, anticoagulants (heparin or derivatives of dicumarin).

# Prophylaxis

- Control of the human body louse and the conditions that foster its proliferation is the mainstay in preventing louse-borne typhus.
- Typhus vaccine is prepared from formaldehyde-inactivated *Rickettsia prowazekii* grown in embryonated eggs. Typhus vaccination is suggested for special risk group.



## BRILL-ZINSSER DISEASE

- In Brill-Zinsser disease the pathogenesis and morbid anatomy are similar to epidemic typhus, however the process is less expressive, because the concentration of *Rickettsia prowazekii* is similar in the blood.
- The course of Brill-Zinsser disease is more mild than epidemic typhus, but the patients have all typical symptoms of the disease.

**Initial period (it's duration is 3-4 days) is accompanied by temperate intoxication. Headache, disorder of sleep, increase of the temperature up to 38-39 °C are marked. Enanthema is observed rarely (in 20% of the cases).**

**The duration period is usually 5-7 days. It is characterised by temperate hyperthermia (38-39 °C) of remittent or rarely constant type.**

- **The signs of the damage of the central nervous system are expressed temperately. Meningeal signs are revealed rarely.**
- **A rash is observed in 60-80 % of the patients. The signs of the damage of the cardiovascular system are marked frequently. Enlarged liver and spleen are revealed inconstantly.**

- In Brill-Zinsser disease the complications develop rarely. It may be pneumonia, thrombophlebitis, thrombosis.
- The treatment is similar to epidemic typhus.
- The differentiation of primary louse-borne typhus is made by showing that the antibody produced is IgM (primary louse-borne) or IgG (Brill-Zinsser disease).