

INTRODUCTION

Hypertension is a silent killer. Patients with hypertension have been shown to be associated with premature mortality. Early detection of hypertension and control is important to reduce or retard target organ damage.

TARGET ORGAN DAMAGE

The management of patients with hypertension should include the evaluation for the presence of target organ damage. The organs that are affected by the hypertensive process are eyes, heart, arteries, brain and kidney.

Eyes

The fundoscopic examination gives one an insight into the state of the arterioles. The most common classification is that of Keith–Wagener–Barker.

Table 1: Keith-Wagener-Barker classification of hypertensive retinopathy

Grade	Characteristic Finding
I	Silver wiring
II	Extensive or generalized arteriolar narrowing, resulting in AV crossing changes, Arterial nicking. AV nipping
III	Haemorrhages or exudates
IV	Papilloedema

The grade of the hypertensive retinopathy reflects the severity, duration and prognosis of patients. Three year survival, in untreated groups are as follows:

κ Group I	70%
κ Group II	62%
κ Group III	22%
κ Group IV	6%

Heart

Hypertension predisposes a patient to the following heart conditions:

- κ Left Ventricular Hypertrophy
- κ Coronary Artery Disease
- κ Arrhythmias
- κ Congestive Cardiac Failure.

Left Ventricular Hypertrophy (LVH)

The Framingham Study showed that LVH on electrocardiogram was associated with a threefold increase in cardiovascular events. Echocardiographic concentric LVH was associated with a fourfold increase in cardiovascular events, MI, stroke, cardiac failure and sudden death.

Coronary Artery Disease

Hypertension is a major coronary risk factor. In Singapore, more than half of the patients with acute myocardial infarction have hypertension. Detection and treatment of hypertension forms an important part of the management of patients with coronary artery disease. Medical angioplasty refers to stabilization of the plaque using medical strategies like lipid lowering, blood pressure and diabetic control, stress management and other risk factor modification and lifestyle changes. These changes would stabilize the plaque and prevent plaque rupture.

Coronary Risk Factors

These can be modifiable or non-modifiable:

- κ Non-modifiable factors: Age, Gender, Family History
- κ Modifiable factors: Mental Stress, Blood lipid level, Smoking, Weight, Hypertension, Diabetes Mellitus, Physical Inactivity.

Arrhythmias

Long-standing effects of hypertension on the heart can result in atrial fibrillation and ventricular ventricular arrhythmias.

Congestive Cardiac Failure (CCF)

Hypertension is an important aetiology of congestive cardiac failure. Medications in treatment of cardiac failure are:

- κ Diuretic
- κ Isosorbide Dinitrate
- κ Hydralazine
- κ Ace Inhibitor
- κ Spironolactone
- κ Beta-Blocker

(To be initiated and prescribed cautiously in tertiary cardiac care centres. Selected beta-blocker like carvedilol, bisoprolol and metoprolol CR /XL start with very low doses. CCF must be well controlled and in absence of fluid overload)

- Angiotensin Receptor Blocker.

Arteries

The increase blood pressure damages the arteries directly as well. Hypertension predisposes to the following arterial disorders:

- κ Aortic aneurysm
- κ Dissecting aneurysm
- κ Peripheral vascular disease.

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Brain

Hypertension is an important risk factor for stroke. The complications in the brain that are related to hypertension include:

- κ Hypertensive Encephalopathy
- κ Cerebral Anuerysm
- κ Cerebral Infarction
- κ Cerebral Haemorrhage.

Kidney

Hypertension is an important aetiology of end-stage renal disease. Effects of end organ damage closely related to hypertension include:

- κ Microalbuminuria
- κ Renal impairment
- κ Renal Failure.

Microalbuminuria

Microalbuminuria is a risk factor. It is detected by a level of above normal of 30 mgm per day. This is below the detectable range of the dipstick which is above 300 mgm.

- κ Microalbuminuria in Type II Diabetics has a total mortality of 8% and cardiovascular mortality of 4% annually. A type II diabetic with microalbuminuria has a mortality rate that is four times that of a diabetic without microalbuminuria
- κ Nondiabetics with microalbuminuria and hypertension have a cardiovascular mortality two to fourfold higher than those without microalbuminuria.

Renal repairment and renal failure

Renal impairment and renal failure are long-term complications of hypertension. Medications that are beneficial for retarding the progression of renal impairment and delaying end stage disease are:

- κ Angiotensin Converting Enzyme Inhibitor (ACE inhibitor)
- κ Angiotensin II receptor blocker (ARB).

HYPERTENSIVE CRISIS

The primary pathophysiologic abnormality is the alteration of both cerebral and renal autoregulation, resulting in ischaemia and arteritis of target organs.

Autoregulation

Normally there is an ability of blood vessels to dilate or constrict to maintain normal organ perfusion.

- κ In the normotensive, normal arteries are able to maintain flow over range of mean arterial pressure, 60-150 mmHg
- κ In hypertensive, this curve is shifted to the right to allow normal perfusion without excessive blood flow at higher blood pressure levels. When blood pressure increases above the autoregulatory range, tissue damage occurs. However, sudden lowering of blood pressure below the regulatory range would lead to hypoperfusion.

Clinical Settings

Clinical settings when autoregulation failure may occur include:

- κ Chronic Hypertension Stage III with a blood pressure above 180/110 mmHg
- κ Rapid rise in blood pressure occurring in normotensive or minimally hypertensive individuals
- κ Eclampsia.

Symptoms

The symptoms that may occur during a hypertensive crisis include:

- κ Headache
- κ Scotoma
- κ Diplopia
- κ Dimness in vision
- κ Photopsia

Physical examination

In the assessment of the patient special attention must be paid in the following areas:

- κ Optic Fundi
- κ Mental State
- κ Cardiac
- κ Pulmonary
- κ Neurologic
- κ Cause of secondary hypertension – suggested by radial femoral delay, abdominal bruit, striae

Investigations

Relevant investigations are urine dipstick, microscopic urine analysis and serum creatinine.

Management of Hypertensive crisis

The aim of treatment is the rapid reduction of blood pressure by 10% during first hour. This is followed by a reduction of another 10%-15% in the next 1 to 3 hours. Intravenous medications used to achieve the above reduction are: intravenous nitroprusside or intravenous nitroglycerin. Oral medications such as the Ca-channel blockers can be used to achieved blood pressure reduction over 6-12 hours after that. In eclampsia, the presence of a fragile fetus complicates the management. Treatment needs to be more careful and conservative.

ASSOCIATED CLINICAL CONDITIONS

Secondary causes of hypertension can also result in target organ damage.

Pheochromocytoma

The diagnostic features of pheochromocytoma are: episodic hypertension in 50%; headache, palpitation and perspiration; weight loss; nervousness; orthostatic hypotension; glucose intolerance; hypotensive crisis resulting in shock; and cardiomyopathy. Medications useful for the hypertensive crises are alpha blockade, beta-blocker and propranolol.

Clonidine withdrawal

Sudden withdrawal of clonidine can result in sudden rise in high blood pressure. The treatment is to reinstitute clonidine.

Eclampsia

Unrecognised hypertension in pregnancy can progress to eclampsia. Regular blood pressure monitoring during antenatal follow is important. Elevated blood pressure should be controlled with bed rest and medications. Eclampsia is an emergency in pregnancy requiring aggressive lowering of blood pressure and delivery of the foetus. Medications useful for the management of eclampsia are magnesium sulphate, hydralazine and methyldopa.

Take Home Messages

- o Untreated hypertension results in long-term target organ damage of the arteries, eyes, heart, arteries, brain and kidneys.
- o In addition, hypertensive crises can occur, causing accelerated damage to end organs.
- o Associated conditions that result in hypertension also need to be considered in the prevention of complications of hypertension.

REFERENCES

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