

A chronic use of lecorice (like in some expectorants or sweets) can cause hypertension that is combined with hypokaliemia, alkalosis, and suppressed renin. This is caused by a natrium retention effect of the ammonia salts of the glycyrrhnic acid, contained in the lecorice extracts. In other words they act similarly to mineralocorticoids.

6. From the toxic effects hypertension can be caused by acute porphyria, lead, thallium, carbon monoxide, mercury poisoning, and experimentally cadmium poisoning. The pathogenic mechanism is probably a centrally conditioned stimulation of adrenergic activity.

7. Postradiation hypertension. Occur in those patients treated by radiotherapy. Those are patients with abdominal tumors probably due to the occurrence of so known radiation nephritis. This hypertension might inquire a malignant character.

---

## 3.16 Systemic arterial hypotension

---

A permanently low systolic blood pressure below 13,3 kPa (100 mm Hg) and a diastolic blood pressure below 8,0 kPa (60 mm Hg) in different positions (lying, sitting, standing) is marked as chronic arterial hypotension. It is not considered as a disease condition, the hypotensive patients usually reach older ages than the normotonic. The cause of the continuously low blood pressure is not exactly understood. From the theoretical point of view the hypotonics are on the opposite side than the hypertonics in the curve that determines the role of hereditary factors on a level of blood pressure. It might be a sign of a generalized asthenia in vagotonics. Its course is usually asymptomatic with the exception of the frequent sleeping or an increased tiredness. Cases of a transient hypotension (syncope and shock) are described elsewhere.

Arterial hypotension might occur in many diseases. It is the accompanying sign of inadequate

adrenal function (Addison's syndrome), malabsorption syndrome, heart failure, aortic stenosis and constrictive pericarditis.

### 3.16.1 Orthostatic (postural) hypotension

The blood vessels are relatively elastic and permeable pipes. Upon taking the upright position, and due to the effect of gravity there is a tendency for the blood to cumulate in the distensible veins below the heart level and also to the escape of plasma into the interstitium. This transient blood distribution would be the cause of a sudden drop of the venous return, leading to a decrease of the arterial blood pressure with the consequent lower cerebral perfusion. In normal conditions when taking the upright posture there are reflex compensatory mechanisms keeping the arterial blood pressure within a certain limit of range. In the human organism the most important are the baroreceptor areas mainly those situated in the vessels above the heart level. Upon standing up the blood pressure above the heart level drops. This change is registered by the baroreceptors where the final effect is the reflexly increased sympathetic tonus of the vasomotor fibers that will provide vasoconstriction in the resistant vessels (a compensation of the lower systolic output) and even in the capacitance blood vessels (lower blood accumulation and hence a larger venous return). Despite the narrowing of the resistant vessels, the hydrostatic pressure in the lower limb capillaries in orthostasis would be over 13 kPa (100 mm Hg), what considerably exceeds the colloidal osmotic pressure of blood protein. There would be a prompt plasma diffusion into the interstitium. The protective mechanism here is represented by the contraction of the precapillary sphincters. An abnormal vessel dilatation will, at the same time, be prevented by the muscular contractions that push the venous blood towards the heart.

The muscle contraction and muscle massage of the vessels in the lower limbs can be out of function in case of the passive tilting. During this examination the patient's position is changing on a mobile bed, to which the patient is tightened. According to the level of blood pressure during the passive changing of the patient's position, we might evaluate the activity of the sympathetic vasomotor reflexes with-

out any side effects. Changes of the blood pressure during the passive tilting in healthy people do not exceed 1,3 kPa (10 mm Hg). Orthostatic hypotension (orthos – upright, statio – standing, being orthostaticus means occurring while upright standing) is a condition, that is characterized by a drop in the systolic and even the diastolic pressure by 2,6 kPa (20 mm Hg) when taking the upright standing position. In complicated situations the sitting alone may cause an evident drop of the blood pressure.

Since hypotension might occur in positions other than the upright position, we might use a wider term – postural hypotension. Apart from the usual picture we might include here some rare situations such as hypotension in the late trimester of gravidity, where the heavy gravid uterus will press in the veins upon laying on the back and causes hypotension that might lead to syncope.

Another rare condition might arise from the presence of atrial myxoma or a pendulous intraatrial thrombus during which hypotension might result upon sitting due to the low ventricular filling in this position.

### 3.16.1.1 Idiopathic orthostatic hypotension

Idiopathic orthostatic hypotension affects men more often than women. It is characterized by clear signs and symptoms caused by a disturbed or inadequate activity of the autonomic nervous system – postural hypotension, low sweating and fixed (unchanged) heart rate. Bradbury and Eggleston were the first who described this syndrome as a triad of a gradually progressing postural hypotension, anhidrosis that affects the whole body surface and impotence. The exact cause of this condition is yet unknown, some hypothesis suggest a disturbance of biosynthesis of catecholamines in the sympathetic ganglia and neurons. The level of catecholamines in plasma and urine is often lower than normal. During the passive tilting there won't be normal reaction (a higher elimination of catecholamines by the urine). In some patients there is a lower reactivity effect of renin – angiotensin – aldosterone system. Hypovolemia is found quite frequently. In cases of lower sympathetic activity, the pumping function of the heart depends mostly on the venous return. As long as the venoconstriction is inadequate and a compensatory tachycardia doesn't occur, the cardiac output during the orthostasis will drop by one fourth. In this posi-

tion a patient is unable to keep the normal values of the systolic and diastolic blood pressure. The lowering of blood pressure might be so serious that an inadequate cerebral blood flow leads to syncope and even loss of consciousness. Putting the patient to a horizontal position will improve his condition very quickly.

### 3.16.1.2 Secondary orthostatic hypotension

An inadequate response to gravitation might be an accompanying sign of many diseases. The most common cause is again a disturbance of a sympathoadrenal system at any level – it occurs in patients with neurological diseases (multiple sclerosis, diabetic and alcoholic neuropathy, peripheral neuropathies), after administration of sympatholytic or following surgical sympathectomy. After a long lying down, and in the cosmonauts after the long lasting loss of gravitation there is a developing orthostatic hypotension, that signalizes a slower or inadequately responding sympathetic nervous system to the effect of gravity to which the patient was not exposed for a long time. A short lasting training is enough to make the symptoms of orthostatic hypotension fade out. Another cause of orthostatic hypotension might commonly be the varicose syndrome. The failure of valves to close in the wider veins can be so serious, that an adequate venous return can not be maintained upon standing upright even with the maximal activation of the sympathicus.

The signs of postural hypotension are also not uncommon in patients with cerebrovascular diseases, in whom syncope might occur upon coughing, a tiring defecation, most probably due to the failure of the reflex vasoconstriction with a low venous return (Valsalva maneuver).

Inversely a sudden drop of the arterial systemic blood pressure can cause focal neurological injury in patients suffering from atherosclerosis, intracranial vessel occlusion, carotid occlusion, or the vertebral artery occlusion.