Doctor.021

no. 5

HYPERTENSIVE VASCULAR DISEASE

CVS PATHOLOGY

Writer: Mai Al-zyadi

Corrector: Sana Al-sokhon

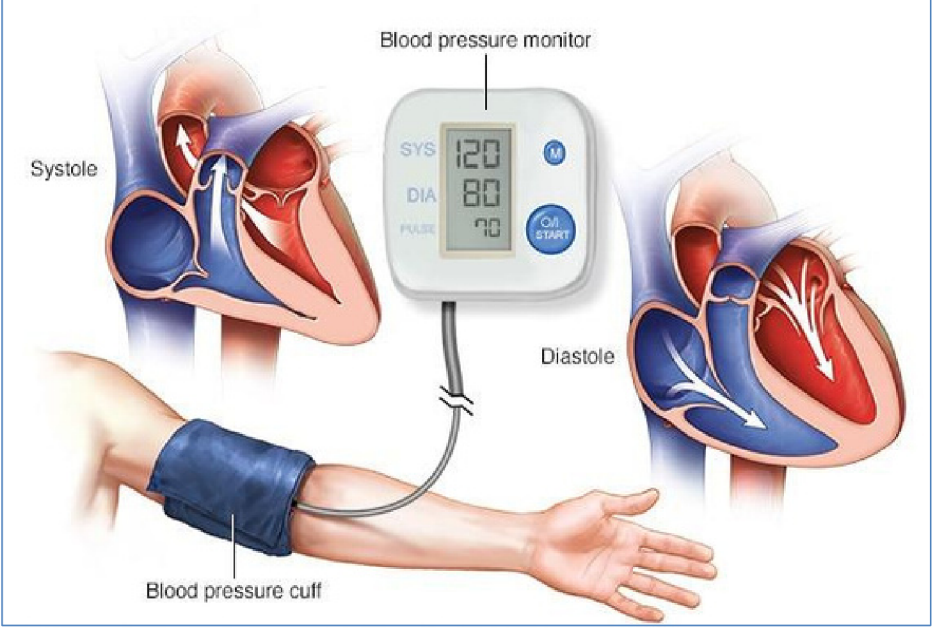
Doctor: Nisreen Abu Shahin

This is will be our fifith cardiovascular pathology lecture it will be about another disease affect arteries **Arteriolosclerosis** specifically :

HYPERTENSIVE VASCULAR DISEASE

Arteriolosclerosis

Dr. Nisreen Abu Shahin
Associate Professor of Pathology
Pathology Department
University of Jordan



Digital blood pressure monitor

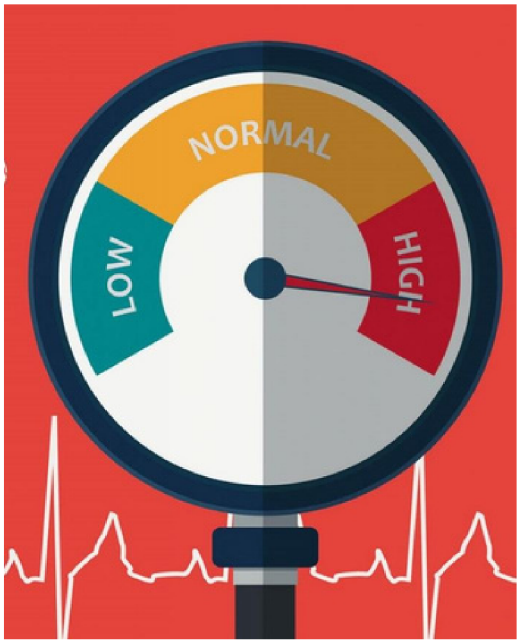
sphygmomanometer

Blood pressure measurement is done using either a sphygmomanometer or a Digital blood pressure monitor either way will show us two types of blood pressure measurement, these are the **systolic** *(the number on top) is the pressure produced when the heart contracts and pushes out blood and
the **diastolic** *(the number on the bottom) is the pressure when the heart relaxes and fills with blood between heartbeats blood pressure measurements.

* information in this color from google

A sphygmomanometer or a Digital blood pressure monitor is used to measure BP.

Blood pressure



- Currently a blood pressure is said to be high when ever a
  sustained **diastolic pressures >80** mm Hg, and/or
  sustained **systolic pressures >130** mm Hg ,
  This are the
  cutoffs in diagnosing hypertension in clinical practice.

Note from doctor:

Systolic pressure reflects the force produced by the heart when it pumps blood out of the body.

while

diastolic blood pressure is the pressure in the blood vessels when the heart is at rest.

Types of hypertension

There are many ways to classify hypertension :

- **According to severity of this condition:**

using this method lead to presence of two type of hypertention:

Benign (95%) versus malignant (5%)

- **According to(etiology)or the underlying cause**:

in this way we can divide hypertension into :

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

- **According to side of circulation**:

that its affecting by the high blood pressure reading

Systolic vs diastolic

•*Malignant hypertension* ***(also known as accelerated HTN)***

➡ About 5% of all hypertensive patients will experienced attacks of a rapidly rising blood pressure that can reach in

➡ **systolic pressures > 200 mm Hg or in diastolic pressures > 120 mm Hg**

➡ This rapidly rising blood pressure that,if untreated leads to death within 1 to 2 years.

This condition is not associated with a malignant process but its called malignant because of dismal prognosis*(poor outlook for a particular situation) it can lead to very important and very agressive complication and mortality in those people within 1 to 2 years if untreated.

In addition, this condition can lead to end organ damage consequently

➡ renal failure and retinal hemorrhages

plus other end organ damage .

* information in this color from google

➡ This condition is usually superimposed on pre-existing benign hypertention (either essential or secondary).

In many of the cases this might be related to uncontrolled primary diseases or secondary diseases .

E.LQ:Malignant hypertension is a case of hypertension that results from a malignancy.

A .True

b. False

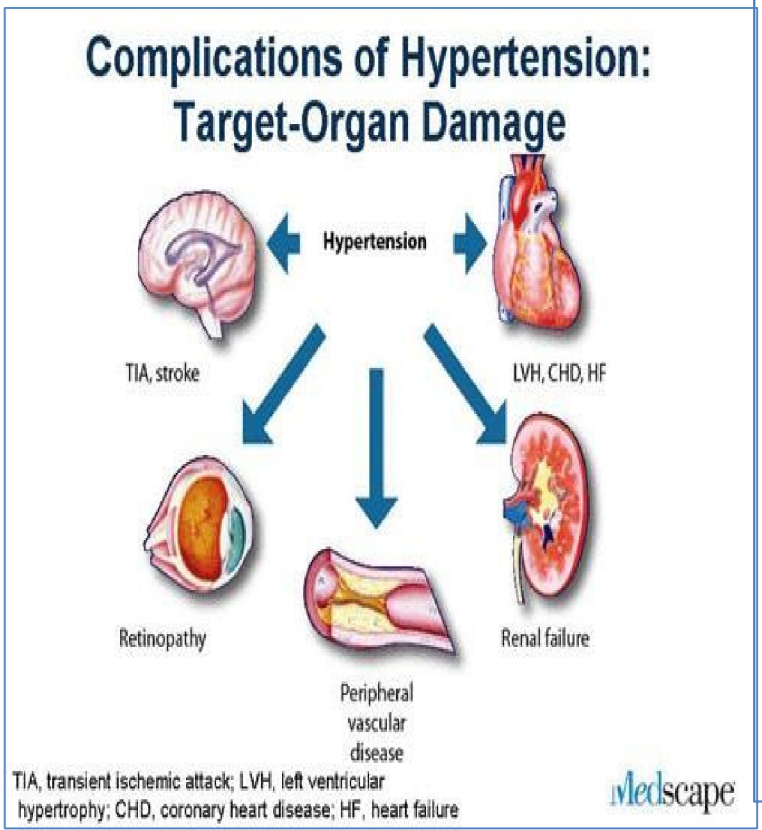
Ans:False

Hypertension (HTN) has the following potential complications:

So uncontrolled hypertension of any underlying etiology can lead to the following complications or what we call target tissue damage :

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

MID :results from a series of small strokes that cause brain damage. It's a type of vascular ***dementia***. There isn't a cure, so treatment involves preventing future strokes. Maintaining healthy blood pressure is key to preventing .



Types of hypertension-according to etiology

1- **essential (idiopathic) hypertension (95%)**

Most of the cases belong to the essential hypertension.

2-**secondary hypertension:**

- **Most common**: related to renal disease or renal artery narrowing **(renovascularhypertension).**

- **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

Secondary hypertension can be related to :

1. Renal conditions.
2. Endocrine conditions.
3. Cardiovascular disorders.
4. neurologic disorders.

E.LQ:Secondary hypertension is most frequently related to an underlying endocrine disorder.

A.true

b.False

Ans :False

- ***Pathogenesis of essential HTN***

- **? Genetic factors**

maybe some thing related to

? familial clustering of hypertension

like gene polymorphism

-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

We have mentioned before that the blood vessels affected in hypertension are mainly the arteries
In this lecture
specifically we will talk about HTN affecting the **arterioles** the smallest size arteries .

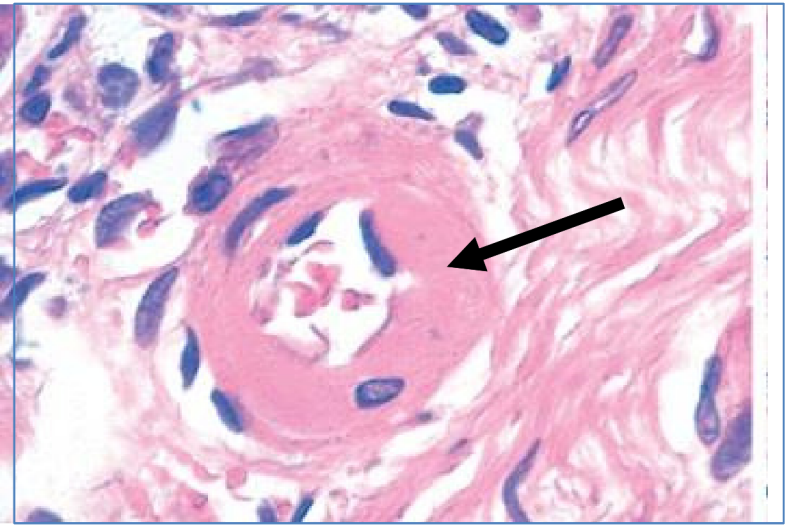
- **HTN is associated with arteriolosclerosis (small arterial disease)**

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

1-hyaline arteriolosclerosis

2-hyperplasticarteriolosclerosis

1-Hyaline arteriolosclerosis



The luminal narrowing and and the pinkish material within the walls of those arterioles comes from :

- Ass. with benign hypertension
- homogeneous pink hyaline thickening of arteriolar walls — It was called hyaline because of pinkish homogenous material that cause thickening of arteriolar walls.
- luminal narrowing — as result of thickening of the arteriolar wall this will have important determinace on the tissue that are supplied by those arterioles
- leakage of plasma components across injured endothelial cells into vessel walls
- increased ECM production by smooth muscle cells in response to chronic hemodynamic stress

So *hypertension* here will lead to microtrauma to endothelial cells lead to injury of endothelial cells lead to leakage of plasma proteins into the wall of these arterioles. this will also lead to inflammatory response in the wall and smooth muscle cells that lining the media will form ECM adding to thickinig of the wall this is also response to chronic hemodynamic stress that it cause as result of hypertension .

•Hyaline arteriolosclerosis: Complications

It can affect any organ but it is

-Most significant(profound) in kidneys ➡

In the kidney this chronic damage that affect the arterioles will eventually lead to

nephrosclerosis(glomerular scarring)

And this will lead to chronic renal failure with time

-Other causes of hyaline arteriolosclerosis:

There is certain other condtions might lead to arteriolosclerosis without presence of hypertention these are :

1-elderly patients even if they are(normo-tensive)

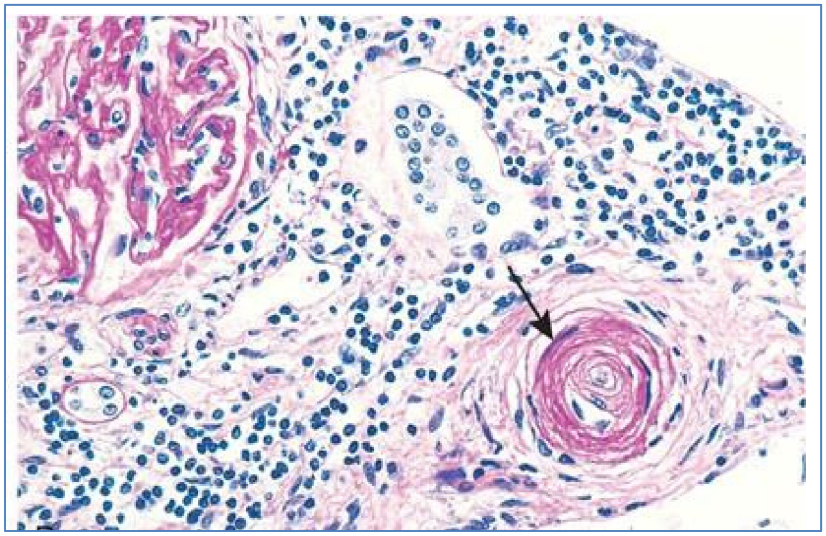
as part of the aging process so even if they are(normo-tensive)they might develop progressive hyline arteriolosclerosis .

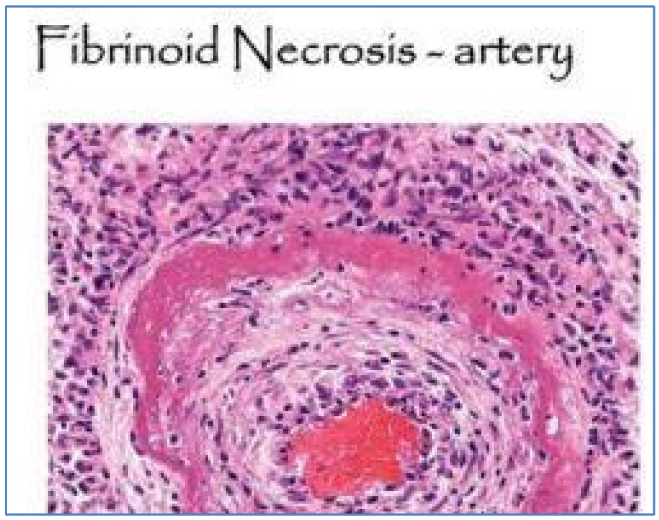
2-diabetismellitus

The other type of arteriolosclerosis

2- Hyperplastic arteriolosclerosis

Hallmark of this condition under the microscope is the **onionskin** appearance of the arterioles.





- With **severe (malignant)** hypertension
- "**onionskin**" concentric laminated thickening of arteriolar walls. (Hallmark)

  This appearance is result of
- luminal narrowing and even complete occlusion .

  This lead to
- reduplicated basement membrane
- fibrinoid vessel wall necrosis (**necrotizing arteriolitis**)

EL.Q:Hyperplastic arteriolosclerosis” is a small artery disease frequently associated with one of the following conditions:

a.aging process .

b. diabetes mellitus .

c.2°hypertension hypertension .

d.malignant hypertension .

Ans:d

اللهُمَّ سخّر لأهل فلسطين ملائكة السماء وجنود الأرض ومن عليها، وافتح لهم أبواب توفيقك واشرح صدرهم، ويسر أمرهم وقوي عزيمتهم، ومد صبرهم.