Pathology of pregnancy

GM - seminar SS 2022/2023

Physiological pregnancy

- duration aprox. 40 weeks (full term from 38+0 to 42+0)

Physiological labor

- stages of labor
  - first stage - cervical effacement and dilation
  - second stage - fetal expulsion
  - third stage - placental expulsion

Pathological pregnancy

1. Ectopic pregnancy
2. Disorders of the placenta, umbilical cord and fetal membranes
    a. Abnormalities of the placenta and lesions of the placenta
    b. Abnormalities of the umbilical cord
    c. Inflammation of the placenta, fetal membranes and umbilical cord
3. Gestational trophoblastic disease
    a. Exaggerated placental site
    b. Hydatidiform mole
    c. Gestational choriocarcinoma
4. (Pre)eclampsia
5. Maternal acute complications of pregnancy and labor

1. Ectopic pregnancy

1. Ectopic pregnancy

- physiology
  - implantation of fertilized egg into the corporal endometrium on the 6th day after fertilization
- extrauterine gravidity
  - presence of the embryo and gestational sac outside of the uterine cavity
  - up to 2 % of confirmed pregnancies
  - salpinx (96 %), ovary (3 %), abdominal cavity (1 %)
  - RF - chronic inflammation in the salpinx, PID (chlamydia, gonorrhea), age (older patients), smoking
  - dg. - β-hCG, USG

2. Disorders of the placenta, umbilical cord and fetal membranes

2a. Abnormalities of the placenta

Abnormal placentation - placenta previa

- implantation of the placenta in the lower uterine segment, partially or completely occluding the internal os
- painless vaginal bleeding of bright red blood in the second half of pregnancy
- IUGR, preterm labor
- it can make vaginal delivery impossible or it can cause variably severe bleeding during labor

2a. Abnormalities of the placenta

Vasa praevia

- blood vessels loosely in fetal membranes overlaying the internal os
- complications:
  - thrombosis, compression or damage during rupture of fetal membranes
  - fetal asphyxia or death of the fetus

2a. Abnormalities of the placenta

Increased adherence of the placenta followed by the difficult placental separation

- absence or weakening of the basal plate, especially in the scar, mostly in the lower uterine segment
- direct contact of chorionic villi with the myometrium
- complications:
  - massive bleeding with hemorrhagic shock in the third stage of labor
  - eventually rupture of the uterus
  - th - hysterectomy

2a. Abnormalities of the placenta

Placental abruption

- premature separation of the placenta from the uterus followed by bleeding
- mostly after the 20th week of gestation
- peripheral - from the low pressure blood vessel system
- central - from the decidual artery into the basal plate, especially in cases of preeclampsia or blunt trauma
- retroplacental hematoma
- complications:
  - acute - hemorrhagic shock
  - hematoma -> placental ischemia
  - fetus - IUGR, hypoxia, death

2a. Abnormalities of the placenta

Abnormal shape of the placenta

- placenta membranacea
- placenta biloba
- placenta biparita
- placenta succenturiata

2a. Abnormalities of the placenta

Extrachorial types of the placenta

- abnormally small chorionic plate not reaching to the margin of the placenta
- increased tendency to premature separation
- placenta circumvalata, placenta circummarginata

2a. Lesions of the placenta

Placental infarction

- obliteration of spiral arterioles
- peripheral x central

2a. Lesions of the placenta

Intervillous (intraplacental thrombus)

- blood clot between chorionic and basal plate
- most likely fetal bleeding to the intervillous space

2a. Lesions of the placenta

Chorioangioma (chorangioma)

- hemangioma
- up to in 1 % of the placentae

2b. Abnormalities of the umbilical cord

Abnormal insertion of the umbilical cord

central
paracentral
marginal

velamentous

2b. Abnormalities of the umbilical cord

- knots - true knot vs. pseudoknot
- torsion, strangulation and prolapsus of the umbilical cord
- thrombosis of the umbilical blood vessels
- aplasia and hypoplasia of the umbilical artery

2c. Inflammation of the placenta, fetal membranes and umbilical cord

- I. acute chorioamnionitis (intraamnial infection)
  - ascending (bacterial or fungal cervicovaginal flora)
  - decidua - fetal membranes - chorionic plate - umbilical cord - umbilical vessels vasculitis - transfer to Wharton’s jelly - acute funisitis
  - preterm labor / spontaneous abortion
  - fetus - FIRS / neonatal infection / neonatal sepsis

2c. Inflammation of the placenta, fetal membranes and umbilical cord

- II. puerperal infection
  - acute inflammatory condition of the mother during postpartum period (after both labor and abortion)
  - ascending bacterial infection (frequently polymicrobiotic)
  - endometritis - - - parametritis - - - peritonitis - - - sepsis

2c. Inflammation of the placenta, fetal membranes and umbilical cord

- III. hematogenic (transplacental) infection (villitis)
  - chorionic villi are affected primarily -> villitis
  - acute (listeriosis, GBS, E. coli) x chronic (TORCH)
  - abortion, IUGR, preterm labor, neonatal infection

2c. Inflammation of the placenta, fetal membranes and umbilical cord

- IV. noninfectious chronic villitis
  - so-called “villitis of unknown etiology”
  - chronic inflammatory cellulisation in chorionic villi
  - probably maternal antifetal rejection
  - can be chronic chorioamnionitis and chronic deciduitis

3. Gestational trophoblastic disease

3. Gestational trophoblastic disease

- trophoblast
  - villous (cyto-, syncytio- and intermediary trophoblast)
  - extravillous (placental site)

- physiological trophoblastic invasion

3. Gestational trophoblastic disease

- pathological trophoblastic proliferation
  - pathological tissue is always of fetal origin

Biological behaviour	Pathological condition	Presence of chorionic villi	β-hCG serum levels
Benign trophoblastic nontumor lesion without risk of malignant transformation	Exaggerated placental site	no	low
Nontumor trophoblastic proliferation with risk of malignant transformation	Partial hydatidiform mole	yes	low
	Complete hydatidiform mole	yes	high
	Invasive hydatidiform mole	yes	high
Malignant trophoblastic tumors	Gestational choriocarcinoma	no	high

3a. Exaggerated placental site

- proliferation of extravillous trophoblast with excessive trophoblastic infiltration of endometrium and surrounding myometrium
- invasive growth does not have destructive potential
- can occur after normal pregnancy or abortion
- tendency to regression, curettage is sufficient
- not associated with higher risk of trophoblastic tumors development

3b. Hydatidiform mole

- proliferation of villous trophoblast (abnormally formed placental tissue)
- pathological fertilization

Complete hydatidiform mole

- diploid
- morphology
  - chorionic villi edema - diffuse
  - trophoblastic proliferation - diffuse
  - trophoblastic cytological atypia - marked
  - presence of fetal tissues - no
- risk of transformation to invasive hydatidiform mole (15 %) and gestational choriocarcinoma (3 %)
- dg. - hCG a USG

Partial hydatidiform mole

- triploid
- morphology
  - chorionic villi edema - focal
  - trophoblastic proliferation - focal
  - trophoblastic cytological atypia - minimal
  - presence of fetal tissues - yes
- risk of transformation to invasive hydatidiform mole (5 %)
- dg. - spontaneous abortion at the end of the first trimester

Invasive hydatidiform mole

- from complete or partial hydatidiform mole (less likely)
- chorionic villi infiltrating myometrium (can reach serosa or lig. latum uteri), growth is of destructive nature
- angioinvasion -> embolism without subsequent infiltrative behaviour, can affect vagina, lungs, brain
- clinical presentation - vaginal bleeding, rarely intraperitoneal bleeding as a result of uterine wall destruction

3c. Gestational choriocarcinoma

- malignant trophoblastic tumor
- associated with molar pregnancy (around one half of noted cases)
- x germinal (nongestational) choriocarcinoma!
- proliferation of cytotrophoblast and syncytiotrophoblast without presence of chorionic villi
- marked cytological atypia, anaplasia
- destructive growth and early hematogenous dissemination (lungs, vagina, liver, brain)
- excellent sensitivity to chemotherapy

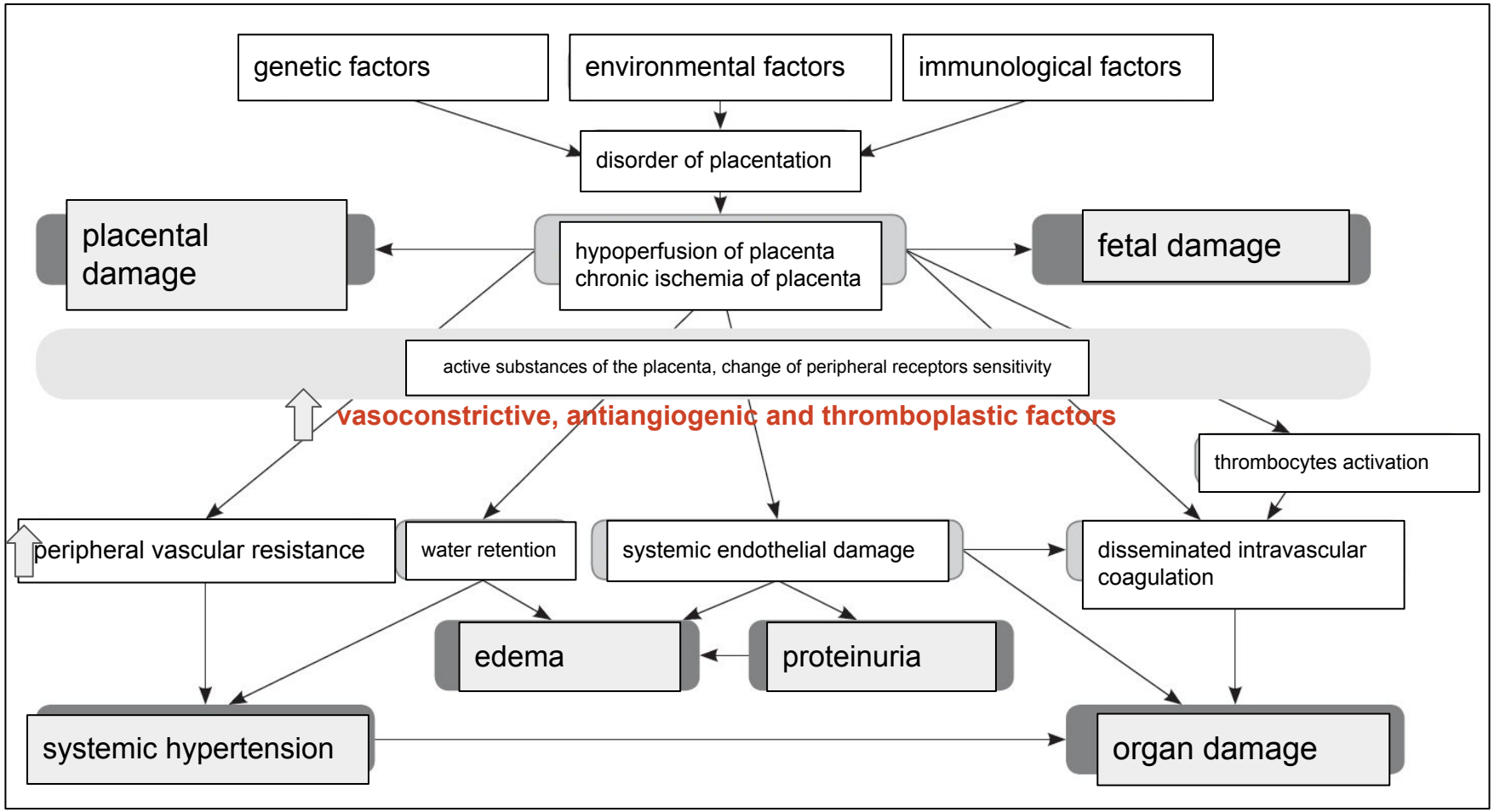
Biological behaviour	Pathological condition	Presence of chorionic villi	β-hCG serum levels
Benign trophoblastic nontumor lesion without risk of malignant transformation	Exaggerated placental site	no	low
Nontumor trophoblastic proliferation with risk of malignant transformation	Partial hydatidiform mole	yes	low
	Complete hydatidiform mole	yes	high
	Invasive hydatidiform mole	yes	high
Malignant trophoblastic tumors	Gestational choriocarcinoma	no	high

4. (Pre)eclampsia

4. (Pre)eclampsia

- hypertonic diseases in pregnancy
- disorder of placentation - abnormal formation of placenta (too shallow trophoblastic invasion)
- hypertension of the mother with organ manifestation (proteinuria, edema)

https://coreem.net/core/preeclampsia-and-eclampsia/


genetic factors
environmental factors
immunological factors
disorder of placentation
placental damage
hypoperfusion of placenta
chronic ischemia of placenta
fetal damage
active substances of the placenta, change of peripheral receptors sensitivity
vasoconstrictive, antiangiogenic and thromboplastic factors
thrombocytes activation
peripheral vascular resistance
water retention
systemic endothelial damage
disseminated intravascular coagulation
edema
proteinuria
systemic hypertension
organ damage

4a. Preeclampsia

- systemic hypertension (above 140/90 mm Hg)
- proteinuria (above 300 mg/den)
- generalised edema
- mother - kidney damage, eventually damage of the heart, adrenal glands, adenohypophysis
- placenta - ischemic changes
- fetus - abortion, IUGR, preterm labor
- **HELLP syndrom** (Hemolysis, Elevated Liver enzymes, Low Platelets)

4b. Eclampsia

- result of untreated preeclampsia
- develops during peripartum period
- seizures
- coma

5. Maternal acute complications of pregnancy and labor

5. Maternal acute complications of pregnancy and labor

- hemorrhagic shock (placental abruption, increased adhesion of the placenta)
- septic shock (puerperal sepsis)
- eclampsia and DIC
- amniotic fluid embolism
  - 5/100 000 labors
  - fissures in the uterine veins
  - cardiorespiratory insufficiency, DIC, neurological symptoms
  - mortality 20 - 50 %
- air embolism
  - placental abruption, cesarean section
  - acute heart failure

Multiple pregnancies - monozygous

- A: dividing in the two cell stage - separated chorionic and amniotic cavities -> bichorial biamnial placenta
- B: dividing aprox. day 5 - common placenta, common chorionic cavity, separated amniotic cavities -> monochorial biamnial placenta
- C: dividing aprox. day 9 - common chorionic and amniotic cavity -> monochorial monoamnial placenta