HYPERTENSIVE VASCULAR DISEASE

Arteriolosclerosis

modified by Lynn Alhamaideh

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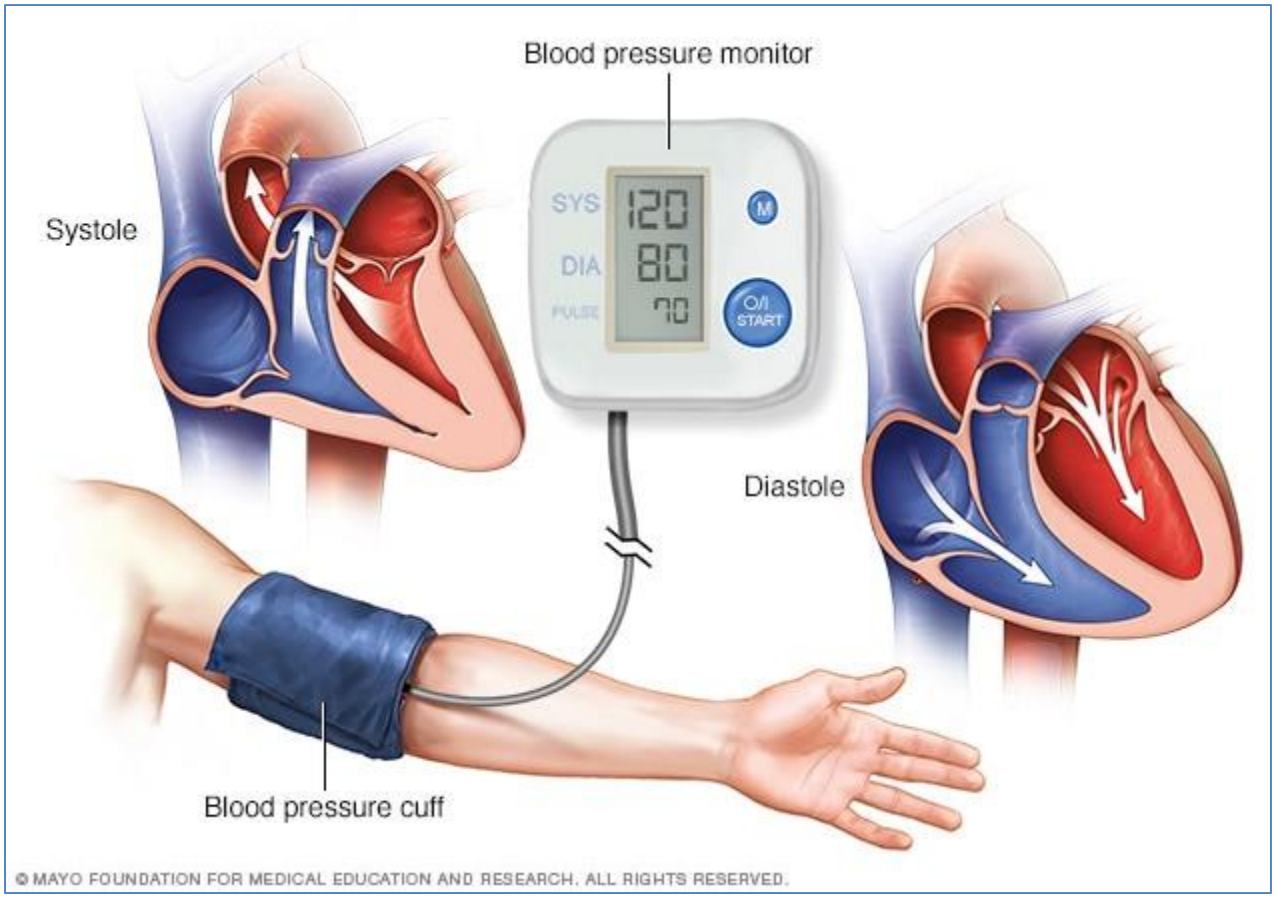
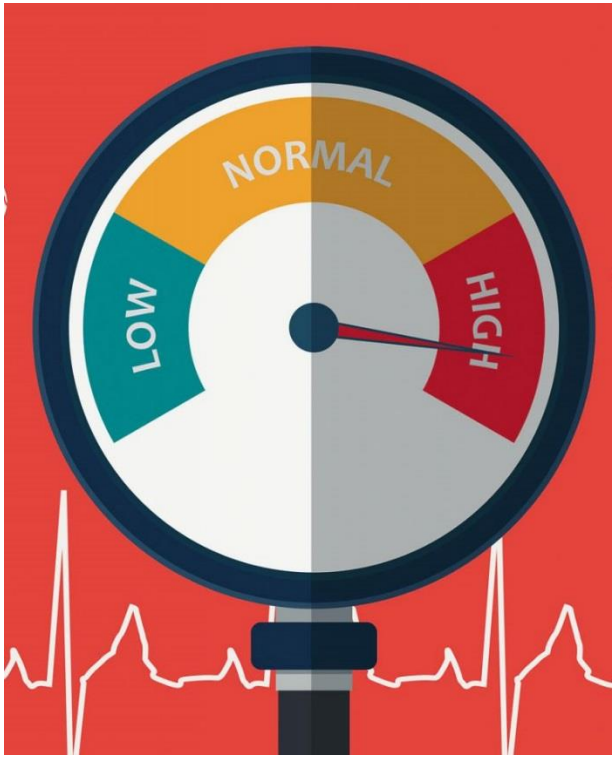


A sphygmomanometer or a Digital blood pressure monitor is used to measure BP. Both will show us diastolic and systolic measurements.

Blood pressure



- Currently, cutoffs in diagnosing hypertension in clinical practice: sustained diastolic pressures >80 mm Hg, and/or sustained systolic pressures >130 mm Hg

Types of hypertension

* Ways to classify hypertension.

① • According to severity:

Benign (95%) versus malignant (5%)

② • According to cause: (etiology)

Primary (essential) (95%) versus secondary (5%)

• According to side of circulation:

Systolic vs diastolic

(Called malignant due to its effects (it's not a result of malignancy))

- ***Malignant hypertension***

→ 5% (also known as accelerated HTN)

→ a rapidly rising blood pressure that, if untreated, leads to death within 1 to 2 years

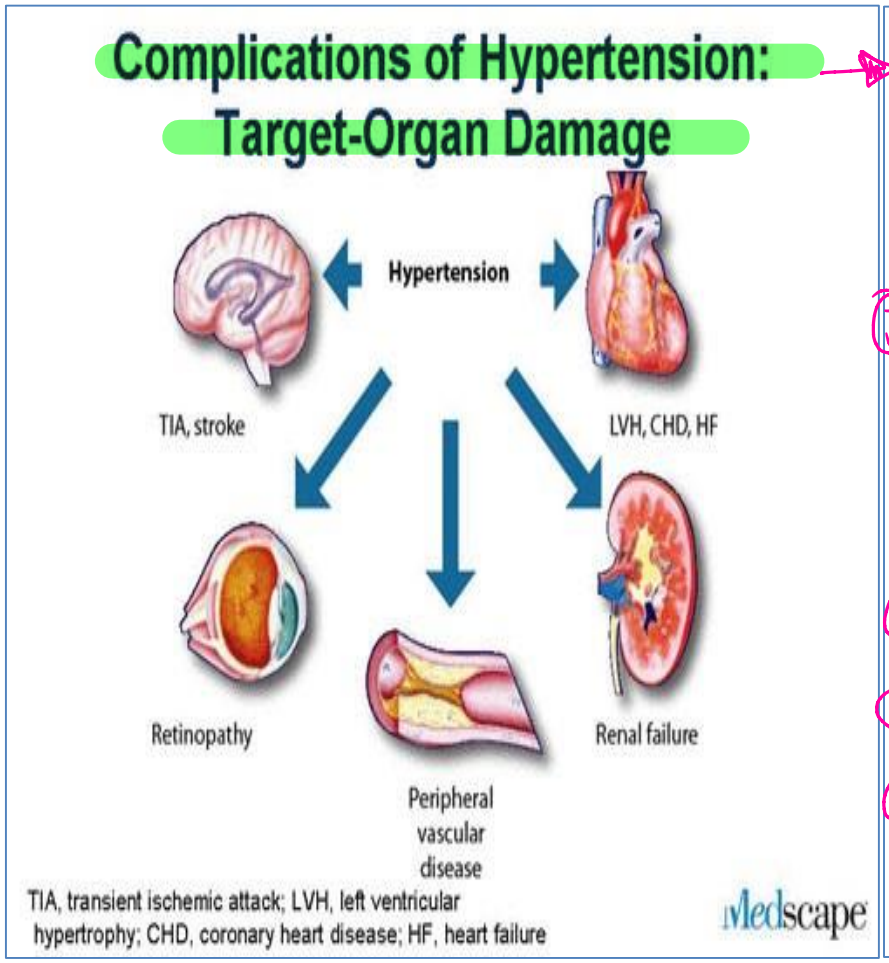
➔ **systolic pressures > 200 mm Hg or diastolic pressures > 120 mm Hg**

→ renal failure and retinal hemorrhages (end organ damage)

→ usually superimposed on preexisting benign hypertension (either essential or secondary)

[uncontrolled primary or secondary disease]

Hypertension (HTN) has the following potential complications:



- stroke (CVD) &multi-infarct dementia
- atherosclerotic coronary heart disease
- cardiac hypertrophy and heart failure (*hypertensive heart disease*)
- aortic dissection
- renal failure
- retinal hemorrhages

Types of hypertension- according to etiology

1- essential (idiopathic) hypertension (95%)

2- **secondary hypertension:**

Most common: renal disease or renal artery narrowing **(renovascular hypertension)**

Other less common: many other conditions….

Essential Hypertension
Accounts for 90% to 95% of all cases
Secondary Hypertension
Renal
Acute glomerulonephritis Chronic renal disease Polycystic disease Renal artery stenosis Renal vasculitis Renin-producing tumors
Endocrine
Adrenocortical hyperfunction (Cushing syndrome, primary aldosteronism, congenital adrenal hyperplasia, licorice ingestion) Exogenous hormones (glucocorticoids, estrogen [including pregnancy-induced and oral contraceptives], sympathomimetics and tyramine-containing foods, monoamine oxidase inhibitors) Pheochromocytoma Acromegaly Hypothyroidism (myxedema) Hyperthyroidism (thyrotoxicosis) Pregnancy-induced (pre-eclampsia)
Cardiovascular
Coarctation of aorta Polyarteritis nodosa Increased intravascular volume Increased cardiac output Rigidity of the aorta
Neurologic
Psychogenic Increased intracranial pressure Sleep apnea Acute stress, including surgery

Most common of all

Most common of secondary causes

- ***Pathogenesis of essential HTN***
- **? Genetic factors**

? familial clustering of hypertension

- angiotensinogen polymorphisms and angiotensin II receptor variants; polymorphisms of the renin-angiotensin system.

- ? Susceptibility genes for essential hypertension: genes that control renal sodium absorption, etc…

- **Environmental factors** modify the impact of genetic determinants

stress, obesity, smoking, physical inactivity, ↑ salt consumption

Blood vessels in HTN- Morphology

usually associated with arteries
specifically small arteries arterioles

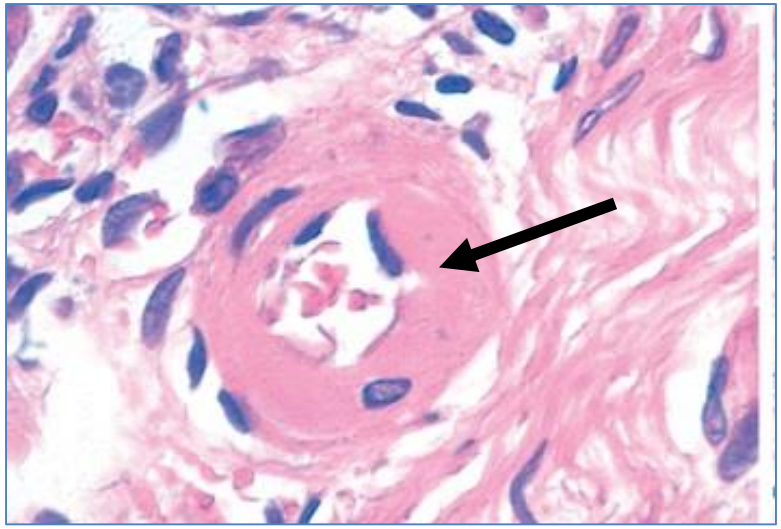
- **HTN is associated with arteriolosclerosis (small arterial disease)**

- **Two forms of small blood vessel disease are hypertension-related:**

1- hyaline arteriolosclerosis

2- hyperplastic arteriolosclerosis

1- Hyaline arteriolosclerosis



hypertension → trauma to endothelial → endothelial injury → leakage of plasma components to vessel walls → inflammatory response → Smooth muscle will increase ECM → thickening of the wall

- Ass. with <u>benign</u> hypertension
- homogeneous pink hyaline thickening of arteriolar walls that's why it is called hyaline
- luminal narrowing
- <u>leakage of plasma components across injured endothelial cells</u> into vessel walls that what causes narrowing
- <u>increased ECM production</u> by smooth muscle cells in response to chronic hemodynamic stress

- **Hyaline arteriolosclerosis: Complications**

↳ can affect any organ

- **Most significant in kidneys➔ nephrosclerosis (glomerular scarring)**

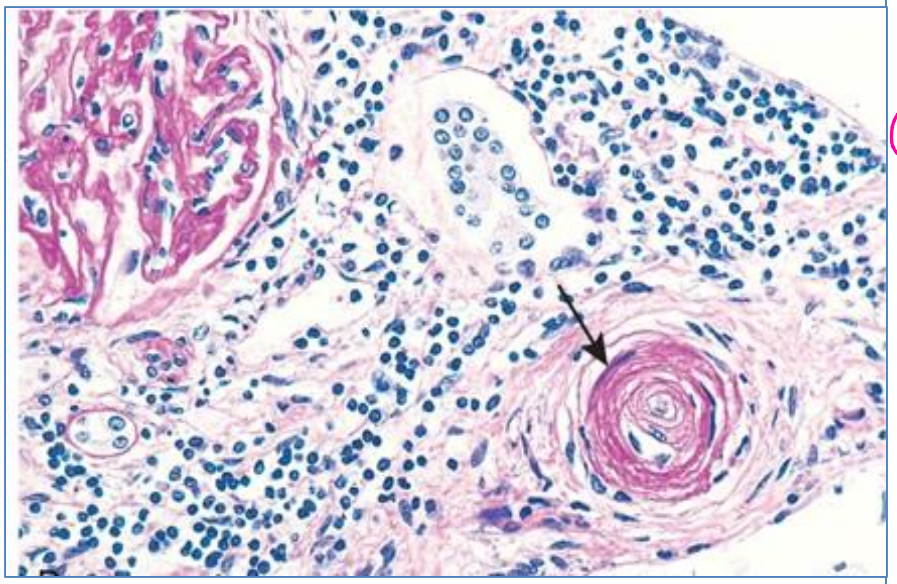
due to chronic damage ⇒ with time chronic renal failure

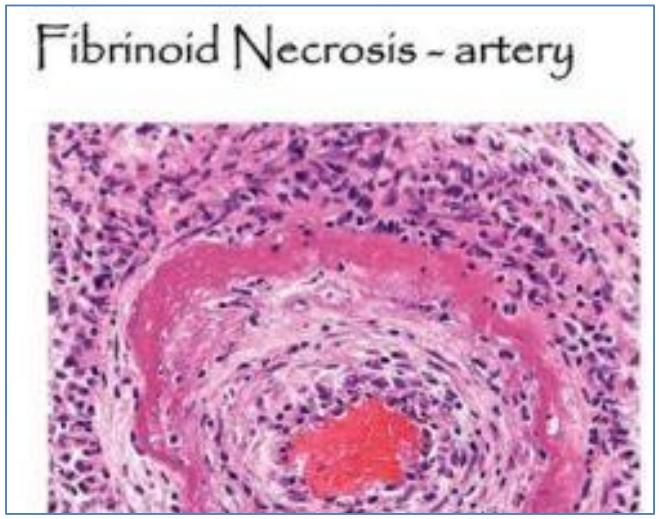
- **Other causes of hyaline arteriolosclerosis:** (without the presence of hypertension)

1- elderly patients (normo-tensive)

2- diabetis mellitus

2- Hyperplastic arteriolosclerosis





- With **severe (malignant)** hypertension
- ① "**onionskin**" concentric laminated thickening of arteriolar walls
  - → hallmark under microscope.
  - → result of ?
- ⇓ luminal narrowing
  - or complete occlusions following recurrent high blood pressure attacks.
- reduplicated basement membrane
- ② fibrinoid vessel wall necrosis (**necrotizing arteriolitis**)