Infections endangering the fetus

Intrauterine infections of the embryo or fetus are most often caused by viruses, bacteria and protozoa. The routes of penetration of infectious agents can be: ascending (per continuity from the birth canal/maternal endometrium, eg in urogenital infections), hematogenous (from the mother's bloodstream through the placental barrier) and descending (from the fallopian tubes).

Congenital (adnatal, congenital) infections of the fetus can be considered to be infections which, after they manifest in the mother, also affect the developing embryo or fetus. The disease can manifest either either intrauterinely or after delivery. In addition to the type of causative agent and the infectious dose,the current age of the infected embryo or fetus also affects the clinical course and consequences of the infection.

The most common causes of congenital infections can be summarized by **STORCH**: **S**yphilis, **T**oxoplasmosis, **O**thers (parvovirus B19, varicala-zoster virus, Listeria monocytogenes, hepatitis B virus, HIV, Chlamydia trachomatis, Borelia burgdorferi, enteroviruses), **R**ubella, **C**ytomegalovirus, **H**erpes simplex.

Congenital infections of the newborn form a group of intrauterine infections that have a strong teratogenic effect and may have a similar clinical picture:

- CNS: early CNS atrophy, microcephaly (CMV), calcification (toxoplasmosis), hydrocephalus, encephalitis,
- hepatosplenomegaly, hepatopathy, jaundice with obstructive component,
- senses: deafness and cataract (rubella), chorioretinitis, microphthalmia,
- myocarditis, pneumonitis, general severe sepsis-like condition, multi-organ failure.

The diagnosis is based on the detection of specific IgM antibodies in the serum of the newborn. For selected diseases (eg CMV infection) it is also possible to specify the transmission of the infectious agent from the mother to the fetus by examining the amniotic fluid obtained by amniocentesis.

Syphilis

Congenital syphilis (lues connata, congenita) is an infection of the fetus or newborn by the spirochete Treponema pallidum obtained from the mother transplacentally during pregnancy or by direct contact with lesions during childbirth. Fetal infection can occur during any stage of maternal syphilis. The longer the time since the mother's primary infection, the less likely she is to transmit the infection to the fetus. The disease is extremely serious - it leads to premature births, miscarriages, congenital infections or even the death of newborns. Syphilis is a chronic systemic infectious disease that is transmitted primarily through sexual intercourse. Antibodies to syphilis are tested in all pregnant women. In the case of positive screening, treatment with penicillin is indicated, which has an effect in the treatment of pregnant women, prevention of transmission to the fetus and therapy of the infected fetus.

Clinical manifestation of congenital syphilis

Early for of congenital syphilis (0-2 years)	Late form of congenital syphilis
Hepatosplenomegaly	Hutchinson's teeth
Hemorrhagic rhinitis (coryza)	Interstitial keratitis of the eyes (aged 5 to 20 years)
Condylomata lata	Deafness based on n. VIII (aged 10 to 14 years)
Osteochondritis, periostitis	Saddle-shaped nose, prominent mandible
Mucocutaneous lesions (bulls on palms and soles)	Perioral fissures
Jaundice	Mental retardation, seizures
Non-immune hydrops of the fetus	Saber shins, Olympic forehead
Hemolytic anemia, coagulopathy, thrombocytopenia	Clutton joints (symmetrical painless swelling of the knees)
Pneumonitis	
Nephrotic syndrome	
Intrauterine Growth Retardation (IUGR)	

The Hutchinson triad is a manifestation of late congenital syphilis and includes barrel incisors, visual impairment (interstitial keratitis), and hearing impairment (cranial nerve damage VIII).

Toxoplasmosis

Toxoplasmosis is a parasitic disease caused by Toxoplasma gondii. Humans can become infected by ingesting undercooked meat or by infected cats or their feces. Toxoplasmosis is transmitted to the fetus, especially when the pregnant woman is first infected, and the risk of transmission of the infection from the pregnant woman to the fetus increases with gestational age. The infection has the most serious consequences at the beginning of pregnancy. The clinical picture of congenital toxoplasmosis most often includes chorioretinitis, intracranial

calcification and hydrocephalus. If all of those are present, it's called **Sabin's trias.** Most infected children are asymptomatic. Toxoplasmosis can be detected serologically and by PCR from body fluids. Pyrimethamine, sulfadiazine and folic acid are used for treatment. Serological screening of pregnant women for toxoplasmosis has not yet been introduced in the Czech Republic.

Rubella

Rubella virus can cause congenital rubella (rubella embryo/fetopathy, Gregg's syndrome).

Clinical picture

The risk and extent of fetal harm depends on gestational age at maternal infection. The risk of fetal harm decreases with the length of pregnancy:

- maternal infections before the 8th week of pregnancy - abortion or **Gregg's syndrome**:
  - deafness (hearing loss caused by impaired inner ear function);
  - congenital heart defects;
  - eye disease (cataract, retinopathy);
  - often also CNS defects (microcephalus);
  - on the skin purpura or petechiae ("Blueberry muffin" image of a child) as a result of thrombocytopenia;
  - sometimes jaundice caused by hepatitis, hepatosplenomegaly;
  - myocarditis, interstitial pneumonia, meningoencephalitis.
- infections in weeks 13 to 16 - about 1/3 of fetuses have impaired hearing;
- infection after week 18 - risk to the fetus is minimal.

Diagnostics
: Serum IgM agains rubella.

Prevention
: Vaccine agains the rubella virus.

Prior to the planned conception, women are advised to have a serological examination and, if necessary, to complete their vaccination. If a pregnant woman is exposed to an infection in **the first trimester** and does not have protective antibodies present, it is recommended that the serological test be repeated in 2-3 weeks and that **termination of the pregnancy** should be considered if antibodies develop.

Hepatitis B

Vertical transmission of HBV from the mother to the child can rarely occur intrauterinely. The baby usually gets infected in the perinatal period at birth, but can also become infected postnatally, especially during breastfeeding and further contact with the mother (HBV can be excreted in milk). HBsAg screening is mandatory during pregnancy. **Newborns of HBsAg positive mothers are vaccinated on the day of birth** (passive + active immunization) and thus the vertical transmission of HBV is significantly reduced. Thanks to this vaccination, vaginal delivery does not increase the risk of HBV transmission. After discharge from the hospital, it is advisable to monitor HBsAg positive mothers and their children in hepatology outpatient clinics at infectious diseases departments.

Prevention of HBV transmission according to the Decree of the Ministry of Health of the Czech Republic No. 537/2006 and 299/2010 Coll. on vaccination against infectious diseases - immunization schedule of newborns of HBsAg positive mothers:

- 0-12 (24) hours: hepatitis B immunoglobulin (eg neoHepatect® i.v.);
- 0-24 hours: 1st dose of HBV vaccine (eg Engerix B® 10 µg (0.5 ml) i.m.);
- 6 weeks: 1st dose of hexavaccine (eg Infanrix Hexa® 0.5 ml i.m.);
- after a month - 2nd dose of hexavaccine;
- after a month - 3rd dose of hexavaccine;
- see also the usual vaccination schedule.

In children with an unfavourable health condition after birth, active immunization can be postponed until the 7th day of life.

During the perinatal period, the child's umbilical cord nor venous blood is are examined for the presence of HBsAg. These tests are subject to considerable false positives, which could lead to incorrect vaccination termination if misinterpreted. Following vaccination, due to the administration of 5 doses of hepatitis B vaccine, it is not necessary to test for anti-HBs antibodies. Most children develop anti-HBs antibodies and will be protected throughout their whole lives from HBsAg positivity. Nevertheless, it is appropriate to determine HBsAg at the age of 2-3 years, where a negative result will rule out a rare infection in a vaccinated child.

Hepatitis C

Mother-to-child vertical transmission of HCV can rarely occur intrauterinely, usually happens during the perinatal period at birth, but the baby can also become infected postnatally, especially during breastfeeding and further contact with the mother. Vertical transmission of HCV occurs in 5-10% of viremic mothers. Children are asymptomatic, usually developing chronic hepatitis, but the development of childhood cirrhosis is rare. Prevention of vertical transmission of HCV is virtually non-existent, neither labor nor breastfeeding affects the frequency of infections (vaginal delivery does not increase the risk of HCV transmission; HCV may be excreted to the colostrum

a small extent, but does not increase the risk of infecting children; HCV is practically not excreted in milk). Anti-HCV testing is not mandatory during pregnancy. It is suitable for women with risky behavior, especially with previous intravenous drug use. Children of anti-HCV positive mothers are vaccinated according to the classic vaccination schedule, they have no restrictions or exceptions in vaccination. After discharge from the hospital, it is advisable to monitor anti-HCV positive mothers and their children in hepatology outpatient clinics at infectious diseases departments.

During the perinatal period, the child's umbilical cord nor venous blood are examined for the presence of anti-HCV antibodies or hepatitis C virus nucleic acid (HCV RNA). These tests are subject to considerable false positives, which, if misinterpreted, could lead to misdiagnosis of hepatitis C virus infection in the child. Anti-HCV positivity may persist in the first year of the child, exceptionally in the second year. Infection is ruled out by the disappearance of anti-HCV and a negative HCV RNA result. In contrast, infection in a child older than 1 year is confirmed by the presence of HCV RNA and long-term persistence of anti-HCV antibody positivity.

Only in women who are simultaneously infected with HCV and HIV, cesarean delivery is indicated in the Czech Republic and breastfeeding is excluded. These measures mainly reduce the risk of HIV transmission to the child.

HIV

There is a mandatory HIV screening in pregnancy - serology. HIV transmission is possible transplacentally, *intra partum* or by breastfeeding. Maternal HIV IgG crosses the placenta, uninfected children become seronegative after about 9 months of age. Diagnosis of neonatal HIV infection: PCR at birth, in the 1st month and between the 3rd and 4th month of life. The average time from infection to the clinical manifestation of AIDS is 4-5 years, the coincidence of CMV infection accelerates the progression of AIDS.

The antiretroviral drug zidovudine reduces the risk of perinatal transmission - it is given during pregnancy and then to a child up to 4-6 weeks of age. Prophylaxis of pneumocystis pneumonia with cotrimoxazole.

Cytomegalovirus

Congenital cytomegalovirus infection is a relatively common congenital infection (3-4 cases/1000 live births). About 1/2 of women are susceptible to CMV infection and almost 1% of them may have a primary infection during pregnancy. Approximately 40% give birth to an infected newborn.

Clinical picture

Child damage is rare - 90% of newborns are asymptomatic and further development is favorable. 5% of newborns have clinical manifestations of infection (neurological and/or sensory impairment): growth failure, microcephaly, encephalitis, hearing impairment, petechiae, purpura, anemia, jaundice, hepatosplenomegaly, pneumonia. In 5% of newborns it manifests later - hearing loss.

Treatment

Antivirals - ganciclovir, foscarnet, cidofovir, blood products without CMV.[1]

Herpes simplex

Přenos během porodu z infikovaných porodních cest matky nebo ascendentní cestou, většinou HSV-2. Při primární genitální infekci matky je riziko infekce novorozence 40 %, při rekurentní infekci < 3 %.

Transmission during labor from an infected maternal birth canal, usually HSV-2. In primary maternal genital infection, the risk of infection of the newborn is 40%, in recurrent infection <3%

Clinical picture

Clinical manifestation at any time during the first 4 weeks after delivery. Typical skin lesions on the skin, mucous membranes, conjunctivas. Encephalitis - poor prognosis, high mortality. Generalized systemic disease - poor prognosis, high mortality.

Treatment

Parenteral administration of aciclovir. Caesarean section is indicated for primary infection of the mother (genital herpes lesions).

Varicela-zoster

In case of infection by the 20th week of pregnancy - low risk of fetal harm (2%: severe scarring of the skin, damage to the eyes and CNS). In case of infection 5 days before delivery, up to 2 days after delivery (the fetus is not protected by maternal antibodies) - high risk of fetal/newborn risk, VZIG administration and aciclovir prophylaxis indicated. Mortality up to 5%.

Varicella-zoster immunoglobulin (VZIG) and aciclovir are given to pregnant women exposed to VZV.

Listeriosis

Listeriosis is a relatively rare disease caused by the bacterium *Listeria monocytogenes*, which mainly affects newborns, the elderly and immunocompromised individuals. A pregnant woman is typically infected by ingesting a contaminated food. The fetus/newborn can become infected transplacentally or during birth (ascending, vertically) or after it. It takes place under the image of sepsis, pneumonia or meningitis and has a high mortality rate. Serious infections can be accompanied by granulomatosis infantiseptica - microabscesses throughout the body, especially in the liver and spleen. In addition to meningitis, late-onset infections can also manifest as colitis accompanied by diarrhea or sepsis without meningitis. Late-onset infections have low mortality with adequate treatment. *L. monocytogenes* can be cultured and is treated with antibiotics, initially ampicillin and then with an aminoglycoside.

Other infections

Other infections include mostly bacterial infections of the fetus caused by a wide range of bacteria. These are often species that are part of the normal microflora of the digestive tract and skin. However, the underdeveloped immune system of the fetus is not able to adequately defend itself.

Overview

	Tests in pregnancy	Newborn examination	Treatment	Breastfeeding
Syphilis	non-treponemal and treponemal tests	non-treponemal and treponemal test or direct proof	penicilin	yes
Hepatitis B	serology (HBsAg)	no	passive+active immunisation	yes
Hepatitis C	seerology (optional)	no		yes
HIV	serology	PCR	antiretrovirotics	no

Links

Similar articles

- Congenital syphilis • Listerial infections
- Teratogens

External links

- JĚŽOVÁ, Marta, Sylva HOTÁRKOVÁ a Katarína MŮČKOVÁ, et al. *Hypertextový atlas fetální patologie : Multimediální podpora výuky klinických a zdravotnických oborů* [online]. Portál Lékařské fakulty Masarykovy univerzity [online], ©2008. Poslední revize 2.2.2010, [cit. 26.11.2011]. ISSN 1801-6103. <http://portal.med.muni.cz/clanek-463-hypertextovy-atlas-fetalni-patologie.html>.
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Source

- ws:Infekce ohrožující plod

1.