HYPERTENSIVE URGENCIES AND EMERGENCIES

Background
1. Definitions:
   o Hypertensive emergency: acute, life-threatening blood pressure (BP) elevations, usually >180/120 mmHg, with evidence of end-organ damage
   o Severe asymptomatic hypertension: severe BP elevation not accompanied by end-organ damage
2. Hypertensive emergencies include two clinical syndromes:
   o Malignant hypertension: retinal manifestations (hemorrhages, papilledema, exudates), renal nephrosclerosis
   o Hypertensive encephalopathy: cerebral hyperperfusion and edema.
3. Severe asymptomatic hypertension includes two clinical syndromes:
   o Hypertensive urgency: Severe asymptomatic hypertension with risk factors for impending end-organ dysfunction (e.g., congestive heart failure, chronic renal failure, history of myocardial infarction)
   o Severe uncontrolled hypertension: No risk factors

Pathophysiology
1. Pathology of Disease:
   o Failure of arteriolar autoregulation, activation of the renin-angiotensin system causes damage of arteriolar and capillary endothelium
   o Fibrinoid necrosis of vessels with luminal narrowing, causing organ dysfunction and further vascular resistance
   o CNS autoregulation fails at lower pressures, allowing hyperperfusion and edema
2. Incidence, Prevalence:
   o In US, 33% adults have hypertension, and 5% ER patients have severe hypertension
   o Approximately 25% of patients with diastolic BP > 110 mmHg asymptomatic (including 8% with hypertensive emergency)
3. Risk Factors:
   o History of severe, longstanding hypertension
   o Recently stopped BP medications
   o Risks for end-organ damage: severe isolated systolic hypertension (SBP >160 mmHg), diabetes mellitus, metabolic syndrome, three or more cardiovascular risk factors, left ventricular hypertrophy by EKG or echo, renal dysfunction (abnormal CrCl or EGFR), proteinuria or known cardiac or renal disease
4. Morbidity / Mortality:
   o Without treatment, 79% one-year mortality rate, 99% five-year mortality rate
   o Twenty percent on dialysis in 4 years, with increased risk if abnormal creatinine and secondary hypertension

Diagnostics (SOR:C)^1-5
1. History: Focus is cardiac, renal and neurologic. Review recent antihypertensive meds, non-steroidal anti-inflammatory drug (NSAID) use, supplements/alternative therapies.
   - Hypertensive emergencies present with headache and/or visual changes (75%), nausea or vomiting (40%), chest pain (27%), dyspnea (22%) and neurologic deficit (21%).
   - In comparison, hypertensive urgencies present with headache (22%), epistaxis (17%), faintness (10%). Majority asymptomatic.

2. Physical Examination:
   - Confirm abnormal BP readings - ensure correct cuff size; check BP in both arms; seated, supported and resting patient.
   - Perform focused cardiopulmonary, neurologic, funduscopic examinations (eg, exudates, hemorrhages, papilledema suggest increased CV risk).
   - Consider orthostatic vital signs in the elderly, diabetics.

3. Diagnostic Testing
   - Laboratory evaluation:
     - Complete metabolic profile (acute renal failure, hepatic injury)
     - Cardiac enzymes (infarct)
     - Urinalysis (proteinuria, hematuria, glucosuria)
     - EKG (ST/T wave changes, hypertrophy)
   - Diagnostic imaging:
     - Chest X-ray (CXR) for fluid overload; first screening test for aortic dissection (present in only 2% of hypertension emergencies)
       - If pretest probability high (e.g., severe, ripping chest pain, radiating to back), get CT chest with contrast.
     - CT head if neurologic symptoms (non-contrast).
   - Other studies: Urine toxicology (e.g., cocaine or methamphetamine)

4. Diagnostic “Criteria”:
   - Absolute BP less important than rate and acuity of BP increase and evidence of end-organ (brain, cardiovascular, kidney, gravid uterus) damage.
   - End-organ damage uncommon with DBP <130 mmHg (except children and pregnancy).

Differential Diagnosis
   - Principle Differential Diagnosis:
     - Hypertensive emergency vs. hypertensive urgency - end-organ damage defines emergency.
   - Additional Differential Diagnosis:
     - Acute stroke
     - Untreated pain/anxiety,
     - Toxin (e.g., cocaine, methamphetamine)
     - Opioid, alcohol or benzodiazepine withdrawal
     - Preeclampsia or HELLP (hemolysis, elevated liver enzymes, low platelets) syndrome (in pregnancy)
     - Serotonin syndrome
     - Thyroid storm
     - Carcinoid syndrome
     - Pheochromocytoma.
Possible Sequelae of Hypertensive Emergency:
- Hypertensive encephalopathy
- Acute aortic dissection
- Acute myocardial infarction or acute coronary syndrome
- Pulmonary edema with respiratory failure
- Acute renal failure
- Microangiopathic hemolytic anemia
- Acute postoperative hypertension

Therapeutics
1. Acute Treatment:
   - Hypertensive Urgency (BP >160/110 mmHg without end-organ damage):
     - PO medications to lower BP over 24-48 hours - gradual to avoid altered autoregulation failure in critical arterial beds resulting in hypoperfusion and ischemia (SOR:C)\(^1-3\)
   - Hypertensive Emergency (acute hypertension with end-organ damage):
     - IV short-acting, titratable agent depending on involved organ system (see below). Treat in ICU setting with close monitoring (SOR:B)\(^4\)
       - Goals: lower MAP 25% within first hour, then lower BP to approx. 160/100-110 over subsequent 6-8 hours (SOR:C)\(^1-3,6\)
       - DO NOT TREAT elevated BP in patients with acute stroke (SOR:B)\(^4\)
       - If tolerated, in acute aortic dissection lower SBP to <100 mmHg (SOR:C)\(^4\)
   - Agents Used For Specific Presentations: (SOR:C)\(^1-3,5,6\)
     - Acute pulmonary edema with systolic dysfunction: nicardipine, fenoldopam or nitroprusside in combination with nitroglycerin and loop diuretic
     - Acute pulmonary edema with diastolic dysfunction: esmolol, metoprolol, labetalol or verapamil in combination with low-dose nitroglycerin and loop diuretic
     - Acute myocardial ischemia: labetalol or esmolol with nitroglycerin
     - Hypertensive encephalopathy: nicardipine, labetalol or fenoldopam
     - Acute aortic dissection: Labetalol or combination of nicardipine and esmolol or combination of nitroprusside with either esmolol or IV metoprolol
     - Acute renal failure/microangiopathic anemia: nicardipine or fenoldopam
     - Sympathetic crisis/cocaine overdose: verapamil, diltiazem or nicardipine with a benzodiazepine
     - Acute postoperative hypertension: esmolol, nicardipine or labetalol
     - Acute ischemic stroke/intracerebral bleed: nicardipine, labetalol or fenoldopam

   - Dosages of Commonly Used IV Antihypertensives (Adverse Effects):
     - enalapril 1.25 mg over 5 min every 4-6 h, titrate by 1.25 mg increments at 12-24 h intervals to maximum of 5 mg q6h (variable response, hypotension, headache, dizziness)
- esmolol 500 mcg/kg load over 1 min, infusion at 25-50 mcg/kg/min, increased by 25 mcg/kg/min every 10-20 min to max of 300 mcg/kg/min (nausea, flushing, first-degree AV block)
- fenoldopam 0.1 mcg/kg/min initial dose, 0.05 to 0.1 mcg/kg/min increments to maximum of 1.6 mcg/kg/min (nausea, headache, flushing)
- labetalol 20 mg initial bolus, 20 to 80 mg repeat boluses or start infusion at 2 mg/min with maximum 24 h dose of 300 mg (hypotension, dizziness, nausea, vomiting, paresthesias, bronchospasm)
- nicardipine 5 mg/h, increase at 2.5 mg/h increments every 5 min to max of 15 mg/h (headache, dizziness, flushing, nausea, edema, tachycardia)
- nitroglycerin 5 mcg/min, titrated by 5 mcg/min every 5-10 min to max of 60 mcg/min (headache, dizziness, tachyphylaxis)
- nitroprusside 0.5 mcg/kg/min, increase to max of 2 mcg/kg/min to avoid toxicity (thiocyanate and cyanide toxicity, headache, nausea, vomiting, flushing, muscle spasm)
- phentolamine 1 to 5 mg boluses, max 15 mg dose (flushing, tachycardia, dizziness, nausea, vomiting)

2. Further Management (24 hrs)
   - ICU management indicated and frequent monitoring for occurrence or progression of end-organ damage (SOR:B)^4
   - Hypertensive urgencies can often be managed with short-acting PO medications, close observation for several hours (SOR:C)^3,7
   - Caution: pts are often volume-depleted - avoid use of diuretics unless evidence of hypervolemia or chronic heart failure, then only with caution (SOR:C)^1

3. Long-Term Care:
   - Close primary care or cardiology follow-up
   - Hypertensive urgencies and emergencies often result from medication non-adherence

Follow-Up
1. Return to Office
   - Hypertensive urgency: < 2 weeks of discharge
   - Hypertensive emergency: < 2 days of discharge
   - Earlier follow-up: chest pain, dyspnea, new neurologic deficits (including confusion or vision abnormalities)

2. Referral to Specialist
   - Recommendations: consultation with cardiologist, neurologist or nephrologist depending on end-organ involvement, < 1 month of discharge

3. Admit to Hospital
   - ALL hypertensive emergencies admitted to the ICU for management (SOR:B)^4
   - Hypertensive urgencies may be managed by observation in ER with subsequent discharge, close follow-up
- No evidence that aggressive BP lowering in the ER improves outcomes - acceptable to manage as outpatient with PO medication (SOR:C)⁴

Prognosis

1. Variable, depending on complications. Rapid identification, cautious reversal of acute BP elevations keys to improving prognosis (SOR:B)¹⁻³,⁴
   - Rapid, acute lowering of BP may cause end-organ ischemia and infarction (SOR:A)⁴
   - Four-year survival of hypertensive emergency approximately 90%⁹
   - Twenty percent of patients will be on dialysis within four years of hypertensive emergency. Strongest predictors of end-stage renal disease are the baseline creatinine and secondary hypertension⁹

Prevention

1. Regular BP monitoring, follow-up, medication adherence, avoidance of precipitants (e.g., drugs)

Patient Education:


References

7. Perez, Marco I; Musini, Vijaya M; Wright, James M; Perez, Marco I. Pharmacological interventions for hypertensive emergencies (Cochrane Review). In: The Cochrane Library 2009 Issue 2. Chichester, UK: John Wiley and Sons, Ltd.

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