Hypertensive Emergencies

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Hypertensive Emergencies

Outline
- Overview of Hypertension
- Signs and Symptoms of Hypertensive Diseases
- Hypertensive Urgencies
- Hypertensive Emergencies
- Treatment and Management
Hypertension Overview
Hypertension Overview

**Incidence**
- >50 million Americans are estimated to have high blood pressure
- 1 in 5 Americans, or 18% of the population
- Believed that 15 million are currently undiagnosed
  - 30% of the 50 million
  - 1 in 18 Americans or 5% of the population have HTN and don’t know it!
- Approximately 1% of these individuals will have a hypertensive emergency
- Account for approximately 2-3% of ED visits annually
Hypertension Overview

- Morbidity / Mortality
  - Gender – Male 49.7%, Female 50.3%
  - Death rate per 100,000 people
    - While Males – 14.4; Black Males – 49.6
    - White Females – 13.7; Black Females 40.5
Hypertension Overview

- Signs and Symptoms of Hypertensive Disease
  - Majority of cases are *asymptomatic* and detected on routine examination
  - Symptoms may be related to the secondary complications from persistently elevated blood pressure
  - Headache is the most common symptom directly related to elevated BP
  - Other symptoms
    - Dizziness, weakness, epistaxis, blurred vision
Hypertensive Emergencies

- There is no absolute level of blood pressure that defines a hypertensive emergency
  - Exist when there is acute end-organ damage in the setting of hypertension

- Hypertensive Urgency is defined as elevated BP without evidence of acute, ongoing target organ damage
  - Requires urgent blood pressure reduction
  - Patients with known end-organ disease but no active compromise
Hypertensive Emergencies

- Hypertensive emergencies
  - Hypertensive encephalopathy
  - Cerebral infarction/hemorrhage
  - Acute aortic dissection
  - Acute myocardial infarction
  - Acute left ventricular failure
  - Eclampsia/preeclampsia
  - Catecholamine induced states
    - Sympathomimetics, pheochromocytoma, MAOI inhibitor interactions
Hypertensive Emergencies

- Blood Pressure Regulation Mechanisms
- Autonomic Nervous System
- Kidneys
  - Renin-Angiotensin-Aldosterone system
- Endocrine System
Hypertensive Emergencies

- Renin
  - An enzyme released by the kidneys that stimulates the production of angiotensin
  - A protein secreted from the kidneys that raises blood pressure back to normal when it begins to fall
Hypertensive Emergencies

- Angiotensin
  - A peptide produced by a biochemical reaction stimulated by the enzyme Renin
  - Two forms: Angiotensin I and Angiotensin II
    - Angiotensin I – inactive
    - Angiotensin II – active form. Raises blood pressure by causing arteries to constrict and triggers the release of Aldosterone
Hypertensive Emergencies

- Aldosterone
  - The main electrolyte-regulating hormone secreted by the adrenal cortex that primarily controls the Na+/K+ balance.
  - An enzyme that is released by the adrenal glands and increases blood pressure by signaling the kidneys to retain sodium and water.

Blood pressure rises → Salt retention → Aldosterone
Hypertensive Emergencies

- Renin-Angiotensin-Aldosterone system
  - Renin stimulates the formation of Angiotensin I
  - Converts to Angiotensin II
  - Angiotensin II is a potent vasoconstrictor
  - Stimulates ADH secretion
  - Results in:
    - Reabsorption of Na+ and water
    - BP elevates
    - Activates the Renin-Angiotensin-Aldosterone system
Hypertensive Emergencies

- ADH
  - Hormone released by the pituitary gland
    - Made in the hypothalamus
  - Has an antidiuretic action
    - Suppresses the rate of urine production
  - Also known as Vasopressin
Hypertensive Emergencies

- Blood Pressure Regulation Mechanisms
  - Autonomic Nervous System
    - Baroreceptors
      - Measure stretch
        - Heart, great vessels
    - Chemoreceptors
      - Measure hypoxemia, acidosis
        - Carotid and Aortic bodies
  - Results in vasodilation or vasoconstriction
Hypertensive Emergencies

- CHF, HTN and Renal Failure
  - Long term, untreated HTN leads to LV Hypertrophy
    - The Starling Effect is compromised and the Left Ventricle is not fully emptied during systole
  - Decreased stroke volume and cardiac output
    - Blood backs up and causes congestive heart failure
  - Less cardiac output means major organs are not adequately perfused
    - Brain, kidneys, eyes
    - Cells are damaged, begin to fail and then die
Evaluation of Hypertension
Evaluation of Hypertension

- Risk Factors for Developing HTN
  - CAD
  - Age
  - Heredity
  - Ethnicity
    - African-Americans, Puerto Ricans, Cubans, Hispanics
  - Diet
    - Cholesterol, Fats, High Sodium
  - Weight
    - Obesity
  - Tobacco and smokeless tobacco users
  - Stress / Type A Personalities
Evaluation of Hypertension

- Etiology of *Primary Hypertension*
  - No specific identifying cause
  - Arteriole wall vasoconstriction, wall damage
    - Many risk factors
  - Develops slowly over years
  - May or may not be symptomatic
  - Treatment aimed at lowering BP through diet and medications
    - Beta Blockers
    - Calcium Channel Blockers
    - Adrenergic Inhibitors
    - ACE Inhibitors
    - Diuretics
Evaluation of Hypertension

- Etiology of Secondary Hypertension
  - Often has an identifiable cause
    - 10% of cases of HTN
  - Abrupt onset
  - Commonly renal in origin
    - Renal artery stenosis
    - Fibromuscular disease of the renal artery
    - Polycystic disease
  - Adrenal Tumors
    - Pheochromocytoma
Complications of Hypertension
Complications of Hypertension

- Damage Caused by Hypertension
  - Vessels
    - Large vessels become sclerosed and hardened
      - Loss of elasticity
      - Decreased blood flow
      - Occlude, tear or weaken and form aneurysms
      - Increased peripheral vascular resistance
  - Small vessels
    - Damage to the intimal layer
    - Scar tissue
    - Obstruction
Complications of Hypertension

- Damage Caused by Hypertension
  - Kidneys
    - Poor perfusion leads to organ damage
    - Decreased function eventually leads to failure
    - If your kidneys fail, you have to go on dialysis!
  - Brain
    - Stroke/CVA
    - Transient Ischemic Attack
Complications of Hypertension

- Damage Caused by Hypertension
  - Cardiac
    - Acute MI
      - Vessel obstruction from poor blood flow through the coronary arteries
    - Hypertrophy
      - Amount of muscle outgrows the blood supply
      - Smaller chamber size results in decreased cardiac output and incomplete LV emptying
  - Congestive Heart Failure
    - Related to increased PVR
    - Poor perfusion of other organs related to decreased cardiac output
Complications of Hypertension

- Prehospital Hypertensive Crisis
  - Common cause is sudden discontinuation of BP medications
  - Pregnancy induced hypertension is also a significant cause
    - Approximately 5% of pregnancies will have elevated BP
  - Pathophysiology as discussed
    - Intracerebral hemorrhage, subarachnoid hemorrhage, cerebral infarcts
    - Aortic dissection
    - MI
  - Diastolic BP generally >100 mmHg
Hypertension Management
Prehospital Hypertensive Crisis
- Signs and Symptoms (all in the setting of elevated BP)
  - Headache
  - Nausea and Vomiting
  - Confusion
  - Seizure
  - Stroke
  - Coma
  - Acute MI
  - Dysrhythmias
  - Nosebleeds
Hypertension Management

- Prehospital Hypertensive Crisis
  - Management
    - Rapid lowering of BP can be dangerous
    - Slow decrease in BP over 2-6 hours preferred
    - Ischemia and infarct possible 2/2 loss of autoregulation
    - NTG is NOT advised in the EMS environment
  - Airway Control
  - Keep the patient calm
  - O2 and assist ventilations as needed
  - IV with TKO fluids
  - Continuous EKG monitoring
  - Frequent LOC checks
  - Repeated VS
Hypertension Management

- Long-Term Hypertension Management
  - 5% decrease in BP will decrease the risk of stroke by 35-40%
  - Adequate treatment of HTN will decrease
    - Heart Failure by 52%
    - Stroke by 38%
    - Left Ventricular Hypertrophy by 35%
    - Cardiovascular mortality by 21%
Hypertension Management

- BP Management and the Paramedic
  - EMS has a significant role in educating the public
  - Primary Prevention programs
  - Public Screening programs
  - On-Scene Education
    - “hey, you know you need to get your BP rechecked by your doc....”
    - Lifestyle changes at an early age
    - Diet improvements
      - Decreased cholesterol, lipids and triglycerides
    - Exercise
    - Avoid tobacco
    - Take your BP medications as prescribed
Wrap Up
Hypertensive Emergencies

Summary
- Overview of Hypertension
- Signs and Symptoms of Hypertensive Diseases
- Hypertensive Urgencies
- Hypertensive Emergencies
- Treatment and Management
- Emergency Medicine Practice
  - Distinguishing and Managing Hypertensive Emergencies and Urgencies
Hypertensive Emergencies

- Questions?