

HTN – Target organs are heart, brain, kidneys, eyes

Definition

New guidelines from the National Heart, Lung, and Blood Institute:

- Normal BP is now :
 - Systolic: less than 120
 - Diastolic: less than 80

Occurring at least 3 separate occasions

Hypertension often accompanies other risk factors for atherosclerotic heart disease:

dyslipidemia, obesity, diabetes mellitus, metabolic syndrome, and a sedentary lifestyle.

HTN is higher in persons who have other CV conditions including HF, CAD, stroke

Smoking causes vasoconstriction and, if a person w/ HTN smokes, risk of death from CVD or related disorders ↑↑↑

BP can be viewed in three ways:

1. as a sign BP used to monitor a patient's clinical status.

↑ BP may indicate an excessive dose of vasoconstrictive medication or other problems

2. as a risk factor for atherosclerotic cardiovascular disease.

HTN contributes to the rate at which atherosclerotic plaque accumulates within arterial walls

3. a disease. As a disease, hypertension is a major contributor to death from cardiac, cerebrovascular, renal, and peripheral vascular disease.

Prolonged HTN eventually damages blood vessels throughout the body

(esp target organs: heart, kidneys, brain, and eyes.

Usual consequences of prolonged, uncontrolled HTN are MI, HF, renal failure, strokes, and impaired vision.

Hypertrophy of the left ventricle of the heart may occur as it works to pump blood against the elevated BP (ie afterload). An echocardiogram is the recommended method of determining whether hypertrophy has occurred.

Pathology

• BP is a result of cardiac output and total peripheral resistance.

$$CO = SV \times HR$$

• CO is determined by stroke volume & heart rate

• Peripheral resistance is maintained by autonomic nervous system, circulating hormones (norepinephrine/epinephrine)

So...

• Factors that alter peripheral resistance, heart rate, or stroke volume affect systemic pressure or blood pressure

Genetics – arteriolar thickening ↑ resistance or other process that causes this

↑ SNS = ↑ vasoconstriction

Renal dysfunction = ↑ volume

↑ renin = ↑ vasoconstriction

cannot rid excess thru kidneys

Regulation - 4 control systems maintain BP

- **Arterial baroreceptors** found in aorta & left ventricle monitor level of arterial pressure and vasodilation
- **body fluid volume**
Excess of salt & water changes the venous return to the heart causing a rise in CO, especially if there is poor functioning kidneys
- **renin-angiotensin system**
Renin, angiotensin, angiotensin II are vasoconstrictors and inhibit release of salt excretion from kidney
- **Vascular autoregulation** keeps perfusion of tissues constant. Affected by salt and water overload

2 major classifications

Essential or Primary (90% HTN) also called Idiopathic

- Unknown cause, begins as benign disease & progresses
- Associated risk factors
 - Family history, age, race
 - High sodium intake
 - Physical inactivity
 - Excessive alcohol intake / smoking / drugs
 - Low potassium, calcium, magnesium intake
 - Excessive calorie consumption, obesity

Secondary: specific disease states –5%-8% of cases

- Renal, vascular or parenchymal (hepatocytes) disease
- Coronary artery disease
- Dysfunction of adrenal glands
- Neurogenic disease; brain tumors, encephalitis
- Pregnancy
- Medications: estrogens, oral contraceptives
- Psychiatric disorders

Malignant HTN

- A severe type of hypertension that appears abruptly and severely taking a malignant course progressing to deterioration
- S/S: morning HA, blurred vision, dyspnea
- diastolic BP > 120

Untreated leads to:

- leads to renal failure
- left ventricular failure
- stroke

Untreated HTN

Sustained BP elevation in clients with Essential hypertension **complications**: damage to blood vessels in vital organs, MI, HF, CAD, aneurysms, CVA (strokes), peripheral vascular disease, retinopathy or renal failure. CAD and MI are most prevalent.

S/S

- headache
- edema
- nocturia
- lethargy
- nosebleeds
- vision changes
- chest pain
- SOB

HTN CRISES

- Hypertensive emergency exists when an elevated BP must be lowered within an hour.
- Requires prompt treatment in ICU for drug therapy
- Nitroprusside drip with close hemodynamic monitoring

ASSESS

- History and risk factors
- Assess potential symptoms of target organ damage
 - Angina, dyspnea, altered speech, altered vision, nosebleeds, headaches, dizziness, balance problems, nocturia
 - Cardiovascular assessment: apical and peripheral pulses
- Personal, social, and financial factors that will influence the condition or its treatment
- BP in both arms
- in supine and erect position
- Peripheral pulse rate, rhythm, and force
- Bruits (turbulent blood flow) over carotid or abdominal area
- Psychosocial stressors
- Retinal changes, vision changes

CLINICAL MANIFESTATIONS (really a review of S&S above)

- Physical exam may reveal no abnormality other than high BP
- Headache
- Visual changes in retinae with hemorrhages or papilledema
- **CAD with angina or MI is most common**
- Kidney involvement: nocturia, >BUN and creatinine levels
- Cerebral vascular changes: TIA, stroke, falls, weakness, dizziness, confusion

DIAGNOSTICS/LABS

- H&P with retinae exam (hemorrhages)
- Labs: urinalysis, chemistries, renin levels, creatinine clearance, total cholesterol
- EKG: left ventricular hypertrophy
- Special studies
 - Intravenous pyelogram (IVP)
 - Renal arteriogram (renal disease)
 - Chest x-ray

MEDICAL MGMT

- The goal of treatment is to prevent mortality by achieving and maintaining a BP below 120/80.
- Non-pharmacologic approaches include weight loss, restriction of alcohol, sodium, tobacco, exercise and relaxation.
- **Drug therapy with greatest effect, few side effects, compliance by patient.**
- Promote compliance by avoiding complicated drug schedules)
- First-line therapy: diuretics and beta-blockers. *

DRUG THERAPY• **Diuretics: 3 types**

Thiazides prevent Na^+ & H_2O reabsorption in distal tubes & promote K^+ excretion (HCTZ, Zaroxolyn, Diuril)

Severe AE: hypo-kalemia, -natremia, -magnesium, hypercalcemia, hyperglycemia, skin rash, photosensitivity

Loop diuretics depress sodium reabsorption in loop of Henle, promote potassium excretion (Lasix, Bumex)

Severe adverse effects: hypokalemia, hyponatremia, rashes, hypomagnesium, hyperglycemia, dehydration

Potassium sparing work on distal tubules to inhibit Na^+ reabsorption retain K^+

*these all reduces amount of circulating fluid (Aldactone)

Severe adverse effects: hyperkalemia, headache, GI upset, skin rash, hyponatremia

• **Beta Blockers:** lower BP by blocking beta receptors in heart and blood vessels; reduces rate and cardiac output. Atenolol (Tenormin), Metoprolol (Lopressor), Propranolol (Inderal), Carvedilol (Coreg), Labetalol(Trandate).

Severe adverse effects: fatigue, hypotension, bronchospasm, hypoglycemia, insomnia

block Ca^{2+} absorption

↑ vasodilation

• **Calcium Channel Blockers:** interfere w/ transmembrane Ca^+ influx into heart muscle results reduced vasoconstriction or vessel relaxation. verapamil(Calan), diltiazem (Cardizem), nifedipine (Procardia), Norvasc

Severe adverse effects: Headache, dizziness, bradycardia, AV block, edema, rash

• **ACE inhibitors** block the conversion of angiotensin I to angiotensin II, a strong vasoconstrictor, resulting in vessel relaxation.

Enalapril (Vasotec), captopril (Capoten), lisinopril (Zestril), ramipril (Altace)

Severe adverse effects: cough, hypotension, angioedema, **causes a <BP in elderly!**

• **Vasodilators** relax vascular smooth muscle tone, reducing peripheral resistance.

(minoxidil; **sodium nitroprusside: Nipride Apresoline for HTN Crises – ER TX- given IV)**

Severe adverse effects: hypotension, tachycardia, headache, edema, dizziness, nausea.

SUMMARY OF TX

1. Life style changes

- Weight loss
- Regular physical activity
- Reduce Na intake
- Alcohol/smoking cessation

2. Continue life-style changes and start drug selection and therapy

- Diuretics/ B-Blockers
- ACE inhibitors
- Ca antagonists

3. Increase drug dosage or substitute another drug or add second agent from different class

4. Add second or third agent and/or diuretic if not already prescribed

INTERVENTIONS

- Diet teaching to include salt restriction, use DASH
- Restrict alcohol and smoking
- Stress management
- Drug therapy
- Teach BP techniques
- Avoid decongestants, cough syrup

DASH DIET

- Dietary Approaches to Stop Hypertension.
 - Weight reduction for normal weight
 - Rich in fruits, vegetables, low fat dairy products, reduce saturated fat
 - Regular aerobic exercise 30 min. day
 - Limit consumption of alcohol (1 drink per day)

CONTINUING CARE

Reinforce the importance of regular follow-up care.

Obtain a H&P with physical exam on each visit

- Assess for presence of medication-related problems (orthostatic hypotension)
- Promote compliance to drug therapy – abrupt cessation = REBOUND HTN