

Varicella (chickenpox)

Chickenpox is an infectious disease, highly contagious, clinically characterized by vesicular rash that occurs in several eruptive waves.

Although it is a generally benign disease, chickenpox is especially important because of its contagiousness and high frequency in children who come in contact with a chickenpox patient.

Etiology

- ✓ The causative agent is varicella-zoster virus (VZV) which belongs to the **family Herpesviridae subgroup alpha-herpesviruses**, chickenpox being the first infection with this virus.
- ✓ The virus measures 150-200 nm, contains double-stranded DNA.
- ✓ It is dermatropic, but it also affects the nervous system and viscera.
- ✓ It is determined in the contents of the vesicles, in the blood and CSF.
- ✓ Primary infection with VZV produces chickenpox, after which it remains confined to the sensory spinal nerve ganglia or homologous cranial nerves; when the titer of anti-VZV antibodies decreases under immunosuppressed conditions, the infection may reactivate and produce shingles.
- ✓ In the external environment VZV is not very resistant

Epidemiology

- Chickenpox is spread around the globe, appearing endemic in cities, sometimes in epidemics.

Chickenpox morbidity is high, in the Republic of Moldova it averages 140-260 per 100,000 inhabitants / year as vaccination is not widely used and is not in the national vaccination program.

Epidemiology

- ❑ **The source of infection** is the man with chickenpox, whose contagion begins 1-2 days before the rash and lasts about 5 days after the last rash.
- ❑ The person with Herpes zoster can also be a source of infection.
- ❑ **Transmission routes.** The transmission is made from the patient to the healthy person by air through drops of nasopharyngeal secretions.
- ❑ Transmission of the infection is also possible through the public transport of air current, containing infectious drops from the patient, over long distances, even from floor to floor.
- ❑ Indirect transmission, through freshly contaminated objects, is rare.
- ❑ Transplacental transmission is possible.

Epidemiology

- Chickenpox receptivity is universal.
- Children born to immune mothers are also immune until the age of 4-6 months.
- Chickenpox is predominantly a childhood disease (90%), with the highest incidence between 2-8 years, with a prevalence of the number of cases in the autumn-winter months.
- The receptivity index is 90-95%.
- Children born to mothers who are not immunized against chickenpox can develop severe forms of chickenpox.
- Mortality is extremely rare (0.01 - 0.05%).

Chickenpox **Immunity:**

- Is lifelong. Chickenpox relapses are exceptional (<3%).
- However, the varicella-zoster virus can persist for several years dormant in nerve cells, especially the spinal ganglia, causing shingles (less common in children, more commonly in adults).
- Reactivation of varicellosis virus with the onset of HZ is similar to infection with herpes simplex virus infection.
- Thus, chickenpox is the first infection with VVZ, and HZ occurs in response to a partially immune organism.
- Cases of shingles in a young child denote an infection with maternal prenatal VVZ.

Immunity:

- both humoral (IgM and IgG anti – VZV antibodies) and cellular, follows disease or vaccination.
- Immunity following disease is durable, life-long.
- Duration of vaccination-related immunity is yet to be established.
- Infants born to immune mothers are protected against VZV infection during their first 4 – 6 months of life due to transplacental transfer of IgG anti – VZV antibodies from their mothers.

Pathogenesis

- ❑ VZV penetrates into human organism through nasopharyngeal and/or conjunctival mucosa, with local replication, followed by infection of the reticulo-endothelial system and bloodstream penetration (viremia).
- ❑ VZV thus reaches the skin and mucosa, where it causes cell degeneration, with the appearance of multinucleate giant cells, with eosinophilic inclusions, as well as various others organs (visceralization).

- The chickenpox virus may persist in the body for a long time.
- Following primary infection, the virus persists in latent form at the site of sensorial ganglia, including dorsal roots of spinal nerves.
- The patient is not contagious during this stage, but it becomes contagious again when the infection reactivates, following immune suppression and herpes zoster appears.

Clinical manifestations

- ❑ The incubation period :14 days (10-21days).
- ❑ Prodrome symptoms are usually absent or mild (subfebrile temperature, and a certain general discomfort for 12 to 24 hours).
- ❑ The pruriginous rash (**exanthema**) appear to the head, trunk and extremities, is often seen on the mucous membranes (**enanthema**) of the oropharings, genital and conjunctival mucosa.

macula→papula→ vesicle (within a few hours) into, but some papules dry up without vesiculation.

- Vesicles are round or oval, unilocular.
- Vesicles dry up in 1 or 2 days, forming the crusts that are shed in one to three weeks.
- Since chickenpox eruption does not develop at once, but comes out in crops at intervals of **24 to 48 hours**, it is polymorphous, i.e. the lesions are in different stages of development (macules, papules, vesicles, crusts) at any time on a given area of the skin.

- In peculiar cases, immunocompromised patients, severe forms of disease may occur with **hemorrhagic, bullous or necrotic exanthema**.
- **Adults** may develop more severe clinical forms than children.
- Varicella occurring during the **first trimester of pregnancy** has been associated with congenital abnormalities (microcephaly, hydrocephaly, brain calcifications, eye defects, etc) – 1-2%, and a high risk of pneumonia in mother.

Perinatal varicella is associated with a high mortality rate when maternal disease develops within 5 days before or 2 days after delivery.

- The illness may be unusually severe.
- Mortality rate is as high as 30% in this group.

Congenital varicella, with clinical manifestations of limb hypoplasia, cicatricial skin lesions, and microcephaly at birth, is extremely uncommon.

Clinical forms:

- ✓ There are typical and atypical forms, according to severity they can be mild, medium and severe.
- ✓ The mild forms are typical and atypical (abortive or rudimentary, in which the rash remains in the macula or papule stage).
- ✓ **The criteria of severity in chickenpox** are: general - CNS damage (signs of general intoxication, repeated vomiting, hallucinations, disturbances of consciousness, convulsions) and local - the number of eruptive elements and their size, as well as the nature of eruptions (hemorrhagic, gangrenous, bullous).
- ✓ The evolution of chickenpox can be with complications and without.

- **The mild form** is accompanied by fever up to 37.5-38.50C, signs of minimal intoxication, discreet rash where many of the eruptive elements remain in the papule stage.
- **In the average form** - the fever reaches 39.00C, signs of moderate intoxication, multiple vesicular rash, including on the mucous membranes.
- **The severe form** is characterized by very rich rash, hyperthermia (39.5-40°C), toxemia, severe general condition, primary chickenpox pneumonia and occurs more frequently in adolescents, adults and patients with immunosuppression, in which chickenpox, like other viral infections, develops usually more severe than in children.
- **Severe forms** of chickenpox are primarily related to the individual characteristics of the case and can be: **hemorrhagic, gangrenous, bullous, and generalized (visceral).**

- **Hemorrhagic chickenpox.** Occurs in immunocompromised children (leukemia, long-term corticosteroid therapy, AIDS, etc.). In these cases after 2-3 days the fluid of the vesicles becomes hemorrhagic, there are skin hemorrhages, bruises and spots on the mucous membranes. It often progresses to death.
- **Gangrene chickenpox.** It is characterized by the appearance of necrosis with deep ulcerations with long-lasting regeneration, possible sepsis. It is marked in weak children with hyponutrition (by superinfection with streptococci or anaerobes).
- **The bullous form** occurs in VVZ infection associated with Streptococcus or Staphylococcus aureus. In the first days of the disease, large bubbles of 2-4 cm in diameter, superficial, appear with ordinary blisters. Some bubbles are located on the perimeter of the vesicles. The bullous elements, having thin walls, break easily, forming erosions, crusts, with slow regeneration.

- **Chickenpox in infants**

- From non-immune mothers it can evolve with the pre-eruptive period (moderate toxic signs, low-grade fever, mild diarrhea). The eruptions appear on the 2nd to 5th day of the disease, abundant, polymorphic, typical. The evolution of the disease is slow with frequent bacterial complications and increased lethality.
- **Chickenpox in pregnant women** up to 16-30 weeks may be the cause of skin damage in children (skin hypoplasia, vesicular lesions, scars), eye damage (microphthalmia, congenital cataracts, chorioretinitis, optic nerve atrophy), skeletal damage (hypoplasia / limb aplasia, joint contracture), neurological (encephalitis, microcephaly, hydrocephalus, cortical atrophy, etc.) and etc..

Generalized chickenpox (visceral)

Diseases can be in newborns and immunocompromised people.

It is characterized by hyperthermia, toxemia, altered general condition, abundant rash, primary chickenpox pneumonia, hepatitis, kidney damage, etc. and frequent deaths.

Chickenpox in adolescents, adults and pregnant women

It is characterized by a severe evolution, with acute onset, hyperthermia, abundant rash, lasting and frequent complications.

Complications

- **Nonspecific complications of suppuration. Skin lesions superinfected with beta-hemolytic streptococcus result:** erysipelas, extra-pharyngeal scarlet fever, acute diffuse glomerulonephritis, sepsis.
- **Specific complications due to VVZ invasion are rare:** primary chickenpox pneumonia, laryngitis, encephalitis, meningoencephalitis, cerebellitis, etc.
- Guillain-Barre syndrom
- Reye's syndrome
- Corneal lesions is possible when a vesicle appears on the cornea.

Differential diagnosis

- Herpes simplex virus infections
- Multiple insect bites
- Enteroviral infection (group A Coxsackie virus)
- Smallpox
- Pemphigus
- Impetigo
- Vacciniform pustulosis

Positive diagnosis

- Epidemiologic date
- Characteristic clinical manifestations
- Laboratory findings:
 - ✓ Leucopenia or normal white blood cells count.
 - ✓ Leukocytosis occurs in the event of bacterial secondary infection.
 - ✓ Serum IgM anti-VZV antibodies (ELISA, complement fixation test) reflect recent/acute infection
 - ✓ Detection of *VZV DNA* by PCR from vesicle fluid and/or CSF
 - ✓ *Tzanck smear* – microscopic examination (from skin lesions) may detect multinucleate giant cells
 - ✓ *VZV isolation in cell cultures* is rarely necessary, usually for research purposes.

- Laboratory methods - virus isolation, detection of VVZ antibodies are required in atypical forms.
- The most used serological tests are ELIZA tests, which can differentiate between anti-VVZ IgM antibodies and anti-VVZ IgG antibodies.
- The presence of anti-VVZ IgM means a recent primary infection with VVZ, which confirms the diagnosis of chickenpox.
- The presence of anti-VVZ IgG in the absence of anti-VVZ IgM suggested previously immunized status against chickenpox (through disease or vaccination), which invalidates the diagnosis of chickenpox today.

Treatment

- The basic treatment of chickenpox is hygienic measures aimed to prevent secondary infection.
- The patient's hands should be kept clean and the nails cut short.
- Vesicles are painted with antiseptic solution .
- Antibiotics are administered in case of a secondary bacterial infection.
- Antiviral treatment (Acyclovir).
- Symptomatically treatment.

Prophylaxis

- The patients are isolated (usually at home) for **9 days** from the beginning of the disease.
- Children who have previously had no chickenpox and who have been exposed to it should be quarantined for a period between **21 days** counting from the time of contact.
- Prevention of varicella – varicella vaccine.