

# Premature delivery

**Preterm birth** is defined as birth before week 37+0 of pregnancy. The cause of premature birth has not yet been fully elucidated, but apparently infection of the fetomaternal unit, as well as distension and ischemia of the myometrium, diseases of the cervix, separation of the placenta, abnormal implantation of the fetal egg, genetic influences, maternal stress, immunological conflict and endocrine disorder of the hypothalamus are involved. pituitary-adrenal axis. In the Czech Republic, the incidence of premature births has been around 8% for a long time.<sup>[1]</sup>

Premature birth is currently considered **a syndrome**, the etiology of which involves various factors that lead to activation of uterine activity, dilatation of the cervix and activation of decidual tissue and fetal membranes. Premature birth is the result of the activation of the same mechanisms as full-term birth, but in the case of premature birth, their activation is pathological.<sup>[2]</sup>

## Types of preterm births

### Spontaneous (70-80%)

- With preserved sac of membranes (40 – 50%);
- premature outflow of amniotic fluid (*Preterm Prelabour Rupture Of Membranes*, PPRM) (20 – 30 %).

### Iatrogenic (20-30%).<sup>[1]</sup>

**Threatened spontaneous preterm labor** means that the pregnant woman has symptoms (uterine contractions - more than 4 contractions in 20 minutes or more than 8 contractions in an hour) that lead to shortening and dilation of the cervix and therefore there is a high risk of delivery within 7 days. **Cervical insufficiency** is a painless dilatation of the cervix that can lead to late miscarriage or premature birth. **A short cervix** is defined by a shortening of the cervix between 20 and 30 weeks of pregnancy below 25 mm (transvaginal cervicometry by ultrasound).<sup>[1]</sup>

**Premature outflow of amniotic fluid before the due date** (*Preterm Prelabor Rupture of Membranes*, PPRM) is a breach of the amniotic membranes with the outflow of amniotic fluid before the onset of regular uterine activity before week 37+0 of pregnancy. It is involved in roughly one third of all premature births and complicates 2-4% of all births. PPRM is always an indication for hospitalization in a perinatal center of intensive or intermediate care. After admission, a vaginal-rectal culture is taken and ATB prophylaxis of GBS infection is started.<sup>[3]</sup>

## Etiopathogenesis

The main etiopathogenetic mechanisms of preterm birth include: infection, excessive uterine distension, cervical incompetence, uteroplacental ischemia, impaired immunological tolerance, allergies, and endocrine disorders.<sup>[2]</sup>

### Risk factors

1. Unaffected:
  - previous preterm birth, African American race, age < 18 or > 40 years, poor nutrition, low prepregnancy body weight, low socioeconomic status, cervical procedures, anatomical anomalies of the uterus, premature shortening and dilatation of the cervix, excessively dilated uterus (multiple pregnancies , polyhydramnios), periodontal disease.
2. Affectable:
  - smoking, drug abuse, lack of prenatal care, short interval between births, anemia, urinary tract infections, pregnant stress.<sup>[1]</sup>

## Prediction

The prediction of spontaneous preterm birth **in asymptomatic pregnant women** is based on the identification of risk factors - low sensitivity and specificity. Another is a previous premature birth or a late abortion in II. trimester. Transvaginal ultrasound is diagnostically important: functional shortening of the cervix (< 25 mm) by the 30th week of pregnancy.

Prediction of spontaneous preterm labor **in symptomatic pregnant women** depends on transvaginal ultrasound: functional shortening of the cervix (< 25 mm) by 30 weeks of pregnancy. With symptoms + shortening of the cervix below 15 mm, the risk of delivery within 7 days is up to 50%. Biochemical markers: fetal fibronectin (fFN), insulin-like growth factor binding protein 1 (IGFBP-1) and placental alpha microglobulin-1 (PAMG-1) in cervicovaginal secretions - high negative predictive value.<sup>[1]</sup>

## Diagnostics

Difficult. Clinical symptoms/criteria: regular uterine contractions (> 4/20 minutes or > 8/hour), gradual shortening and dilation of the cervix/portus on digital vaginal examination and/or transvaginal cervicometry by ultrasound, and premature amniotic fluid drainage.<sup>[1]</sup>

## Prevention

### Progesterone

Stabilization of the myometrium – inhibition of contractility, anti-inflammatory effect (when administered vaginally). Indicated in asymptomatic pregnant women with a short cervix, or in women with a history of premature birth or late miscarriage in II. trimester (administered in the form of vaginal tablets from 16+0 to 35+0 weeks of pregnancy).

### Cerclage of the cervix

Preventive, indicated on the basis of history (three or more premature births or pregnancy losses in the second trimester - preventive procedure in asymptomatic women between the 12th and 14th weeks of pregnancy), history of premature birth or late abortion in the second trimester. trimester + short cervix according to transvaginal cervicometry.

#### Emergency cerclage

Dilation of the cervix + bag of membranes protruding into the vagina. Contraindications: uterine activity, clinical signs of chorioamnionitis, vaginal bleeding, PPRM, signs of fetal distress, non-viable fetus (dead fetus, congenital fetal defects, etc.).

#### Surgical techniques

Transvaginal cerclage according to McDonald, high transvaginal cerclage according to Shirodkar, transabdominal cerclage per laparoscopy or per laparotomy.

### Removal

- before childbirth, usually between the 36th and 37th week of pregnancy, with a planned caesarean section, it is possible only on the day of the procedure itself;
- at the onset of uterine activity - to reduce the risk of cervical injury;
- at PPRM.

Transabdominally performed cerclage requires cesarean delivery and the cerclage can be left in situ.<sup>[1]</sup>

## Management

### Tocolysis

To stop or reduce the contractile activity of the uterus, thereby delaying preterm birth (on the order of days) - gaining time for transfer to a perinatology center and/or administration of corticosteroids to induce fetal lung maturity. It is usually not indicated before the 24th and after the 35th week of pregnancy. Tocolysis should not exceed 48 hours, but it can be repeated if necessary. Most tocolytics also have side effects on the mother and/or fetus.

Indication: stopping/delaying labor. Contraindications: indication from the point of view of the mother and/or the fetus for acute termination of pregnancy, clinical signs of chorioamnionitis, non-viable fetus (dead fetus, congenital defects of the fetus, etc.).

#### Tocolytics

- **Antagonist of oxytocin receptors (atosiban)** – currently the most effective tocolytic agent with minimal side effects for both mother and fetus, unwanted side effects are rare: hypotension, insomnia, pruritus, allergic reaction.
- **β2-sympathomimetics (hexoprenaline, ritodrine)** – act on beta-receptors and cause relaxation of the smooth muscle of the uterus. Contraindications: cardiovascular disease of a pregnant woman, pheochromocytoma, hyperthyroidism, severe disorders of liver and kidney function and decompensated diabetes mellitus. Monitoring of heart rate, blood pressure and breathing is necessary. Adverse side effects: respiratory distress, tachycardia, neuromuscular changes, tremor, cerebral vasospasm, skin erythema, vasculitis.
- **Calcium channel blockers (nifedipine – still off label)** – contraindications: heart disease in a pregnant woman.
- **Prostaglandin synthesis inhibitors – cyclooxygenase inhibitors (indomethacin – still off label).**
- **Magnesium sulfate (magnesium sulfate)** – the role of magnesium is not yet fully understood, it is not considered a tocolytic.

#### Induction of lung maturity (corticosteroids)

Antenatal administration of corticosteroids in women with preterm labor reduces the risk of neonatal death, the risk of neonatal respiratory distress syndrome, and the risk of fetal/newborn intraventricular hemorrhage. Between the 24th and 35th week of pregnancy, if we expect a premature birth in the next 7 days. The onset of the full effect of corticosteroids can be expected only after approx. 24 hours after the completion

of the entire course, however, the administration of even one dose is important. If the effect of corticosteroids has worn off, or if more than 14 days have passed since the previous course, it is possible to administer another course of corticosteroids before the 32nd week of pregnancy and in anticipation of early delivery. Compensated diabetes mellitus or chorioamnionitis is not a contraindication.

**Betamethasone** 12 mg IM every 24 hours, a total of two doses or **Dexamethasone** 6 mg IM every 12 hours, a total of 4 doses;

### Antibiotics

The goal of ATB treatment is to reduce the incidence of early and late neonatal and maternal infections. Upon admission of a pregnant woman with threatened premature birth, swabs are taken from the vagina and rectum to determine *Streptococcus agalactiae* (GBS) colonization. ATB GBS prophylaxis in preterm labor with preserved amniotic fluid is indicated if preterm labor is unavoidable and culture results for GBS are unknown, or the pregnant woman is GBS positive. Antibiotics as in GBS prophylaxis or according to culture results. The antibiotic of first choice is **penicillin G** iv; an alternative is ampicillin iv ev. in case of allergy to 1st generation cephalosporins (cefazolin, cephalothin) iv and at high risk of anaphylaxis clindamycin iv ATB prophylaxis in premature labor with amniotic fluid drainage (PPROM) for 7-10 days with a conservative procedure.

For clinical signs of chorioamnionitis, a double combination of ATB (empirical: ampicillin + gentamicin) is recommended, and further according to the results of cultures and sensitivity; when catching atypical bacteria (ureaplasma, mycoplasma) macrolides even for 7 days; a single application of azithromycin after chlamydia infection is sufficient.

### Neuroprotection

Magnesium sulfate (MgSO<sub>4</sub>) has been proven to reduce the risk of developing cerebral palsy. Indication: impending premature birth between 24+0 and 32+0 weeks of pregnancy. Childbirth should not be delayed just because of administration of MgSO<sub>4</sub> for the purpose of neuroprotection.

Contraindications: myasthenia gravis, atrioventricular heart block, severe impairment of kidney function.<sup>[1][2]</sup>

## Method of managing premature labor

Transport to a perinatal center for intensive or intermediate care. The management of singleton pregnancies in the case of a longitudinal position with the head does not differ from the management of delivery at term. 22+0 to 25+0 individual approach after discussion with the pregnant woman and her partner (significant risk of perinatal mortality and morbidity). After 25+0 weeks of pregnancy, a caesarean section is performed for identical indications from the point of view of the fetus and/or the mother as for a pregnancy at term. Epidural analgesia is suitable for vaginal delivery.

Performing a preventive episiotomy does not benefit the premature baby. The use of vacuum extraction is contraindicated before week 34+0 of pregnancy.<sup>[1]</sup>

## Links

### Related Articles

- Immature newborn
- Eating disorders in pregnancy

### External links

### References

1. Czech Gynecological and Obstetrical Society. *Spontaneous premature birth : Recommended procedure* [online]. ©2017. [cit. 2020-10-23]. <<https://www.gynultrazvuk.cz/data/clanky/6/dokumenty/p-2017-spontanni-predcasny-porod.pdf>>.
2. STRAŇÁK, Z. *Neonatology*. 2. edition. 2015. 29-34 pp. ISBN 978-80-204-3861-4.
3. Czech Gynecological and Obstetrical Society. *Premature drainage of amniotic fluid before the due date of delivery : Recommended procedure* [online]. ©2017. [cit. 2020-10-23]. <<https://www.gynultrazvuk.cz/data/clanky/6/dokumenty/p-2017-predcasny-odtok-plodove-vody-pred-terminem-porodu.pdf>>.