Aetiology and pathophysiology of pre-eclampsia

Principles

- Pre-eclampsia is the result of a “sick” placenta
- Pre-eclampsia is NOT primarily a hypertensive disease
- Pre-eclampsia affects all organ systems
- To assess pre-eclampsia all organ systems must be evaluated
- Pre-eclampsia is cured by removing the placenta

Primary aetiology

- Primary lesion – poor second wave trophoblast invasion of spiral arterioles
- Smooth muscle of spiral arterioles is not replaced by hyaline material.
- Vessels are still responsive to vasoactive substances.
- Areas of ischaemia in tertiary villi of placenta
- Microvilli from trophoblasts are shed into maternal vascular system

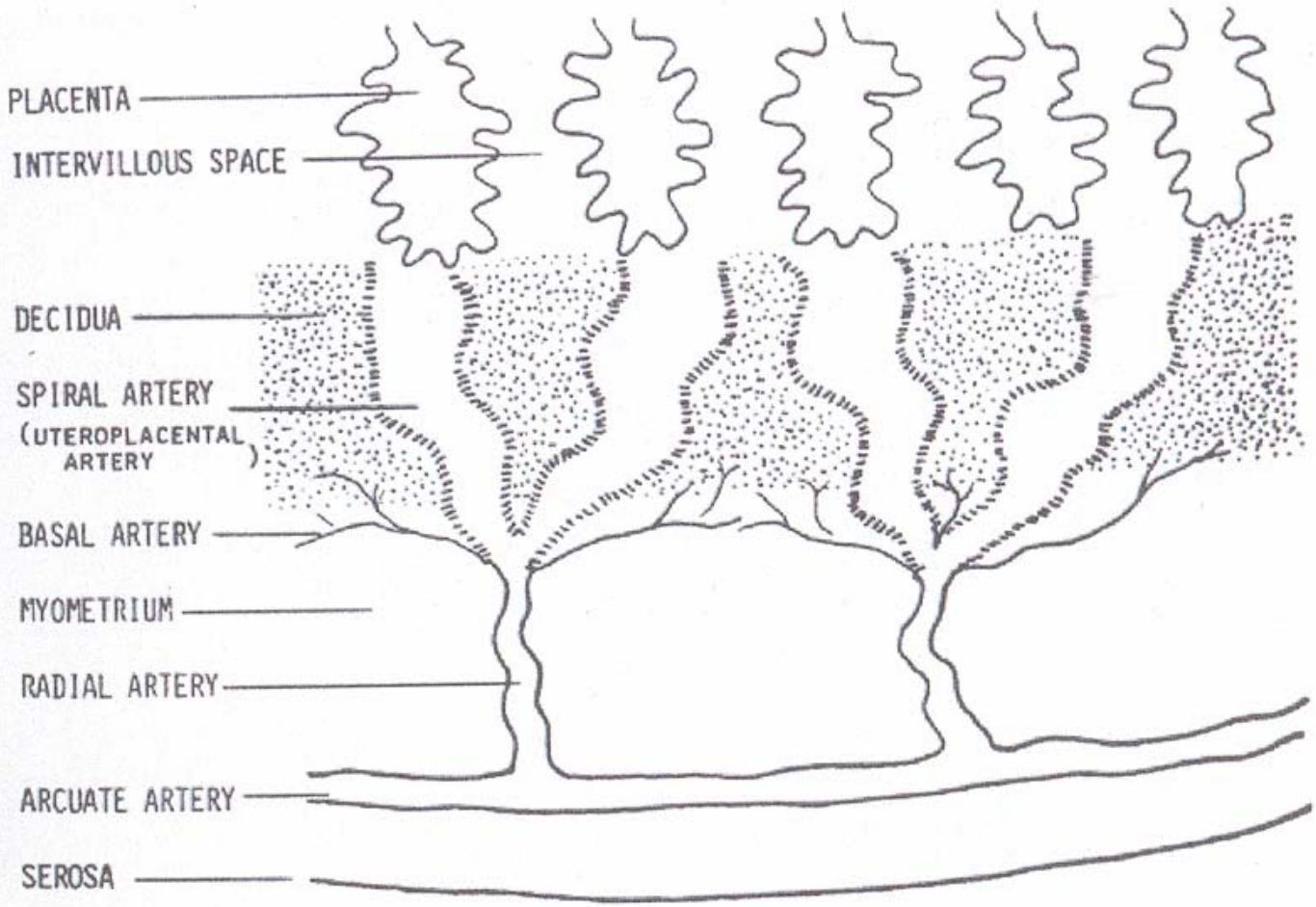

Diagram of the blood supply to the placenta in the third trimester. The spiral arteries (hatched) have been converted to uteroplacental arteries from their origins from the radial arteries.

(Reproduced by kind permission of the British Journal of Obstetrics & Gynaecology)

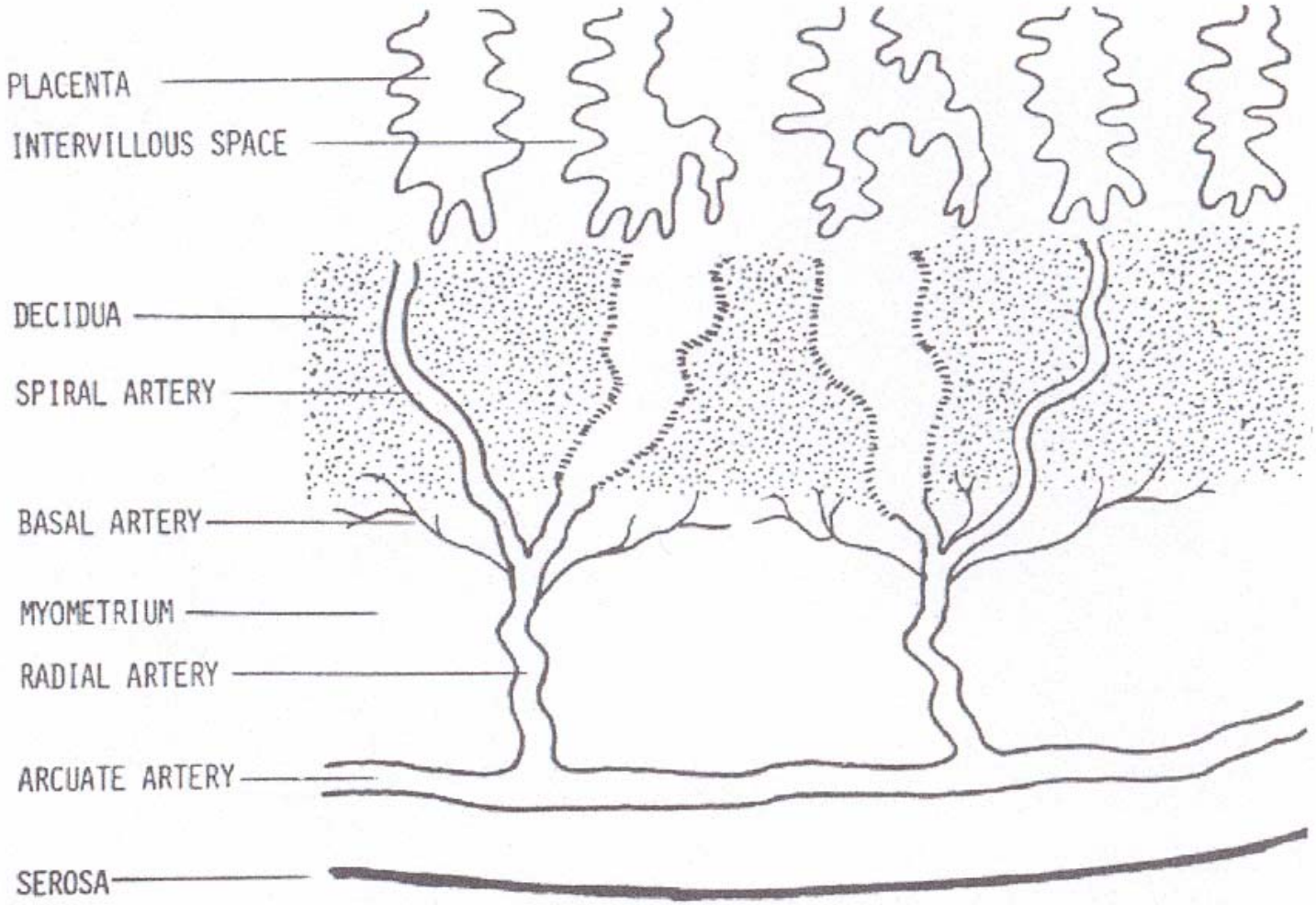

Diagram of the blood supply to the placenta in pre-eclampsia: the spiral arteries are either not converted to uteroplacental arteries (solid outlines) or, if they are, have been so converted only in their decidual segments (hatched outlines).

(Reproduced by kind permission of the British Journal of Obstetrics & Gynaecology)

Primary aetiology (Cont.)

- Microvilli are toxic to endothelial cells
- Damaged endothelial cells release vasoconstrictive agents
- Mircovilli are normally filtered out by lungs
- If the lungs are overwhelmed by the microvilli, they get into the arterial system and endothetial cells throughout the arterial system are damaged
- Vasoconstrictve agents are released, and vasospasm results – i.e. hypertension occurs

Failure of second wave trophoblast invasion?

- Genetic predisposition
- Autoimmune factors
- Paternal influence

Secondary effects (pathology)

- CVS – hypertension
- Renal – raised uric acid, proteinuria
- Hepatic – raised liver enzymes
- CNS – cerebral oedema
- Respiratory – pulmonary oedema
- Heamatological – low platelets
- Placental – impaired fetal growth

Tertiary effects (pathology)

- Convulsions
- Cerebral haemorrhage
- Retinal detachment
- Pulomary oedema
- DIC
- Renal cortical necrosis
- Hepatic rupture
- Abruptio placenta
- IUD

Management

- Primary prevention - ?
- Secondary prevention – delay in onset (delay appearance of secondary effects)
  - Calcium
  - Aspirin
  - Vitamin C and E
- Tertiary prevention – delay and prevention of complications
  - Timing of delivery (BIBO or *Vier B's BBBB)*
    - **Better in, better out** or ***Beter binne, beter buite***
  - Use magnesium sulphate etc. to prevent complications

Diagnosis of pre-eclampsia

- Investigate all organ systems
  - Clinical – CVS, CNS, Resp.
  - Haematological – Platelets, haematocrit
  - Renal – proteinuria, creatinnine, (uric acid)
  - Hepatic – AST
  - Placenta – Doppler U/S umbilical artery, fetal growth

Classification

- Australasian Classification of hypertension in pregnancy
  - Additional resources pack

- (Davey and MacGillvary Classification of hypertension in pregnancy (PEP)