

HYPERTENSIVE DISORDERS OF PREGNANCY

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Definition

- chronic hypertension: hypertension (BP>140/90mmHg) before 20 weeks without significant proteinuria or if is already on anti-hypertensives.
- gestational hypertension: hypertension (BP>140/90mmHg) after 20 weeks without significant proteinuria (<300mg/24h urine collection).
- pre-eclampsia: hypertension (BP>140/90mmHg) after 20 weeks with significant proteinuria (>300mg/24h urine collection).

Definition

- eclampsia: generalized tonico-clonic convulsions associated to preeclampsia.
(loss of consciousness, arm flexion, eyes deviated, back extension, foamy saliva, bowel and bladder control loss)
- HELLP syndrome:
 - haemolysis (LDH increased)
 - elevated liver enzymes (SGPT, SGOT increased, bilirubin increased)
 - low platelet count (platelets $<100\,000\text{ mm}^3$)

Epidemiology

Preeclampsia:

- 5% of pregnancies (mild: 1/10, severe: 1/100 pregnancies)
- most common medical problem during pregnancy
- 14% of direct maternal deaths in the UK

Eclampsia:

- 2% of preeclampsia (1/2000 pregnancies)

HELLP syndrome:

- 0.1-0.8% of pregnancies, 2-12% of severe preeclampsia, 80% +preeclampsia

Predisposing factors

- history of pre-eclampsia: hypertension (13-53%), pre-eclampsia (16-25%)
- black race
- obesity
- advanced age >40 years
- primigravida
- diabetes mellitus
- kidney disease
- hypertension
- antiphospholipid syndrome

Predisposing factors

- twin pregnancy
- history of IUGR
- history of intrauterine death
- history of placental abruption
- history of hydatidiform mole
- history of fetal, placental hydrops

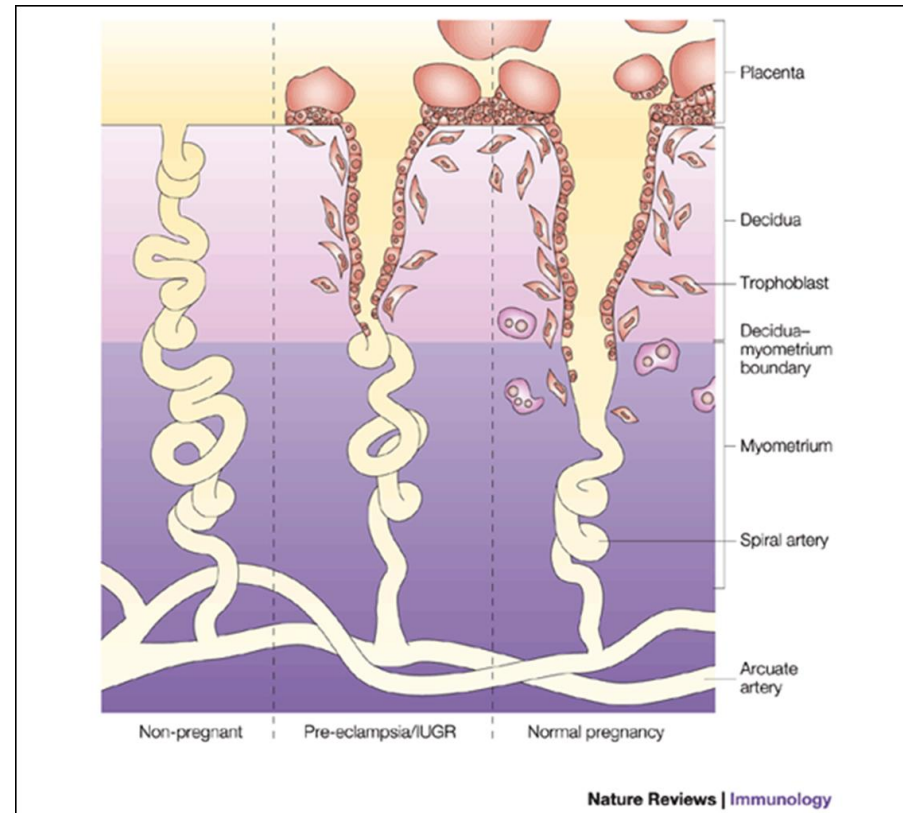
Protective factors

-smoking: lower incidence but more severe due to endothelial damage

Pathophysiology

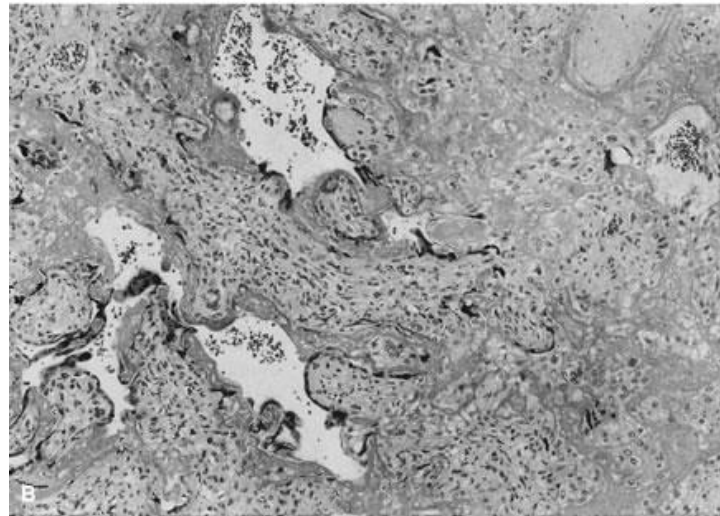
- trophoblast invasion of spiral arteries: abnormal
- spiral arteries: no remodelling-no distension, high resistance
- placenta: poor perfusion \Rightarrow fetal complications (stage 1)
- maternal circulation: inflammatory factors \Rightarrow maternal complications (stage 2)
(clotting system activation, inflammatory response,
capillaries: increased permeability, vasospasm, end organ damage)

Pathophysiology



Pathophysiology

Placental insufficiency



Classification

mild pre-eclampsia:

- BP>140-149/90-99 mmHg
- 24 hour urine collection >300mg

moderate pre-eclampsia:

- BP>150-159/100-109 mmHg

severe pre-eclampsia:

- BP>160/110 mmHg (MAP >125 mmHg)
- 24h urine collection >5gr
- end organ damage symptoms

Clinical signs and symptoms

- headaches, scotomata, photophobia, blurred vision
- altered mental status
- nausea, vomiting
- flashing
- dyspnoea, chest pain
- epigastric pain
- oliguria
- swelling
- jaundice (HELLP syndrome)

Complications

- seizures-eclampsia
- stroke
- pulmonary edema
- liver hematoma, liver rupture
- kidney failure
- HELLP syndrome
- DIC
- maternal death

Complications

- intrauterine growth restriction
- placental abruption
- intrauterine death
- prematurity

Diagnosis

Blood pressure measurement:

-systolic >140, diastolic >90 mm Hg (in 2 occasions 4hours apart)

Urinary reagent strip:

->1+ \Rightarrow urinary protein/creatinine ratio or 24 hour urine collection for protein

Urinary protein/creatinine ratio:

->30ng/mmol \Rightarrow significant proteinuria

24 hour urine collection for protein:

->300mg \Rightarrow significant proteinuria

Diagnosis

Hematocrit, hemoglobin

-increased

Platelets

-decreased, $<100\,000/\text{mm}^3$ in HELLP syndrome

Liver transaminases (SGOT, SGPT)

-increased

Urea, creatinine, uric acid:

-increased

LDH:

-normal, elevated in HELLP syndrome

Diagnosis

Growth ultrasound

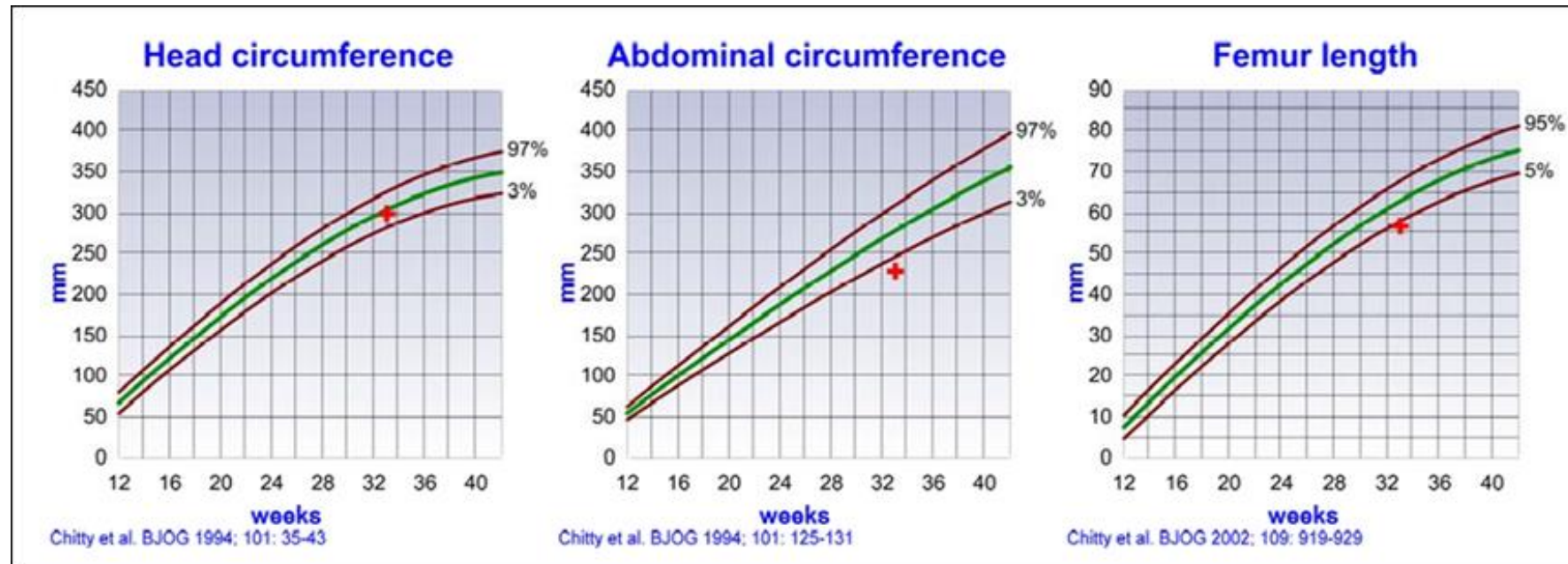
- intrauterine growth restriction
- oligohydramnios
- doppler studies: pathological

Cardiotocogram

- fetal distress

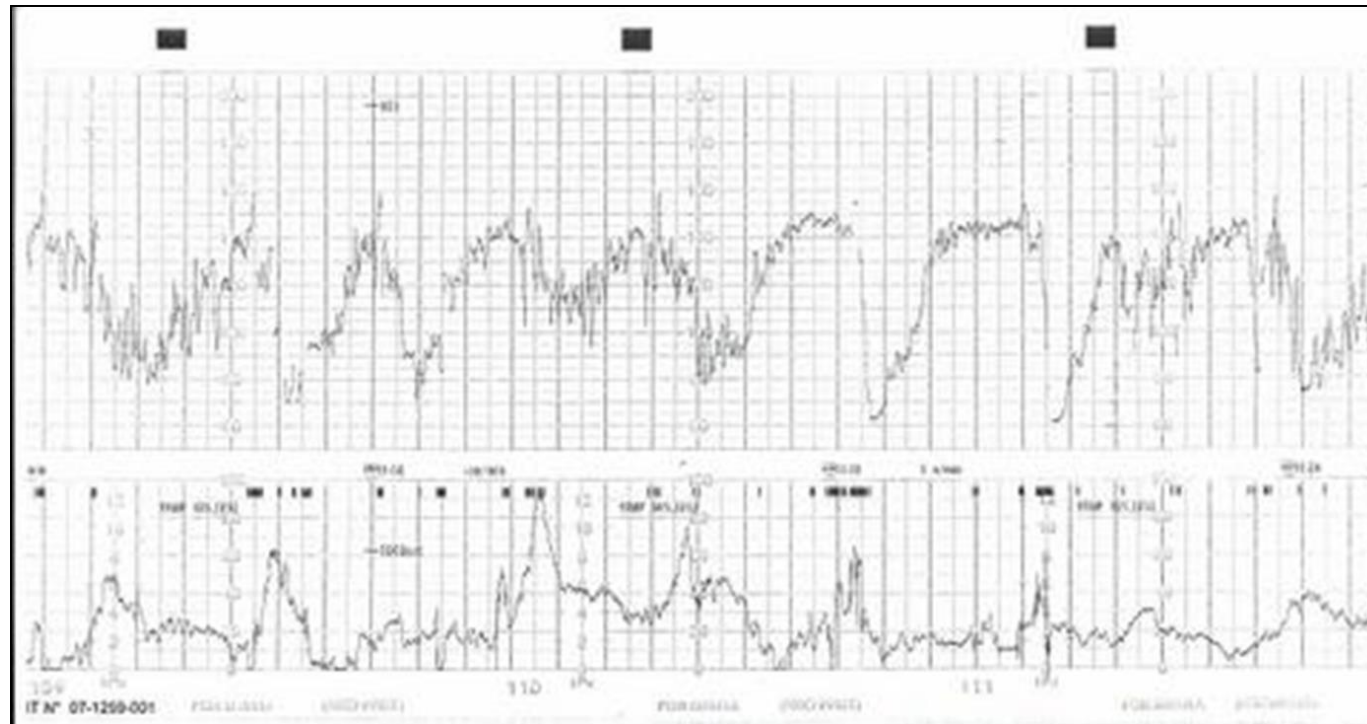
Diagnosis

Growth ultrasound: growth restriction



Diagnosis

Cardiotocography



Differential diagnosis

- chronic hypertension/ gestational hypertension/ pre-eclampsia/ eclampsia/ HELLP syndrome
- systemic lupus erythematosus (SLE)
- thrombotic thrombocytopenic purpura (TTP), idiopathic purpura (ITP)
- acute fatty liver of pregnancy
- haemolytic uremic syndrome
- acute hepatitis (viral or not)
- pregnancy cholestasis
- epilepsy, stroke, brain tumor, encephalitis, hypoglycemia, hypotension, drugs

Management

1. Antihypertensives

- BP goal <150/100 mmHg (no organ damage), <140/90 mmHg (organ damage)
- admission if BP >160/110 mmHg
- treatment if BP >150/100 mmHg
- hydralazine, labetalol: first line
- methyldopa, nifedipine: second line
- BP measurements: 2/week if BP <160/110, 4/day if BP >160/110 mmHg
- purpose: prevent end organ damage and in particular stroke

Management

a. Hydralazine

-dose: 5mg, bolus, every 10-15', max dose 20mg

b. Labetalol

-contra-indication: asthma

c. Nifedipine

-dose: 10mg, s.l

-side effects: hypotension

d. Methyldopa

-dose: 250mg, 1x4, p.o

-side effects: depression

Management

2. Laboratory examinations

-full blood count, electrolytes, liver function tests, kidney function tests:

mild hypertension: routine

moderate hypertension: once

severe hypertension: once/week

3. Fluid balance

-based on hematocrit, urine output

-85ml/h is suggested

-avoid fluid overload ⇒ pulmonary edema, ARDS

Management

4. Anticonvulsants

a. Magnesium sulphate

-loading dose: 4gr, in 5', i.v/ infusion rate: 1gr/hour for 24 hours, i.v

 further dose: 2-4gr, in 5', i.v

-actions: vasodilation

-result: seizure prophylaxis or management

-side effects: flushing, hypotension, nausea, vomiting, headaches

 loss of tendon reflex, respiratory paralysis, cardiac arrest

Management

- indications: severe pre-eclampsia + history + birth plan within 24 hours
- contraindications: oliguria, acute renal failure
- monitoring: magnesium serum levels, tendon reflexes, breathing
- toxicity: serum magnesium $>8.5-12\text{mg/dl}$ or $3.5-5.0\text{ mmol/l}$
- antidote: calcium gluconate (1-2gr, in 5', i.v)

Management

5. Delivery

- 37 weeks: gestational hypertension, chronic hypertension
- 34 weeks: mild preeclampsia
- <34 weeks (after corticosteroids administered given):
 - hypertension refractory to treatment
 - maternal indications (severe symptoms, end organ failure)
 - fetal indications (distress, IUGR)
- delivery is the only cure for the disease
- avoid ergometrine for third stage of labour

Management

6. Anesthesia

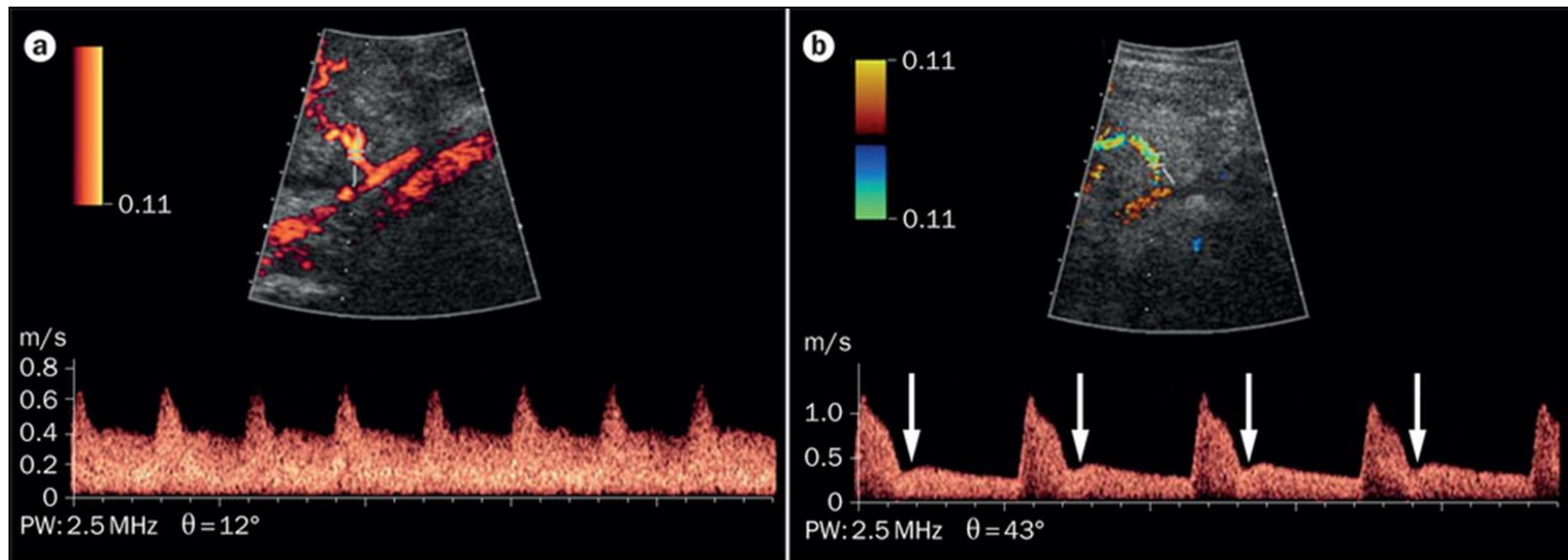
- regional: reduces blood pressure, contraindicated in thrombocytopenia
- general: increases blood pressure, difficult intubation due to laryngeal edema

Prediction

1. Black race
2. history of preeclampsia
3. Uterine artery doppler velocimetry
 - diastolic notch: impedance to flow at 11-13 week and 18-23 week scan
4. Angiogenic factors (VEGF, PlGF)
 - decreased in preeclampsia
5. Antiangiogenic factors (sEng, sFlt-1)
 - increased in preeclampsia

Prediction

Uterine artery doppler



Prevention

Aspirin

-dose: 75mg, 12weeks until birth

-indications:

hypertensive disorders

chronic kidney disease

autoimmune disease (SLE, antiphospholipid syndrome)

type 1 or type 2 diabetes mellitus

+age >40 years, BMI >35kg/m², family history of pre-eclampsia,
multiple pregnancy.

Prevention

Nitric oxide donors, progesterone, diuretics, folic acid, magnesium,
low molecular weight heparin, antioxidants (vit C, E), fish oils, salt restriction
-no recommendation for use as preventive measures by NICE

References

1. The FIGO Textbook of pregnancy hypertension.
2. BA Payne, C Hanson, S Sharma, LA Magee, P von Dadelszen. Epidemiology of the hypertensive disorders of pregnancy.



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