



## Hypertention pathophysiology and Hypertensive eye disease

### Hypertention pathophysiology

**Hypertension:** a sustained systolic pressure in excess of 140 mm Hg or a sustained diastolic pressure more than 90 mm Hg (>140/90)

- In the early stages of HTN there are few or no symptoms.
- Hypertension is an important factor which contributes in development of:
  - Coronary heart disease.
  - Cerebrovascular accidents (stroke)
  - Cardiac hypertrophy
  - Congestive heart failure.
  - Aortic dissection.
  - Renal failure.
  - Retinopathy



➤ Risk factors for Hypertension

- **Hereditary**, Genetics- family history
- **Race**. African-Americans
- **Gender**. Men & postmenopausal women
- **Age**
- **Obesity**
- **Diet**, particularly sodium intake
- **Lifestyle**-stressful
- **Heavy alcohol consumption**
- **Diabetes**
- **Use of oral contraceptives**
- **Sedentary or inactive lifestyle**

➤ Classification: based on etiology/cause

- **Primary/Essential Hypertension (95%)**: Mechanisms largely unknown. It is idiopathic .
- **Secondary Hypertension (5-10%)**: it can be due to pathology in the renal, endocrine, vascular or neurogenic systems

➤ Causes of Secondary Hypertension

<b>Renal</b>	<b>Glomerulonephritis,</b> <b>Renal artery stenosis,</b> <b>Renal vasculitis</b> <b>Adult polycystic disease</b> <b>Chronic renal disease,</b> <b>Renin producing tumors</b>
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<b>Endocrine</b>	<b>Adrenocortical hyperfunction (Cushing syndrome, primary aldosteronism, congenital adrenal hyperplasia)</b> <b>Hyperthyroidism/Thyrotoxicosis</b> <b>Hypothyroidism/Myxedema,</b> <b>Pheochromocytoma</b> <b>Acromegaly</b> <b>Exogenous hormones (glucocorticoids, estrogen e.g. oral contraceptives)</b> <b>Pregnancy-induced</b>
<b>Vascular</b>	<b>Coarctation of aorta</b> <b>Vasculitis e.g. Polyarteritis nodosa</b> <b>Increased intravascular volume</b> <b>Increased cardiac output</b> <b>Rigidity of the aorta</b>
<b>Neurogenic</b>	<b>Psychogenic</b> <b>Increased intracranial pressure</b> <b>Sleep apnea</b> <b>Acute stress, including surgery</b>

➤ **Classification based on clinical features.**

○ **Benign:**

- The BP is at modest level (not very high).
- It can be idiopathic HTN or secondary HTN
- Fairly stable over years to decades.
- Compatible with long life.

**○ Malignant (5%):**

- there is rapidly rising BP which often leads to end organ damage
- It can be a complication of any type of HTN (i.e. essential or secondary)
- It is seen in 5% of HTNsive patients.
- The diastolic pressure is usually over 120mmHg
- It is associated with:
  - Widespread arterial necrosis and thrombosis
  - Rapid development of renal failure
  - Retinal hemorrhage and exudate, with/without papilledema
  - Hypertensive encephalopathy
  - Left ventricular failure
  - Leads to death in 1 or 2 years if untreated.

**➤ Complications in HTN:**

The organs damaged in HTN are:

- **Cardiovascular**
  - Left ventricular cardiac hypertrophy (left sided hypertensive cardiomyopathy/ hypertensive heart disease)
  - Coronary heart disease
  - Aortic dissection
- **Kidney**
  - Benign nephrosclerosis (photo A)
  - Renal failure in untreated or in malignant hypertension
- **Eyes**
  - Hypertensive retinopathy (photo B) is especially seen in malignant hypertension.

- Brain

- Hemorrhage, infarction leading to Cerebrovascular accidents

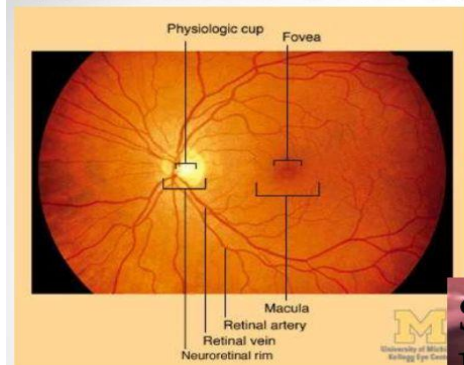


### Hypertensive eye disease

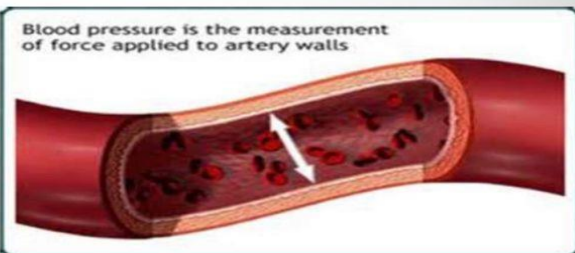
#### EFFECT ON EYE

- ❖ Hypertensive retinopathy
- ❖ Hypertensive choroidopathy
- ❖ Hypertensive optic neuropathy
- ❖ Subconjunctival haemorrhage in older individuals is prevalent, and blood pressure should be checked.
- ❖ Glaucoma

#### NORMAL FUNDUS



#### HYPERTENSIVE RETINOPATHY



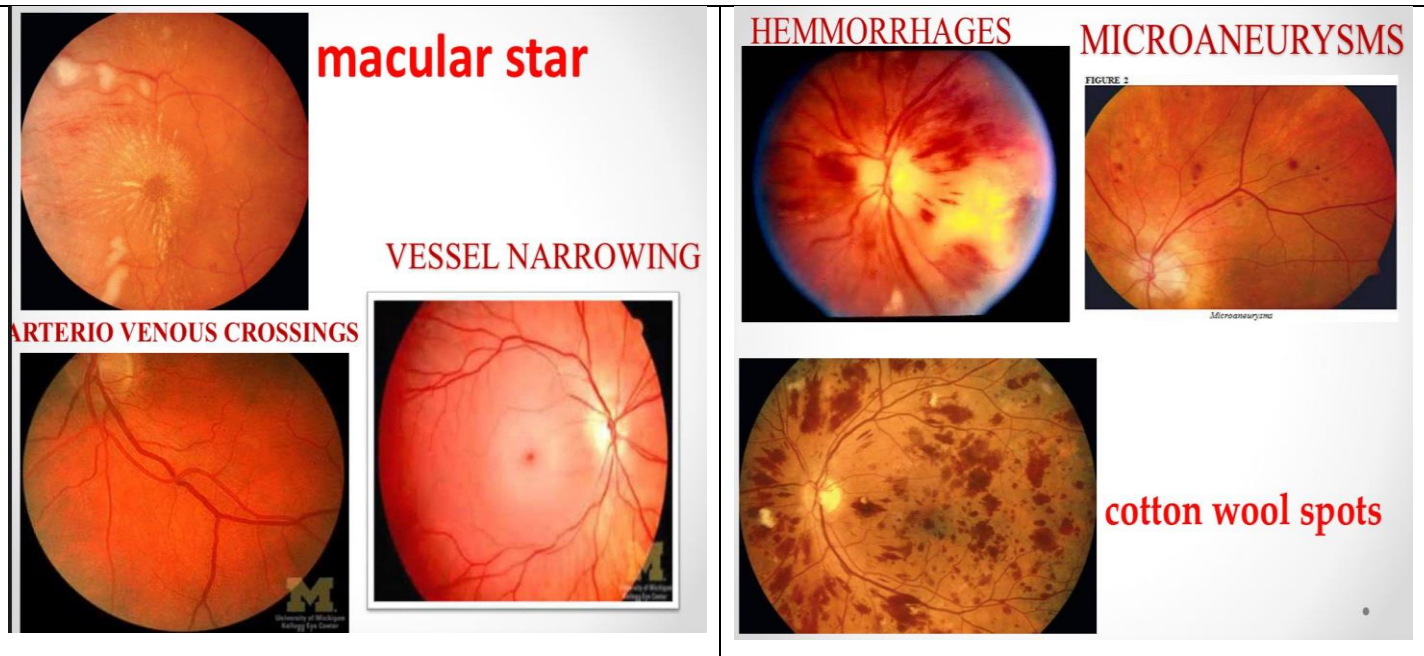
#### Subconjunctival hemorrhage



**FUNDUS CHANGES**

Prolonged systemic hypertension results in retinal vascular effects:

- ❖ Vessel narrowing
- ❖ Arterio venous crossings
- ❖ Microaneurysms
- ❖ Hemorrhages
- ❖ Cotton-wool spots
- ❖ Macular star
- ❖ Papilledema



➤ **HYPERTENSIVE CHOROIDOPATHY**

- It's a rare.
- Choroidal vascular bed shows impaired circulation & extensive occlusive & ischemic changes.
- HYPERTENSIVE OPTIC NEUROPATHY( HTON )
- Optic disc edema has been described as an essential manifestation of malignant HTN.
- Optic disc edema is the initial manifestation of HTON.