Hypertension in Pregnancy
Can We Do It Better?

- Case presentation illustrating:
  - Areas of confusion
  - Areas of progress
  - Further challenge

Classification

- Chronic hypertension (CH)
- Pre-eclampsia/Eclampsia
- Pre-eclampsia superimposed on CH
- Gestational hypertension
  - Transient
  - Chronic

Traps in Classification

- Possibilities
  - Gestational hypertension
    - Pre-eclampsia (PE)
  - Chronic hypertension
    - Normotensive at booking
    - BP later in pregnancy
  - Chronic hypertension + superimposed PE

Case 1

- Mrs R K
  - Age 28 G, P
  - POH
  - 1996, ECS Term Severe PIH,
    - 2900 g alive
  - 2001, ECS Severe PIH
    - 26+2 wks @ 815 g
    - NND day 3 (pulmonary haemorrhage)
  - G4 - Uneventful until 23+2/40
CAUTION

Blood pressure control in pre-eclampsia does not abate the pathology

Alpha Methyl Dopa

- Central acting α adrenergic
- False neurotransmitter (agonist)
- Reduces peripheral resistance
- Maintains cardiac output
- Extensive long term safe use in pregnancy

Nifedipine

- Type 2 Ca channel antagonist
- Smooth muscle relaxant
- Rapid action
  - Oral 10 - 30 mins
  - Sublingual 5 - 10 mins

CAUTION WITH MgSO₄

Labetalol

- β blocker
- α₁ receptor antagonist
- Reduces cardiac output
- Useful if methyl dopa not effective

Treatment of BP

- ASSHP recommendation
  - Systolic ≥ 170 mmHg
    - Emergency
  - Diastolic ≥ 110 mmHg
  - Systolic ≥ 160 mmHg
  - Diastolic ≥ 90 mmHg

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Angiotensin Converting Enzyme Inhibitors

- Contraindicated
  - Oligohydramnios
  - Fetal renal artery stenosis
  - Renal tubular dysgenesis

Observation
- BP monitoring

Signs & symptoms
- Proteinuria
- Urine output
- Fetal wellbeing

CNS

Hepatic

Laboratory Investigation

- FBC
- Urea, electrolytes, creatinine, uric acid
- LFT
- Urinalysis
- 24 hour urinary protein

Fetal Monitoring

- CTG
- Growth scan
- BPP
- Doppler

Severe PIH Management

<table>
<thead>
<tr>
<th>Random Studies</th>
<th>No</th>
<th>Gest Age</th>
<th>Days Gained</th>
<th>PNM</th>
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</thead>
<tbody>
<tr>
<td>Odendaal</td>
<td>20</td>
<td>28-34</td>
<td>0</td>
<td>75%</td>
</tr>
<tr>
<td>Sibai</td>
<td>46</td>
<td>28-32</td>
<td>48 hrs</td>
<td>36.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15.4 days</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
<td>7</td>
<td>33%</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Gest Age</th>
<th>Days Gained</th>
<th>PNM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin &amp; Tupper</td>
<td>55</td>
<td>&lt;30</td>
<td>33%</td>
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<tr>
<td></td>
<td></td>
<td>30-36</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Sibai</td>
<td>60</td>
<td>18-27</td>
<td>87%</td>
<td></td>
</tr>
<tr>
<td>Odendaal</td>
<td>129</td>
<td>&lt;34</td>
<td>11</td>
<td>22.3%</td>
</tr>
<tr>
<td>Patinson</td>
<td>&lt;28</td>
<td>14</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td>Wallenburg</td>
<td>20-32</td>
<td>14</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Moodley</td>
<td>30-32</td>
<td>14</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>Viser</td>
<td>25-35</td>
<td>14</td>
<td>7%</td>
<td></td>
</tr>
</tbody>
</table>
Careful Selection for Expectant Management

- Expedite delivery if:
  - BP poor control
  - Eclampsia
  - CNS signs
  - Platelets < 100,000
  - RUQ pain
  - Pulmonary oedema
  - Abruption

GETTING BACK TO THE CASE

<table>
<thead>
<tr>
<th>Test</th>
<th>Range</th>
<th>Units</th>
<th>30/7/02</th>
<th>30/8/02</th>
<th>7/11/02</th>
<th>16/9/02</th>
<th>23/10/02</th>
<th>28/11/02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>18-45 g/d</td>
<td>mmol/l</td>
<td>0.3</td>
<td>0.1</td>
<td>0.1</td>
<td>8.2</td>
<td>8.1</td>
<td>8.8</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.1-0.25</td>
<td>mmol/l</td>
<td>7.3</td>
<td>13.0</td>
<td>12.0</td>
<td>9.3</td>
<td>9.3</td>
<td>12.0</td>
</tr>
<tr>
<td>AST</td>
<td>10-40</td>
<td>U/L</td>
<td>22</td>
<td>18</td>
<td>16</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>ALT</td>
<td>6-40</td>
<td>U/L</td>
<td>27</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Albumin</td>
<td>30-40</td>
<td>g/L</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>0-1.5</td>
<td>g/day</td>
<td>0.24</td>
<td>0.24</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
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Ultrasound

- 28/8/02
  - 18/8 g
  - N/A
- 16/9/02
  - EPW 458 g
  - AFI 11.5
- 23/10/02
  - EPW 838 g
  - AFI 13.0
- 7/11/02
  - EPW 1078 g
  - AFI 11.4
- 11/11/02
  - Doppler normal
- 28/11/02
  - Doppler normal

Chronic Hypertension

- 5% pregnancies → 10-25% PE
- 25-30% women in reproductive age have hypertension
- 95% essential hypertension
- 5% secondary to other disease
- ↑BMI and insulin resistance

Treatment of Mild Chronic Hypertension

- ? Value
- ? Reduction in superimposed pre-eclampsia
Severe Chronic Hypertension
- **Aim**
  - Prolong pregnancy
- **Risk**
  - Prematurity
  - Abruptio
  - FDIU

Pre-Eclampsia / Eclampsia
- Peculiar to humans
- Eclampsia - Gutsch 1776
- Aetiology remains unknown
- Significant maternal, perinatal morbidity and mortality

Pre-Eclampsia
- 4.5-11% of pregnancies
- Extremes of reproductive age
- First pregnancy
- ? Immunologic phenomenon of primipaternity
- Placental tissue
- Underlying hypertension

PET
- Multisystem disorder
  - Cardiovascular
  - Hepatic
  - Renal
  - Central nervous system
  - Haematological
  - Feto-placental unit

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<th>Mild Pre-Eclampsia</th>
<th>Severe Pre-Eclampsia</th>
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<tbody>
<tr>
<td>Systolic BP</td>
<td>≤ 150</td>
</tr>
<tr>
<td>Diastolic BP</td>
<td>≤ 100</td>
</tr>
<tr>
<td>Proteinuria</td>
<td>&gt; 300 mg/24 hrs</td>
</tr>
<tr>
<td>Oliguria</td>
<td>Absent</td>
</tr>
<tr>
<td>Uric acid</td>
<td>≤ 6 mg/dL</td>
</tr>
<tr>
<td>LDH</td>
<td>&lt; 600 U/L</td>
</tr>
<tr>
<td>AST</td>
<td>≤ 70 U/L</td>
</tr>
<tr>
<td>Creatinine</td>
<td>≤ 1 mg/dL</td>
</tr>
<tr>
<td>Platelet</td>
<td>≥ 100,000</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Absent</td>
</tr>
<tr>
<td>IUGR</td>
<td>Absent</td>
</tr>
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Case 2
- Mrs AR
  - 18 years G. P.
  - Transferred to LHS at 31/40
  - Itching 1/52
  - Headache 2/52
- Diagnosis
  - PIH
  - Cholestasis
  - PET
  - Twins
Ultrasound

- 1.11.02
  - 30+/40
  - EFW 1244 g 1238g
  - AFI 12.7 15.5

- 7.11.02
  - 31+/40
  - AFI 12.3 16.1
  - Doppler normal

The Liver

- Hepatic artery resistance in PE (Oosterhof et al 1994)
- Periportal fibrin deposits
- Haemorrhage
- Hepatocellular necrosis

HELLP (Weinstein 1982)

- Haemolysis
- Lactate dehydrogenase > 600 U/L
- Aspartate aminotransferase > 70 U/L
- Platelet < 100,000/UL
Dexamethasone vs Betamethasone in HELLP

- Prospective RCT
- IV Dexamethasone better than IM Betamethasone
  - Improve LFT
  - MAP lower
  - Urine output better

The Kidney
- Impaired tubular fn
  - ↑ uric acid levels; ie PE evolving
- Impaired GFR
  - Proteinuria; ie poor fetal prognosis

Pre-Eclampsia & Underlying Disease
- Autoimmune disease
- Renal disease
- Diabetes
- Thrombophilias
  - Antiphospholipid syndrome
  - Factor V Leiden deficiency
  - Activated protein C resistance
  - Hyperhomocysteinaemia

Case 3
- Mrs A A
  - Age 31, G2 P0 24 weeks gestation
  - H/O
    - SLE 15 years
    - Nephrotic syndrome
    - Diffuse proliferating GN
    - Hypertension
    - Current Rx
      - Isoptin, oxprenolol, methyl dopa, Prednisone, aspirin
  - POH
    - TOP 2 years ago at 20 weeks
    - Renal failure
    - Uraemic pericarditis

Mrs A A - Admitted at 24 weeks
- Platelets 392 414 376 357
- Urea 9 6.7 7.9 153
- Cr 145 156 163 167
- Ua 0.42 0.40 0.37 0.39
- Albumin 31 28 29 26

Management Plan
- Monitor renal function
- Monitor BP control
- Fetal surveillance
Progress

- Renal function
- Gradual deterioration
- BP control
- Satisfactory
- No pre-eclampsia
- Fetal surveillance
  - Growing at 5th centile
  - No reverse flow on Doppler
  - CTG - abnormal at 28 weeks
  - LSCS - 749 g male

Management

- Observation
- Antihypertensives
- Convulsion prophylaxis
- Appropriately timed delivery
  - Prevent maternal morbidity/mortality
  - Increase fetal survival

Indications for Delivery

- Poor BP control
- Deteriorating LFT
  - Elevated liver enzymes
  - Epigastric pain
- Deteriorating RF
- Worsening thrombocytopenia
- Neurological complications
  - Hyperreflexia/clonus
- Fetal compromise

Case 4

- Mrs HK
  - Age 17, G 3, P 0  EDC 25.11/02
  - Booking BP 29/40  115/60
  - 37½/40  130/70
  - Severe headache 2/7
  - Fits x 2
  - BP 170/94  R14  FH 174  HR 120
  - Drowsy, reflex normal
  - Plan: MgSO₄ infusion, IDC, monitoring

- 38/40
- ECS
- 3195, boy, Apgar 9, 9

Test | Range | Units | 15/03 | 16/03 | 17/03 | 18/03 | 19/03 | 20/03 | 21/03
--- | --- | --- | --- | --- | --- | --- | --- | --- | ---
Asp-T | 0-15 | - | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9
ALT | 0-40 | U/L | 40 | 40 | 40 | 40 | 40 | 40 | 40
Creatinine | 40-100 | mg/dL | 40 | 40 | 40 | 40 | 40 | 40 | 40
Creatinine | 40-100 | mg/dL | 40 | 40 | 40 | 40 | 40 | 40 | 40
Predicting Pre-Eclampsia
- Parity - MacGillvray
  - nullips 5.3%
  - secondigravids 0.3%
- Family History - Chelsey
  - 24.2% in daughters of pre-eclamptics
  - 38% in sisters
  (? Recessive single gene trait)
- Roll over test
- Serum uric acid
- Urinary calcium/creatinine ratio
- Plasma fibronectin concentration

Reducing PIH Complications
- Vigilance
  - antenatal care
  - intrapartum care
  - postpartum care
- Well considered management protocol
  - Antenatal screening
  - Regular antenatal care
  - Admission policy
    - observations
    - investigations
    - drugs
    - timing
    - mode of delivery
    - postpartum care
- Quality assurance program