Hypertension: JNC-6 (Archive)

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Management and Treatment of Hypertension
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HYPERTENSION
(NIH Study)

I. Introduction

A. NIH Study: since its inception (1972) progress in the detection, treatment, and control of HTN has been remarkable

- in the last 2 decades, the following observations were reported:

(1) number of patients aware of their hypertensive condition has increased dramatically

(2) the percentage of hypertensive patients taking medication and controlling their HTN improved significantly

(3) mortality from coronary heart disease (CHD) decreased by approx. 50%

(4) mortality from stroke decreased by 57%

- progress in the detection, treatment, and control of HTN has significantly contributed to the reported decreases in mortality rates for CHD and stroke since HTN is a major risk factor for CHD and the most important risk factor for stroke

B. Clinical Evaluation

- 50 million Americans have elevated BP:
    - SBP > or = 140 mm Hg and/or
    - DBP > or = 90 mm Hg

- the prevalence of HTN:
    - increases with age
    - is greater for blacks than for whites
    - is greater in less educated people (both races, whites and blacks)
    - is much greater in lower socioeconomic groups
    - is greater in men than women (in young adulthood and early middle age)
    - is greater in women than men (after middle age)
    - is greater in people living in the southeastern U.S. than people living in other areas of the country

B. Clinical Evaluation (continued)

- risks for cardiovascular diseases (CVDs), including CHD and stroke, are lowest for adults with average SBP < 120 mm Hg and average DBP < 80 mm Hg
- at every level of DBP, risk of CVDs are greater with higher levels of SBP
- in middle-aged and older people, elevated SBP with normal DBP is associated with increased risk of CVD → "isolated systolic hypertension"

C. New Classification of High Blood Pressure

(1) high-normal BP is a new category (SBP=130-139 / DBP=85-89)

- people with SBP and/or DBP in this range are at increased risk of progressing to high BP → increased risk of experiencing non-fatal and fatal CVDs
- people with high-normal BP should be:
  - monitored frequently
  - counseled about life-style measures → reduce BP
- pharmacologic treatment is rarely needed in people with high normal BP

(2) table 2: Classification of BP for Adults (18 Years and Older)

Classification of Blood Pressure for Adults Aged 18 Years & Older

Category	Systolic (mm Hg)	Diastolic (mm Hg)
Normal	< 130	< 85
High Normal	130-139	85-89
Hypertension		
Stage 1 (mild)	140-159	90-99
Stage 2 (moderate)	160-179	100-109
Stage 3 (severe)	180-209	110-119
Stage 4 (very severe)	> or = 210	> or = 120

(2) table 2: Classification of BP for Adults (continued)

- all stages of HTN are associated with increased risk of nonfatal & fatal CVDs and renal disease
- the higher the BP, the greater the risk of CVDs
- stage 1: (previously termed "mild" HTN)
  - most common form of HTN
  - responsible for a major proportion of the incidence of morbidity, disability, and mortality associated with HTN
- all stages of HTN require long-term therapy

D. Cost of Drugs

- generic drugs → reduced drug costs
- new drugs used in HTN are expensive (up to 30 times more than generic diuretics and beta blockers)
- drug dosages may be reduced with patient education and counseling for diet and weight control → decreased drug costs
- dividing a scored tablet in half for the prescribed dose → cost savings

E. Treatment of HTN

(1) Goal

- the ultimate goal in treating HTN is to prevent morbidity and mortality
  - objectives:

    a. control BP by the least intrusive method possible → life-style modification

    b. maintain: SBP < 140 and DBP < 90

    or

    SBP < 135 and DBP < 85 (if possible)

(2) Life-Style Modification (previously termed "nonpharmacologic therapy")

a. lose wt if overweight

- wt reduction decreases BP in most pts who are 10% above ideal wt

IBW = (2.3 x ht in inches above 5') + 45.5 kg (female)

IBW = (2.3 x ht in inches above 5') + 50 kg (male)

b. limit alcohol intake to < or = 1 ounce of alcohol (24 oz or beer, 8 oz of wine, or 2 oz of 100 proof whiskey)

c. exercise

d. reduce sodium intake < 100 mmol/d (< 6 gm of NaCl)

e. maintain adequate dietary K, Ca, and Mg

- hypokalemia → may increase BP and induce ventricular ectopy

→ important in patients on diuretics

- hypocalcemia → associated with increased BP (in some studies)
  - there is no rationale for increasing Ca intake in excess of the recommended daily allowance (800-1200 mg)
- hypomagnesemia → "suggested" association with increased BP
  - there is no conclusive data to justify Mg supplementation to lower BP

f. stop smoking

g. reduced dietary saturated fat and cholesterol intake

F. Pharmacologic Treatment of HTN

(1) General Considerations

- the decision to initiate drug therapy in patients with HTN requires the following considerations:

  a. severity of the HTN
  b. TOD (target-organ disease)
  c. presence of other conditions and risk factors

table 3: **Manifestation of Target-Organ Disease**

Organ System	**Manifestations**
Cardiac	Clinical, electrocardiographic, or radiologic evidence of coronary artery disease; left ventricular hypertrophy or "strain" by EKG or left ventricular hypertrophy by EKG; left ventricular dysfunction or cardiac failure
Cerebrovascular	Transient ischemic attack or stroke
Peripheral Vascular	Absence of 1 or more major pulses in extremities (except for dorsalis pedis) with or without intermittent claudication; aneurysm
Renal	Serum creatinine > or = 1.5 mg/dL; proteinuria (1+ or greater); microalbuminuria
Retinopathy	Hemorrhages or exudates, with or without papilledema

(2) Pharmacologic Efficacy

- reducing BP with drugs → decreases cardiovascular mortality and morbidity → decreases incidence of stroke, coronary events, CHF, more severe HTN, and all-cause mortality

- studies indicate that:

  - 42% reduction in stroke from a 5 to 6 mm Hg drop in DBP

  - 20 - 25 % reduction in the rate of CHDs

(3) Stage 1 and Stage 2 Hypertension

- if BP remains at 140/90 during a 3 - 4 month period → pharmacologic tx (after encouragement of life-style modifications)

- if DBP = 90 - 94 and SBP = 140 - 149 → withhold drug tx in the absence of TOD & risk factors → follow-up at 3 to 6 month intervals (since BP may increase)

(4) Initial Drug Therapy

- initial drug therapy (stage 1 and stage 2) → monotherapy

a. diuretics and beta blockers → preferred for initial drug therapy

   - clinical trials have shown diuretics and beta blockers reduce cardiovascular M/M

b. Alternative Drugs

   - calcium channel blockers, ACE inhibitors, alpha-1 blockers, and alpha-beta blockers

     → equally effective in reducing BP
     → have not been shown in long-term clinical trials to reduce M/M
     → should be used when diuretics and beta blockers have been ineffective or unacceptable (d/t side effects, etc…)

c. Supplemental Antihypertensives (not for initial monotherapy)

   - direct-acting smooth muscle vasodilators (hydralazine, minoxidil)
     → induce reflex sympathetic stimulation of the cardiovascular system
     → cause fluid retention

   - alpha-2 agonist
     → cause annoying side effects in many patients

   - peripheral adrenergic neuron antagonists
     → cause annoying side effects in many patients

d. Special Considerations

i. Demographic Characteristics

- blacks → more responsive to diuretics & Ca channel blockers than beta blockers or ACE inhibitors
- geriatrics → responsive to all classes of drugs
- gender → no special determinations

■ NOTE: issues concerning race, age, or gender are not reasons for avoiding any drug class especially if a particular drug offers other therapeutic benefits since efficacy differences may be accomplished by the addition of a diuretic or another drug

ii. Concomitant Diseases and Therapies

- anti-HTN drugs may axacerbate some disease states while improving others:

beta blockers improve	→ angina
	→ cardiac dysrhythmias
	→ migraine headaches
	→ prolong life after a MI
beta blockers worsen	→ asthma
	→ diabetes
	→ peripheral ischemia

- selecting an anti-HTN drug that treats a coexisting disease state

→ simplifies drug regimen
→ reduces side effects
→ reduces drug costs

iii. Quality of Life → Side Effects

- anti-HTN drugs may cause undesirable side effects:
  - central acting drugs → drowsiness & sedation
  - beta blockers → reduce exercise tolerance

iv. Physiologic Factors

- body wt, heart rate, plasma renin activity, hemodynamic measures → helpful in choosing a specific agent

  high renin levels → ACE inhibitor

v. Economic Considerations

- cost of drugs → may be a barrier to controlling HTN

e. Dosage and Follow-up

i. the lowest dosage of initial drug should be used even though it may not immediately control BP → avoidance of side effects

ii. the lowest dose should be given for several weeks before increasing the dosage of the drug → time required to assess efficacy and side effects

iii. a drug given once or twice daily → improves patient compliance → controls BP

iv. after 1 to 3 months, if response to initial therapy is (1) adequate, (2) pt is not experiencing significant side effects, and (3) patient compliance is adequate, then 3 options may be considered:

1. increase the dose of the first drug
2. substitute an agent from another class
3. add a second drug from another class

- combining antihypertensives with different mechanisms of action → lower doses of drugs used to achieve BP control → decreases dose-dependent side effects

- addition of a 2nd agent usually enhances the effects of the 1st drug

  - example: adding a diuretic enhances the effects of other agents

- if addition of a 2nd drug results in adequate BP control, an attempt to discontinue the 1st drug may be worthwhile since monotherapy will control BP for at least 50% of all patients

- after achieving a level of BP control, substituting comparable combination tablets may simplify patients' drug regimens and promote compliance

v. Causes of Lack of Responsiveness to Therapy

- clinicians should assess the possible reasons for lack of responsiveness to drug therapy before proceeding to the next treatment step

(5) Stage 3 and Stage 4 Hypertension

(patients with DBP > or = 110 and/or SBP > or = 180)

- patients in stage 3 and 4 may respond adequately to monotherapy; however, a 2nd or 3rd agent is usually necessary for BP control
  - intervals between regimen changes may be decreased for BP control
  - maximum doses of some drugs may be increased for BP control
- some patients may require initial treatment with more than one drug for adequate antihypertensive effects
- patients with DBP > 120 with significant TOD may require hospitalization

(6) Isolated Systolic Hypertension (ISH)

a. Adolescents and Young Adults

- ISH → often indicates hyperdynamic circulation which may be predictive of future elevation of DBP
- if life style-modifications ineffective, drug therapy should be considered

b. Older Persons

- ISH → SBP > or = 160 and DBP < 90 → drug therapy if life-style modifications ineffective

(7) Step-Down Therapy

- after BP has been controlled for 1 year (with at least 4 office visits), an attempt to reduce antihypertensive drug therapy in a gradual, progressive manner is recommended
- step-down therapy is particularly successful in patients who are also practicing life-style modifications
- regular follow-up should be arranged after discontinuing antihypertensive drugs since BP usually increases to hypertensive levels months or years after discontinuation especially if life-style modifications were discontinued

(8) J-Curve Hypothesis

- concerns about lowering DBP with antihypertensive drugs has raised the J-curve hypothesis:

  low DBP (< 90) → low diastolic perfusion pressure in coronary circulation
  → risk of coronary disease

- this hypothesis may be more important in patients with preexisting CAD

- currently, these is no evidence to support the J-curve hypothesis and clinical trails have supports the reduction of DBP to less than 90 mm Hg

(9) Resistant Hypertension

a. HTN is considered resistant if a patient's BP:

   i. cannot be reduced to less than 160/100 by a triple-drug regimen given in maximal doses

   ii. pretreatment BP was > 180 / 115

   or

   i. cannot be reduced to less than 140 / 90 by a triple-drug regimen given in maximal doses

   ii. pretreatment BP was < 180 / 115

b. isolated systolic HTN is considered resistant if an older patient's SBP:

   i. cannot be reduced to less than 170 mm Hg

   ii. pretreatment SBP was > 200 mm Hg

   or

   i. cannot be reduced to less than 160 mm Hg & by at least 10 mm Hg

   ii. pretreatment SBP was 160 - 200 mm Hg

(10) Follow-up Visits

a. goal of drug therapy: achieving and maintaining target BP with the lowest possible drug doses → requires ongoing follow-up for dosage adjustments

b. patients with stage 1 HTN without TOD

   i. should be seen within 1 to 2 months after start of therapy to assess BP control, patient compliance, and presence of side effects

   ii. once BP is controlled, follow-up at 3- to 6- month intervals

(11) Strategies to Improve Adherence to Therapy

- poor patient compliance to long-term tx (life-style modifications and pharmacologic therapy) → inadequate control of BP → increased HTN-related M/M

- guidelines to improve adherence to treatment:

  a. simplify the drug regimen

  b. include patient in the decision making process

  c. incorporate the treatment into the patient's daily life -style

  d. set realistic short-term objective of the treatment plan with the patient

  e. encourage discussion of side effects

  f. minimize drug costs

  g. indicate that you will ask about compliance at the next office visit

Pharmacologic Treatment of Hypertension