Hypertension Through The Ages And At Many Ages

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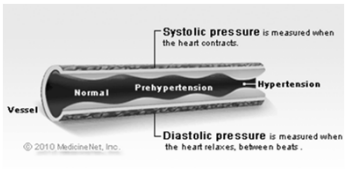
Definition of HTN

- Hypertension:

A condition in which the force of blood against the artery is too high.

What is HTN?

- BP is determined by the balance between cardiac output and vascular resistance. A rise in either of these variables, in the absence of a compensatory decrease in the other, increases mean BP, which is the driving pressure.



What increases the volume?

- Factors that affect cardiac output include the following :
- Baroreceptors
- Extracellular volume
- Effective circulating volume - Atrial natriuretic hormones, mineralocorticoids, angiotensin
- Sympathetic nervous syndrome

What affects the pipe stiffness?

Factors that affect vascular resistance include the following :

- Pressors - Angiotensin II, calcium (intracellular), catecholamines, sympathetic nervous system, vasopressin
- Depressors - Atrial natriuretic hormones, endothelial relaxing factors, kinins, prostaglandin E , prostaglandin I
- Atherosclerotic vascular disease

A Turning Point in the History of Medicine

The Pharmaceutical Treatment for HTN is Relatively New

- FDR died of a cerebral hemorrhage in 1945
- He suffered from severe HTN for at least 10 years prior to that.
- His blood pressure one year prior to his death was 184/108.
- At the Yalta Conference it was 260/150

Treatment

At that time there were two options:

- The Kempner Diet

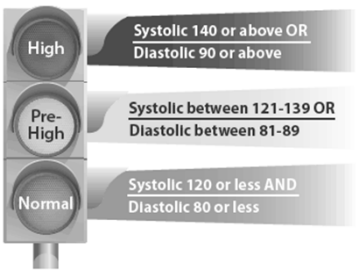
OR

- Lumbar Sympathectomy

Meds and Studies

- Diuretics were discovered to be an effective treatment in 1949.
- In the early 60's two studies found that treatment of HTN significantly reduced the risk for strokes.
- After this, the drug company race was on to find new and better drugs for treatment.

That Is When Recommendations Were Born



Pregnancy and HTN

Let's start at the beginning

- Hypertension is the most common medical problem encountered during pregnancy, complicating 2-3% of pregnancies. Hypertensive disorders during pregnancy are classified into 4 categories, as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy[1]:
- Chronic hypertension
- Preeclampsia-eclampsia
- Preeclampsia superimposed on chronic hypertension
- Gestational hypertension (transient hypertension of pregnancy or chronic hypertension identified in the latter half of pregnancy). This terminology is preferred over the older but widely used term "pregnancy-induced hypertension" (PIH) because it is more precise.

Definitions

- Chronic hypertension is defined as blood pressure exceeding 140/90 mm Hg before pregnancy or before 20 weeks' gestation. When hypertension is first identified during a woman's pregnancy and she is at less than 20 weeks' gestation, blood pressure elevations usually represent chronic hypertension.
- Preeclampsia is a serious condition that typically starts after the 20th week of pregnancy; high blood pressure is a main contributing factor. The rate of preeclampsia in the US has increased 25% in the last two decades (involving 3-6% of pregnancies, and is a leading cause of maternal and infant illness and death.
- Gestational hypertension refers to hypertension with onset in the latter part of pregnancy (>20 weeks' gestation) without any other features of preeclampsia, and followed by normalization of the blood pressure postpartum.

Treatment

For mild preeclampsia:

Bedrest

Magnesium

For severe preeclampsia:

Deliver the baby if it is over 34 weeks gestation

Otherwise, treat BP and hospital bed rest

Treatment, cont'd

Eclampsia:

- Deliver the baby
- Treat seizures
- Lower BP

Look for HELPP Syndrome (15%)

(Hemolysis, Elevated liver enzymes, and low platelets)

Treatment cont'd

HELPP syndrome usually resolves with delivery of the baby.

Steroids

Transfusion

May be required

Pediatric HTN

Age	95th %ile for girls 50th%ile for height	75th %ile for height	95th %ile for boys 50th %ile for height	75th %ile for height
1	104/58	105/59	103/56	104/58
6	111/74	113/74	114/74	115/75
12	123/80	124/81	123/81	125/82
17	129/84	130/85	136/87	138/87

Causes of HTN in infants

Thrombosis of renal artery or vein

Congenital renal anomalies

Coarctation of aorta

Bronchopulmonary dysplasia

Causes of HTN in children from 1-6 years of age

Renal artery stenosis

Renal parenchymal disease

Wilms tumor

Neuroblastoma

Coarctation of aorta

Causes of HTN in children 7-12 years of age

Renal parenchymal disease

Renovascular abnormalities

Endocrine causes

Essential hypertension

Causes of HTN in adolescents

Essential hypertension

Renal parenchymal disease

Endocrine causes

Why is it so important to identify HTN in children?

- Obese children have approximately a 3-fold higher risk for hypertension than non-obese children. As many as 41% of children with high BP have left ventricular hypertrophy (LVH). Almost 60% of children with persistent elevated BP have relative weights greater than 120% of the median for their sex, height, and age.
- As in adults, in whom abdominal girth correlates to elevated blood pressure, studies show that this measurement is also to be considered in the assessment of a teenager with suspected BP elevation at an early age.

HTN in Adults

- Blood pressure is high when it measures 140/90 or higher at two or more checkups. It is important to have your patient check his or her blood pressure at home at different times of the day. If the pressure stays high, even when relaxed, the doctor or provider may suggest exercise, changes in diet, and medication.

Prehypertension

- The term “prehypertension” describes people whose blood pressure is slightly higher than normal—for example, the first number (systolic) is between 120 and 139, or the second number (diastolic) is between 80 and 89. Prehypertension can put patients at risk for developing high blood pressure.

Primary HTN

- High blood pressure that gradually develops over years.

Otherwise known as essential HTN

Secondary HTN in adults

- Obstructive sleep apnea
- Kidney problems
- Adrenal gland tumors
- Thyroid problems
- Certain defects in blood vessels you're born with (congenital)
- Certain medications, such as birth control pills, cold remedies, decongestants, over-the-counter pain relievers and some prescription drugs
- Illegal drugs, such as cocaine and amphetamines
- Alcohol abuse or chronic alcohol use

Renal Artery Stenosis

- The narrowing in one or both renal arteries is most often caused by atherosclerosis, or hardening of the arteries. This is the same process that leads to many heart attacks and strokes. A less common cause of the narrowing is fibromuscular dysplasia.
- This is a condition in which the structure of the renal arteries develops abnormally for unclear reasons.

Treatment

- Generally angioplasty
- Stents
- Surgery

Risks for HTN

- **Age.** The chance of having high blood pressure increases as you get older.
- **Gender.** Before age 55, men have a greater chance of having high blood pressure. Women are more likely to have high blood pressure after menopause.
- **Family history.** High blood pressure tends to run in some families.
- **Race.** African-Americans are at increased risk for high blood pressure.

Lifestyle changes for a healthy BP

- **Keep a healthy weight.** Being overweight adds to your risk of high blood pressure. Ask your doctor if you need to lose weight.
- **Exercise every day.** Moderate exercise can lower your risk of high blood pressure. Set some goals for yourself so that you can exercise safely and work your way up to exercising at least 30 minutes a day most days of the week. You should check with your doctor before starting an exercise plan if you have any health problems that are not being treated. You can find more information about exercise and physical activity from the National Institute on Aging at *www.nia.nih.gov/Go4Life*.
- **Eat a healthy diet.** A diet rich in fruits, vegetables, whole grains, and low-fat dairy products may help to lower blood pressure. Ask your doctor about following a healthy diet.
- **Cut down on salt.** Many Americans eat more salt (sodium) than they need. Most of the salt comes from processed food (for example, soup and baked goods). A low-salt diet might help lower your blood pressure. Talk with your doctor about eating less salt.

More Lifestyle Suggestions

- **Drink less alcohol.** Drinking alcohol can affect your blood pressure. Most men should not have more than two drinks a day; most women should not have more than one drink a day.
- **Don't smoke.** Smoking increases your risk for high blood pressure, heart disease, stroke, and other health problems. If you smoke, quit.
- **Get a good night's sleep.** Tell your doctor if you've been told you snore or sound like you stop breathing for moments when you sleep. This may be a sign of a problem called sleep apnea. Treating sleep apnea and getting a good night's sleep can help to lower blood pressure.

HTN in the elderly-The Framingham Study

Among patients younger than 60 years of age, 27% were hypertensive (blood pressure [BP] > 140/90 mm Hg), and 20% were classified as having stage 2 hypertension (untreated BP ≥ 160 mm Hg and/or ≥ 100 mm Hg) or receiving antihypertensive therapy.

Among those 80 years or older, nearly 75% were hypertensive, and more than 60% had stage 2 hypertension or were receiving treatment. Remarkably, only 7% of the oldest group (≥ 80 years of age) had normal BP.

WHY?

- Inadequate intensity of treatment
- Suboptimal drug regimens
- Treatment resistance

Cost and Side Effects are a major issue among my patients.

What is best?

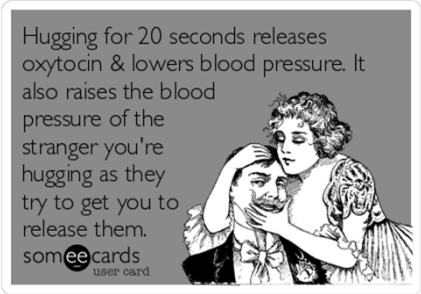
- For systolic HTN
- Calcium Channel Blockers
- Diuretics

Downside: (Swelling from #1 and urinating all the time in #2)

HTN in those over 90

- Treating hypertension in healthy patients older than 80 years of age is effective. Exact targets are uncertain, but the primary trial aimed for 150/80 mm Hg. Benefits are uncertain for the frail elderly or those with orthostasis or standing systolic BP below 140 mm Hg.
- In the Leisure World Study of those over 90, those with HTN had a lower risk of dementia.

Treatment



Medications

- Designed to either decrease the pressure of the flow through the blood vessels or open up the blood vessels to decrease flow pressure.

HERE WE GO……..

Diuretics

- Flush water and salt from the body
- Thiazides are the usual choice

Upside: They work

Downside: They can lower sodium and potassium

Angiotensin-Converting Enzyme Inhibitors

- Block Angiotensin which allows the blood vessels to dilate.
- Upside: They are effective and protect the kidneys of diabetics.
- Downside: They increase potassium and can decrease renal function. They can cause angioedema and more commonly a cough.

Angiotensin II Receptor Blockers

- They also block angiotensin.
- The upside and downside are similar to the ACE inhibitors, but they rarely cause a cough.
- They cost a lot more than the ACE inhibitors.

Beta Blockers

- They work by blocking nerve and hormonal signals to the heart and blood vessels causing the pressure to drop.
- The upside: They work and protect the heart
- The downside: They lower the pulse and can cause fatigue and sexual side effects. They also can cause bronchospasm so should never be used in asthmatics.

Calcium Channel Blockers

- These medications prevent calcium from going into the heart and blood vessel muscle cells. The cells relax and blood pressure drops.
- The upside: They work. They prevent migraines. Treat Raynaud's
- The downside: They can cause leg swelling and constipation.

Renin Inhibitors

- This new medication called Tekturna, slows down production of renin and stops the chain of chemical steps that leads to an increase in BP.
- Upside: It may work (I have not seen it work well)
- Downside: Adding it to ACE inhibitors or Angiotensin II receptor blockers can cause stroke. Diabetics should not use this medication.

Combinations

- Often combining small doses of multiple medications works better than a large doses of one.

Rare Causes of HTN

- 50 year old African American man with blood pressures in the 160/100 range.
- BP unresponsive to medications.
- Labs reveal a potassium that is under 2.5 and is very difficult to supplement and keep at a normal level.

Hyperaldosteronism

- Aldosterone is a hormone that acts on the kidney
- When made in excess, it increases the absorption of sodium and secretion of potassium.
- This can be idiopathic or due to an adrenal adenoma that is usually (not always) benign.

Medications

- Spironolactone (potassium sparing diuretic)
- ACE or ARB's can be used in many of these patients
- Bottom Line: If you diagnose this problem. Turn the treatment over to the nephrologists.

Pheochromocytoma

- Usually a benign adrenal tumor
- Very Rare
- High Blood Pressure
- Rapid Heart Beat
- Flushing
- Shortness of Breath
- Headache

Pheo….cont'd

- Anxiety
- Intermittent spells of 15 to 20 minutes
- They can be triggered by anxiety
- Foods high in tyramine (cheeses, pickled fish, beers, fermented foods such as kimchi and sauerkraut)
- Found with a 24 urine test for catecholamines and metanephrines and plasma metanephrine.

In A Nutshell

Remember

- Check to see if a patient is truly hypertensive
- If they are, find the cause if there is one
- Treat with lifestyle changes and as little medication as possible
- Make sure you find a treatment that they will tolerate and adhere to.
- This means, pay attention to costs and side effects.

Medications are like condoms
They don't work in the drawer!