### Presentation of hypertensive emergency

#### Definitions surrounding hypertensive emergency

- **Hypertension**: elevated blood pressure (BP), usually defined as BP >140/90; pathological both in isolation and in association with other cardiovascular risk factors
- **Severe hypertension**: systolic BP (SBP) >200 mmHg and/or diastolic BP (DBP) >120 mmHg
- **Hypertensive urgency**: severe hypertension with no evidence of acute end organ damage
- **Hypertensive emergency**: severe hypertension with evidence of acute end organ damage
- **Malignant/accelerated hypertension**: a hypertensive emergency involving retinal vascular damage

#### Causes of hypertensive emergency

- Usually inadequate treatment and/or poor compliance in known hypertension, the causes of which include:
  - **Essential hypertension**
    - Age
    - Family history
    - Salt
    - Alcohol
    - Caffeine
    - Smoking
    - Obesity
  - **Secondary hypertension**
    - Renal
      - Renal artery stenosis
      - Glomerulonephritis
      - Chronic pyelonephritis
      - Polycystic kidney disease
    - Endocrine
      - Cushing’s syndrome
      - Conn’s syndrome
      - Acromegaly
      - Hyperthyroidism
      - Phaeochromocytoma
    - Arterial
      - Coarctation of the aorta
    - Drugs
      - Alcohol
      - Cocaine
      - Amphetamines
    - Pregnancy
      - Pre-eclampsia

#### Pathophysiology of hypertensive emergency

- Abrupt rise in systemic vascular resistance
- Failure of normal autoregulatory mechanisms
- Fibrinoid necrosis of arterioles
- Damage to red blood cells from fibrin deposits causing microangiopathic haemolytic anaemia
- Microscopic haemorrhage
- Macroscopic haemorrhage
Clinical features of hypertensive emergency

- Hypertensive encephalopathy
  - Headache
  - Visual disturbance
  - Nausea & vomiting
  - Confusion
  - Seizures
  - Drowsiness
  - Coma
- Hypertensive retinopathy
  - Visual disturbance
  - Silver wiring
  - Cotton wool spots
  - Flame haemorrhages
  - Papilloedema
- Hypertensive cardiomyopathy
  - Ischaemic chest pain
  - Dyspnoea
  - Bibasal crepitations
  - Raised jugular venous pressure (JVP)
- Hypertensive nephropathy
  - Oliguria
- Intracerebral haemorrhage
  - Drowsiness
  - Coma
  - Focal neurological signs
- Aortic dissection
  - Tearing chest pain radiating to the back
  - Differential in pulse and BP between right and left upper limbs
- Eclampsia
  - Seizures in late pregnancy

Initial investigation of hypertensive emergency

- CT head
  - Exclude intracranial pathology that may cause, complicate or masquerade as hypertensive emergency
- Fundoscopy
  - Silver wiring
  - Cotton wool spots
  - Flame haemorrhages
  - Papilloedema
- 12-lead ECG
  - Left ventricular hypertrophy (LVH)
    - S wave in V1 or V2 + R wave in V5 or V6 >35 mm
  - Ischaemic changes
    - ST depression and/or T wave inversion
- Urinalysis
  - Proteinuria
  - Haematuria
  - Beta human chorionic gonadotropin (hCG)
- Urea & electrolytes
  - Acute kidney injury (AKI)
- Chest radiograph (CXR)
  - Pulmonary oedema
  - Widened mediastinum

**Further investigation of hypertensive emergency**
- Ambulatory BP monitoring in patients not known to have hypertension who present with hypertensive urgency
- Exclude secondary causes if not already done so

**Initial management of hypertensive emergency**
- Assess the patient from an ABCDE perspective
- Maintain a patent airway: use manoeuvres, adjuncts, supraglottic or definitive airways as indicated and suction any sputum or secretions
- Deliver high flow oxygen 15L/min via reservoir mask and titrate to achieve oxygen saturations ($S_{O2}$) 94-98% or 88-92% if known to have COPD
- Attach monitoring
  - Pulse oximetry
  - Non-invasive blood pressure
  - Three-lead cardiac monitoring
- Request 12 lead ECG and portable CXR
- Obtain intravenous (IV) access and take bloods
- Obtain a CT head to exclude intracranial pathology that may cause, complicate or masquerade as hypertensive emergency
- Controlled BP reduction; rapid BP reduction should be avoided because this may compromise blood flow to tissues in which autoregulatory mechanisms are already impaired; pharmacological options are:
  - Nitroprusside IV
  - Labetalol IV
  - Nitrates IV
- Referral to high dependency unit (HDU) for:
  - Invasive BP monitoring, cardiac monitoring, urine output monitoring, neurological observations
- Patients with hypertensive urgency can be discharged once their BP has settled; should this require pharmacological management, a stat dose of amlodipine 5 mg orally (PO) is usually adequate

**Further management of hypertensive emergency**
- Advise lifestyle changes
  - Reduce intake of salt, alcohol and caffeine
  - Health diet
  - Regular exercise
  - Smoking cessation
- Control other cardiovascular risk factors e.g. diabetes mellitus
- Review of antihypertensive medication
  - If age <55 years: angiotensin converting enzyme inhibitor (A) +/- calcium channel blocker (C)/thiazide diuretic (D) +/- D/C
  - If age >55 years or black patient: C/D +/- A +/- D/C, respectively
Common questions concerning hypertensive emergency

- Define the term hypertensive emergency and explain how this differs from hypertensive urgency
  - Hypertensive emergency: severe hypertension with evidence of acute end organ damage
  - Hypertensive urgency: severe hypertension with no evidence of acute end organ damage
- List seven risk factors for essential hypertension
  - Age
  - Family history
  - Salt
  - Alcohol
  - Caffeine
  - Smoking
  - Obesity
- Outline the causes of secondary hypertension
  - Renal
    - Renal artery stenosis
    - Glomerulonephritis
    - Chronic pyelonephritis
    - Polycystic kidney disease
  - Endocrine
    - Cushing’s syndrome
    - Conn’s syndrome
    - Acromegaly
    - Hyperthyroidism
    - Phaeochromocytoma
  - Arterial
    - Coarctation of the aorta
  - Drugs
    - Alcohol
    - Cocaine
    - Amphetamines
- List the different types of end organ damage that may occur in hypertensive emergencies
  - Brain: hypertensive encephalopathy, intracerebral haemorrhage
  - Heart: hypertensive cardiomyopathy
  - Kidneys: hypertensive nephropathy
  - Eyes: hypertensive retinopathy
  - Aorta: aortic dissection
- Describe the clinical features of hypertensive encephalopathy
  - Headache
  - Visual disturbance
  - Nausea & vomiting
  - Confusion
  - Seizures
  - Drowsiness
  - Coma
- What initial investigation is important to exclude intracranial pathology that may cause, complicate or masquerade as hypertensive emergency?
  - CT head
- What other investigations would you perform and what abnormalities would you look for?
  - Fundoscopy
    - Silver wiring
    - Cotton wool spots
- Flame haemorrhages
- Papilloedema

- 12 lead ECG
  - Left ventricular hypertrophy (LVH): S wave in V1 or V2 + R wave in V5 or V6 >35 mm
  - Ischaemic changes: ST depression and/or T wave inversion

- Urinalysis
  - Proteinuria
  - Haematuria
  - Beta human chorionic gonadotropin (hCG)

- Urea & electrolytes
  - Acute kidney injury (AKI)

- Chest radiograph (CXR)
  - Pulmonary oedema
  - Widened mediastinum

- Outline your approach to BP reduction in a patient with hypertensive emergency
  - Controlled BP reduction; rapid BP reduction should be avoided because this may compromise blood flow to tissues in which autoregulatory mechanisms are already impaired; pharmacological options are:
    - Nitroprusside IV
    - Labetalol IV
    - Nitrates IV

- Referral to HDU for:
  - Invasive BP monitoring
  - Cardiac monitoring
  - Urine output monitoring
  - Neurological observations

- How would you manage a patient with hypertensive urgency who was otherwise fit for discharge?
  - Patients with hypertensive urgency can be discharged once their BP has settled; should this require pharmacological management, a stat dose of amlodipine 5 mg PO is usually adequate

- What follow up investigation would you consider for a patient with hypertensive urgency who was not previously known to have hypertension?
  - Ambulatory BP monitoring

- What lifestyle advice would you give patients about reducing their BP
  - Reduce intake of salt, alcohol and caffeine
  - Health diet
  - Regular exercise
  - Smoking cessation