

Key

RUBELLA VIRUS

Togavirus (RNA virus)

A woman goes to her doctor complaining of a red rash on her face. She reports having a fever that resolved just before the rash appeared. During a physical exam, the doctor notes that the rash has spread to the arms. Swollen lymph nodes are felt in the cervical region and behind the ears. The doctor inquires about the woman's vaccination record and makes a diagnosis to be confirmed by serological studies. The doctor also makes sure that the woman is not pregnant. The woman is relieved to know the rash will go away in several days, although she may experience arthritis for some time thereafter

CLINICAL PRESENTATION: Fever, cervical adenopathy followed by descending rash congenital rubella: congenital malformations (deafness, patent ductus arteriosus, pulmonary artery stenosis, cataracts, microcephaly)

PATHOPHYSIOLOGY: Transmitted by aerosol → virus infects nasopharynx and replicates in local lymph nodes → systemic spread via blood (viremia) → antibody-mediated reaction leads to maculopapular rash beginning in face and spreading to extremities → antibody complexes may result in arthritis in women if it infects pregnant woman in first trimester → may cross placenta to fetus → infects fetal cells and promotes mitotic arrest, necrosis, or chromosomal damage → congenital defects in brain, heart, or eyes lifelong immunity following infection

DIAGNOSIS Detection of anti-rubella antibodies: IgM if recent infection, IgG if immune.

TREATMENT self-limiting (no antiviral treatment available) vaccine: live-attenuated rubella virus in measles–mumps–rubella (MMR) vaccine

Mumps Virus

Paramyxovirus (RNA virus)

A 16-year-old male requests the private attention of a doctor for testicular pain. He explains that his left testis became tender and enlarged yesterday. A few days before, he recalls suffering from a mild fever and muscle aches. The doctor also recognizes a remarkable swelling of both parotid glands, and the teenager reveals swallowing difficulties. The doctor confirms a diagnosis after seeing the teenager's vaccination records and receiving lab reports that show elevated serum amylase

CLINICAL PRESENTATION: Parotitis, orchitis, pancreatitis, aseptic meningitis

PATHOPHYSIOLOGY: Transmitted by respiratory droplets → attaches and invades upper respiratory tract epithelium via viral hemagglutinin envelope proteins → viremia → 2- to 3-week incubation period → infection of glandular tissues (parotid gland, testes) → inflammatory infiltration and edema → painful enlargement of glands virus may spread to meninges → aseptic meningitis lifelong immunity after one infection

DIAGNOSIS: Symptoms, detection of virus in saliva, urine, CSF.

TREATMENT: Supportive: analgesics, compression of parotid vaccine: live-attenuated rubella virus in measles–mumps–rubella (MMR) vaccine

Measles Virus

Paramyxovirus (RNA virus)

An 11-month-old who attends day care presents with rashes that blanch upon pressing as well as fever, conjunctivitis, and runny nose. The rashes have spread from the hairline to the trunk and then to extremities over time and have become bright red and raised. Now, the rash is already starting to disappear in the same sequence it appeared. While the symptoms resolve over a week, the doctor wonders whether the child will ever have neurological problems from a latent recurring infection, and whether other children in the day care will have the same illness. To contain the illness, the doctor urges the mother to keep the child away from others for at least a few weeks. He also writes a note to the day care center reminding them that all children ages 12–15 months should receive a vaccination for this illness.

CLINICAL PRESENTATION: Flu-like symptoms, Koplik's spots, followed by rash encephalitis complications: SSPE (Subacute Sclerosing Panencephalitis)

PATHOPHYSIOLOGY Spread between humans via respiratory aerosol droplets → infects, replicates within, lyses respiratory epithelial cells → 1° viremia → infects and replicates in reticuloendothelial cells → 2° viremia → spread to: • mucosa → promotes inflammation around capillaries → in the mouth, Koplik's spots (red lesions with a blue-white center) form • dermis → promotes inflammation around capillaries → rash forms starting at head and progressing to feet, disappearing in the order it appears • respiratory tract, lung → giant cells form with inclusion bodies (Warthin-Finkeldey cells) → cell damage leads to cough, rhinorrhea • brain → meningitis, encephalitis if infected with a variant of measles virus → over years, chronic low-level infection of CNS → inflammatory lesions of brain → gradually presents as personality and cognitive changes (subacute sclerosing panencephalitis or SSPE) → death

DIAGNOSIS: Isolate virus from nasopharyngeal secretions, blood, and urine. Warthin-Finkeldey cells (multinucleated giant cells with inclusion bodies in nucleus and cytoplasm, pathognomonic for measles) in respiratory secretions.

TREATMENT Vaccine: live-attenuated measles virus in measles–mumps–rubella (MMR) vaccine. severe cases in infants: high doses of vitamin A