

Federal State Budgetary Educational Institution of Higher Education "North Ossetian State Medical Academy" of the Ministry of Health of the Russian Federation

Department of Internal Diseases No. 4

Methodological guidelines for conducting practical classes
with students of the 6th year of the Faculty of Medicine on the topic:
"Arterial hypertension"

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Methodological guidelines for conducting practical classes

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"Arterial hypertension"

The purpose of the lesson: to learn how to conduct differential diagnosis of hypertension syndrome, to determine the medical tactics of managing a patient with hypertension, indications for hospitalization, to fill out medical documentation.

Motivation for the relevance of the topic:

Arterial hypertension (AH) is the most common disease of the cardiovascular system. In the developed countries of the world, 25% of people over the age of 40 suffer from hypertension. With age, this amount increases in direct proportion. For the Russian Federation, the problem of high blood pressure (BP) is especially relevant, since, according to various estimates, up to 30-40% of the adult population of the Russian Federation have a blood pressure level exceeding 140/90 mm Hg. Due to long-term hypertension, pathological processes occurring in these organs can lead to vascular catastrophes:

The etiology of hypertension remains not fully elucidated. A number of factors have been identified that are closely and independently associated with an increase in blood pressure:

Risk factors:

- age - an increase in age is associated with an increase in the frequency of hypertension and blood pressure (primarily systolic);
- overweight and obesity contribute to an increase
- hereditary predisposition
- excessive sodium intake (>5 g/day);
- alcohol abuse;
- hypodynamia.

The causes of secondary hypertension can be considered any conditions in which an increase in blood pressure is due to some cause (pathological condition), for example:

-Pregnancy (gestosis)

-Kidney diseases (renal vascular damage, parenchymal kidney damage (including glomerulonephritis, polycystic kidney damage, etc.)

-Endocrine diseases (pheochromocytoma, Cushing's syndrome, primary aldosteronism (Cohn syndrome), hyperparathyroidism, acromegaly, primary hypothyroidism, thyrotoxicosis)

-Medications (

AD categories	AD categories	AD categories	AD categories
Optimal	<120	и	<80
	120 – 129	и/или	80 – 84
Normal	130 – 139	и/или	85 – 89
	140 – 159	и/или	90 – 99
High	160 – 179	и/или	100 – 109
Normal	≥ 180	и/или	≥ 110
AG of the 1st degree	≥ 140	и	<90

for example: oral contraceptives with estragens, anabolic

Classification of hypertension by stages

Stage I: Increased blood pressure, without damage to target organs, in the presence of risk factors. Target organs include: brain, heart, kidneys, blood vessels

Stage II: target organ damage (symptoms), without associated clinical conditions or associated diseases

Stage III: target organ damage in the presence of associated clinical conditions.

Cardiovascular risk factors in patients with hypertension;

Gender (men > women); Age ≥ 55 years in men, ≥ 65 years in women;

Smoking (present or past); Dyslipidemia (each of the presented indicators of lipid metabolism is taken into account): OHC > 4.9 mmol/l and/or LDL cholesterol > 3.0 mmol/L and/or HDL cholesterol in men - 1.7 mmol/l; Uric acid (≥ 360 mmol/L in women, ≥ 420 mmol/l in fasting glycemia disorder: fasting plasma glucose $5.6 - 6.9$ mmol/l; violation of glucose tolerance; Overweight (BMI $25 - 29.9$ kg/m²) or obesity (BMI ≥ 30 kg/m²); Family history of development with Stage 4 CKD with GFR < 30 ml/min/1.73 m² or low creatinine clearance < 60 ml/min; proteinuria (> 300 mg per day)

Severe retinopathy (hemorrhages or exudates, swelling of the optic nerve nipple)

DM (considered as an additional aggravating risk).

The severity of hypertension, treatment tactics and prognosis, in addition to the value of blood pressure, determines the cardiovascular risk, which is the risk of developing cardiovascular complications and death from them in the next 10 years. Risk stratification requires information about risk factors, target organ damage, the presence of metabolic syndrome (MS), diabetes mellitus (DM) and associated clinical conditions (ACS).

According to the Framingham model, the probability of developing cardiovascular complications and death from them within the next 10 years is less than 15%, the average risk is 15-20%, the high risk is 20-30%, and the very high risk is more than 30%.

Классификация стадий АГ в зависимости от уровней артериального давления, наличия факторов СС риска, поражения органов, обусловленного гипертензией, и наличия сопутствующих заболеваний

Стадия ГБ	Другие факторы риска, ПОМ или заболевания	АД, мм рт. ст.			
		Высокое нормальное САД 130—139 ДАД 85—89	Степень 1 САД 140—159 ДАД 90—99	Степень 2 САД 160—179 ДАД 100—109	Степень 3 САД ≥180 ДАД ≥110
Стадия I	Нет других ФР	Низкий риск (риск 1)	Низкий риск (риск 1)	Умеренный риск (риск 2)	Высокий риск (риск 3)
	1—2 ФР	Низкий риск (риск 1)	Умеренный риск (риск 2)	Умеренный / высокий риск	Высокий риск (риск 3)
	≥3 ФР	Низкий / умеренный риск	Умеренный / высокий риск	Высокий риск (риск 3)	Высокий риск (риск 3)
Стадия II	ПОМ, ХБП стадия 3 или СД без поражения органов	Умеренный / высокий риск	Высокий риск (риск 3)	Высокий риск (риск 3)	Высокий / очень высокий риск
Стадия III	Установленное ССЗ, ХБП стадия ≥4 или СД с поражением органов	Очень высокий риск (риск 4)	Очень высокий риск (риск 4)	Очень высокий риск (риск 4)	Очень высокий риск (риск 4)

Clinic. In most cases, blood pressure increases asymptotically, and hypertension is detected only during an objective examination of the patient. clarification of complaints and collection of anamnesis;

-repeated blood pressure measurements;

-objective examination;

laboratory and instrumental research methods: routine

at the first stage and complex - at the second stage of examination (according to indications);

exclusion of secondary (symptomatic) hypertension if necessary;

assessment of overall cardiovascular risk.

The examination includes laboratory :

1 Clinical blood test (extended)*

2 Biochemical blood analysis: -total protein, -urea, -creatinine (calculated by GFR), -uric acid, -blood glucose, -bilirubin (total and its fractions) - AST, -ALT, -LDH, -CK (+ CK-MV), -cholesterol (total and its fractions) -triglycerides, -electrolytes (Na⁺, K⁺, Cl⁻)

3 Clinical urine analysis with sediment microscopy and protein determination using test strips and microalbuminuria

4 Coagulogram

5 Rehberg-Tareev test (with calculation of GFR)

and instrumental research methods:

1. Chest X-ray

2 Electrocardiography in 12 leads

3 Echocardiography

Начало антигипертензивной терапии (изменение образа жизни и лекарственные препараты) при различных значениях АД, измеренного в медицинском учреждении



ly monitoring of arte.

The basis of antihypertensive therapy for lowering blood pressure and reducing the number of SS events are 5 classes of antihypertensive drugs

- * ACE inhibitors (ACE inhibitors)
- * angiotensin-II receptor blockers (ARBs),
- * beta blockers (BB),
- * calcium channel blockers (AK)
- * diuretics (thiazide - hydrochlorothiazide, and thiazide-like - chlorthalidone and indapamide).

Examples of fixed combinations:

- *ACE inhibitor and thiazide diuretic•*ARB and thiazide diuretic;•ACE inhibitor and AC, ARB + AC•*diuretic + ACE inhibitor + AC•*ARB + diuretic + AC, etc.

ACE inhibitors of angiotensin converting enzyme (captopril, enalapril, ramipril, perindopril, lisinopril, fosinopril) - preferred after myocardial infarction with circulatory insufficiency, with diabetic nephropathy (have a nephroprotective effect, reducing proteinuria and stabilizing the filtration function of the kidneys). They start with low doses, after the withdrawal of diuretics, they titrate.

ARBs-angiotensin AT-II receptor blockers (losartan, candesartan, valsartan, telmisartan, irbesartan, eprosartan) - are indicated for ACE intolerance or their insufficient effect, are the drugs of choice in patients with DM due to their nephroprotective properties.

AK-calcium antagonists (verapamil and diltiazem groups (vol cardioselectivity has the property of stimulating the production of nitric oxide, which is a powerful vasodilator. In addition, nebivolol has no effect on carbohydrate and lipid metabolism.

alpha-adrenoblockers (doxazosin-cardura, prazosin) have a number of advantages over other antihypertensive drugs in terms of their metabolic effects: they do not disrupt lipid metabolism, reduce atherogenicity of blood serum, reducing the level of high-density lipoprotein cholesterol and triglycerides, increase the sensitivity of tissues to the action of insulin. However, their use in clinical practice is limited by the high risk of developing orthostatic hypotension, which can complicate the course of DM due to the development of autonomic polyneuropathy. Drugs of choice in the presence of prostatic hypertrophy.

Hypertensive crisis (GC) is a condition in which a significant increase in blood pressure (up to grade 3) is associated with acute damage to target organs, often life-threatening, requiring qualification complications of hypertension requiring intensive therapy: stroke, ACS, subarachnoid hemorrhage, acute visual impairment, pulmonary edema, aortic dissection, renal failure, eclampsia.

Test tasks on the topic:

"Hypertension"

1. Vascular complications in patients with arterial hypertension associated with atherosclerosis of the arteries:

A. Acute encephalopathy;

B. Hemorrhagic stroke;

B. Ventricular tachycardia, sudden death;

D. Pulmonary edema in a patient with a left ventricular ejection function of 50%.

d. All of the above is true

2. What blood pressure figures make it possible to state the presence of hypertension:

A. >140 and >90 mm Hg.

B. 150 and 90 mm Hg.

V. >139 and >85 mm Hg.

g. >129 and >90 mm Hg.

3. Specify the drugs related to beta-blockers:

A. Carvedilol

B. Amlodipine

V. Losartan

G. Prazosin

D. Sotalol

E. Atenolol

4. Stage II hypertension manifests itself:

- A. By an increase in plasma creatinine levels above 133 mmol/l
- B. By daily excretion of albumin in urine in the amount of 300-500 mg
- B. By a decrease in glomerular filtration rate $<60 \text{ ml/min} / 1.73 \text{ m}^2$
- G. The presence of nephroangiosclerosis according to kidney biopsy
- D. A decrease in the accumulation of radiopharmaceuticals according to kidney scintigraphy.

5. What are the main risk factors for hypertension:

- A. Hyperlipidemia
- B. Burdened heredity
- B. Low physical activity
- G. Obesity
- D. Excessive consumption of table salt
- E. Smoking
- J. Excessive alcohol consumption
- Z. Stressful situations of a domestic and industrial nature
- I. Hard water
- K. Young age
- L. Mental overstrain
- M. Snoring and indications of respiratory arrest during sleep (information from the words of the patient's relatives)

6. Of the above, complications of a hypertensive crisis do not apply:

- A. Acute left ventricular failure
- B. hemorrhagic stroke
- B. acute coronary insufficiency
- G. retinal hemorrhage
- D. pulmonary hemorrhage

7. With vasorenal arterial hypertension, blood pressure increases as a result of:

- A. increased activity of the sympathoadrenal system
- B. increased volume of circulating blood
- B. increased activity of renin-angiotensin-aldosterone

8. Hypertensive crises with pheochromocytoma are characterized by:

- A) hyperglycemia
- B. hypoglycemia
- B. leukopenia
- G. lymphocytosis
- D. none of the above

9. Arterial hypertension occurring with crises accompanied by tachycardia, sweating, facial hyperemia is characteristic of:

- A. Conn syndrome
- B. renovascular hypertension

B. pheochromocytoma

G. Cushing's syndrome

10. Target organs for hypertension include:

A. Kidneys, liver, brain, retina, heart

B. Heart, retina, skeletal muscles, brain

B. Arteries, liver, kidneys, heart, retina

d. Heart, kidneys, brain, arteries, retina of the eye

d. Heart, liver, arteries, brain, kidneys

11. For the relief of uncomplicated hypertensive crisis is not used:

A. intravenous administration of 1.0 ml of 0.01% solution of clonidine (clofelin)

B. 40-80 mg of furosemide (lasix) intravenously

B. 10-20 mg of nifedipine sublingually d) 10 mg of enalapril sublingually

D. intravenous administration of labe

12. The following drug is contraindicated for the relief of a developed hypertensive crisis in a patient with bronchial asthma:

A. propranolol (anaprilin)

B. captopril

V. nifedipine (corinfar)

G. myotropic antispasmodics

D. nitroglycerin

13. In biochemical blood tests with Conn syndrome, the following are most often found:

- A. an increase in the level of catecholamines
- B. a decrease in the concentration of aldosterone
- B. an increase in the level of renin
- G. an increase in the concentration of aldosterone
- D. correctly 2 and 3

14. During coarctation of the aorta, blood pressure increases:

- A. in the arteries of the upper extremities
- B. on the lower extremities
- B. in the renal arteries
- G. all the answers are correct
- D. there is no correct answer

15. The cause of arterial hypertension may be taking:

- A. Oral contraceptives
- B. corticosteroids
- B. nonsteroidal anti-inflammatory drugs
- G. tricyclic antidepressants
- D. all of the above

16. Risk factors affecting the prognosis that should be taken into account when stratifying risk in patients with arterial hypertension (WHO recommendations and MOG.: A. The degree of increase in blood pressure (1-3 degrees.;

B. Men - over 55 years old, women - over 65 years old;

B. Menopausal women;

G. Smoking;

D. Overweight;

E. Retinal artery narrowing;

J. Retinal detachment;

Z. Stroke, transient cerebrovascular accident;

I. IBS;

K. Pain-free depression of the ST segment detected on the Holter ECG.

17. Causes of arterial hypertension in tumors localized in the adrenal glands:

A. Paraganglioma;

B. Primary hyperaldosteronism;

B. Renin-secreting tumor;

G. Cushing's disease;

D. Cushing's syndrome (ACTH stimulates hyperglucocorticoidism.;

E. Hyperaldosteronism due to suppression of dexamethasone synthesis;

18. The first choice of antihypertensive therapy, which should be carried out for a long time, in patients with severe dyslipidemia:

- A. Diltiazem-retard;
- B. Verapamil-retard;
- B. Cardioselective beta-blockers;
- G. Long-acting ACE inhibitors (enalapril.;
- D. Short-acting ACE inhibitors

19. Diseases accompanied by an acute rise in blood pressure:

- A. Psychogenic hyperventilation;
- B. Hypoglycemia;
- B. Burns;
- G. After heart surgery;
- D. Respiratory acidosis;
- E. Encephalitis;
- J. Ischemic stroke;
- Z. Migraine.

20. Vascular complications in patients with arterial hypertension associated with atherosclerosis of the arteries:

- A. Atrial fibrillation;
- B. Myocardial infarction;
- B. Ischemic stroke;
- G. Nephrosclerosis;
- D. Intermittent lameness.

Response standards:

1-In

2-A

3-ADE

4-In

5-ABVG

6-D

7-In

8-A

9-In

10-B

11-D

12-A

13-G

14-A

15-D

16-ABG,

17-BG,

,18-ABG,

19-AUGJ,

20-ABVD

Task 1. Patient E., 54 years old, was admitted to the clinic with complaints of headache, dizziness, visual impairment, drowsiness, mood swings. It is known from the anamnesis that he suffers from arterial hypertension from the age of 48, after the onset of menopause, with a maximum blood pressure of 180/100 mm Hg. From the same time, he notes an increase in body weight by 25 kg. He does not receive permanent antihypertensive therapy. During the last year, sleep disorders with frequent and prolonged periods of respiratory arrest during sleep, compensated by daytime drowsiness, have been worrying. Notes a tendency to depression. Leads a sedentary lifestyle. OIM and ONMC could not stand it. Hereditary anamnesis: mother, 74 years old, suffers from coronary heart disease, arterial hypertension, type II diabetes mellitus. My brother died at the age of 50 from ONMC. During the inspection: The condition is satisfactory. Increased nutrition. Height 156 cm, weight 94 kg. BMI – 38.6 kg/m². Waist circumference is 111 cm . Hip circumference - 108 cm. The skin and visible mucous membranes of the usual color and humidity. The lymph nodes available for palpation are not enlarged. Thyroid gland without features. In the lungs, vesicular breathing, no wheezing, BH 16 in min. Percutorically, the boundaries of the relative dullness of the heart are expanded to the left. Heart tones are muted, rhythmic, heart rate is 90 per minute, the accent of the II tone in the II intercostal space to the right of the sternum, blood pressure is 170/100 mmHg. The abdomen is soft, painless with palpation in all departments. The liver and spleen are not enlarged. The symptom of pounding is negative on both sides. Clinical blood test: hemoglobin 157 g/l; erythrocytes 5,0x10¹²/l; platelets 220x10⁹/l; leukocytes 6,8x10⁹/l; ESR 15 mm/h.

Biochemical blood test: total protein 78 g/l; urea 7.0 mmol/l; creatinine 96 mmol/l; AST 28 units/l; ALT 26 units/l; CPK 96 units/l; bilirubin total. 16 mmol/l; total cholesterol 8.2 mmol/l; LDL 4.5 mmol/l; HDL 0.8 mmol/l; triglycerides 3.5 mmol/l; glucose 6.5 mmol/l; uric acid 620 mmol/l.

Blood glucose concentration 2 hours after glucose loading: 10.5 mmol/l.

In daily urine: albumin 280 mg / day.

Task 2. Patient A., 66 years old, went to the emergency department of the hospital with complaints of palpitations, heart failure, dizziness, weakness. From anamnesis: he has been suffering from arterial hypertension for more than 15 years, with a maximum increase in blood pressure to 170/100 mm Hg, adapted to blood pressure 130/80 mm Hg. 6 years ago, type 2 diabetes mellitus was diagnosed, corrects by diet, taking hypoglycemic drugs. Since that time, the syndrome of night apnea has been identified. Acute myocardial infarction, acute cerebrovascular accident, thyroid disease in the anamnesis denies. The present deterioration of the condition has been noted since yesterday, when the above-described complaints appeared. The day before there was an episode of alcohol consumption (~ 200 ml of ethyl alcohol). Bad habits: smokes for more than 35 years, 1 pack of cigarettes a day. Alcohol consumption is sporadic. Heredity: mother - diabetes mellitus, father - coronary heart disease.

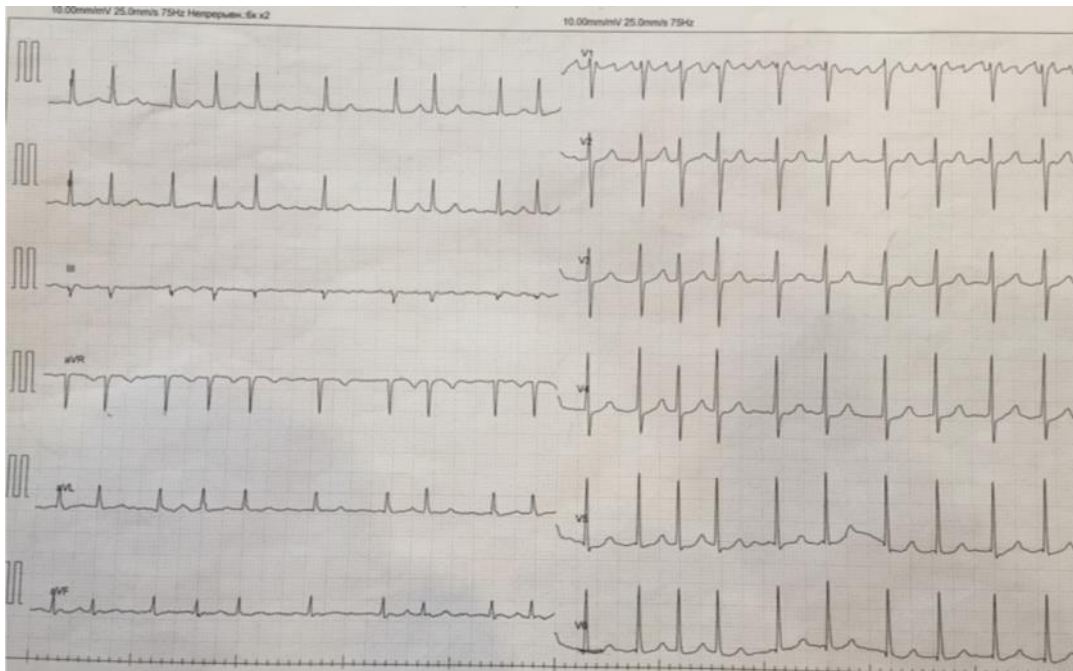
Objectively: the condition is of moderate severity. Conscious, in contact. Oriented comprehensively correctly. Height 180 cm . Weight 122 kg. Body temperature 36.6 °C. The skin and visible mucous membranes of the usual color and humidity. There are no peripheral edema. The thyroid gland is not palpationally enlarged. Peripheral lymph nodes are not palpated. BH 18 in min. In the lungs, breathing is hard, it is carried out in all departments, there are no wheezes. With percussion, the expansion of the boundaries of the heart to the left is determined. Heart rate ~ 130 v min. Auscultation: the heart tones are muted, the rhythm is incorrect, pathological noises are not listened to. Blood pressure 160/90 mmHg on both hands. The abdomen is soft, painless with palpation. Liver at the edge of the costal arch. The spleen is not palpable. The symptom of pounding is negative on both sides. Healthy bladder and bowel habits.

Examination data:

Clinical blood test: no specifics.

Biochemical blood analysis: total protein 79.5 g/l, urea 8.6 mmol/l, creatinine 149.0 mmol/l, uric acid 520 mmol/l, total bilirubin 12 mmol/l, ALT 19 units/l, AST 29

units/l, potassium 3.2 mmol/l, CPK 112 units/l, glucose 6.9 mmol/l, cholesterol 7.0 mmol/L. Urinalysis: erythrocytes - 0, leukocytes - 0, protein 3.8 g/l.



Echocardiography: Left atrium dilation. Moderate symmetrical left ventricular (LV) myocardial hypertrophy. LV myocardial mass is 370 g. Diffuse decrease in LV myocardial contractility. LV systolic function is reduced. The ejection fraction is 42%. Valvular heart apparatus without pathology.

Task 3. A 47-year-old man is on re-admission. Two weeks ago, he suffered a respiratory viral infection, about which he turned to the district physician and during the examination he was found to have increased blood pressure to 164/98 mm Hg. The patient recalls that he had previously been told about "high blood pressure", but he does not remember the values of blood pressure, according to the words, treatment was not recommended. Currently, the patient feels well, does not complain. The patient does not smoke, drinks alcoholic beverages "like everyone else," that is, "on holidays, and maybe a couple of bottles of beer on weekends." He does not engage in regular physical exercises, his work is sedentary. The father died of a stroke at the age of 69, the mother is alive and, according to the patient, healthy, at the age of 72. He has two older brothers, and he is not aware of the presence of

any chronic diseases in them. On examination: height -177 cm, body weight -84 kg, waist circumference -103 cm, body temperature 36.7 ° C. Skin of ordinary color, vesicular respiration, there are no wheezes, the respiratory rate is 14 per minute. The boundaries of relative cardiac dullness on the left are 1 cm to the left of the left mid-clavicular line, clear, heart rate -78 per minute. Blood pressure - on the left arm 156/96 mm Hg, on the right arm -152/98 mm Hg. For other organs and systems without deviations from the norm.

Questions:

1. Assume the most likely diagnosis.
 2. Justify your diagnosis.
 3. Draw up and justify a plan for additional examination of the patient.
 4. What non-pharmacological methods of treatment should be recommended to the patient?
 5. Which groups of antihypertensive drugs can be recommended to the patient? Justify your choice.
- vicular line, on the right - along the right edge of the sternum, heart tones