

CVS module – 8

HYPERTENSIVE HEART DISEASE



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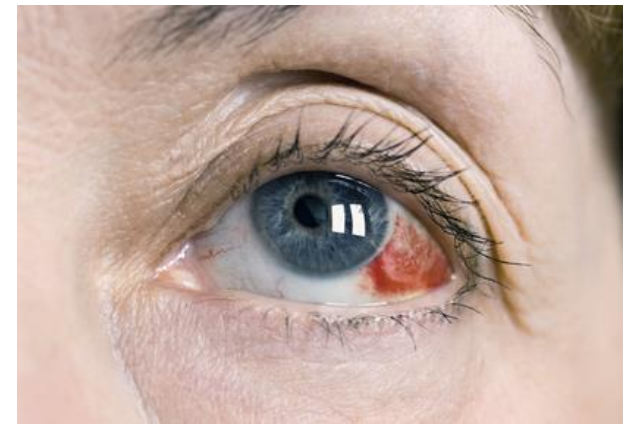
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HYPERTENSIVE HEART DISEASE

- ▶ Hypertensive heart disease is a term applied generally to heart diseases, that are caused by the direct or indirect effects of elevated BP. Hypertension increases the workload on the heart inducing structural and functional changes in the myocardium.
- ▶ Cutoffs in diagnosing hypertension in clinical practice:
 - diastolic pressures greater than 90 mm Hg, or sustained systolic pressures in excess of 140 mm Hg.
- ▶ 25% of persons in the general population are hypertensive, Without appropriate treatment, 50% of hypertensive patients die of ischemic heart disease (IHD) or congestive heart failure.

Malignant hypertension

- Malignant hypertension is a term that has been used to describe patients with elevated blood pressure (BP) and multiple complications (renal failure and retinal hemorrhages, with or without papilledema) with poor prognoses.
- ▶ It can arise de novo but most commonly is superimposed on preexisting benign hypertension.
- ▶ Defined as : systolic pressures over 200 mm Hg or diastolic pressures over 120 mmHg.



Types of hypertension.

Primary: Idiopathic, most common (95%).

Secondary:

Renal

- Acute glomerulonephritis
- Chronic renal disease
- Polycystic disease
- Renal artery stenosis
- Renal vasculitis
- Renin-producing tumors

Cardiovascular

- Coarctation of aorta
- Polyarteritis nodosa
- Increased intravascular volume
- Increased cardiac output
- Rigidity of the aorta

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)

Neurologic

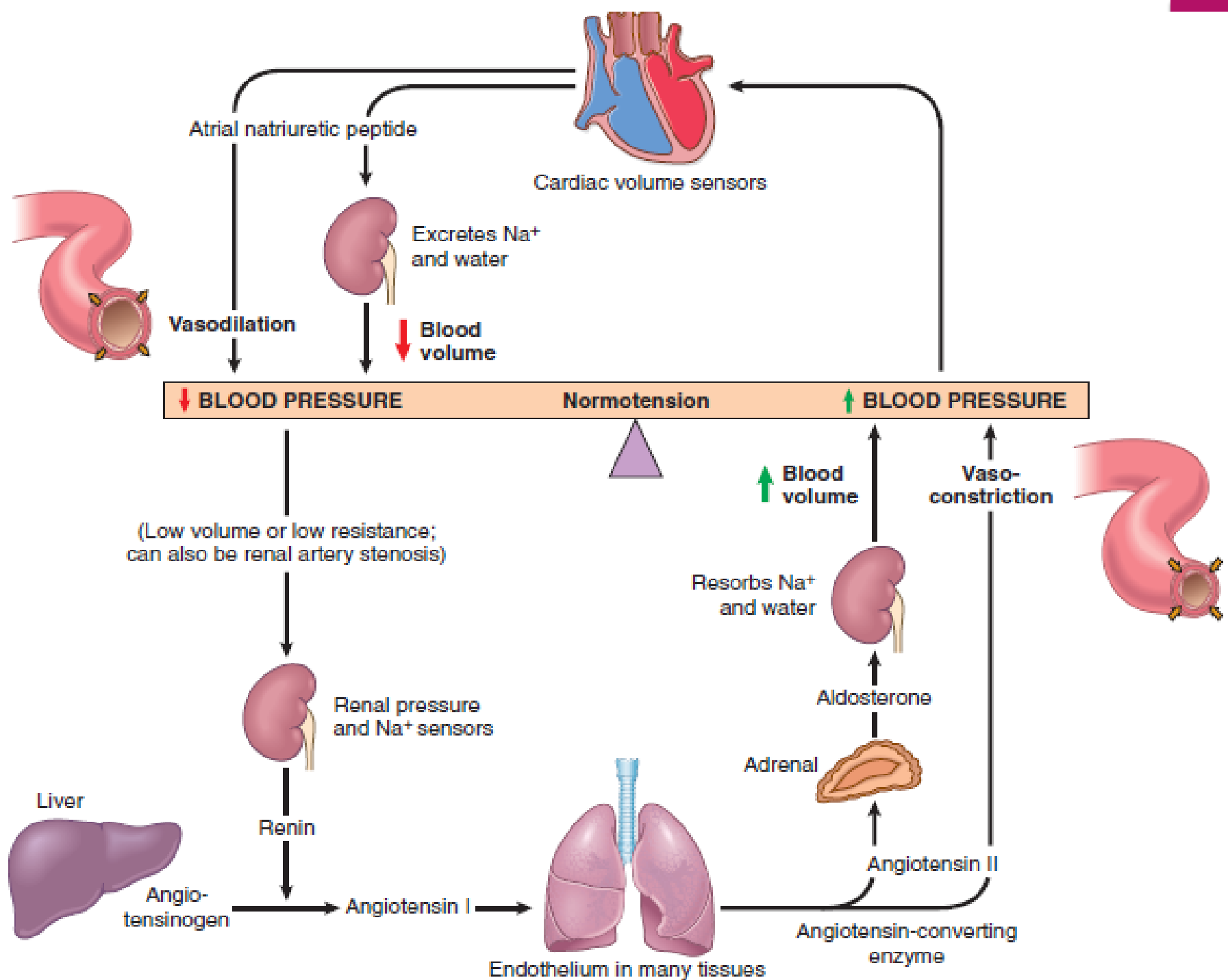
- Psychogenic
- Increased intracranial pressure
- Sleep apnea
- Acute stress, including surgery

Pathogenesis of primary HTN.

- Genetic factors: seen in familial clustering of hypertension.
- Environmental factors, such as stress, obesity, smoking, physical inactivity, and high levels of salt consumption.

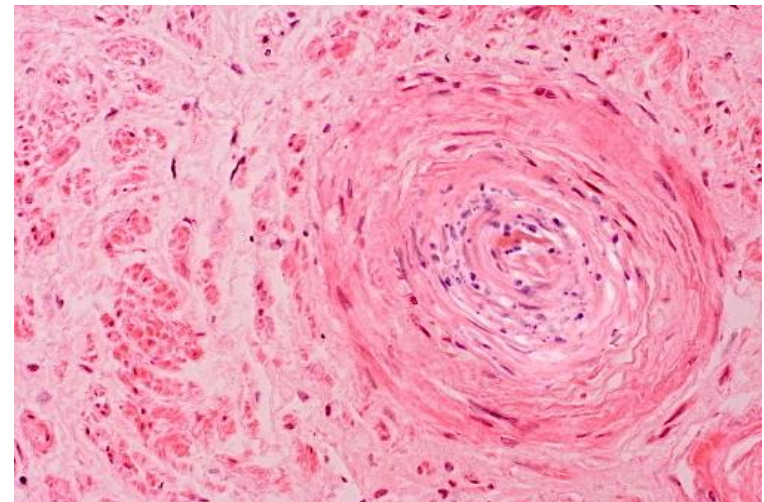
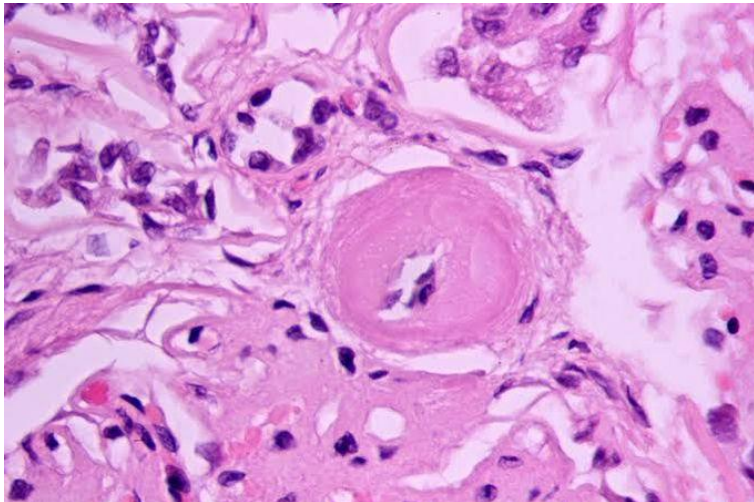
$$Pressure = \frac{Force}{Area}$$

- So essential HTN linked to : renal sodium handling and increased vascular resistance



Hypertension-related small blood vessel disease

- ▶ 1-Hyaline arteriolosclerosis: associated with benign hypertension.
- ▶ It is marked by homogeneous, pink hyaline thickening of the arteriolar walls, with loss of underlying structural detail, and luminal narrowing.
- ▶ 2. Hyperplastic arteriolosclerosis: Associated with severe hypertension.
- ▶ Vessels exhibit “onionskin,” concentric, laminated thickening of arteriolar walls and luminal narrowing.
- ▶ The laminations consist of smooth muscle cells and thickened, reduplicated basement membrane.



❖ Hypertension can lead to:

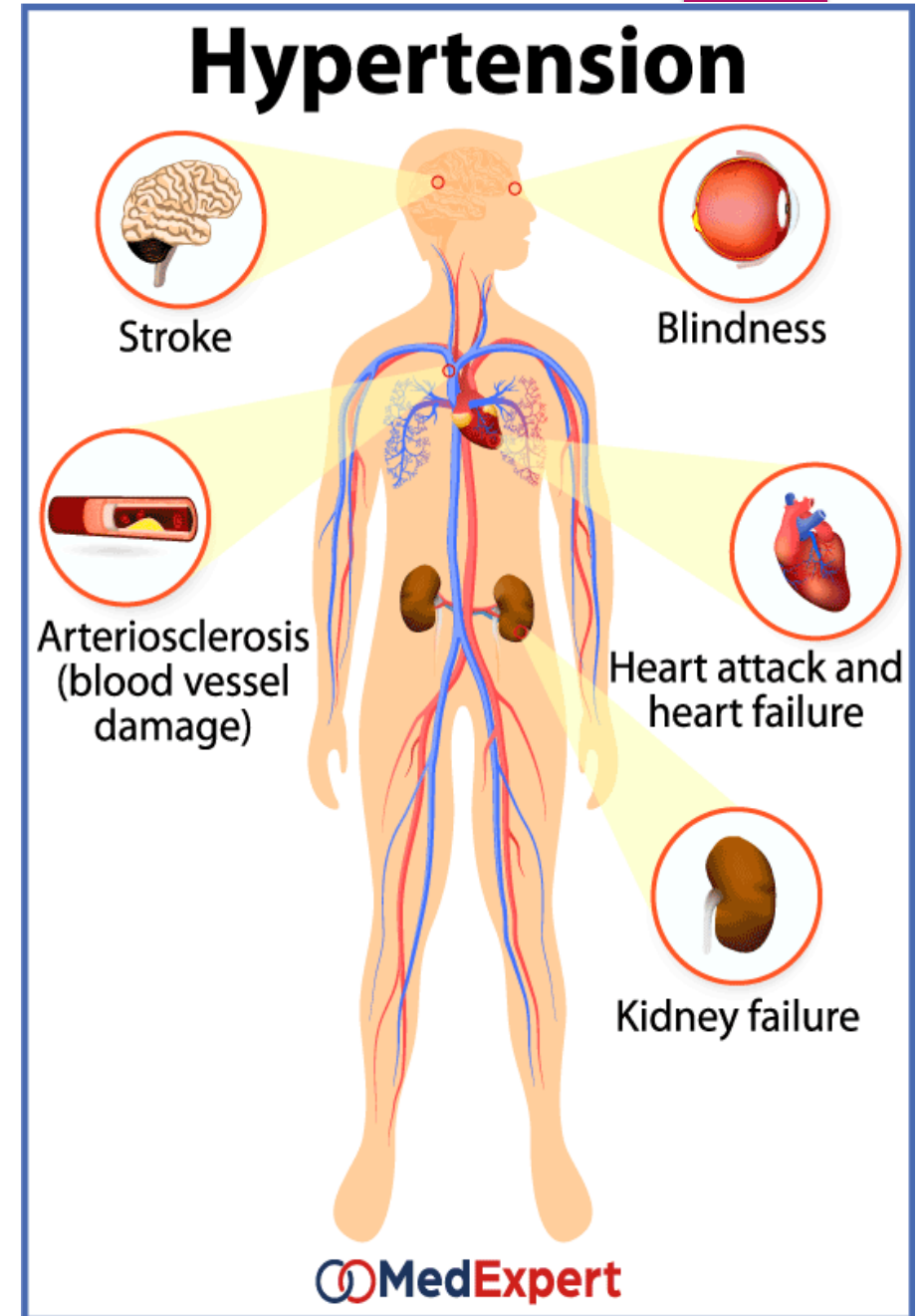
- stroke.
- atherosclerotic coronary heart disease.
- hypertensive heart disease.
- aortic dissection.
- multi-infarct dementia.
- renal failure.

❖ HYPERTENSIVE HEART DISEASE, include:

- cardiac hypertrophy and heart failure .

❖ So sub classified into:

1. Systemic (Left-Sided) Hypertensive Heart Disease.
2. Pulmonary Hypertensive Heart Disease—Cor Pulmonale.



Systemic (Left-Sided) Hypertensive Heart Disease

*The criteria for the diagnosis of systemic hypertensive heart disease are:

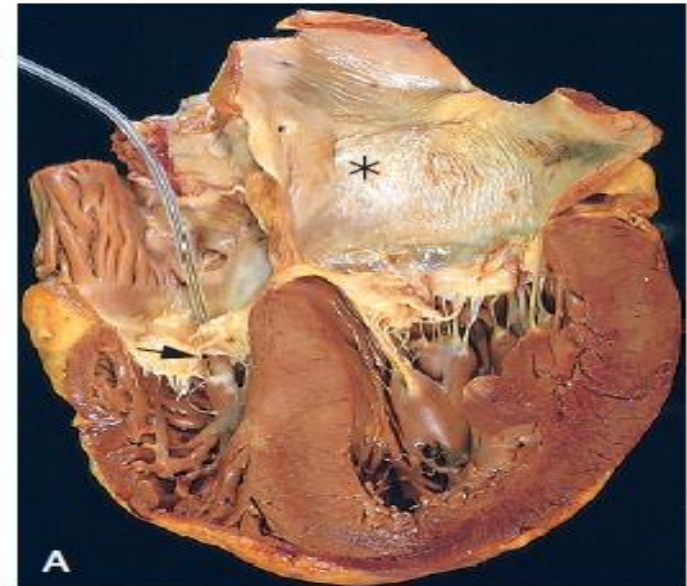
- (1) left ventricular hypertrophy in the absence of other cardiovascular pathology (e.g., valvular stenosis).
- (2) A history or pathologic evidence of hypertension.

*It was established that even mild hypertension (above 140/90 mm Hg), if sufficiently prolonged, induces left ventricular hypertrophy, than it may progress into heart failure due to:

- Structural abnormalities
- inadequate vascular supply to meet the demands of the increased muscle mass.

Cardiac morphology in systemic HTN

- ▶ left ventricular hypertrophy:
- ▶ heart weight can exceed 500 g, left ventricular wall thickness can exceed 2.0 cm.
- ▶ left atrial dilation : due to increased left ventricular wall thickness that impairs diastolic filling.



Microscopically

- ▶ The transverse diameter of myocytes is increased with prominent nuclear enlargement and hyperchromasia (“boxcar nuclei”).
- ▶ Intercellular Fibrosis.



Clinical features

- ✓ Depending on the severity and duration of the condition, the underlying cause of hypertension, and the adequacy of therapeutic control, patients Can :
 - asymptomatic , have elevated blood pressure on routine physical exams, or ECG findings of left ventricular hypertrophy.
 - Develop progressive IHD owing to the effects of hypertension in potentiating coronary atherosclerosis,
 - progressive renal damage or cerebrovascular stroke.
 - progressive heart failure.
 - sudden cardiac death.

Pulmonary Hypertensive Heart Disease (Cor Pulmonale).

- ✓ Cor pulmonale consists of right ventricular hypertrophy and dilation accompanied by right heart failure, caused by pulmonary hypertension attributable to primary disorders of the lung parenchyma or pulmonary vasculature.
- ✓ Cor pulmonale:
 - can be acute in onset, as with pulmonary embolism.
 - or can have a slow and insidious onset when due to prolonged pressure overloads in the setting of chronic lung and pulmonary vascular disease

Table 10–4 Disorders Predisposing to Cor Pulmonale

Diseases of the Pulmonary Parenchyma
Chronic obstructive pulmonary disease
Diffuse pulmonary interstitial fibrosis
Pneumoconiosis
Cystic fibrosis
Bronchiectasis
Diseases of the Pulmonary Vessels
Recurrent pulmonary thromboembolism
Primary pulmonary hypertension
Extensive pulmonary arteritis (e.g., Wegener granulomatosis)
Drug-, toxin-, or radiation-induced vascular obstruction
Extensive pulmonary tumor microembolism
Disorders Affecting Chest Movement
Kyphoscoliosis
Marked obesity (pickwickian syndrome)
Neuromuscular diseases
Disorders Inducing Pulmonary Arterial Constriction
Metabolic acidosis
Hypoxemia
Obstruction to major airways
Idiopathic alveolar hypoventilation

Morphology

- ▶ In acute cor pulmonale, the right ventricle usually shows only dilation; if an embolism causes sudden death, the heart may even be of normal size.
- ▶ Chronic cor pulmonale is characterized by right ventricular (and often right atrial) hypertrophy.
 - The right ventricle is markedly dilated and hypertrophied with a thickened free wall and hypertrophied trabeculae.

