Should Peri-Operative Hypertension Lead to Postponing of Surgery?

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A Little History

• 33% mortality rate in patients with hypertensive or arteriosclerotic disease
  – Sprague 1929

• Dangers of methonium drugs
  – Armstrong Davidson 1951

• Autonomic testing prior to anaesthesia
  – Dingle 1966
Mean Arterial Pressure Changes with Anaesthesia

Prys-Roberts C et al. BJA 1971; 43: 122-137
**British Hypertension Society Guidelines**

**Thresholds for intervention**

Initial blood pressure (mm Hg)

- >180/110
  - Treat

- 160-179/100-109
  - ↑

- 140-159/90-99
  - ↑

- 130-139/85-89
  - ↑

- <130/85
  - Treat

- ≥160/100
  - Treat

- 140-159/90-99
  - Observe, reassess risk of cardiovascular disease yearly

- <140/90
  - Reassess yearly

- Reassess in 5 years

- Target organ damage or cardiovascular complications or diabetes or 10 year risk of cardiovascular disease ≥ 20%

- No target organ damage and no cardiovascular complications and no diabetes and 10 year risk of cardiovascular disease < 20%

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- Unless malignant phase of hypertensive emergency confirm over 1-2 weeks then treat
- ↑ If cardiovascular complications, target organ damage, or diabetes is present, confirm over 3-4 weeks then treat; If absent remeasure weekly and treat if blood pressure persists at these levels over 4-12 weeks
- ↑ If cardiovascular complications, target organ damage, or diabetes is present, confirm over 12 weeks then treat; If absent remeasure monthly and treat if these levels are maintained and if estimated 10 year cardiovascular disease risk is ≥20%
- Assessed with risk chart for cardiovascular disease

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Williams B et al. BMJ 2004: 328; 634-40
Perioperative Management of Hypertensive Patients

- In patients with admission blood pressures
  - $\text{SAP} \geq 180$  \quad $\text{DAP} \geq 110$
    - Confirm severity of hypertension
    - Manage on a case by case basis.
    - Consider risk/benefit balance of deferring surgery
    - Defer surgery and treat hypertension if possible, especially in patients with target organ damage
Perioperative Cardiovascular Lability in Untreated Hypertensives

Goldman and Caldera, Anesthesiol 1979; 50:285-92
Hypertension and Intraoperative Events

- 17,638 consecutive day surgery patients
- Hypertension and intraoperative adverse events
  - Any event OR 2.2 (1.4-3.6)
  - Cardiovascular events OR 2.5 (1.5-4.2)

Cheung F et al. BJA 1999; 83: 262-70
Intraoperative Events Among Hypertensive Day Surgery Patients

- Hypertension 174 (76%)
- Arrhythmia 21 (9.2%)
- Hypotension 14 (6.1%)
- Bradycardia 13 (5.7%)
- Tachycardia 7 (3.1%)

Cheung F et al. BJA 1999; 83: 262-70
The Haemodynamic Response to Laryngoscopy

Impact of Intraoperative Blood Pressure on Cardiac Complications in Patients with Cardiac Disease

Hypotension Following Induction

- 2,406 patients
- Hypotension following induction
  - MAP decrease of >40% and MAP <70 mmHg
  - MAP <60 mmHg
- Prolonged postoperative stay and/or death more common in patients with hypotension
  - 13.3% vs. 8.6% (p<0.02)

- Maintain cardiovascular stability
- Avoid hypoxia

Teach not thy grandmother to extract,
The embryo juices of the bird by suction,
The good old lady can enact, that feat,
Quite irrespective of thy instruction.

Odgen Nash
Cardiovascular Stability
Anaesthetist Number Seven

- 1,023 patients undergoing elective CABG-monitored during induction
- Preoperative ischaemia 36.9%
- Significant association between ischaemia and MI (6.9% vs. 2.5%)
- Anaesthetist with whose patients had highest incidence haemodynamic instability had 9 fold increased risk of MI

Preoperative Treatment of Hypertension

- 989 patients with DAP 110-130 mmHg in theatre waiting room after receiving midazolam
- Randomised
  - 589 Nifedipine 10mg
  - 400 deferred until BP controlled for 3 days
- Similar frequency cardiovascular instability
- No complications in either group

• Does not address the question of preoperative assessment-studied patients who had been declared fit for surgery
• Determination of diastolic pressure by Dynamap
• 8 year recruitment period
• Placebo, blinding?
• Significant difference in group size
• Excluded high risk patients-No cardiovascular complications in either group
Exclusions

- Unstable angina
- Class 3 angina
- Previous MI
- Pregnancy induced hypertension
- Chronic renal failure
- LVH
- Aortic stenosis
- Previous coronary revascularisation
- Cardiac conduction abnormalities
- Rhythm other than sinus
- Previous stroke
Nifedipine

- Earlier preparations of some dihydropyridines such as capsular nifedipine have a rapid onset of action, unpredictable effects on BP and accompanied by reflex sympathetic activation.

.... These agents have no place in the management of hypertension even in the emergency setting.

Williams B et al. J Hum Hypertension 2004: 18; 139-85
Cardiac Risk in Patients with Medically Treated CAD Undergoing Non-Cardiac Surgery

Perioperative Management of Hypertensive Patients

- In patients with admission blood pressures SAP $\geq 180$ DAP $\geq 110$
  - Confirm severity of hypertension
  - Manage on a case by case basis.
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  - Defer surgery and treat hypertension if possible, especially in patients with target organ damage
The RAS and Perioperative Cardiovascular Stability

Cardiac Risk in Non-Cardiac Surgery

Blood Pressure, Cardiac Output and IMA Flow

Gould TH et al. BJA 2002; 89: 446-51
Teach not thy grandmother to extract
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Odgen Nash
ACEI/ARA and the Likelihood of Perioperative Hypotension

Renin Levels and Cardiovascular Complications

Laragh J. Am J Hypertension 2001; 14: 307-10
Studies of Hypertension and Anaesthesia I

Following induction of anaesthesia untreated hypertensives had:

• a greater fall in blood pressure
• episodes of myocardial ischaemia

Prys-Roberts C et al. BJA 1971; 43: 122-137
Possible Secondary Hypertension

• Young age
  – Any hypertension <20 years
  – Hypertension needing treatment <30 years
• Elevated creatinine
• Haematuria or proteinuria
• Sudden onset or worsening of hypertension
• Hypokalaemia with normal or elevated serum sodium

Williams B et al. Journal of Human Hypertension 2004; 18: 139-35
Impact of Admission Blood Pressure

Howell et al, Anaesthesia 1996; 51: 1001-4
Hypertension and Admission Blood Pressure as Predictors of Postoperative Silent Myocardial Ischaemia

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Odds Ratio for Postoperative Ischaemia (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of Hypertension</td>
<td>2.58 (1.12-5.96)</td>
</tr>
<tr>
<td>Admission Systolic Pressure</td>
<td>1.20 (1.10-1.42) per 10mmHg</td>
</tr>
</tbody>
</table>

Howell SJ et al. Anaesthesia 1997; 52:107-111
Dose-response relation between peak serum cTnI and 6-month mortality

Kim LJ et al. Circulation 2002; 106: 2366-71
The RAS and Perioperative Cardiovascular Stability

Beware High Renin Hypertension

- May be younger
- Target organ damage (angiotensin II)
- Poor treatment response to diuretics or CCBs
- Vasoconstricted
- Low circulating volume
- May become very hypotensive at induction of anaesthesia
- Have cardiovascular disease
Comparison of systolic blood pressure changes in 30 subjects (10 normotensive and 20 hypertensive) when subjects were visited by doctor (solid line) and a nurse (dashed line).