Hypertension and Pregnancy Outcomes

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Hypertensive disorders of pregnancy

- Affect 10-20% of pregnancies
- Increasing incidence (increase in maternal age, obesity, multiple pregnancies, chronic diseases)
- Major causes of maternal and perinatal morbidity and mortality
- 15% of preterm deliveries (In Hungary: 1200 preterm births/year)
- 30% of maternal deaths

Classification (NHBPEP-2000)

- Transient hypertension of pregnancy
- Chronic hypertension
- Preeclampsia
- Superimposed preeclampsia

Maternal complications

- HELLP syndrome, DIC
- Eclampsia
- Abruptio placentae
- Pulmonary oedema
- Acute renal failure
- Liver failure or haemorrhage
- Hypertensive encephalopathy, stroke
- Death
- Long-term cardiovascular morbidity

Neonatal complications

- Preterm delivery
- Fetal growth restriction (IUGR)
- Hypoxia-neurologic injury
- Perinatal death
- Long-term cardiovascular morbidity associated with low birtweight (fetal origin of adult diseases)

Aims

- To investigate the maternal and perinatal outcomes of pregnancies in women with chronic hypertension
- To determine risk factors for superimposed preeclampsia, preterm delivery and IUGR in chronic hypertensive patients
- To analyze antihypertensive medication of chronic hypertensive patients during pregnancy

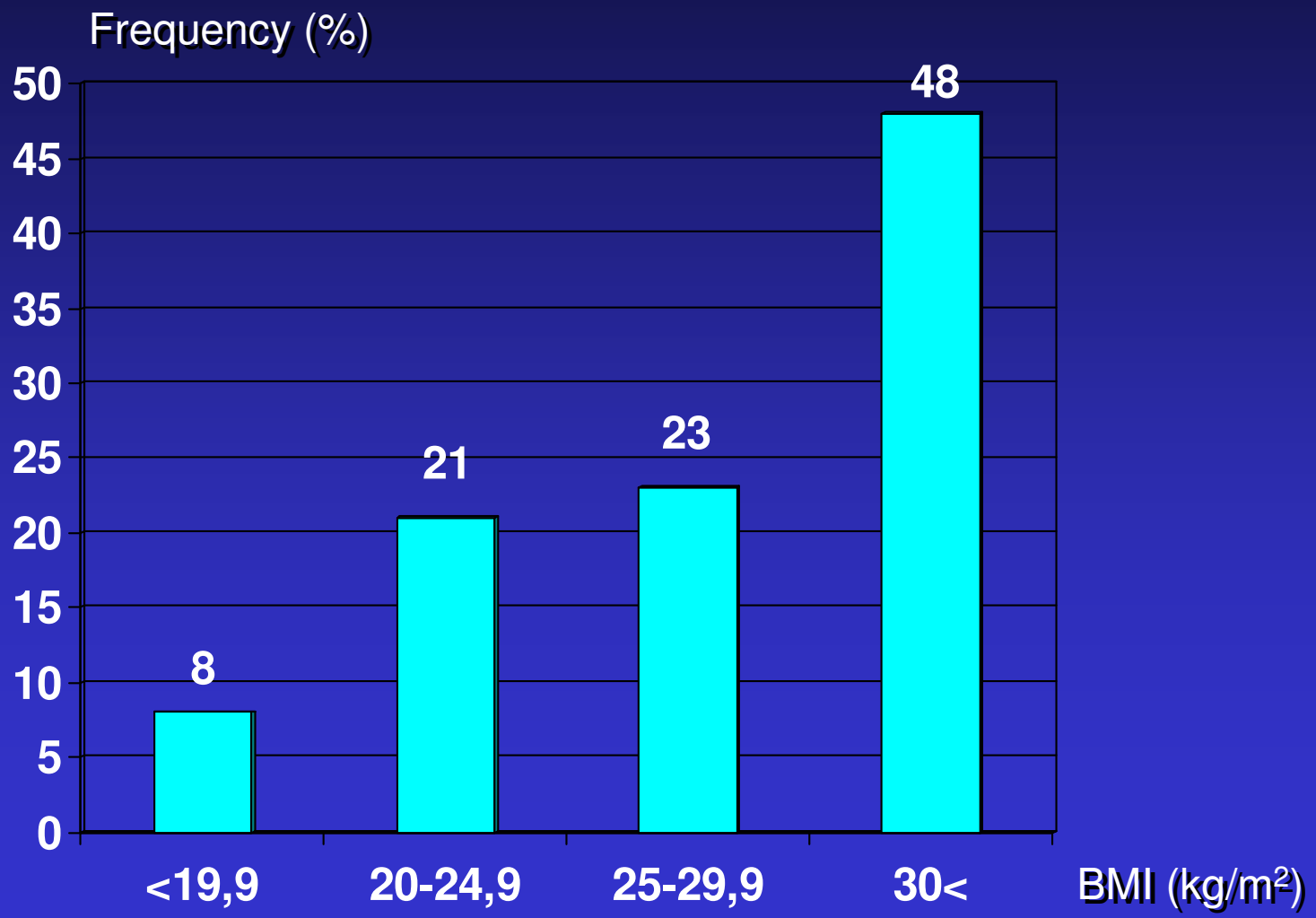
Patients

- 143 women with pre-existing chronic hypertension, who delivered in the 1st Department of Obstetrics and Gynecology, at the Semmelweis University between 1st of January, 2000 and 31st of December, 2007
- Inclusion criteria: being on antihypertensive therapy before conception, RR systolic > 160 mmHg and/or RR diastolic > 110 mmHg
- Exclusion criterion: multifetal gestation

Baseline characteristics

Age (mean ± SD)	32,1 ± 5,5 years
Duration of hypertension	8,0 ± 6,2 years
Pre-pregnancy BMI	30,5 ± 8,2 kg/m^2
RR syst. max. before pregnancy	176 ± 25 mmHg
RR diast. max. before pregnancy	107 ± 17 mmHg
Essential hypertension	132 (92%)

Distribution of pre-pregnancy BMI



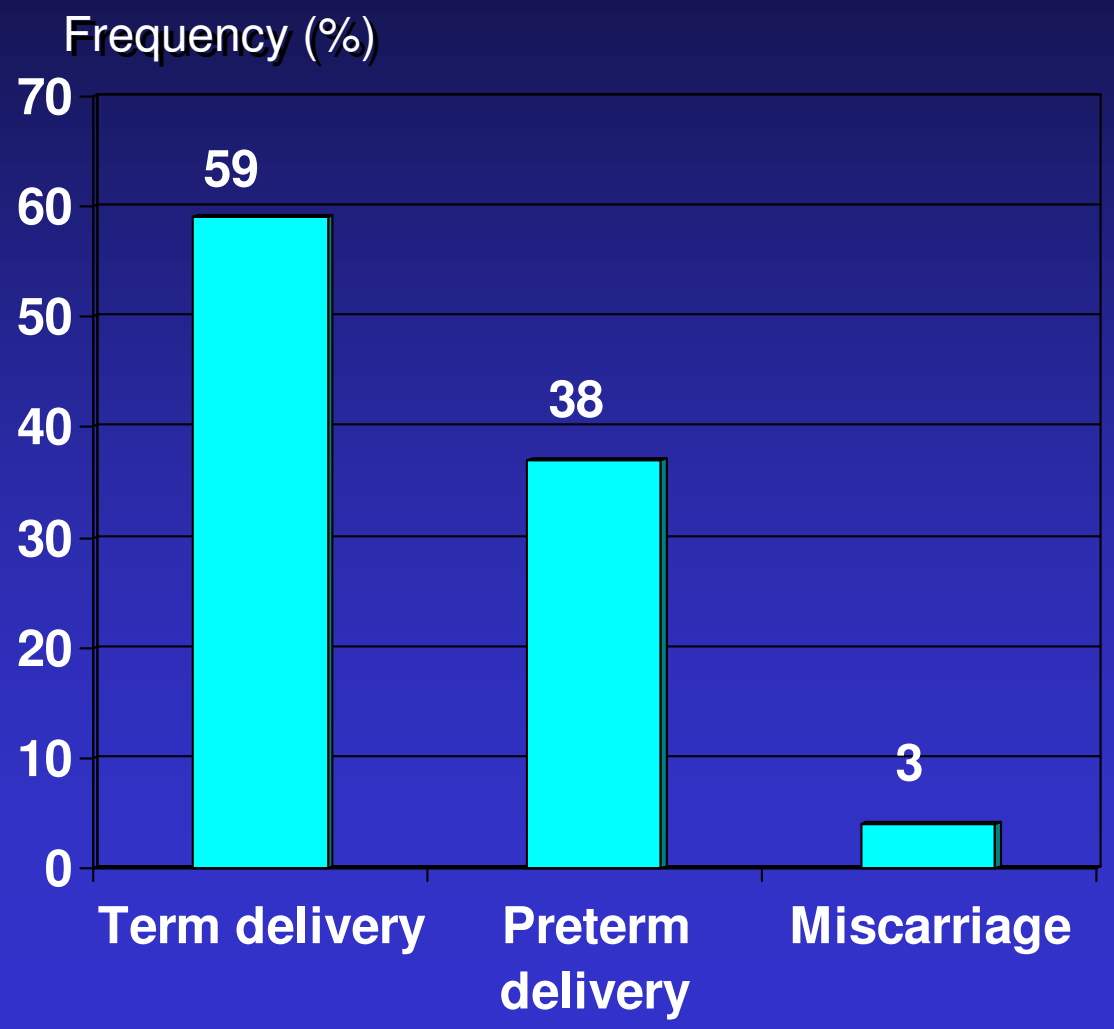
Maternal outcomes

Normotensive in the first half of pregnancy	62 (43%)
RR syst. max. during pregnancy (mean ± SD)	170 ± 23 Hgmm
RR diast. max. during pregnancy (mean ± SD)	104 ±13 Hgmm
Superimposed preeclampsia	41 (29%)
HELLP syndrome	2 (1,4%)
Eclampsia	0 (0%)
Caesarean section	110 (77%)
Planned pregnancy	49 (34%)

Perinatal outcomes

Gestational age at delivery (mean ± SD)	35,3 ± 5,3 weeks
Fetal birth weight (mean ± SD)	2521 ± 1127 g
Preterm birth	53 (37%)
Fetal growth restriction (IUGR)	30 (21%)
Perinatal death	4 (2,8%)

Pregnancy outcomes



Maternal and perinatal outcomes in chronic hypertensive patients with and without superimposed preeclampsia

Outcome	CHT with SPE	CHT without SPE	P value
HELLP syndrome	1 (2,4%)	1 (1,0%)	NS
Caesarean section	39 (95%)	71 (71%)	<0,001
Preterm delivery	28 (68%)	25 (25%)	<0,001
IUGR	17 (41%)	13 (13%)	<0,001
Perinatal death	3 (7,3%)	1 (1,0%)	<0,05

Risk factors for superimposed preeclampsia

Risk factor	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age >35 years	1,02 (0,45-2,31)	1,05 (0,45-2,43)
Primiparity	1,25 (0,61-2,60)	1,20 (0,53-2,74)
Prepregnancy obesity (>30 kg/m^2)	0,59 (0,28-1,24)	0,59 (0,28-1,23)
Smoking	1,58 (0,61-4,14)	1,60 (0,60-4,30)
Hypertension >4 years	1,14 (0,54-2,39)	1,14 (0,54-2,42)
Diabetes	0,47 (0,10-2,25)	0,53 (0,11-2,68)
Chronic renal disease	2,65 (0,63-11,1)	2,34 (0,55-10,1)
Antiphospholipid syndrome	2,52 (0,15-41,4)	1,88 (0,11-31,6)
Hypertension before 20 weeks	2,32 (1,07-5,05)	2,51 (1,14-5,54)
Early diastolic notch after 26 weeks	3,70 (1,50-9,11)	4,25 (1,65-10,9)

Risk factors for adverse perinatal outcomes

- Hypertension in the first half of pregnancy and persistent early diastolic notch in uterine artery were associated with an increased risk for preterm delivery, but the associations disappeared after adjustment for the presence of superimposed preeclampsia
- Smoking during pregnancy (adjusted OR: 3,62, 95% CI: 1,24-10,6) and persistent early diastolic notch (adjusted OR: 5,84, 95% CI: 1,85-18,4) were independently associated with an increased risk for IUGR

Hypertension care before pregnancy

Hypertension controlled by	Family physician 64% Internist 27% Lack of control 9%
Regular check-up	85%
ABPM	60%

Antihypertensive medication during pregnancy

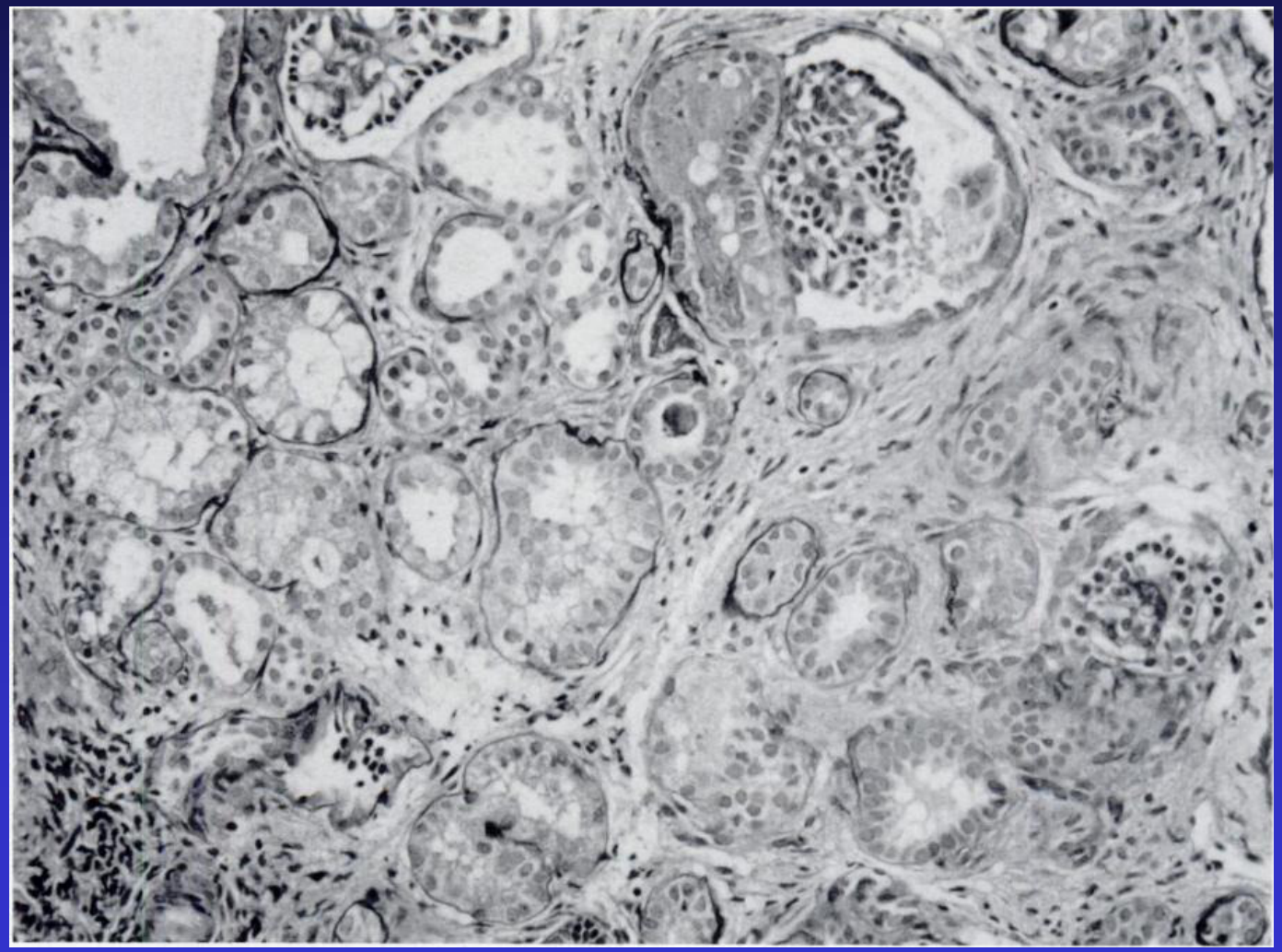
Drug	1st trimester	2nd trimester	3rd trimester
Beta-receptor blocker	51%	34%	36%
Central alpha2-receptor agonist (methydopa)	49%	59%	65%
Calcium antagonist	34%	40%	47%
ACE inhibitor	30%	2%	0%
Diuretic	6%	2%	5%
Alpha-adrenergic receptor blocker	3%	3%	5%
Imidazoline receptor agonist	3%	1%	0%
Direct vasodilator	0%	3%	1%
Angiotensin II receptor blocker	2%	0%	0%

Drugs contraindicated in pregnancy

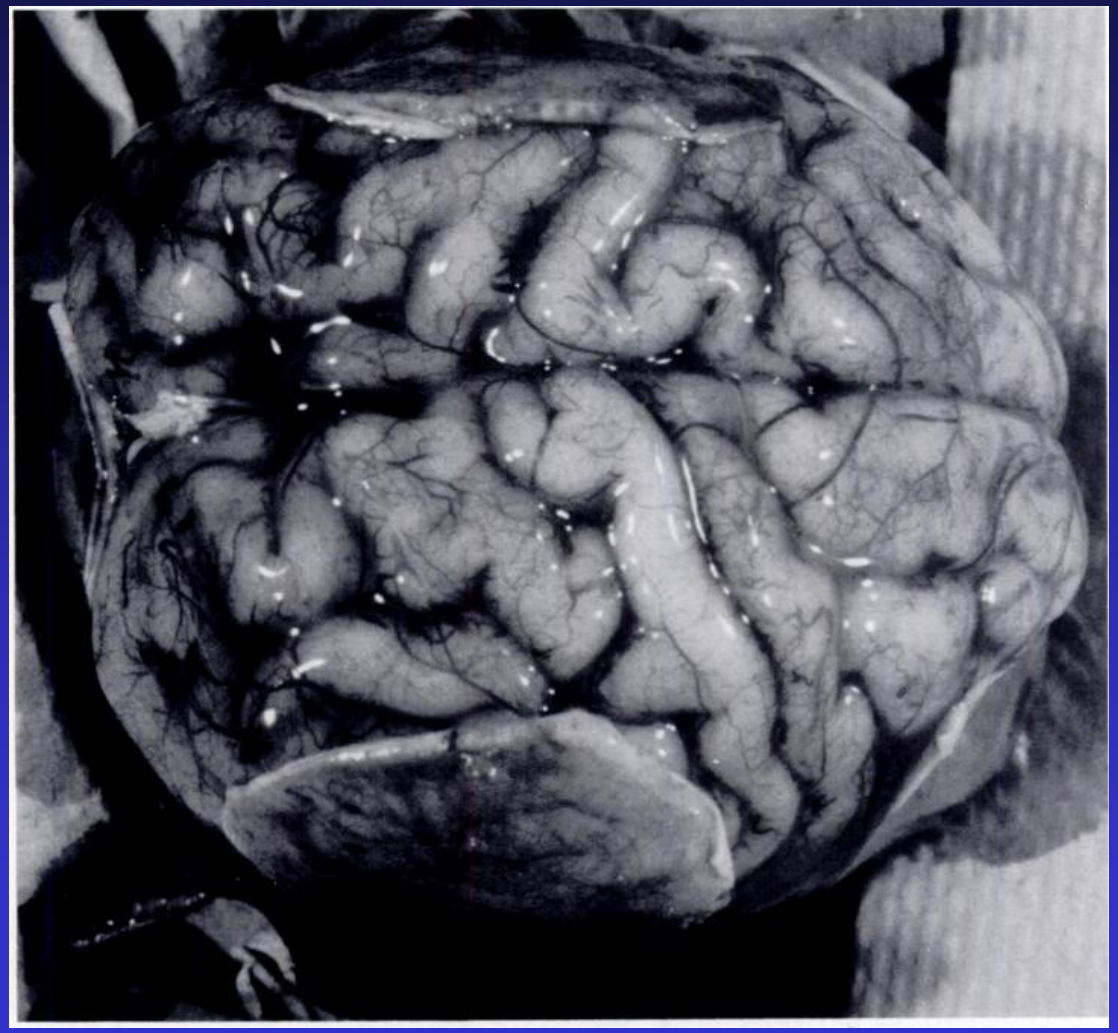
ACE inhibitors (Angiotensin II receptor blockers)

- 1st trimester
  - Cardiovascular malformations
    (RR: 3,72 95% CI: 1,89 -7,30)
  - Central nervous system malformations
    (RR: 4,39 95% CI: 1,37-14,02)
- 2nd-3rd trimester
  - Fetal hypotension, renal tubular dysplasia, anuria-oligohydramnios, pulmonary hypoplasia, IUGR
  - Hypocalvaria
  - Intrauterine death

Renal tubular dysplasia



Hypocalvaria



Conclusions

To reduce the maternal and perinatal morbidity and mortality associated with chronic hypertension:

- Optimal preconceptional care (planned pregnancy, optimal BMI, smoking cessation, RR diary, antihypertensive regimen change)
- Close collaboration between primary care physicians, internists and obstetricians during pregnancy (tight blood pressure control)
- Prenatal care and delivery in third level centers with NICU