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Hypotension: A comprehensive review

Rasika Dnyandeo Bhalke, Mahendra Ashok Giri, Rasal Yash Anil, Narhe Mansi Balasaheb, Parjane Abhishek Nanasaheb and Vishal Vijay Pande**Abstract**

Hypotension is a decrease in systemic blood pressure below accepted low values. While there is not an accepted standard hypotensive value, pressures less than 90/60 are recognized as hypotensive. Hypotension is a relatively benign condition that is under-recognized mainly because it is typically asymptomatic. It only becomes a concern once pumping pressure is not sufficient to perfuse key organs with oxygenated blood. This leads to symptoms impacting the quality of life of a patient. Hypotension is classified based on the biometric parameters of the blood pressure measurement. It may be absolute with changes in systolic blood pressure to less than 90 mm Hg or mean arterial pressure of less than 65 mm Hg. It may be relative to a decrease in diastolic blood pressure to less than 40 mm Hg. It may be orthostatic with a decrease in systolic pressure or 20 mm Hg or greater or a decrease in diastolic pressure of 10 mm Hg or greater on positional change from lying to standing. It may be profound which is defined as being medication-dependent. In acute conditions, the hypotensive shock is a possible and life-threatening condition.

Keywords: Hypotension, orthostatic hypotension, neurally mediated hypotension, Chronic Asymptomatic hypotension

Introduction

Low blood pressure is known as Hypotension. It is the blood pressure low enough that flow of blood to the organ of the body is inadequate. Normal blood pressure is 120/80mm of Hg whereas hypotension blood pressure is 90/60mm of Hg.

Types of hypotension

1. Chronic Asymptomatic hypotension.
2. Orthostatic hypotension.
3. Neurally Mediated hypotension.

Chronic Asymptomatic Hypotension

It has no signs or symptoms & needs no treatment.

Orthostatic Hypotension (OH)

It occurs when standing up from a sitting down position. It can give a dizzy feel. Orthostatic hypotension occurs if your body isn't able to adjust blood pressure and blood flow fast enough for the change in position. This type of low blood pressure usually lasts for only a few seconds or minutes after immediate standing. After sitting or lying down for a short time brings blood pressure to normal. It may occur in all age groups.

Orthostatic Hypotension causes

Two types of causes

I. Non neurogenic causes

It is caused by cardiac impairment, hypovolemia, venous pooling. It is of the following two types.

a. Acute non neurogenic

In this type hypotension is frequently caused by decrease in intravascular blood flow. It is accompanied by myocardial infarction.

b. Chronic non neurogenic causes

It is associated with disorders causing cardiac impairment, anemia, diabetic insipidus.

II. Neurogenic causes

It is associated with central and peripheral autonomic disorder. There are two types:

a. Acute neurogenic

It is a breakdown of autonomic regulatory mechanisms. In this type parasympathetic and sympathetic nervous systems are affected.

b. Chronic neurogenic

It is associated with neurodegenerative disease which is interrupted with sympathetic reflex arc. The adrenergic response is abnormal.

These are again subdivided into two types

Primary chronic neurogenic

Failure of autonomic mechanism caused by peripheral or sympathetic dysfunction which is associated with low level of norepinephrine.

Secondary chronic neurogenic

It is usually associated with disease and syndrome which are inherited and acquired.

Prevalence: The prevalence of orthostatic hypotension is between 5% and 30% for healthy communities, increases with age, and may be present in up to 50% of long-term-care residents.

Signs & Symptoms

Hypotension has symptoms like weakness, fatigue, nausea, palpitations, headache, syncope, dyspnea, chest pain, lightheadedness, dizziness and changes in vision. Neck and shoulder pain are also possible but occur less frequently [1-2, 9-10].

Pathophysiology of orthostatic Hypotension

Changing position from lying to standing there is change in blood pressure i.e. systolic pressure remains unchanged or drops slightly and diastolic pressure rises slightly. The drop in blood pressure is related to the dependent pool of blood in veins of liver, organs, intestines, legs and feet. Venous return and stroke volume decrease because of pooled blood. Therefore, cardiac output becomes compromised and arterial blood pressure drops. By sudden standing, the blood rushes to feet by gravity thus further decreasing venous return. Once venous return and stroke volume is compromised, the body activated baroreceptor located in the aorta and carotid arteries Baroreceptor works constantly to maintain normal range of blood pressure. Baroreceptors stimulated by pressure excreted upon them by blood in vessels. When upper body vessel pressure falls, baroreceptor stimulation stops and this information is transmitted to the brain. The medulla reacts by initiating vasoconstriction, increasing heart rate and cardiac output to raise blood pressure. When the sympathetic nervous system increases heart rate increases, contractility, and increases vasomotor tone of the capacitance vessels. Simultaneous parasympathetic inhibition also increases heart rate. Therefore, there is activation of renin-angiotensin-aldosterone-system (RAAS) and vasopressin (ADH) secretion cause sodium and water retention and increase circulating blood volume.

Factors affect blood pressure in patients with OH

Age: The pumping action of heart loses efficiency and blood

vessels stiffen and weaken, causing decreased cardiac output. Additional baroreceptor becomes less sensitive to pressure changes thus the signal transmitted to medulla is not effective.

Hypertension: It decreases baroreceptor compensatory mechanism. This increases the risk of OH. The afferent pathway transfers information from arterial baroreceptors in the carotid artery and the aortic arch. This information reaches the vasomotor centre in the medulla oblongata. The afferent pathway regulates two basic cardiovascular responses: heart rate and vascular tone. The hypothalamus can then activate vasopressin release, which is an additional regulatory mechanism. Higher brain functions can modulate autonomic cardiovascular responses [3].

Numbers of medications can also cause OH particularly drugs used to treat high blood pressure:

1. Diuretic
2. Beta blocker
3. Calcium channel blocker
4. Angiotensin converting enzyme inhibitors
5. Antidepressants
6. Drug used to treat Parkinson's disease
7. Erectile dysfunction

Treatment on orthostatic hypotension [4]

a. Nonpharmacological treatment

The first line of defense is those avoiding carbohydrate rich meals & adding sodium-rich foods or sodium tablets to the diet & limiting alcohol intake.

b. Pharmacologic treatment

1. **Mineralocorticoids & Fludrocortisone:** It is necessary for regulation of salt and water in the body & it increases sodium reabsorption by an action on the distal tubules of the kidney and thus raising blood pressure.
2. **Midodrine:** It works on narrowing the blood vessels and increasing blood pressure. Thus it is used to treat low blood pressure.
3. **α -1-adrenoceptor agonists (systemic vasoconstrictors):** Methoxamine and phenylephrine are used as pressor agents in treating hypotension and shock.
4. **Fluid & salt:** (Volume expansion)

Neurally Mediated Hypotension

In this hypotension after standing for a long time, blood pressure drops. Person may feel dizzy, faint, or sick. It is also called as fainting reflex/neurocardiogenic syncope/vasodepressor syncope/autonomic dysfunction/vaso-fatal reflex.

Neurally mediated hypotension is a complication that occurs due to unnatural reflex action between the brain and heart, though they are structurally normal. It is a disorder of the autonomic regulation of postural tone, which results in hypotension, bradycardia and loss of consciousness. Symptoms included are nausea, lightheadedness, abdominal discomfort, difficulty in concentration, temporary impairment of blood circulation in the brain and anemia.

Cause of Neurally mediated hypotension

Low blood pressure from faulty brain signals (neurally mediated hypotension). This disorder, which causes a blood pressure drop after standing for long periods, mostly affects young adults and children. It seems to occur because of a miscommunication between the heart and the brain.

Pathophysiology

In normal person's body

Human body has remarkable ability to maintain stable blood pressure in fact of changing forces that constantly shift & redistribution the circulated blood volume. To achieve this stable blood pressure reflex mechanism continuously works & adjusts the vascular tone and cardiac output. Small change in posture there is shifting of blood from thorax to abdomen and further to lower extremities; this shifting decreases the cardiac output. The decrease of cardiac output sensed by arterial baroreceptors located in the carotid sinus and aortic arch. The receptor transmits the signal to the nervous system and results in reflex-increased sympathetic output. In addition, the vascular system responds locally restricting blood flow to non-vital organs such as skin, adipose tissue, muscle etc. Clinically this response manifests as an increase in heart rate, which is mediated, increase in sympathetic output, and diastolic pressure increase, which is mediated by local vasoconstriction.

In NMS person's, NMS is caused by hypersensitivity of ANS, which over respond to different stimuli Eg: NMS is trigger by orthostatic stress ^[5-10].

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