MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
ODESA NATIONAL MEDICAL UNIVERSITY
Medical Faculty
Department of Internal Medicine #2 with postgraduate training

APPROVED
Vice-rector for scientific and pedagogical work
_____ Eduard BURIACHKIVSKYI
«____» September 2024

METHODICAL GUIDE
for independent applicant's work (IAW) in educational discipline

International Faculty, V-th course

Educational discipline: **Internal Medicine**

Theme: **Fundamentals of diagnosis, treatment and prevention of major diseases of the musculoskeletal system and connective tissue**

Approved

At the meeting of the Department of Internal Medicine #2 with postgraduate training

Protocol № 1 dated «02» September 2024

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METHODICAL RECOMMENDATIONS
for independent students work (IWS)

Topic: « Fundamentals of diagnosis, treatment and prevention of major diseases of the musculoskeletal system and connective tissue»
(Topics № № 1-7, number of hours – 12).

Importance of the theme:

The problem of rheumatic joint diseases and systemic connective tissue disorders (SCTD) is extremely actual today. They are serious and heavy burden for the patient, his family and the whole society.

In Ukraine there are over 3.5 million patients with rheumatic diseases (RD), more than 2 million are of working age. The prevalence of main rheumatic diseases are increasing (osteoarthritis, metabolic arthropathy SCTD, osteoporosis, etc.) and as a rasult increasis their high levels of temporary incapacity, disability, low quality of life. The fight against these diseases remains one of the most important tasks of public health policy.

Rheumatology Association of Ukraine cooperates with the European League Against Rheumatism (EULAR) and other international medical and scientific organizations. Further activation and development of new measures aimed at ensuring the timely diagnosis and treatment of rheumatic diseases is conducing, including within the framework of the International Decade dedicated to diseases of bone - muscle system organized by WHO in 2000

It should be noted that the active introduction of new technologies RD treatment (in particular, biological agents, slow-acting drugs for the treatment, drugs for the treatment of osteoarthritis, etc.) allowed for significant improvement or in general medication - induced remission in treated patients.

1. 1. Specific objectives:
be able to:

- Analyze complaints, history and physical examination of the patient data with RD;
- Explain the pathogenetic mechanisms of RD symptoms and syndromes in the patient;
- Classify patients with existing rheumatologic syndromes by their clinical significance;
- Interpret data of laboratory and instrumental examination of patients with RD;
- Offer a program of differential diagnosis and patient treatment program with RD;
- Draw schemes ratio of identified syndromes in a patient;
- To make the patient's history with rheumatic diseases.

2. Interdisciplinary integration *(basic knowledge, skills necessary for studying the topic)*

Disciplines	To know	The acquired skills:
1. The preceding - Normal anatomy - Normal physiology	Anatomical structure of the musculoskeletal system. The mechanism of functioning of connective tissue and joints.	
- pathological anatomy - pathophysiology	Possible pathological changes in the connective tissues and joints in RD.	Identify and interpret the symptoms and syndromes of RD.
- Propedeutics of Internal Medicine	Symptoms and syndromes in diseases of the musculoskeletal system. Procedure of a physical examination of the rheumatological patient and interpretation of results of additional research methods (laboratory, radiology, functional)	Determine violations of the joints and connective tissue. Physical examination of rheumatological patient and interpretation the results of additional research methods (laboratory, radiology, functional)
2. Following disciplines (Internal Medicine 6-th year)	Urgent conditions in rheumatology and algorhythms for emergency care by modern standards	
3. Intrasubject integration (Medical Practice from Therapy)	Principles of RD patient management in the practice of general practitioner-family physician	

3. Tasks for independent work during preparation for classes to Chapter: *"Fundamentals of diagnosis, treatment and prevention of major diseases of the musculoskeletal system and connective tissue"*

№	Theme	Hours
1.	Preparation to practical lessons, including: – Capture of interpretation of X-ray data of joints skills – Capture of interpretation of information of echocardiography research skills – To analyse a capture skills data of laboratory methods (CBC, general albumen and albuminous fractions, creatinine, urine acide of a blood, electrolytes of blood, acute fhase indexes of blood, data of serum researches at autoimunne processes, transaminazes, coagulograme – Capture of registration and interpretation of ECG skills	9
2.	Curation of the patient with grounding the diagnosis	1
3.	Individual work: • Report of abstract on practical lesson • Report at clinical conferences • Report history of case on practical lesson • Writing of theses, articles	
TOTAL		**10**

4.1 List of basic parameters and characteristics which are the student must learn to prepare for the classes:

1. Joint syndrome types, the degree of dysfunctional joints.
2. Syndrome of inflammation, the degree of inflammatory activity
3. Sjogren syndrome
4. Felty's syndrome
5. Reiter's syndrome

4.2 Theoretical questions for the class:

1. The main symptoms of rheumatologic diseases.
2. Methods of research in rheumatology.
3. Acute rheumatic fever and chronic rheumatic heart disease: the value of laboratory and instrumental methods. Diagnostic criteria.
1. Rheumatoid arthritis: clinical picture based on the activity of the pathological process, stage of disease systemic manifestations.
2. Systemic lupus erythematosus: clinical manifestations based on diseased organs and systems, activity of the disease. Diagnostic criteria.
3. Systemic scleroderma and dermatomyositis: clinical picture based on diseased organs and systems. Diagnostic criteria.
4. Hemorrhagic vasculitis (Henoch-Schonlein purpura hypersensitivity vasculitis): clinical presentation, diagnostic criteria.
5. Polyarteritis nodosa: clinical manifestations, diagnostic criteria. Differential diagnosis.

6. Osteoarthritis: clinical picture based on predominant localized lesions. Diagnostics. Drug-free treatment.
7. Ankylosing spondylitis: diagnostic criteria.
8. Reactive arthropathy: clinical manifestations of reactive arthritis of different etiologies. Reiter's syndrome, the value of laboratory and instrumental methods of diagnosis. Diagnostic criteria. Treatment role of antibiotic therapy.
9. Gout: diagnostic criteria.

5. Contents of theme:

5.1. Mastering the skills of interpretation and registration of ECG - left ventricular hypertrophy, right ventricular hypertrophy and atrial hypertrophy (left and right) *(theme #1)*

Normal electrocardiographic study includes registration of 12 leads: 3 standard, 3-augmented limb leads single-pole from the extremities and 6 chest leads (Fig.1)

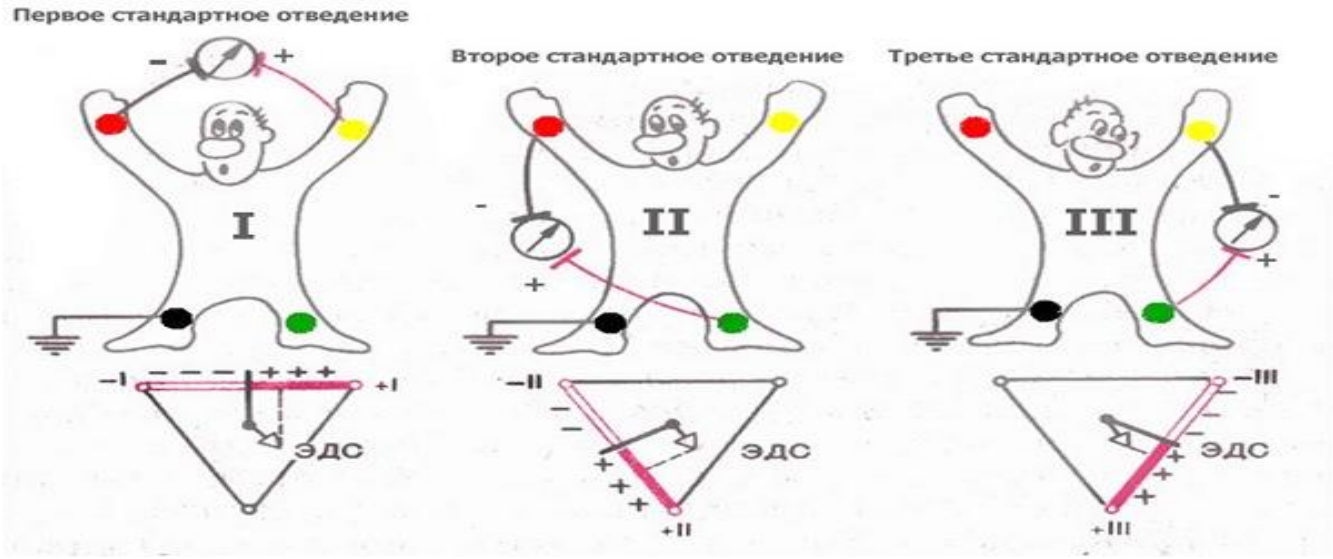


Fig.1. Standard leads of ECG

Electrodes are placed (see Fig. 1) on the right hand (red marking), left arm (yellow marking) and on the left leg (green marking). These electrodes are connected in pairs to the electrocardiograph for each standard lead registration. Fourth electrode is placed on the right foot to connect grounding conductor (black marking)

Standard limb leads represents a particular orientation in space:

I lead - left hand (+) and right arm (-);

II lead - left leg (+) and right arm (-);

III lead - left leg (+) and left hand (-).

Augmented limb leads records the potential difference between one of the limbs on which the positive electrode active part is placed , and the average potential of the other two limbs (see Fig.2). As the negative electrode in these leads are used so called combined Goldberger electrode, which is formed by connecting two additional resistance through the limbs. Three augmented single pole limb leads :

aVR - augmented _ from the right hand;
aVL - augmented _ from the left hand;
aVF - augmented _ from the the left leg

As shown in Fig.2, axis from augmented single pole limb leads is obtained by connecting the electrical center of the heart with the placed active electrode for this lead, actually - one of the vertices of the Einthoven triangle.

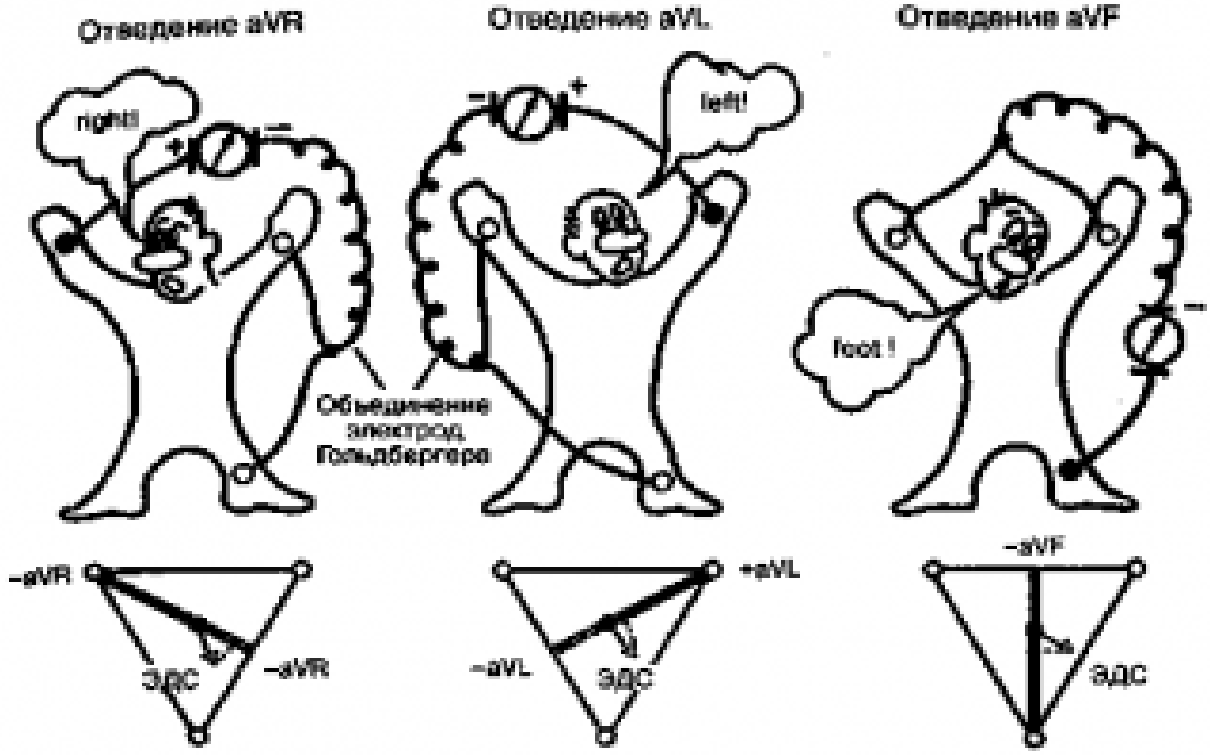


Fig. 2. Augmented single pole ECG leads.

Chest leads -these are single pole leads proposed by Wilson. They register the potential difference between the active (+) electrode placed in a strictly defined points on the chest wall and (-) combined electrode of Wilson (see Fig. 3). Last formed by connecting three limbs (right hand, left hand and left foot) and has a potential close to zero.

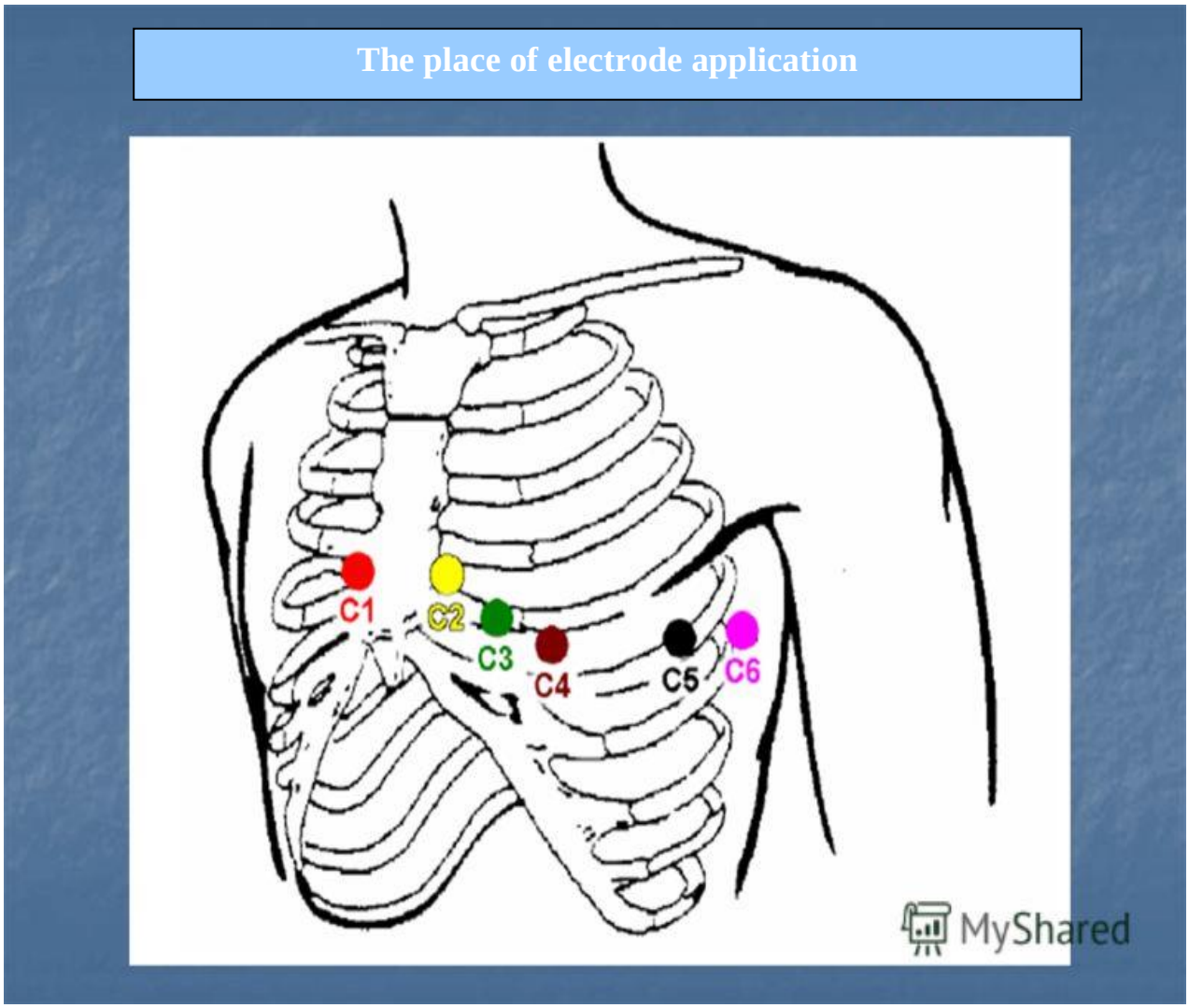


Fig.3 Chest leads

Position of the active electrode for recording chest leads:

V1 - IV intercostal space at the right edge of the sternum;

V2 - IV intercostal space at the left sternal border;

V3 - between positions V2 and V4 (approximately at the level of IV rib on the left para-sternal line);

V4 - in the V intercostal space on the left mammilar line;

V5 - at the same horizontal level as V4 on the left anterior axillary line.

V6 - at the same horizontal level as V4 and V5 for the left mid-axillary line.

Additional leads. Need for them arises when there is insufficient information content of 12 conventional leads. There are many additional leads and they are used for specific indications. For example, in the diagnosis of posterior-basal and posterior-lateral myocardial infarction can be critically useful extreme left chest leads V7-V9 (see Fig. 4)

To record these leads active electrode is set according to posterior axillary, scapular and paravertebral lines on the horizontal level electrodes V4-V6.

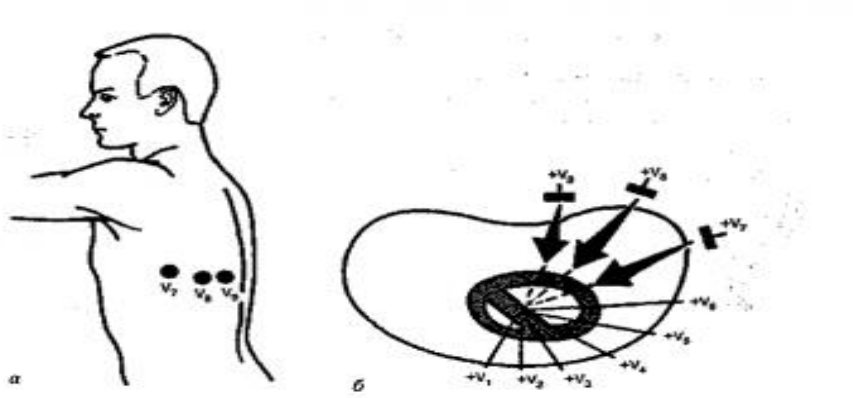


Fig.4. Additional leads of ECG.

In clinical practice, widespread Nebb's leads (see Fig. 5). These are bipolar leads, which record the potential difference between two points on the surface of the chest. Lead Dorsalis (D) - the active (+) electrode is placed at the level of the cardiac apex on posterior axillary line (-) electrode - in II intercostal space at the right edge of the sternum. Lead Anterior (A) - active (+) electrode - placed in point of the apical impulse, (-) electrode - in II intercostal space at the right edge of the sternum. Lead Inferior (J) - active (+) electrode - placed in point of the apical impulse, (-) electrode at the level of the cardiac apex on the posterior axillary line. Leads by Nebb used for diagnosis of focal myocardial changes in the posterior wall (lead D), anterolateral (lead A) and the upper parts of the anterior wall of the left ventricle (lead J).

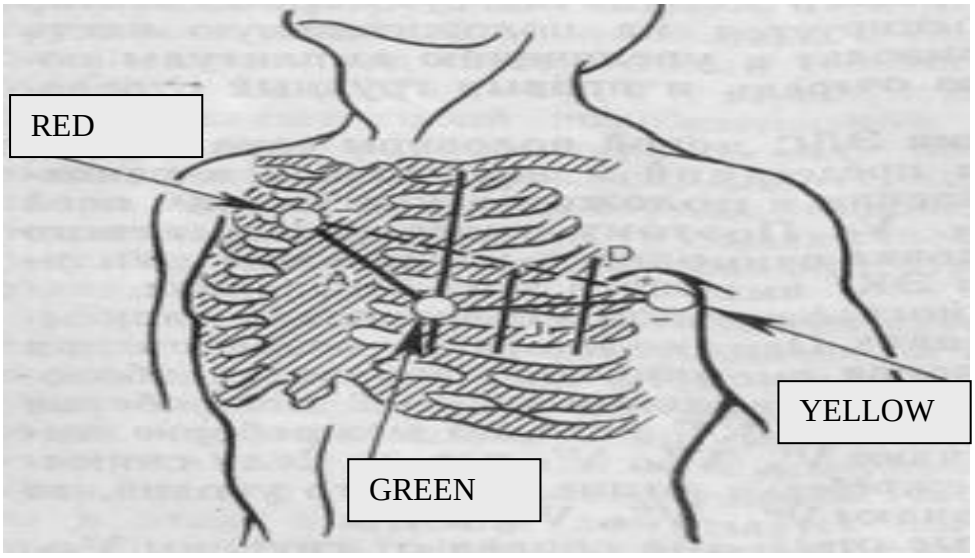


Fig.5. **Leads by Nebb**

ECG recording technique. ECG should be performed in a warm room to avoid shivering patient with maximum muscle relaxation. Planned studies are conducted after 10-15 min. rest no earlier than 2 hours after meal. Normal position – lying on his back. Breathing equal, light deep.

1. Placing the electrodes. In order to reduce currents and improving the quality of ECG recording is necessary to ensure good contact between electrodes and skin. This is usually achieved using gauze pads between the skin and the electrodes wetted 5-10% sodium chloride solution or special conductive pastes. If required in the areas of electrodes previously defatted skin. In the case of a large hairy to these places wetted with with soapy water.

On the inner surface of the forearms and shins in the bottom third are placed plate electrodesby clipping them with rubber bands. On chest is placed one (or more if multitrack recording) chest electrode which is fixed rubber pear sucker.

2. Connect the electrodes to the ECG machine. Each electrode is connected to the corresponding ECG lead with wire hose having a conventional color-coded. The electrode located on the right hand, is attached wire, marked in red, on the left hand - yellow on the right foot - black, left leg - green.

Chest electrode is connected to the cable, marked with white color. When multi-channel recording with simultaneous registration of all six chest leads to the electrode positions are V1 is connected wire with a red tip, V2 - yellow, V3 - with green, V4 - brown, V5 - black, V6 - with blue or purple.

3. Grounding the electrocardiograph.

4. Switching device in a network.

5. Recording control millivolt. ECG recording should be preceded gain calibration that enables you to standardize the study, for examlpe evaluate and compare for dynamic monitoringthe amplitude characteristics. For this leads with "0" are switched to a galvanometer electrocardiograph pressing a button supplied standard calibration voltage 1 mV. Is desirable to calibrate the recording at the beginning and end of the ECG recording.

6. Selecting the speed of the paper. Modern electrocardiographs can record ECG using different speeds of the tape: 12.5, 25, 50, 75, and 100 mm / s. Selected speed is set by pressing the appropriate button on the control panel. Most convenient for the further analysis of ECG speed is 50 mm / s. Lower rate (typically 25 mm / s) is used to identify and analyze arrhythmia when a more prolonged ECG is required.

At speed 50 mm/s each small cell millimetry grid, located between the thin vertical lines (ie, 1 mm) corresponds to 0.02 s. The distance between two thicker vertical lines, including 5 small cells (i.e., 5 mm) corresponds to 0.1s. At speed of 25 mm / s small cell corresponds to 0.04, large - 0.2 s.

7. ECG recording. ECG consists of sequential recording of electrocardiographic leads that makes turning the switch knob. In each lead is recorded for at least 4 cycles.

a) Recording standart leads are enable in positions of I, II and III leads. It is accepted to register III lead with a single breath on deep inspiration. This is done in order to establish the nature of positional changes which are often detected in this lead

b) Recording unipolar augmented limb leads are recorded by using the same electrodes and the same _ location as when registering standard lead The swircht of leads in I lead records aVR, II - aVL, III - aVF.

c) Recording chest leads. The switch of leads is turned into the position V. Registration of each lead produced by moving the chest electrode sequentially from position to position V1 V6 (see above).

d) Recording leads by Nebb. This additional leads are recorded by plastic electrodes, which are moved from limbs to chest wall. Red marked electrode from right hand is moved to II При этом, электрод с правой руки (красный маркированный провод) перемещают во II intercostal space at the right edge of the sternum; from left foot (green marked electrode)- in position V4 (apex of heart); from left foot (yallow electode) - horizontal level on posterior axillary line.

The swith of leads is in position of I lead to record lead D II-A, III-J.

Before recording the ECG or after it on the ecg paper is written the date of procedure (time if emergency), patient`s name and age.

5.2. Mastering the skills of ECG interpretation (to themes № 1, 5).

ECG interpretation algorithm:

1. Identifying the source of a pacemaker:

- Sinus rhythm is detected when in standard lead II positive P wave before the QRS complex and negative in lead aVR.
- Nonsinus rhythm (atrial) - in the II, III standard leads negative P wave, the rhythm of the AV Connection - P is negative or missed.

2. Definition of regularity heartbeat.

- Regular (right) heart rhythm recorded when the difference between the RR (RR duration of one cardiac cycle) is> 0.1s. "

3. Calculation of heart rate per 1 min.: HR=60"/ (RR) x 0.02 mm (at a rate of 50 mm/s), 0.04 (at a rate of 25 mm / s).

In case of abnormal rhythm of heart rate count by the following formula: HR=60"/ ((R-Rmax + R-Rmin) / 2) x 0.02 (at a rate of 50 mm/s), 0.04 (at a rate of 25 mm/ s).

4. Position of heart axis:

- The normal position (∠α +30° to +69°): RII ≥ RI ≥ RIII; in leads III and aVL, R=S;
- deviation to the left (or horizontal position ∠α +30° to -90°): high R in I, aVL, than at RI ≥ RII ≥ RIII, deep SIII;
- deviation to the right (or vertical position; ∠α +70° to +180°) in the high R III aVF, RIII ≥ RII ≥ RI, deep SI.

5. Calculate all intervals: PR (PQ), QRS, QT and evaluate QRScomplex amplitude. Evaluate the character of the P wave (amplitude, duration). Assess the state of the repolarization phase (depression (its type) or segment elevation ST, T wave changes).

6. Determination of four electrocardiographic syndrome:

A) estimation of rhiythm (arrhythmia);
B) conduction disturbances (blockade);
C) myocardial hypertrophy
D) myocardial injury: ischemia, myocardial infarction.

ECG criteria for myocarditis (the themes №№ 1, 3, 4):

- The appearance of a variety of rhythm disturbances and conduction; sinus tachycardia or sinus bradycardia, supraventricular and ventricular premature beats, paroxysmal

tachycardia, intraatrial and intraventricular blocks, especially left bundle branch block, at least - atrial flutter and fibrillation;

- Reducing the voltage on ECG (RI+RII+RIII<15mm or the largest «R» in one of the standard leads <5mm);
- Changes in the final part of the ventricular complex: reduction of RS-T segment and the formation of a smoothed or balanced or unbalanced negative T wave in several electrocardiographic leads (see Fig 6).

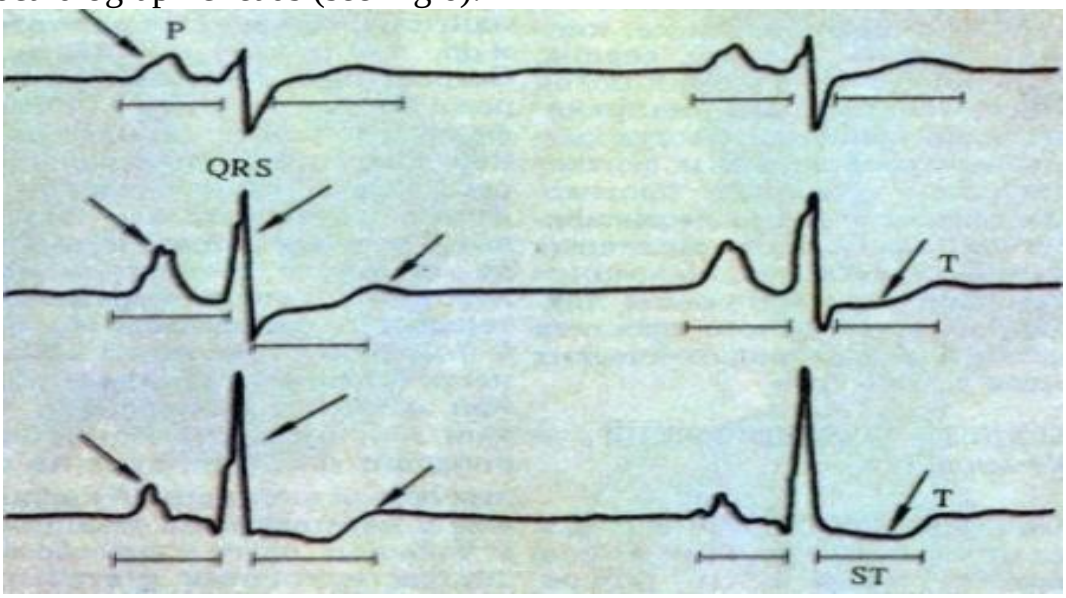
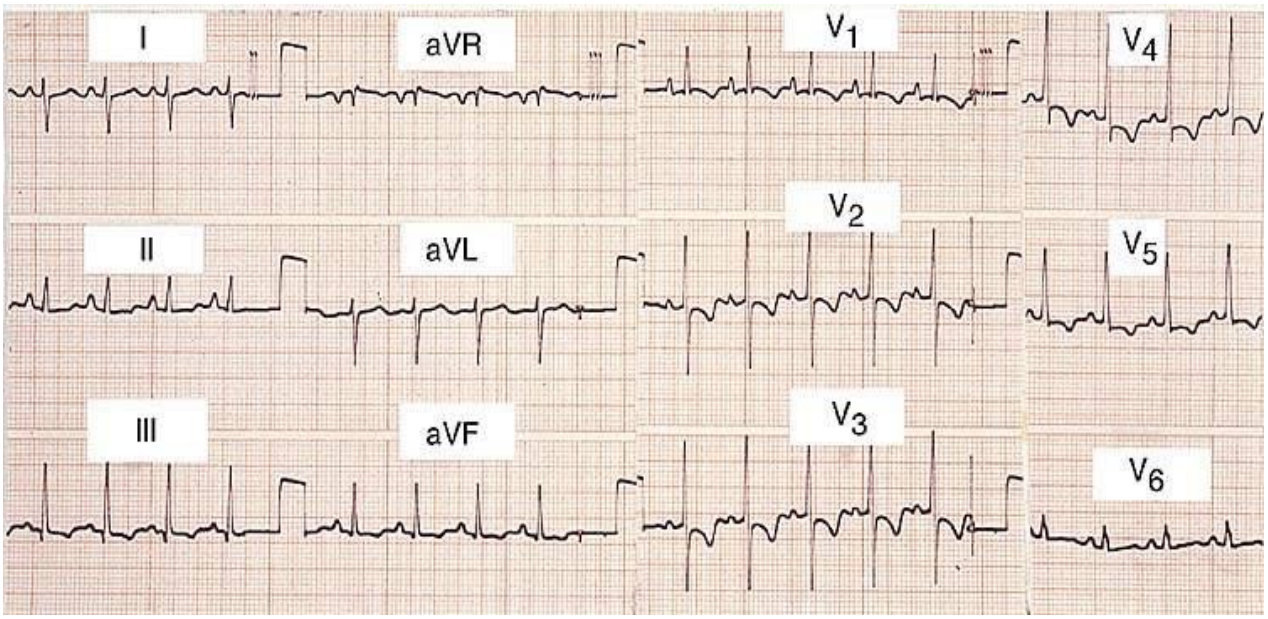


Fig. 6. Schematic representation of the ECG changes in myocarditis.

An example of ECG interpretation №1.

Female 43 years after acute respiratory infection within 2 weeks complains of pain in the heart, shortness of breath, palpitations. OBJECTIVE: T° - 37,9°C; heart border: 1.5 cm to the left, heart rate - 100 bpm.



Interpretation:

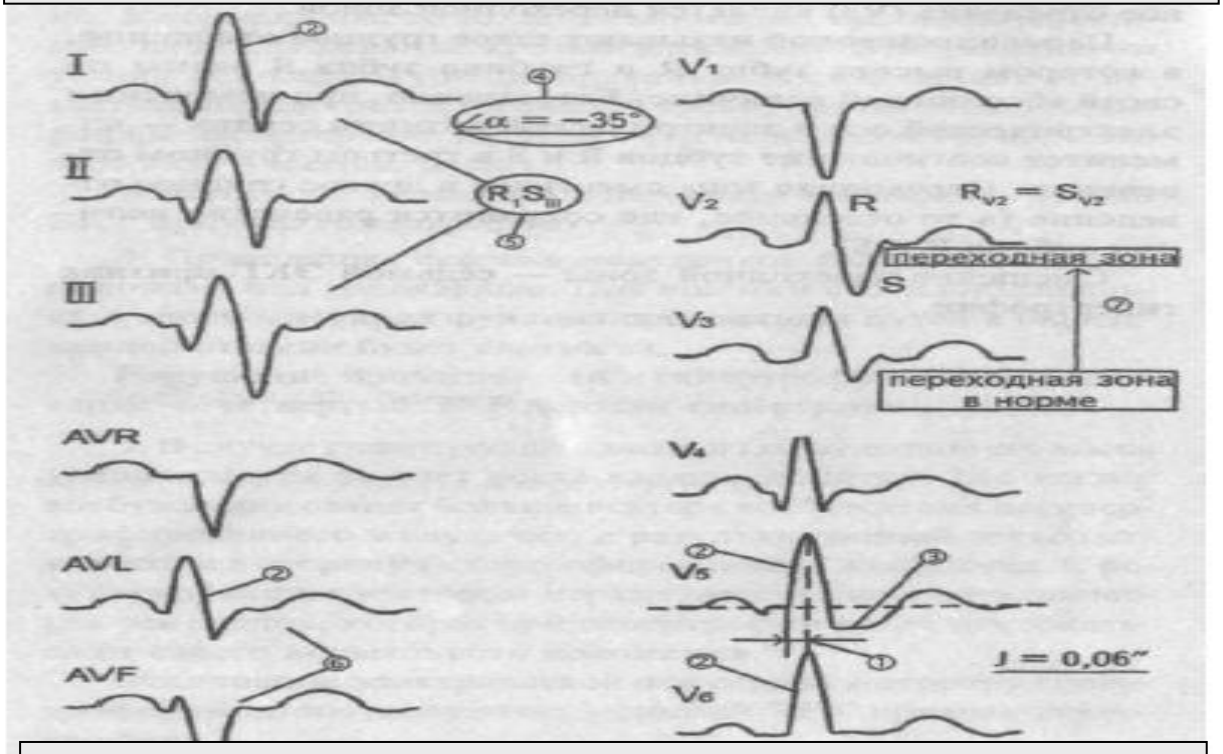
Rhythm - sinus, regular. Sinus tachycardia. HR-100 bpm, Heart axis deviation to the right. In leads III, aVR, V1-V5 marked T wave inversion, and segment depression ST. P-wave amplitude in the II increased, it pointed. In V1 increased wave amplitude R = 10mm.

Conclusion: diffuse nonspecific changes of myocardium, hypertrophy of the right atrium and right ventricle.

ECG criteria for LVH

- Increasing the amplitude of the R wave in the precordial leads (V5, V6) and the amplitude of the S wave in the right precordial leads (V1, V2).
  While RV1 <RV5 or RV4 <RV6; RV5,6> 25mm;
- $R_{V5,6}+S_{V1}>38$mm – Sokolov-Lyons index;
- ($R_{AVL}+S_{V5}$) mm x QRS ms > 2440 mm/ms- Cornell criteria;
- Left shift of electrical axis of the heart . While RI ≥ 15mm, RaVL ≥ 11mm or RI + SIII ≥ 25mm;
- shift RS-T segment in leads V5, 6, I, aVL lower isoline and formation of negative or biphasic (+ / -) T waves in leads I, aVL and V5, 6;
- increase the duration of QRS in the left chest leads greater than 0.05 s (Fig. 7).

ECG scheme with left ventricle Hypertrophy

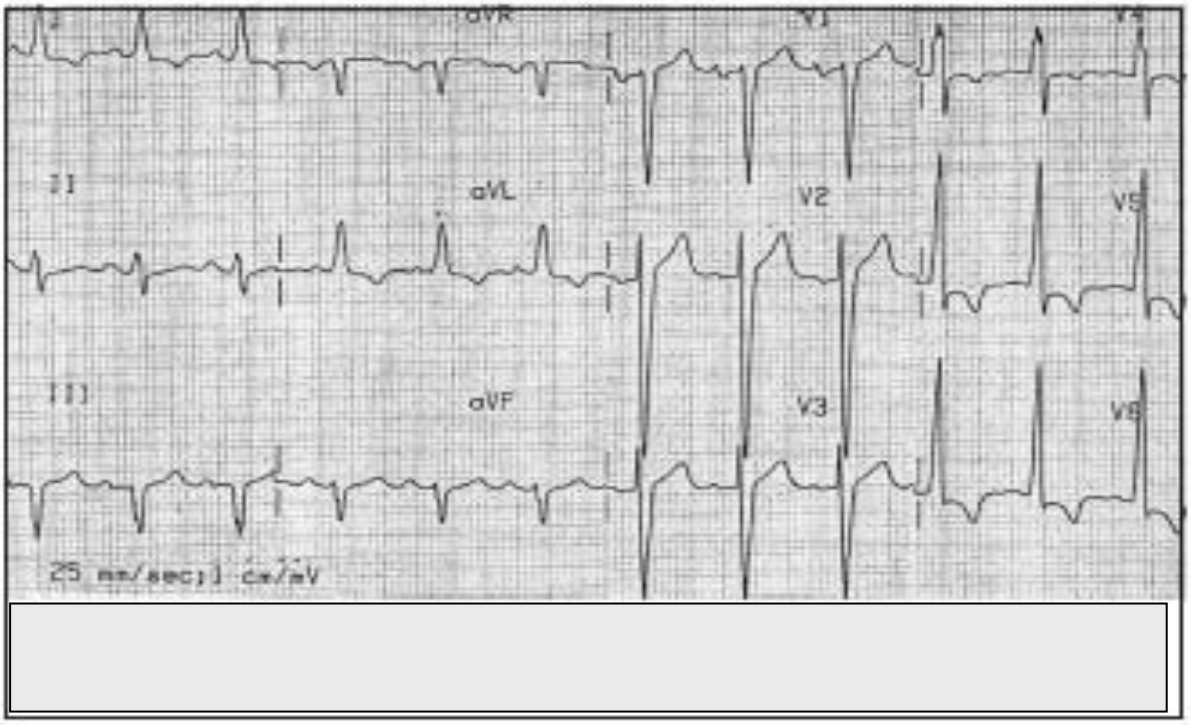


1. Increasing of the time of internal deviation = 0.06”
2. Increasing amplitude of R wave
3. Sub-endocardial hypoxia
4. $\angle\alpha = -35^0$ – Left Anterior Bundel Branch Block
5. left axis deviation
6. Shift of transition zone in V2

Fig. 7. Schematic illustration of ECG changes of left ventricular hypertrophy.

An example of ECG interpretation №2.

Patient female 60 years appealed to the clinic complaining of pain in the occipital region of the head, dizziness. OBJECTIVE: BP 200/100 mmHg, heart rate – 100 bpm, auscultation – Accentuated second heart sound on the aorta.



Interpretation:

Rhythm - sinus, regular. Sinus tachycardia. HR-100 bpm, Heart axis deviation to left, increased the amplitude of the R waves in leads V5-V6 (RV4 <RV5 <RV6), as well as the amplitude of the S wave in V1-V2. RV5, 6 + SV1 (Sokolov-Lyons index)=45mm. ST segment in leads I, aVL, V4-V6 lower then isoline in these same leads inverted T waves.

Conclusion: signs of left ventricular hypertrophy and its overload.

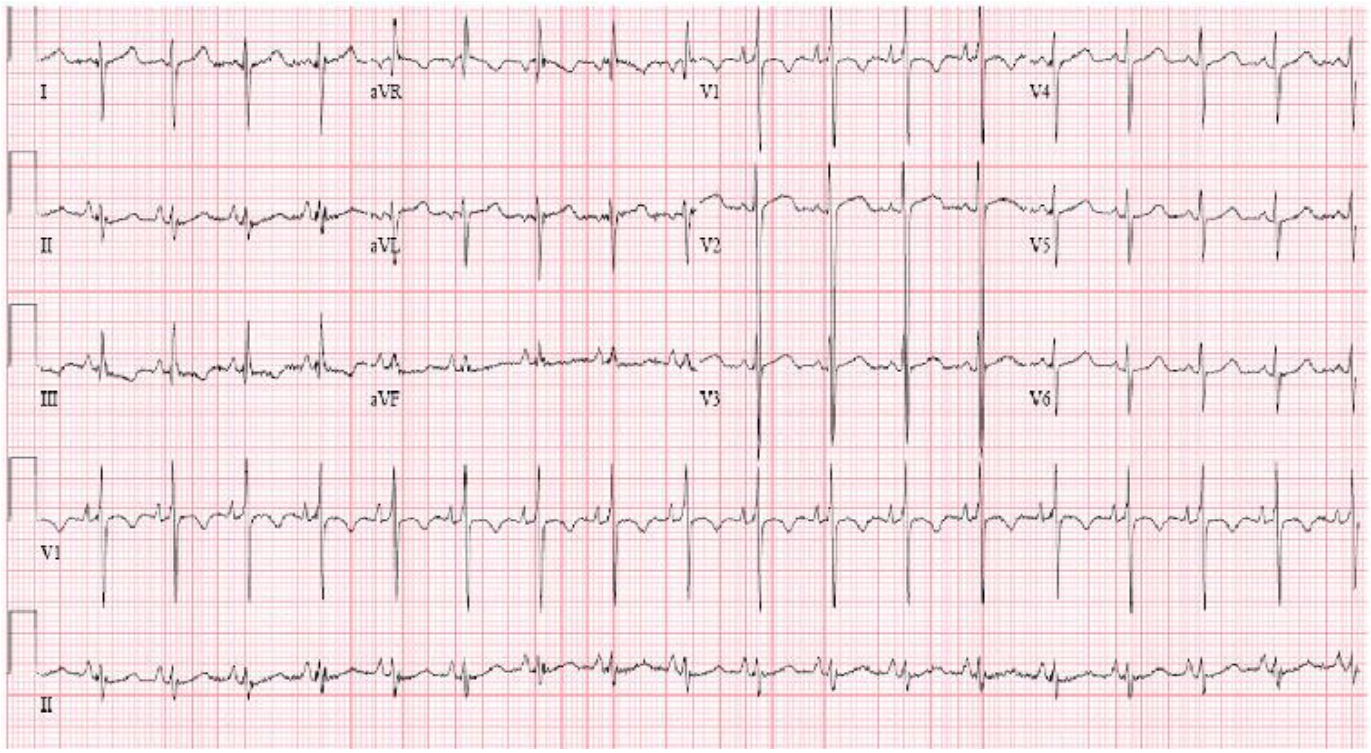
ECG criteria for RVH

- Deviation of heart axis to the right (∠α over +100°);
- Increase in the amplitude of the R wave in the right chest leads (V1, 2) and S-wave amplitude in the left chest leads (V5, 6). *In this quantitative criteria may be considered: amplitude RV1 ≥7mm or RV1+SV5, 6 ≥10,5 mm;*

- Appearance in V1 QRS complex types: rSR or QR;
- Signs of heart axis: shift to the transition zone to the left, in the lead V5-V6 and the appearance in leads V5, V6 QRS complex type RS;
- Displacement of RS-T segment lower then isoline and appearance of negative T waves in leads III, aVF, V1, 2;
- Prolongation of QRS in the right precordial leads V1 more than 0.03 s.

An example of ECG interpretation №3

Patient 56 years old, smoker, suffers from COPD. Appealed to the clinic with complaints of palpitations, shortness of breath, swelling of the lower extremities. Dilated right heart border 1.5 cm Heart sounds are muffled, accent II tone of the pulmonary artery.



Interpretation:

Sinus rhythm, right, regular. Sinus tachycardia. HR - 110 min. Heart axis deviation to right. Having a high picked P wave (amplitude of 3 mm) in a normal length of it II, III, aVF, V1. Increased R-wave amplitude in V1 and further reduce its amplitude to the V6. Duration QRS- 0,11 s. ST segment in leads III, aVR, V1 lower then isoline, inverted T waves.

Conclusion: on ECG - Signs of right ventricular hypertrophy and right atrium. Overload of the right ventricle.

ECG criteria for hypertrophy of the left atrium:

- Splitting and an increase in R wave amplitude I, II, aVL, V5, 6 (P-mitrale);

- Increase in the amplitude and duration of the second negative phase of the P wave in lead V1 (less V2) or the formation of a negative wave PV1;
- Negative or biphasic (+ -) P wave III (not a permanent feature);
- Increase in the total duration (latitude) P wave - more than 0.1s

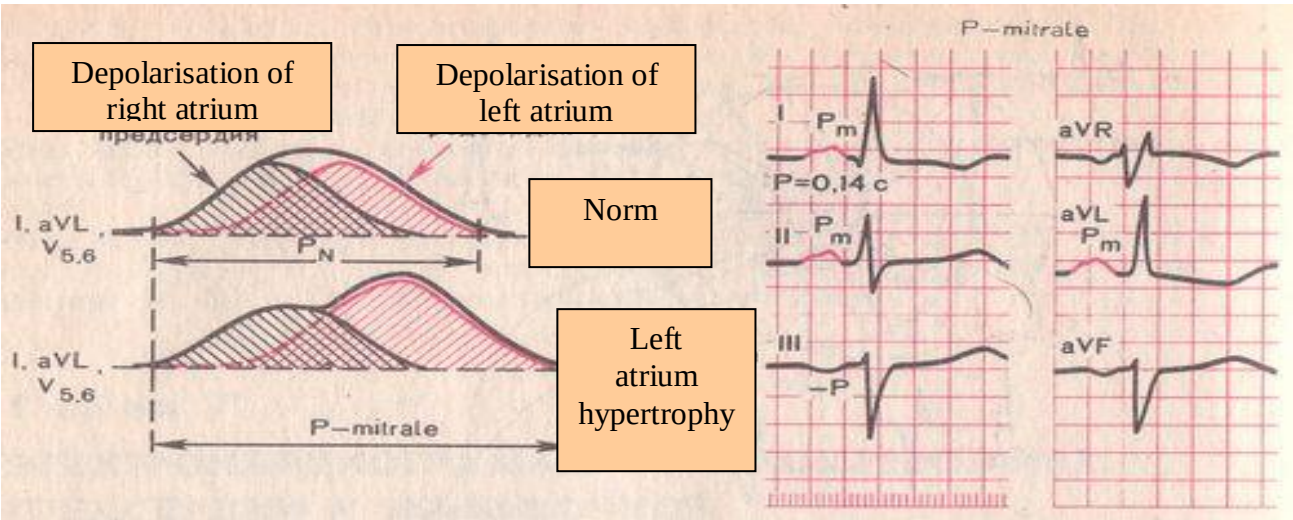


Fig. 8. ECG criteria of hypertrophy of the left atrium.

ECG criteria for hypertrophy of the right atrium (fig. 9):

- In leads II, III, aVF P wave high amplitude with pointed tip (P-pulmonale);
- In leads V1,2 P-wave (or at least its first - right atrium - phase) positive with pointed tip (P-pulmonale);
- In leads I, aVL, V5, 6 P wave of low amplitude, and aVL, may be negative (not a permanent feature);
- P wave duration exceeds 0.1 second.

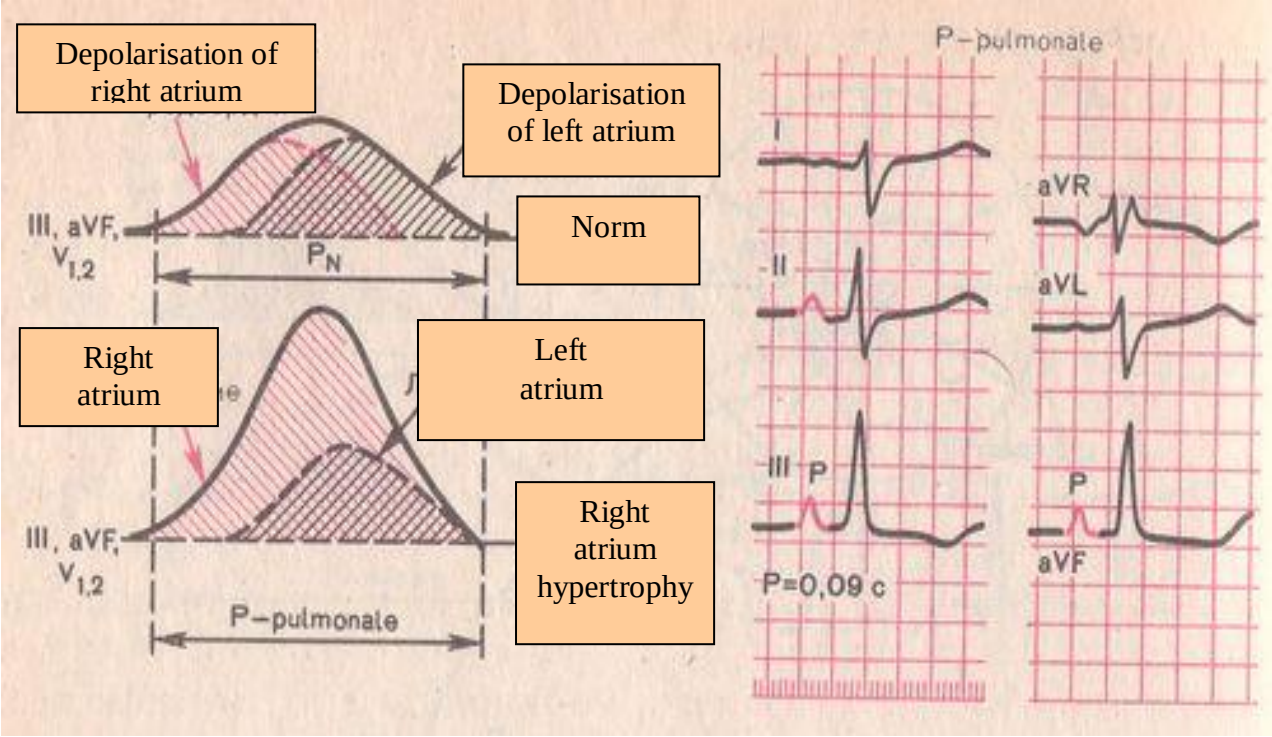


Fig. 9. ECG criteria for hypertrophy of the right atrium.

5.2. Mastering the skills of data interpretation x-ray studies of joints in patients with rheumatoid arthritis, osteoarthritis, spondylitis, gout - 5 radiographs.

Theme №№ 2-9:

Joint x-ray description:

1. Name, age of the patient.

2. General characteristics of radiographs:

- Identify research method (radiographs, radiographs with direct image magnification, fistulography, pnevmoaortography, angiography, CT, etc.).
- Determination of the region study (knee, tibia and ankle, skull, pelvis, etc.).
- Definition of the projection on the radiograph (direct, lateral, tangential, axial).

3. Study of bones:

- Position of the bones (not offset, offset);
- Bone shape (corresponding anatomical position, deformation, additional bone overgrowth, bone missing portions, etc.);
- The size of the bone (the usual lengthening, shortening, atrophy, thickening);
- Contours of the bone (flat, bloating, lack of local, roughness, etc.);
- Structure of the bone (not changed, osteoporosis, osteosclerosis, destruction, sequestration);
- Periosteal reaction (or not there as a form of periostitis).

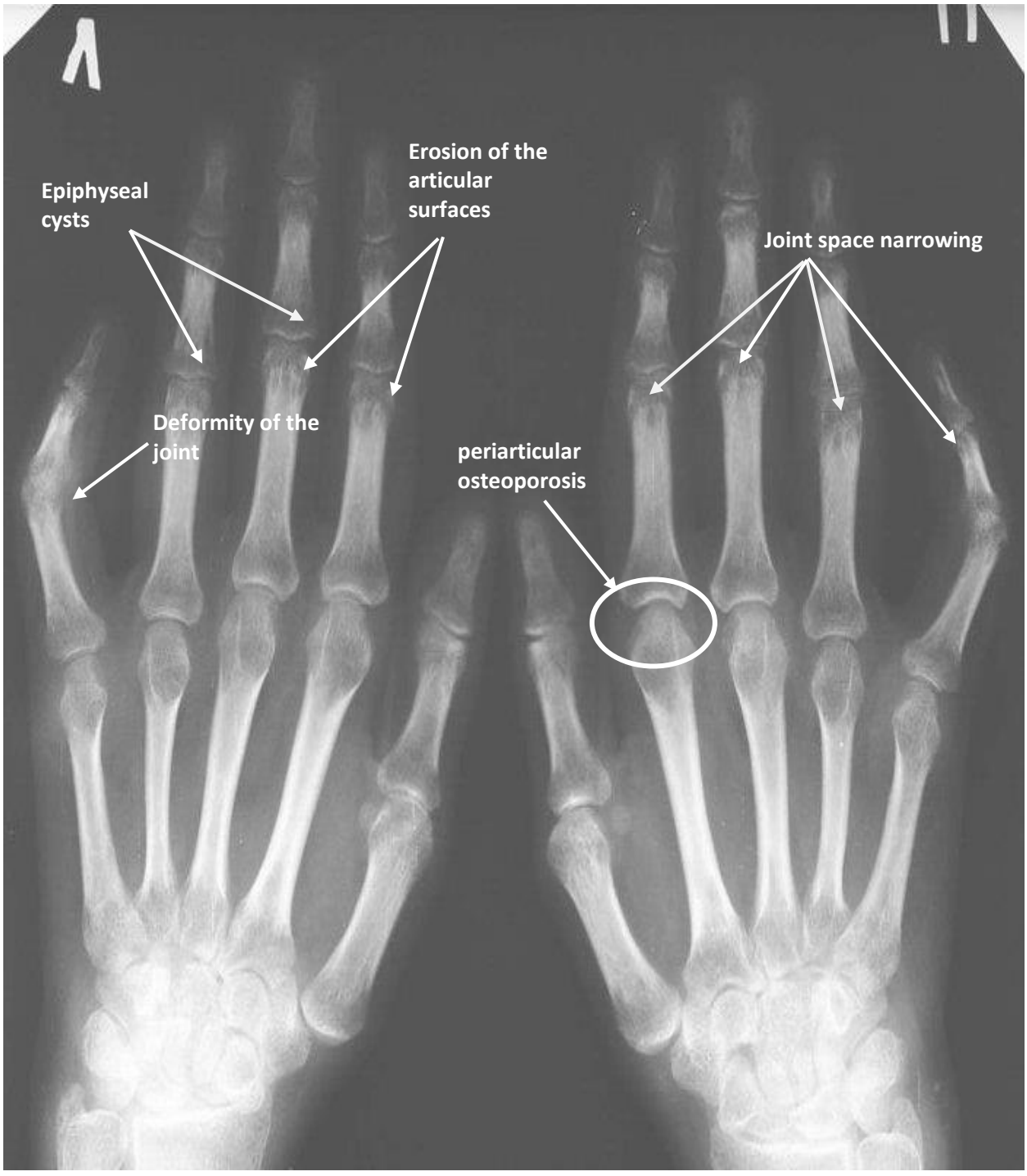
4. Joint study:

- The ratio of the articular surfaces (not broken, subluxation);
- The state of the X-ray joint space (not changed, uniform or non-uniform contraction, expansion, disappearance);
- The state of the end plates of the apophyses (not broken, thinning, thickening, destruction).

5. Study of soft tissue (no change, increase, decrease, more shade or lightening).

6. Conclusion about the nature of the pathological changes

Analysis and interpretation of radiographs of a patient with rheumatoid arthritis:



Interpretation: *On the x-ray of both hands in a direct projection noted symmetric deformation of the proximal interphalangeal joint in the form of medial deviation of the distal phalanges of the fifth fingers. Pronounced periarticular osteoporosis. Multiple cysts. Sharply narrowed interarticular intervals. Isolated erosion of the articular surfaces. Symmetric changes.*

Conclusion: rheumatoid arthritis, stage II by Shtein-Broker.

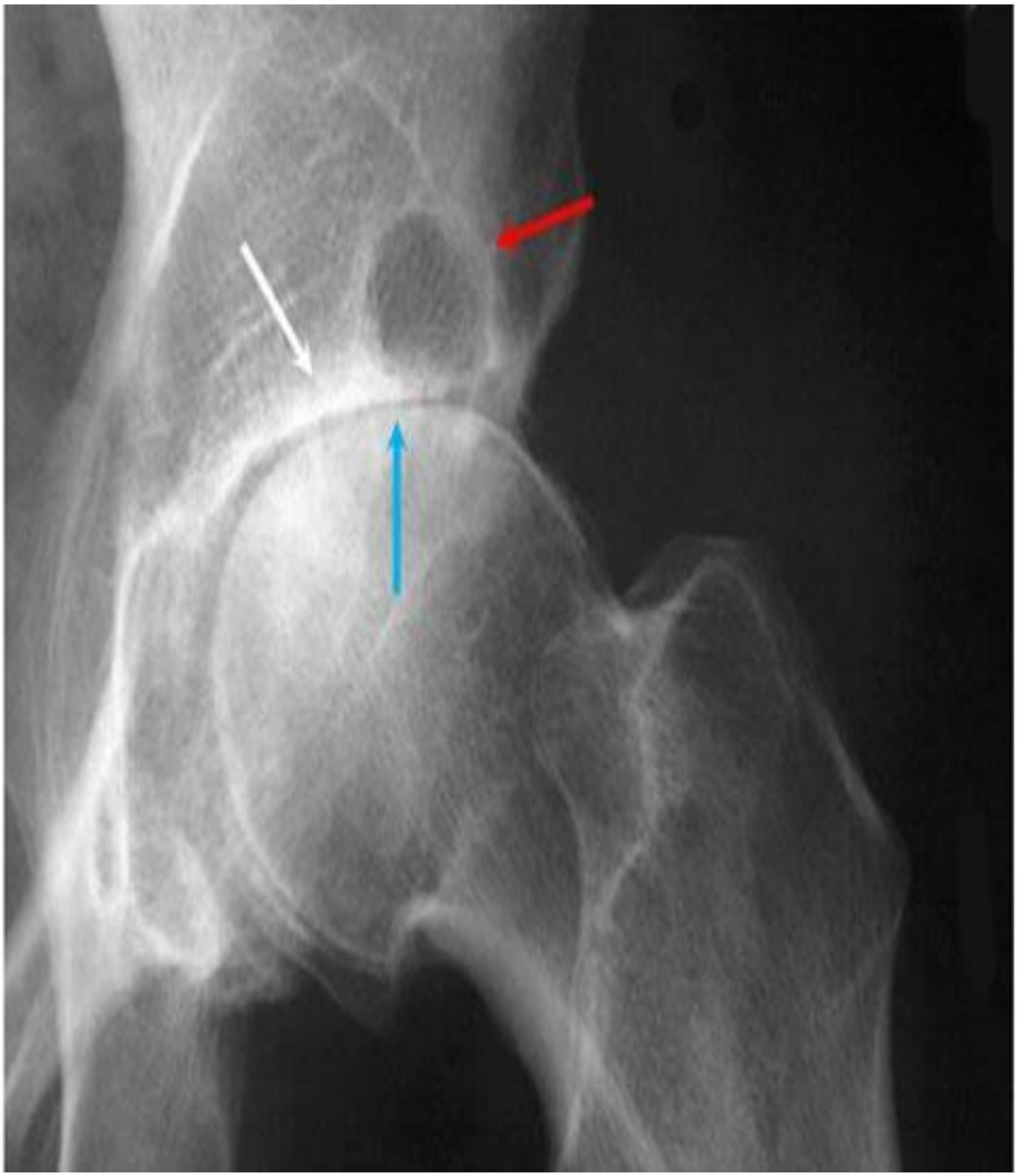
1- Deformity, 2 – ulcerention. 3 - narrowing

Interpretation:

On the x-ray of both hands in a direct projection noted deformity of the metacarpophalangeal and proximal interphalangeal joints, joint gaps deformovany and sharply narrowed multiple erosive boundary metaphyseal defects and subchondral cysts, ankylosis of the second proximal interphalangeal joint - symmetric second metacarpophalangeal joint of the left hand, third proximal interphalangeal joint of the right hand and the fifth proximal interphalangeal joint - symmetricl. Determined symmetric subluxation in the first subluxation of the metacarpophalangeal joints and proximal interphalangeal . Notes the common periarticular osteoporosis.

Conclusion: rheumatoid arthritis, stage IV by Shtein-Broker.

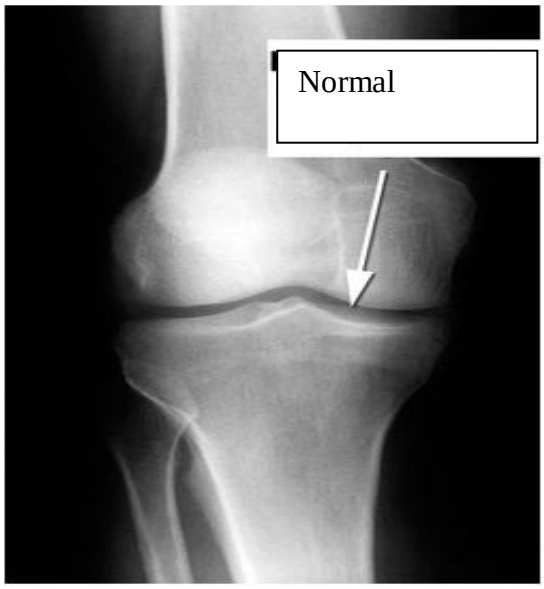
Analysis and interpretation of radiographic studies in osteoarthritis



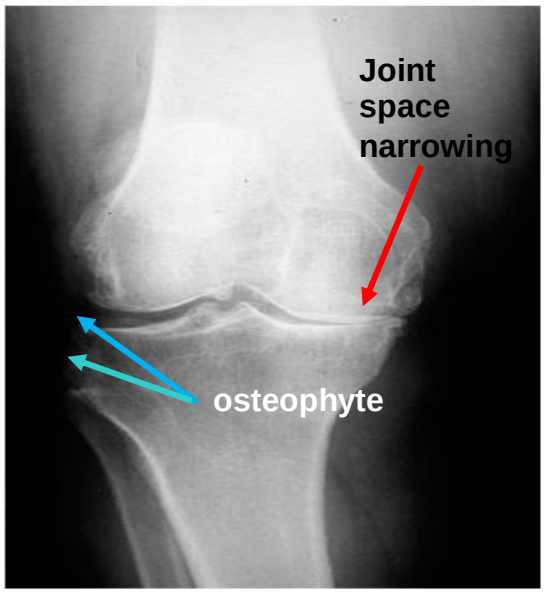
Interpretation:

On the x-ray of the left hip in a direct projection seen unequal joint space narrowing due to the upper half, resulting noted shift of the femoral head up. In the area of joint space narrowing seen subchondral osteosclerosis (marked white arrow). The femoral head is straighten (indicated by a blue arrow). Osteophytes visible along on the femoral head a. In the upper part of the acetabulum noted pseudocyst (with a red arrow).

Conclusion: coxarthrosis left hip joint.



Нормальный коленный сустав



Коленный сустав, пораженный артрозом

Interpretation: *the x-ray on the left knee in a direct projection seen unequal interarticular narrowing of the gap, the distal edge of the femur and tibia unequal, fuzzy, jagged by subchondral osteosclerosis. Marginal osteophytes seen from the medial side edge of the tibia.*

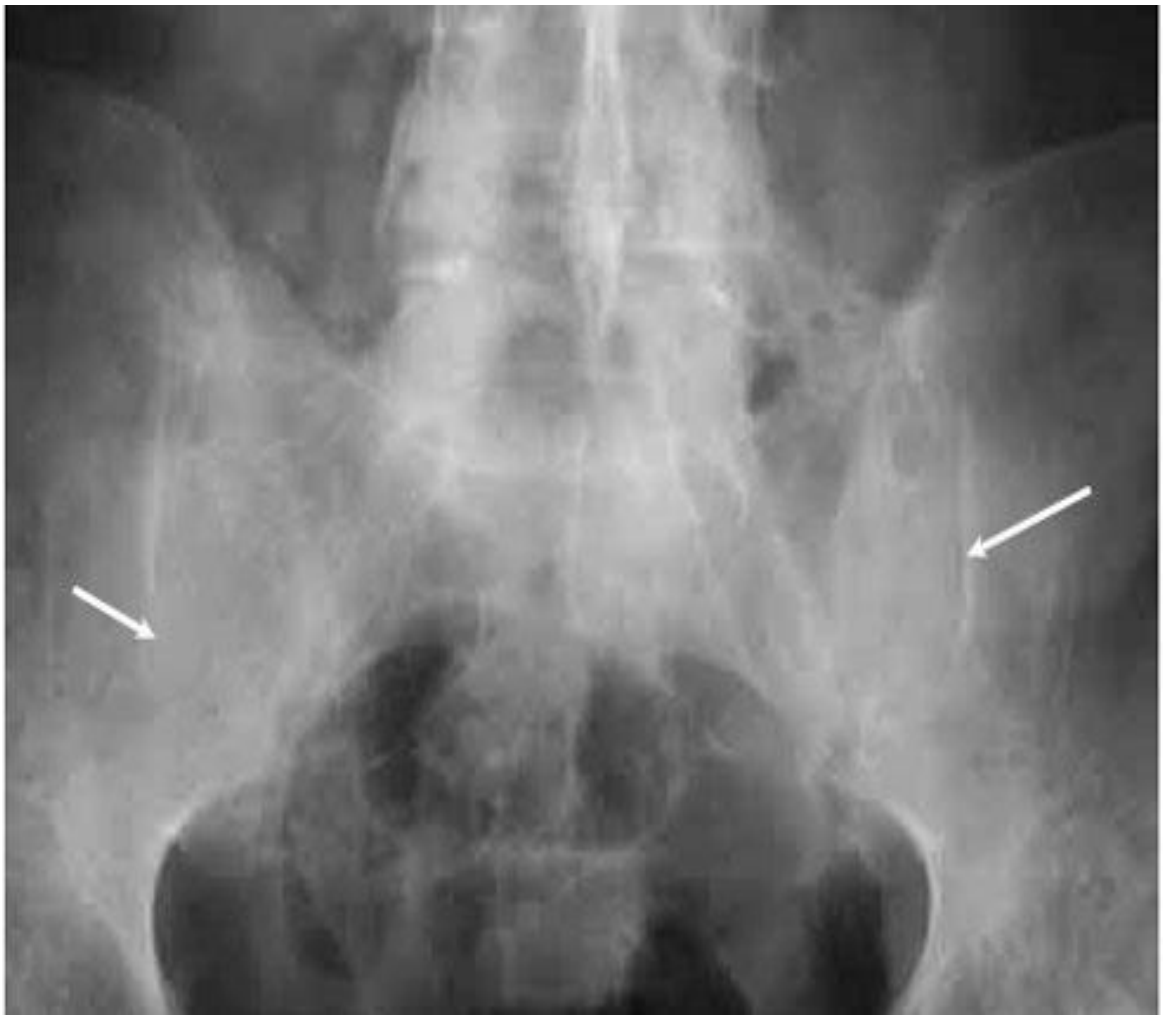
Conclusion: deformal left knee arthrosis*.*

Analysis and interpretation of x-ray in patients with gout

Interpretation: *on the x-ray of the left foot is visible destruction metatarsofalangeal joint of the first finger and _ its deformation (halus valgus) due to the deposition of uric acid masses (tophus). Marked erosive changes in the distal interphalangeal joints of the fourth and fifth toes. In the epiphysis of the distal interphalangeal joint of the fourth toe is seen round the lithening (the phenomenon of "punch"), which is bordered by the destroyed cortex (a symptom of "swelling of the bone edge").*

Conclusion: gouty arthritis.

Interpretation of radiographs of a patient with ankylosing spondylitis

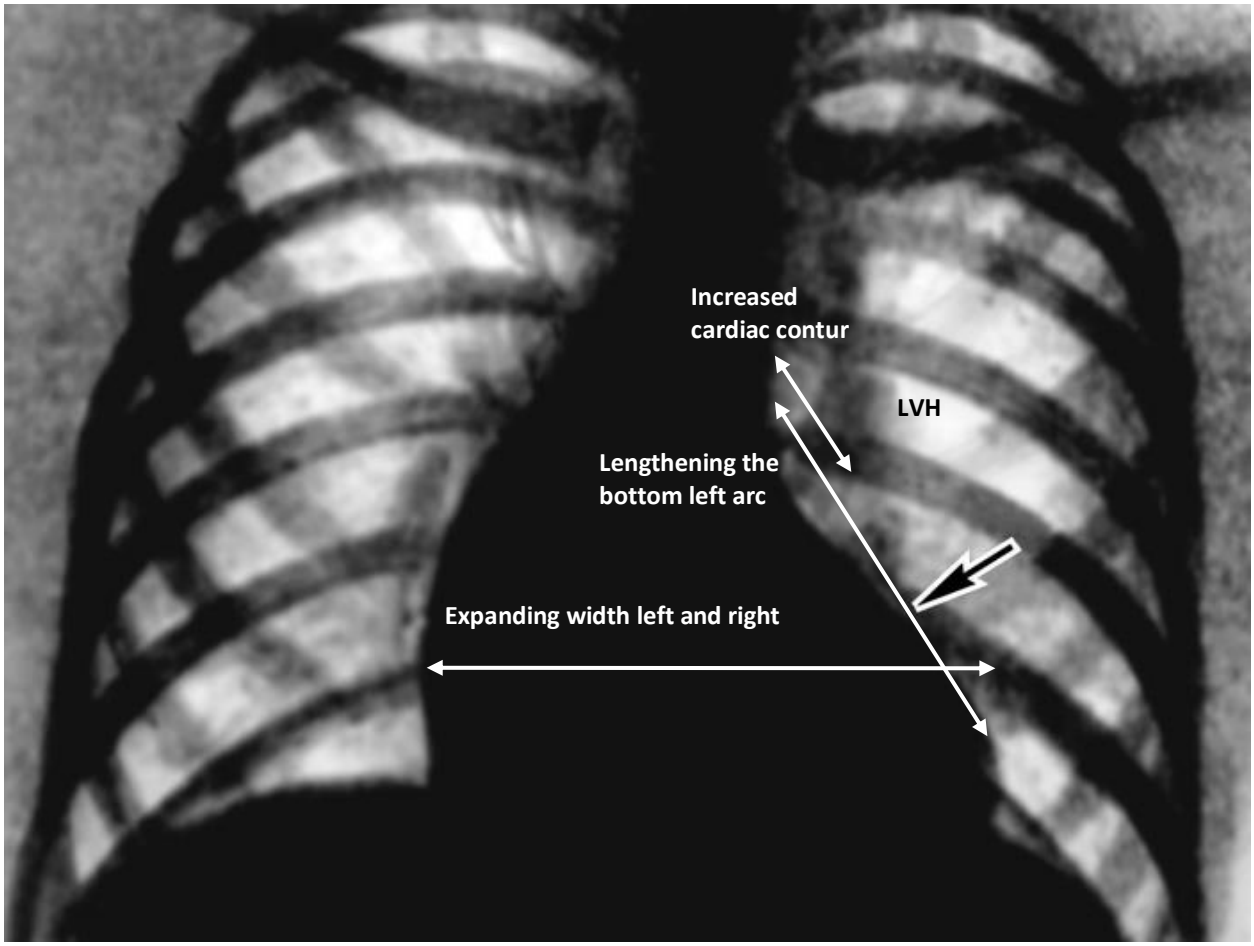


Interpretation*: on radiographs of both sacroiliac joints joint gaps are not visible - complete obliteration these joints (ankylosis).*

Conclusion: bilateral sacroiliitis radiographic stage III by Kellgren.

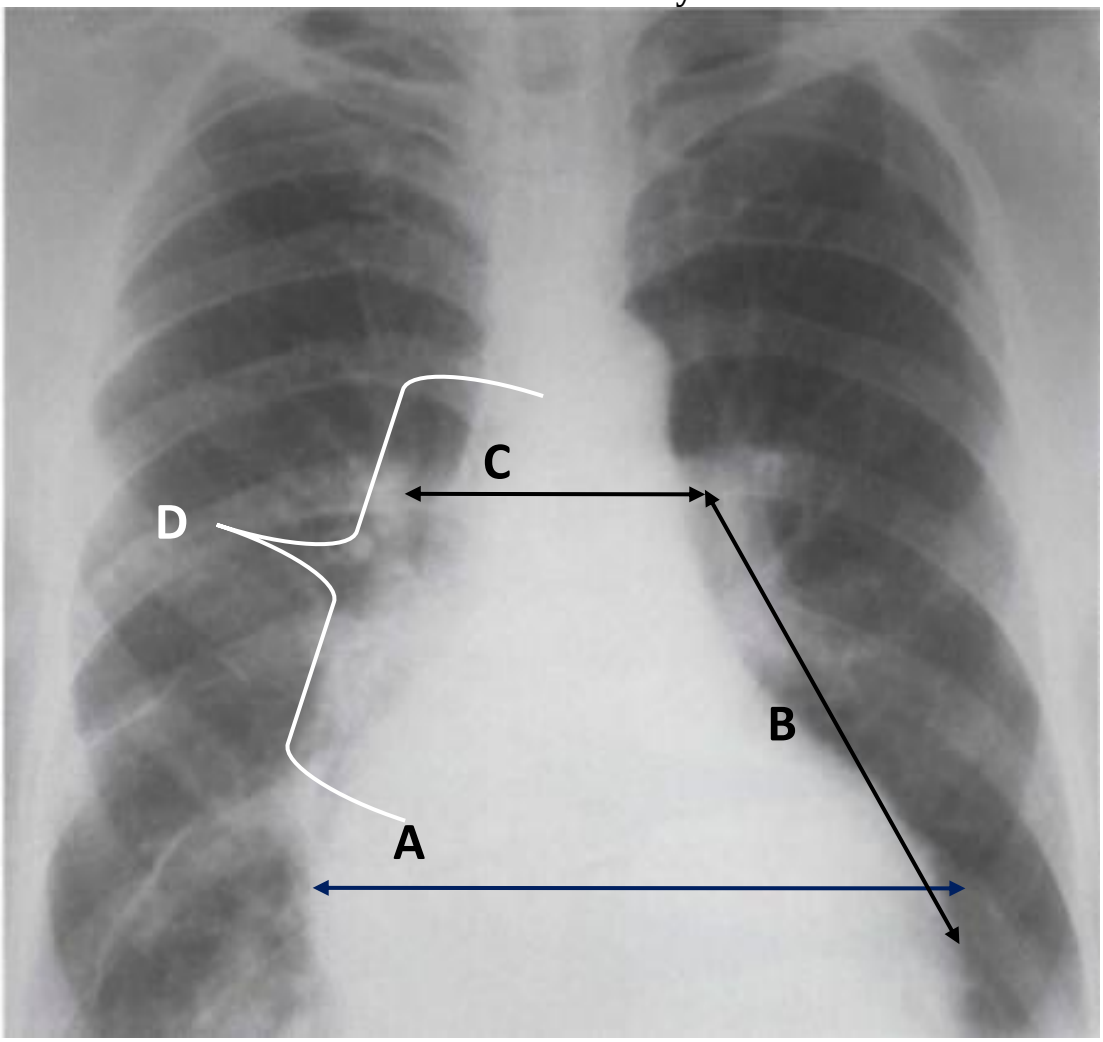
5.3 Mastering the skills of interpreting X-ray and the echocardiography with heart defects (aortic stenosis, aortic regurgitation mitral stenosis mitral insufficiency).

Analysis and interpretation of radiographs of the chest cavity of a patient with aortic stenosis



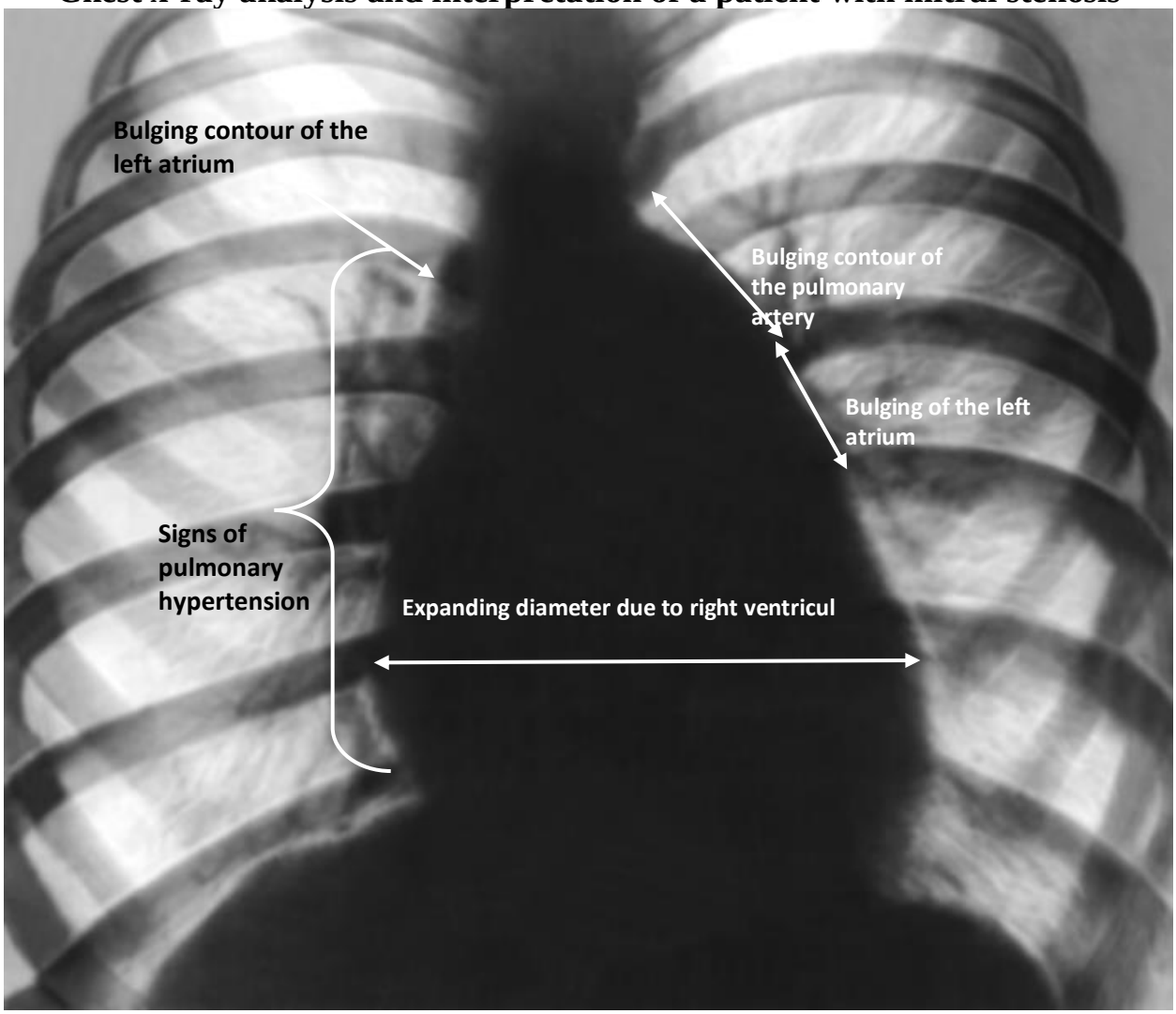
Interpretation: *on the x-ray of the chest in a straight front projection seen a marked increase in the transverse dimension of the heart to the left and a moderate expansion of the right. The rounding left heart contour, mainly in the apex of the heart (heart in the form of "sitting duck"). There is poststenotic expanding of the ascending aorta thereby observed merge right upper and lower arch. Marked elongation of the bottom left of the arc due to the hypertrophied left ventricle.*

Chest x-ray analysis and interpretation of a patient with aorticinsufficiency



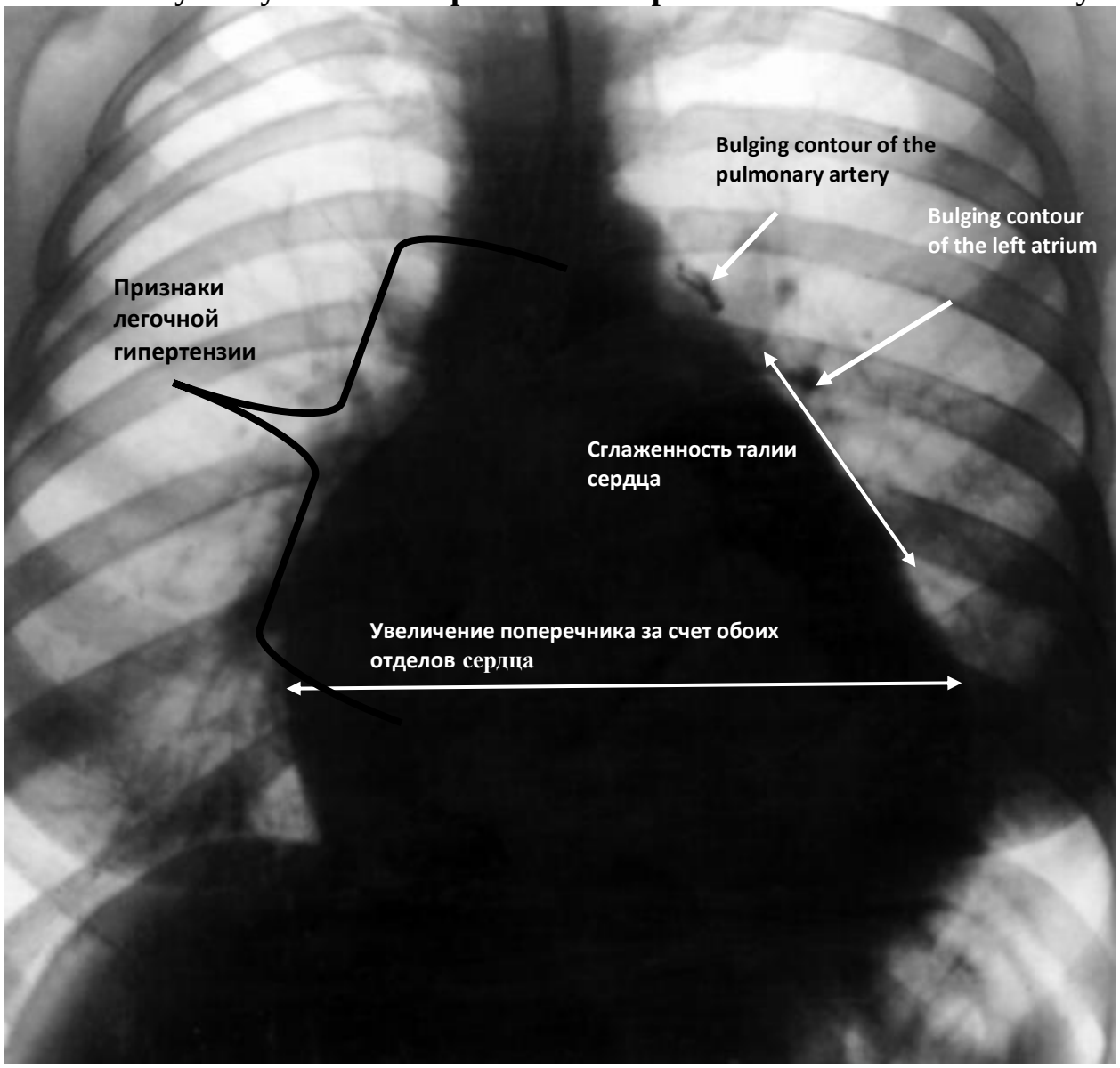
Interpretation: *On the the x-ray of the chest in a straight front projection visible significant expansion of transverse diameter of the heart to the left and to the right (indicated in Figure "A"). Left Lower elongated arc (B). Heart takes the lateral position. Strongly rounded apex of heart. Vascular bundle widened through expansion and extension of the aortic root (C). Stagnation in the pulmonary circulation (D) .*

Chest x-ray analysis and interpretation of a patient with mitral stenosis



Interpretation: *on the x-ray of the chest cavity in direct projection diameter of the right heart is widened. Heart takes a more upright position. Cardio-phrenic angle on the right is lifted up. Waist of heart smoothed. Third arch on the left cardiac shadow contour bulging due to enlarged left atrium. On the right upper contour arc visible bulging enlarged left atrium. The diameter of the left ventricle decreased. Expressed signs of pulmonary hypertension, sharply bulging arc of the pulmonary trunk, the roots of the lungs expanded, but structurally, extended shadow arterial branches are cut off, as it were (a symptom of "amputation").*

Chest x-ray analysis and interpretation of a patient with mitral insaficiency



Interpretation: *on the x-ray of the chest cavity in direct projection visible widening of diameter of heart to the left and right. The left ventricle is rounded at the bottom left ventricular arc. Rounded apex of heart and shifted to the leftCardiac waist straightened _ and has two flat bulge: the bottom relating to the left atrium and the top related to the pulmonary arteryAortic arch has a well-defined bulge. Right edge of the vascular shadows formed a wide band of the superior vena cava. Right cardiovascular angle is high. Right heart greatly rounded edge and widened dilation to right. There are signs of stagnation of blood in the pulmonary circulation (pulmonary hypertension).*

5.2.1. Echocardiographic criteria for the diagnosis of left atrioventricular hole stenosis :

- Domed diastolic bulging of the anterior leaflet of the mitral valve in the left ventricular cavity.
- Increasing the size of the left atrium (normal <4 cm) and right ventricle (normal <2.6 cm).
- Unidirectional movement front and back leaflet.Уменьшение диастолического расхождения створок клапана.
- Reduction of the area of the mitral orifice (normally 4 6cm^2), which has the form of an ellipsoid or slits.
- Calcification of leaflets fibrous ring chordal apparatus of the mitral valve
- Increase in the maximum linear velocity of mitral diastolic flow peak velocity during atrial systole is also increased.
- Increase in diastolic pressure gradient between the left atrium and left ventricle.
- slowdown velocity of diastolic filling.
- Considerable turbulence of blood flow.

5.2.2. Echocardiographic criteria for the diagnosis of mitral insufficiency:

- Separation Mitral valve ventricle during systole.
- Discordant stroke front and back leaflet.
- Hypertrophy and dilatation of the left heart (LA> 4cm; EDVLV >5.6 cm).
- Left ventricular hypertroph (LA>4cm; EDVLV>5,6cm).
- Pathological changes of the mitral valve: dence them, thickening and deformation due to
- fibrosis multiple sclerosis and calcification.
- Increase range of motion of the interventricular septum.
- Violation left ventricular systolic function.
- Registration mitral regurgitation in continuous wave Doppler.
- Turbulent systolic blood flow in the left atrium

5.2.3. Echocardiographic criteria for the aortic stenosis:

- signs of fibrosis and calcification of the aortic valve and aortic root aortic valve thickened.
- left ventricular hypertrophy (IVST in diastole >1.1cm; PWLV diastolic >1.1 cm).
- Dilatation of the left heart (LF>4см; EDVLV >5,6cm).
- Increase flow rate through the aortic valve to systole.
- Reducing differences of aortic valve leaflets in systole (normally> 18mm).
- Increase in systolic pressure gradient of the aortic valve (normally ≤ 8 mm Hg
- Reduction of the area of the aortic opening defined by the equation of continuity flow (normal 2.5-3.5 cm^2).

5.2.4. Echocardiographic criteria for aortic valve insufficiency:

- fibrosis and calcification of the aortic valve leaflets and aortic root.
- Increased systolic excursion PWLV and IVS.

  - The high-frequency diastolic fluttering of the anterior leaflet of the mitral valve.
  - The expansion of the aortic root
  - Left ventricular hypertrophy (IVST in diastole >1.1cm; PWLV diastolic >1.1cm).
  - Dilatation of the left heart. (LA>4см; EDVLV>5,6cm).
- Violation left ventricular systolic function.
- Registration aortic regurgitation in continuous wave Doppler.
- Turbulent systolic blood flow in the left ventricular cavity

Protocol of echocardiography interpetation in mitral regurgitation
Patient's surname and name: I. N. Date of birth: 23.09.1964.
Date of investigation: 12/08/2013

Left atrium (anterior-posterior size) – 4,7 sm (N<4cm).
Right ventricle (diastolic size) 2,5cm (N<2,6cm). Anterior wall – normal size (<0,5cm).
Aortic valve (separating of the valves in systole) – normal (>18mm); systolic gradient – normal (<8mmHg); valves: fibrosis–not revealed; calcification– not revealed; regurgitation – absent.
Aorta diametr (at the aortal valve level)-3,2cm (<3,5cm); aorta wall – without pathological changes.
Mitral valve: E/A - 0,7 cm (N=1-2); IVRT – 96 mc; regurgitation – II degree.
Valves changes – thickened, deformed.
Tricuspid valve: maximal regurgitation gradient 14 mm Hg (N<18 mmHg); valves changes absent.
Pulmonary artery valve - maximal regurgitation gradient–2,7 mmHg (N <8 mm Hg); type of bloodflow – normotensive.
Left ventricle - septum (in diastole)–1,12cm (N–0,6-1,1cm); posterior wall of the left ventricle (in diastole)–1,12cm (N–0,6-1,1cm); movement of the valves – without features.
Diastolic size–5,5cm (N 3,5-5,6csm); systolic size – 3,2cm (2,3-3,8cm). Ejection fraction-64% (N>55%).
Pericardium – thickness of liquid in systola along posterior wall of the left ventricle – upsent (N<0,2cm).
Conclusion*:* *valvular heart disease - mitral regurgitation, II degree. Enlarged left atrium. Diastolic dysfunction of the left ventricle, I type. Minimal hypertrophy of left ventricle myocardium.*

Protocol of echocardiography interpetation in mitral stenosis
Patient's surname and name: K.I. Date of birth: 11.02.1962
Date of investigation: 12/08/2013

This patient has atrial fibrillation.
Left atrium (anterior-posterior size) – 5,4cm (N<4cm).
Right ventricle (diastolic size)–3,0cm (N<2,6cm). Anterior wall–0,6cm (<0,5cm).

Aortic valve (separating of the valves in systole) – normal (>18mm); systolic gradient – normal (<8mmHg); valves: fibrosis–not revealed; calcification–not revealed; regurgitation – absent.
Aorta diametr (at the aortal valve level) - 3,2 cm (N<3,5cm); aorta wall – without pathological changes.
Mitral valve: E/A, IVRT – impossible to check out; regurgitation – absent.
Mitral valve area – 0,5cm^2.
Valves changes – very thickened, deformed, calcificated.
Tricuspid valve: maximal regurgitation gradient – 36 mm Hg (N<18 mm Hg); valves changes – absent.
Pulmonary artery valve - maximal regurgitation gradient – not evaluated (N<18 mm Hg); type of bloodflow – hypertensive.
Left ventricle - septum (in diastole) – 0,9cm (N 0,6-1,1cm); posterior wall of the left ventricle (in diastole)–0,8cm (N 0,6-1,1cm); movement of the valves – without features.
Diastolic size – 4cm (N=3,5-5,6cm); systolic size – 2,2 cm (2,3-3,8cm). Ejection fraction - 69% (N>55%).
Pericardium – thickness of liquid in systola along posterior wall of the left ventricle – upsent (N <0,2cm).
Conclusion: *valvular heart disease - stenosis of the mitral valve, III degree. Enlarged left atrium and right ventricle. Hypertrophy of the right ventricle anterior wall. Secondary pulmonary hypertension I stage.*

Protocol of echocardiography interpetation in aortic regurgitation
Patient's surname and name: N. G. Date of birth: 14.12.1969
Date of investigation: 12/08/2013
Left atrium (anterior-posterior size) – 4,5 cm (N< 4cm).
Right ventricle (diastolic size) – 2,5 cm (N<2,6cm). Anterior wall – normal (<0,5cm).
Aortic valve (separating of the valves in systole) – normal (>18mm); systolic gradient – 9mm Hg (<8 mm Hg); valves: fibrosis – II degree; calcification – I degree; regurgitation – II degree.
Aorta diametr (at the aortal valve level) – 4cm (N<3,5cm); aorta wall – loosened, hyperechogenic.
Mitral valve: E/A - 1,6cm (N=1-2); IVRT – 68 mc; regurgitation – absent. Valves changes – absent.
Tricuspid valve: maximal regurgitation gradient – 12 mm Hg (N<18 mm Hg); valves changes – absent.
Pulmonary artery valve - maximal regurgitation gradient – not evaluated (N<18 mm Hg); type of bloodflow – hypertensive.
Left ventricle - septum (in diastole) – 1.2 cm (N–0,6-1,1cm); posterior wall of the left ventricle (in diastole) – 1,18 cm (N 0,6-1,1cm); movement of the valves – without features.
Diastolic size – 5,8 cm (N=3,5-5,6cm); systolic size – 3,8 cm (2,3-3,8 cm). Ejection fraction - 59% (N>55%).

Pericardium – thickness of liquid in systola along posterior wall of the left ventricle – absent.

Conclusion: *valvular heart disease – aortic regurgitation, II degree. Enlarged left atrium and left ventricle. Concentric hypertrophy of the left ventricle myocardium I degree. Enlargement of the aorta root, signs of aortitis. Diastolic dysfunction of the left ventricle, II type.*

Protocol of echocardiography interpetation in aortic stenosis

Patient's surname and name: P. E. Date of birth: 09.11.1979

Date of investigation: 12/08/2013

Left atrium (anterior-posterior size) – 4,5 cm (N<4cm).

Right ventricle (diastolic size) – 2,5 cm (N<2,6cm). Anterior wall – normal (<0,5cm).

Aortic valve (separating of the valves in systole) – 11 mm (>18mm); systolic gradient – 48mm Hg (<8 mm Hg); valves: fibrosis – II degree; calcification – I degree; regurgitation – absent.

Aorta diametr (at the aortal valve level) - 3.5cm (N<3,5cm); aorta wall – thickened.

Mitral valve: E/A – 0,7 cm (N=1-2); IVRT – 102 mc; regurgitation – absent.

Valves changes – absent.

Tricuspid valve: maximal regurgitation gradient – 14 mm Hg (N<18 mm Hg); valves changes – absent.

Pulmonary artery valve - maximal regurgitation gradient – not evaluated (N<18 mm Hg); type of bloodflow – hypertensive.

Left ventricle - septum (in diastole) – 1.32 cm (N–0,6-1,1cm); posterior wall of the left ventricle (in diastole) – 1,3cm (N 0,6-1,1 cm); movement of the valves – without features.

Diastolic size – 5,0cm (N=3,5-5,6cm); systolic size – 3,2cm (2,3-3,8 cm). Ejection fraction - 70% (N>55%).

Pericardium – thickness of liquid in systole along posterior wall of the left ventricle – absent.

Conclusion: *valvular heart disease – aortic stenosis, II degree. Concentric hypertrophy of the left ventricle myocardium II degree. Enlargement of the left atrium. Diastolic dysfunction of the left ventricle, I type.*

5.4. Learn how to analyze laboratory data (complete blood count, total protein and protein fractions, creatinine, uric acid of blood blood electrolytes immunological markers acute phase blood markers serological studies in autoimmune processes, laboratory parameters of the functional state of the liver and kidney coagulation system blood) the determination of the presence of non-specific signs of inflammation, specific markers.

Themes 1-9.

5.4.1. Lead clinical-laboratory measures of inflammatory activity in acute rheumatic fever.

Patient 26 years after 2 weeks of undergoing follicular angina complains of pain in the right knee, shortness of breath, palpitations, increased body temperature to 37.8^0C. Laboratory data: Complete blood count: Hb - 130 g / l Er. - 4.2×10^{12}/L, Leukocites - $11.9x10^9$/l, ESR-30 mm/h. Acute phase proteins of inflammation: CRP++, fibrinogen - 5.7g/l seromucoid - 0.27 units, sialic acid - 0.28 units. Proteinogramma total protein - 70g/l albumin- 31.2 g/l; α2-globulins - 14,5%; γ-globulins - 22%. ASO- titre: 1:45 units.

Interpretation:

a) The patient has:

- Clinical and epidemiological syndrome (history of tonsillitis);
- Joint syndrome, which manifests itself in the form of monoarthritis;
- Syndrome of cardio-vascular system demage, indicated by complaints of dyspnea and palpitations;
- Syndrome of inflammatory lesion a low grade temperature and characteristic changes in the blood count (leukocytosis, elevated erythrocyte sedimentation rate) biochemical blood analysis (Dysproteinemia with increased globulin fraction proteins as well as increased acute phase proteins of inflammation: CRP, fibrinogen, seromucoid, sialic acids) ;
- immunological syndrome of confirmed streptococcal infection (ASO titer rises)

b) According to the clinical data (appearance of undergoing follicular tonsillitis asymmetric monoarthritis knee signs carditis of shortness of breath, palpitations) and increase the level of laboratory indicators of activity of rheumatic fever in this patient has II (moderate) degree of activity of acute rheumatic fever.

5.4.2. Lead to clinical-laboratory measures of inflammatory activity in rheumatoid arthriti.

Patient S., 48 years old, complains of pain and limitation of motion in the small joints of the hands, especially intense in the second half of the night and the morning, in the evening decreasing. Concerned about morning stiffness that lasts up to 12 hours a day. Body temperature of 37.4^0C. Objectively observed symmetrical involvement of joints of the hands, their deformation a ulnar deviation of the fingers as subluxations. By palpation - moderate hyperthermia over the skin and swelling of the joints periarticular tissues. Over the metacarpophalangeal joint, and in the area of olecranon painless palpable nodules the size of a pea. Interosseous muscles atrophied. Sick for 4 years. Laboratory data: Complete blood count: Hb - 110g/l, Er.3.2×10^{12}/L, Leukocytes $9x10^9$/l, ESR-35 mm/h. Acute phase proteins of inflammation: CRP++, fibrinogen - 6.1 g/l, seromucoid - 0.29 units, sialic acid - 0.32 units. Proteinogramma total protein - 68 g/l albumin - 30 g/l; α2-globulin -15%; γ-globulins - 23%. Reaction of Vaaler - Rouse - 1:128.

Interpretation:

a) On examination the patient has the following syndromes:

- Articular syndrome manifesting symmetric involvement of hand joints, pain and stiffness in them in the morning, deformation and subluxation of fingers;

- Extra-articular syndrome of (systemic) immunological destruction - the presence of palpable nodules over the olecranon and over the metacarpophalangeal joints in blood test - anemia.
- inflammatory syndrome - low-grade fever, in complete blood count - leukocytosis and increased erythrocyte sedimentation rate, in biochemical blood analysis - Dysproteinemia with increasing α2-and γ-globulin, as well as acute phase proteins of inflammation (CRP, fibrinogen, seromucoid, sialic acid).
- Immunological syndrome of - an increase in titer of RF in reaction of Vaaler Rose.

b) According to the clinical manifestations (presence of pain in the joints of the hands and stiffness in them , pain aggravated by movement symmetrical joint involvement, over the affected joints are painless nodules, low-grade temperature) and laboratory studies (light leukocytosis - 9 g/l, ESR-35 mm/h; CRP++, increasing the acute phase proteins, dysproteinemia, the presence of a positive response of RF in Vaaler Rose reaction). This patient has II (moderate) degree of activity of rheumatoid arthritis.

5.4.3. Lead clinical-laboratory measures of inflammatory activity in systemic lupus erythematosus.

30 years old female patient was admitted to the clinic with complaints of dyspnea (mixed character), stabbing pain in the heart, palpitations, disruption of the heart rithm, pain in the shoulder, elbow, knee and joints of hands, increasing the temperature to 38.7^0 C, expressed general weakness. The above complaints emerged after resting in the Crimea. An abortion in history of patient, a year ago, after which noted the appearance of arthralgia. OBJECTIVE: flushing of the cheeks, the affected joints are swollen, sharply painful on palpation, the skin -hyperemic. RR 27 per minute. On auscultation over the lower lobes of lung breath is not carried out, pleural friction rub is heard. Relative bounds heart percussion extended to the right (+1cm from the right edge of the sternum) and left (+1.5cm from the left midclavicular line), auscultation - muffled tones dramatically, heart activity by type of arrhythmia , extrasystole type, above the mitral valve - systolic murmur. BP-145/85 mm Hg, HR-100 bpm. Laboratory data: Complete blood count: Hb - 80 g/l, Er - 2.7×10^{12}/L, Leukocyte - $3.8x10^9$/l, thrombocyte – $120x10^9$/l, ESR-50 mm/h. Acute phase proteins of inflammation: CRP++++, fibrinogen - 7.5 g/l, seromucoid - 0.40 units. Proteinogramma: albumin-30%; α2-globulins-16%; γ-globulins-32%. Immunological research: LE-cells: 5:1000 leukocyte antinuclear factor - 1:128; antibodies to native DNA - 360 IU.

Interpretation:

a) On examination the patient has the following syndromes:

- articular syndrome (arthritis of the shoulder, elbow, wrist and hand joints);
- syndrome of skin destruction (erythema of the malar area);
- respiratory syndrome destruction (symptoms of exudative pleurisy);
- syndrome of cardiovascular system demage (symptoms of myocarditis);
- inflammatory syndrome (febrile, increased erythrocyte sedimentation rate, significantly elevated acute phase proteins Dysproteinemia);

– immunological syndrome destruction (presence of high titers of LE-cells, ANF, antibodies to native DNA);
– hematological syndrome (hemolytic anemia, leukopenia, thrombocytopenia).

b) *According to the clinical manifestations*of febrile fever, erythema "butterfly", acute fever, diffuse myocarditis, exudative pleurisy, anemia, leukopenia and thrombocytopenia significantly increased ESR-50 mm/h, and the availability of high titers of specific immunological markers (LE cells - leukocytes 5:1000; ANF - 1:128; antibodies to DNA-360IU) can be diagnose high (third degree) activity of systemic lupus erythematosus.

5.4.4. Lead to clinical-laboratory measures of inflammatory activity in systemic sclerosis

Patient 38 years old, female, complained of morning stiffness of hand joints, feeling of tightness of skin, difficulty in swallowing food. Disease arose after frostbite hands. OBJECTIVE: amimic face narrowing mouth erythema "pouch" on the face - telangiectasia. The tips of the fingers pale, cold to the touch. Auscultation of lungs - dry rales, heart sounds muffled, rhythm irregular accent II tone of the pulmonary artery, HR-98 bpm.

Laboratory data: Complete blood count: red blood cells - 4.7 T/L, Leukocyte - 5.0g/L, ESR-25 mm/h. Biochemical blood analysis: CRP++, fibrinogen 5.0g/l; seromucoid - 0.29 g/l. Proteinogramma: α2-globulins - 10%; γ-globulins -28%.

Interpretation :

a) This patient has such syndromes:

- Raynaud's syndrome (coldness and numbness fingertips);
- syndrome of fibrosing skin lesions (acroscleroderma and scleroderma);
- syndrome of vascular lesions (telangiectasia);
- syndrome of lung injury (fibrosis);
- Syndrome of cardio-vascular system (cardiosclerosis);
- destruction of the digestive tract syndrome (disphagial disorder).

b)Acording to the clinical picture (presence of sclerodactyly, scleroderma, Raynaud's syndrome, pulmonary fibrosis and Cardiosclerosis), moderate increase in ESR - 25mm/h, CRP++, a small increase in fibrinogen and seromucoid, dysproteinemia by increasing γ-globulins-28%, the degree of inflammatory activity can be defined as moderate (II).

5.4.4. Lead to clinical-laboratory measures of inflammatory activity in gout.

Patient 37 years suddenly at night after a birthday celebration had severe pain in the metatarsophalangeal joint of the big toe of his left foot, expressed chills. Joint bluish, increased in volume due to swelling, severe pain on palpation, swelling and redness are common to the entire foot. T - 39.2°C.

Laboratory data: Complete blood count leukocyte-15,6x10^9/l, ESR-45mm/h. Biochemical blood analysis: CRP++++, fibrinogen 6.9g/l, seromucoid - 0.38 units, sialic

acid-350 UI. Uric acid - 0.700 mmol/l. Proteinogramma: α2-globulins - 15%; γ-globulins - 30%.

Interpretation:

a) Patient`s syndromes:

- articular syndrome: acute arthritis of the first metatarsophalangeal-toe;
- Inflammatory syndrome - piretik fever, increased erythrocyte sedimentation rate, and white blood cells, acute phase proteins and globulins.
- Dismetabolic syndrome (increased uric acid).

б)Acording to the clinical (acute arthritis of the first metatarsophalangeal-toe), increasing the temperature to 39.2^0C, significant increase the level of ESR-45 mm/h, very high values of acute phase proteins (CRP++++, fibrinogen 6.9g/l, seromucoid, sialic acids, globulins), and the significant increase of uric acid level to 0,700 mmol/l is possible to establish a high degree of inflammatory activity acute gouty arthritis

5.4.5. To clinical-laboratory measures of inflammatory activity in systemic vasculitis (polyarteritis nodosa)

38 years old male complained of formication and tingling in the feet and hands, pain in the calf muscles, weight loss of 10kg in the last year, constant fever, high blood pressure. Notes presence of rash and nodules on the legs, feet and hips. Body temperature - 38.2^0C. BP180/110mm Hg. Objectively: the lower extremities seen reticular livido, hemorrhagic purpura on the lateral surface of the tibia, as well as palpable nodules of various sizes along the femoral and popliteal arteries.

Laboratory data: Complete blood count: Hb-105g/l, Er. - 3.7×10^{12}/L Leukocyte – $13x10^9$/L, thrombocyte – $100x10^9$ /l, ESR - 35 mm/h, Biochemical: blood analysis: CRP++, fibrinogen 5.2g/l, seromucoid-0.30 units, creatinine-180 μmol/l; proteinogramma: α2-globulins-12%; γ-globulins, 32%; immunogram: circulating immune complexes - 200; urinalysis: sp. gr. – 1027, protein-1.4 g/l, Leukocyte 3-5 in HPF, Eritrocytes - 15-20 in HPF.

Intrepretation:

a) Patient`s syndromes:

- Cutaneous syndrome (reticular livido, purpura and palpable nodules);
- Neurological (polyneuropathy);
- Lesions of the musculoskeletal system (myalgia);
- Renal disorders (increase in serum creatinine level and proteinuria with red blood cell in the analysis of urine);
- Hypertension syndrome (secondary outcome genesis as nephropathy);
- Weight loss;
- Inflammatory syndrome (febrile fever, increased erythrocyte sedimentation rate, and leukocytosis in the blood, increased acute phase markers in the blood and γ-globulinemiya);
- Hematological syndrome (anemia, thrombocytopenia);
- Immunological syndrome (raising the level of the circulating immune complexes in the blood).

б) Acording to the clinical picture (if the patient myalgia, neuropathy, increased blood pressure, weight loss, persistent fever, palpable nodules along the arteries and skin rash in the form of purpura and livedo) also laboratory data (increased ESR, moderate leukocytosis, mild anemia, thrombocytopenia, a moderate increase in acute phase proteins: CRP, fibrinogen, seromucoid and sialic acid, a significant γ-globulinemiya; signs of chronic renal failure: increase in serum creatinine to 180 μmol/l, proteinuria and microscopic hematuria; slight increase in CRP) patient has a moderate degree of inflammatory activity.

5.4.7. Lead to clinical-laboratory measures of inflammatory activity in reactive arthritis (Reiter's syndrome).

34 years old male complains of pain in the left sacroiliac joint and lumbosacral region of the spine, in the left knee and right ankle joints, pains in the eyes. From history we know that these symptoms first appeared five weeks after undergoing urogenital infection. Body temperature - 37.1^0C. OBJECTIVE: trophic disorders of nails, sclera injected, palpation - pain in the affected joints, left sacroiliac joint and Achilles tendon.

Complete blood count: Hb–160 g/l, Er– $4{,}5x10^{12}$/l, leukocyte– $10x10^9$/l, ESR– 25 mm/h; biochemical blood test: CRP+, Fibrinogen 4.5g/l, seromucoid-0.28g/l, seromucoid - 3.3 mmol/l; proteinogramma: α2-globulin-12%; γ-globulins-23% immunogram CIC-45%; HLAB27+; urinalysis clarity - 1020; protein – no, leukocyte - 3-6 HPF, Er. 0-1 HPF.

a) Patient`s syndromes:

- urogenital (urogenital infection in the past);
- Joint (asymmetric oligoarthritis with the defeat of the left knee and right ankle, unilateral sacroiliitis);
- Damage to eyes (conjunctivitis);
- Skin and tendons (hyponychial keratitis and Achilles bursitis);
- syndrome, inflammatory (light subfebrilitet, a slight increase in ESR - 25 mm / h, leukocytes – $10x10^9$, CRP+, acute phase proteins and globulins.
- Immunological (presence of CIC - 45% and HLAB27+).

б) Acording to the clinical picture (appearance after undergoing urogenital infection symptoms and left-hand sacroiliitis oligoarthritis with lesions of the knee and ankle joints, conjunctivitis) also laboratory data (minor subfebrilitet - 37.1^0 C, a slight increase in ESR-25mm/h, leukocytes-$10x10^9$/l, CRP+, acute phase proteins and globulins presence of CIC - 45%, and HLA B27+ the degree of inflammatory activity minimally expressed.

6. Recommended literature:

Basic:

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2. 2019 Update of the American College of Rheumatology/ Spondylitis Association of America/Spondyloarthritis Research and Treatment Network Recommendations for

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10. FitzGerald J.D., Dalbeth N., Mikuls T. et al. 2020 American College of Rheumatology Guideline for the Management of Gout. Arthritis Care & Research, 2020; Vol. 72, No. 6: P.744–760.
11. Hellmich B, Agueda A, Monti S, et al. 2018 Update of the EULAR recommendations for the management of large vessel vasculitis. Annals of the Rheumatic Diseases 2020;79:19-30.
12. Kloppenburg M, Kroon FP, Blanco FJ, et al. 2018 update of the EULAR recommendations for the management of hand osteoarthritis. Annals of the Rheumatic Diseases 2019; 78: 16-24.
13. Kolasinski, S.L., Neogi, T., Hochberg, M.C. et al. 2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee. Arthritis Rheumatol, 72: 220-233.

14. Maz M., Chung S.A., Abril A. et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. Arthritis Care & Research Vol. 73, No. 8, August 2021, pp 1071–1087
15. Nikiphorou E, Santos EJF, Marques A, et al. 2021 EULAR recommendations for the implementation of self-management strategies in patients with inflammatory arthritis. Annals of the Rheumatic Diseases 2021; 80: 1278-1285.
16. Richette P, et al. 2016 updated EULAR evidence-based recommendations for the management of gout. Ann Rheum Dis 2017;76:29–42.
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3. ABC of Rheumatology, 5th edition. Ed. by A.Adebajo and L.Dunkley. Hoboken, NJ : John Wiley & Sons, Inc., 2018. 209 p.
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5. Rheumatology Secrets, 4th edition. Ed.by S.G. West, J. Kolfenbach. Elsevier, 2020. 744 p.
6. Rheumatology: Principles and Practice. Ed.by S. Princeton. HAYLE MEDICAL, 2019. 248 p.
7. Therapeutic Guidelines Rheumatology. – Therapeutic Guidelines Limited, 2017. – 335 p.
8. USMLE Step 2 CK Lecture Notes 2017: Internal Medicine. – Kaplan Inc., 2016. – 473 p.

Approximate plane for independent preparation for writing patients history:

Basic	**Pointers**
1	**2**
Using the scheme of history to write test results of the patient with rheumatologic disorders	- Patient`s history should contain succinct description of all necessary sections with thorough description and analysis of the musculoskeletal system and disease pathogenesis - Before formulating the preliminary diagnosis should be seen and decrypt the syndromes present in the patient - In terms of examination of the patient should not only specify the name of the survey method, but also result in the expected changes in the results, or to formulate what purpose he was appointed - - List of prescription must match the shape of the stationary plate prescriptions (Regime - I, II, III, IV, V), a diet, medication appointments with the following scheme: IV , intramuscular , oral, etc., local, physical therapy, therapeutic agent written out in Latin (Form - Tab., Sol., Supp.), single dose in mg or g, the path and frequency of administration in English, all medications are prescribed by the international title - Results of inspection should include clinical interpretation with the release of laboratory and laboratory-instrumental syndromes, which will later be used to justify a clinical diagnosis - Differential diagnosis should be represented as a differential diagnosis program scheme - leading syndrome, syndrome like forms, comparison example of leading syndrome in a patient with a potentially syndrome like form - Substantiation of the clinical diagnosis for the underlying disease and its complications - Formulation of the clinical diagnosis according to the scheme - Basic disease: - Complication: - Comorbidities: - Epicrisis (must include recommendations for the correction of patient lifestyle, diet, drug treatment and its duration)

8. Materials for self-control.

8.1. Questions for self-control.

1.The main symptoms of rheumatologic diseases.
2. Basic research methods in rheumatology.
3. Acute rheumatic fever (ARF and chronic rheumatic heart disease: laboratory and instrumental methods. Criteria for the diagnosis of rheumatic fever.
4.Rheumatoid arthritis: diagnostic criteria, stage of disease systemic manifestations.
5.Systemic lupus erythematosus: diagnostic criteria.
6. Systemic scleroderma and dermatomyositis: diagnostic criteria.
7. Hemorrhagic vasculitis (Henoch-Schonlein purpura hypersensitivity vasculitis): diagnostic criteria.
8. Polyarteritis nodosa: diagnostic criteria. Differential diagnosis.
9. Osteoarthritis: diagnostic criteria.

8.2. Tests for self-control (“KROK-2” format)

Tests to the theme 1.
1. Patient 25 years old 2 weeks after pharyngitis began to complain of increasing temperature to 38 ° C, general weakness, dyspnea , swelling and pain of joints with changeable nature. OBJECTIVE: cyanosis of the lips. Pulse weak filling, rhythmic, 100bpm. Cardiomegaly (the left border of the heart +1 from midclavicular line), apex tone weakened, soft systolic murmur is heard. What is the most likely etiological factor leds to the disease process?
+ A. β-hemolytic streptococcus
B. herpes virus
C. pneumococcus
D. staphylococcus
E. Fungi
2. Female 19 years, complains of pain in the large joints of the upper and lower extremities, fever up to 38,6 ° C. 2 weeks ago, had been ill with angina. Mother suffers rheumatic heart disease. Objectively: in affected joints hyperemia, with light swelling ; t = 37,3ºC, pulse 84 bpm, BP 120/70 mmHg. Enlarged left heart border +2 cm, 1 sound on apex of the heart is weakened, systolic murmur; Hb-126g/l, L-9, 2x109, ESR-47 mm/h. ECG - regular rhythm, PQ- 0,24 ". What is the etiology of this disease?
A. Herpes simplex virus.
B. Viral and bacterial .
C. Staphylococcus aureus
+ D. Beta-hemolytic streptococcus.
E. Genetically determined.
3. In the patient on echocardiography was revealed: left atrium 5.0cm, mitral valve fibrotic changed movement valves "P-shaped" back valve - tightened to the front. What kind of change it is?
A. Mitral Valve Prolapse
B. Mitral valve insufficiency
+ C. Stenosis of the mitral valve orifice
D. Ventricular septal defect

E. Atrial septal defect
4. In a woman at the age of 55 during medical examination weakening of the Ist sound over aorta and in the same place rough systolic murmur which irradiated to carotids arterias and to Botkin's point were revealed on auscultation. What valvular heart disease may be suspected?
A. Mitral stenosis
B. Combined mitral defect
C. Mitral regurgitation
+ D. Aortic stenosis
E. Aortic regurgitation
5. Woman 42 years old was admitted to hospital with complaints on dyspnoea and palpitation on exertion. Heart borders were expanded up and to the right, loud I tone at the apex and diastolic thrill were auscultated. Liver was lowered below the costal arch by 5 sm, legs were swollen. What is the reason of heart failure?
A Mitral regurgitation
+ B Mitral stenosis
C Tricuspid regurgitation
D Tricuspid stenosis
E Ventricular septal defect
6. 28 years old patient complains on dyspnoea, irregular heartbeat. The apical push shifted to the left, weak I sound and systolic murmur on the apex were ausculatated/ What kind of valve defect is presented?
A. Aortic stenosis
B. Mitral stenosis
+C. Mitral regurgitation
D. Aortic regurgitation
E. Atrial septal defect
7. Female 34 years old after fall ill after viral infection. Pain in the interphalangeal joints and after 2 weeks in the knee joints, morning stiffness, increased body temperature to 38°C appeared. Objective: interphalangeal, metacarpophalangeal and knee joints swollen, hot to the touch and limited in motion. In the blood: ESR-45 mm/h, CRP+++, reaction Vaaler Rose 1:128. What is the mechanism of the disease in this situation?
A. Allergic
B. Metabolic
+ C. Autoimmune
D. Dystrophic
E. Degenerative

Test tasks to topic № 7
1. Patient 60 years old complains on pain in the interphalangeal joints of hands, which increases with the work. Objective: distal and proximal joints II-IV fingers are deformed, with Heberden's nodes, Bouchard, painful, with limited mobility. X-ray: narrowed joint spaces, marginal osteophytes, subchondral sclerosis. What is the most likely diagnosis?
A. Psoriatic arthritis

B. Reiter's disease
C. Ankylosing spondylitis
D. Rheumatic arthrosis
+ E. Deforming osteoarthritis
2. Patient 64 years old complains on pain in the knee joints, which occurs 2-3 hours after the walk. On examination motions in these joints are limited because of pain, crunching motion, on both hands Heberden's nodes. In history: ulcer. Which of the following drugs can be prescribed to the patient?
A. piroxicam
B. indomethacin
C. Ortophenum
D. acetylsalicylic acid
+ E. nimesulide
3. Patient 58 years old, accountant, 2 years suffering with osteoarthritis of the knees. 2 weeks treated in a hospital. Discharged in satisfactory condition with complaints on minor pain after prolonged static load. Local hyperthermia and exudative phenomenon absent in the joints. What further tactic of the patient maintaining is most appropriate?
A. Referral to medical comission
B. Holding on an arthroscopy
C. Consult a podiatrist
D. Repeated inpatient treatment
+ E. Treatment in outpatient
4. Patient 42 years old complains on pain and swelling in the joints of the hands and feet during movement and at rest, morning stiffness for three hours. Falled ill three years ago after flu. Objectively: deformation of 3-4 proximal interphalangeal joints of the right hand, swelling and limited mobility in the left wrist joint, muscle atrophy on the back of both hands. CBC: L-12,5G/l, ESR-35mm/h. On X-rays-osteoporosis. Preliminary diagnosis?
+ A. rheumatoid arthritis
B. Rheumatism, arthritis
C. deforming osteoarthritis
D. reactive arthritis
E. psoriatic arthritis
5. Male 60 years, builder, complains on pain in the knee and right hip joints, worsened on exertion. Sick for the past 5 years. OBJECTIVE: Obesity. Right knee moderately deformed. Other organs and systems revealed no pathology. CBC: L.- 8.2xG/l, ESR-15 mm/h. Uric acid-0.35 mmol/l. What is the most likely diagnosis?
+ A. osteoarthritis
B. reactive arthritis
C. gout
D. rheumatoid arthritis
E. Reiter's disease
6. Patient N. 30 years, over the last year complaining on pain in the sacrum and hip joints, pain and stiffness in the lumbar area of the spine. ESR-56 mm/h. X-ray showed signs of bilateral sacroiliitis. The patient has antigen HLA-B27. Your diagnosis:

+ A. Ankylosing spondylitis
B. Osteoarthritis
C. Rheumatoid arthritis
D. Reiter's disease
E. Psoriatic arthritis

7. Patient 56 years old, weight 110kg complained on nagging pain in the knee, ankle and hip joints that occurs when moving and at rest, worse in the evening, change of weather and during exercise, lameness when walking. Body T- 36.80C. Knee joints deformed, palpation - pain on the inner surface in the joint space region. Movements are accompanied by the crunch. What is the most likely diagnosis?
A. ankylosing spondylitis
B. gouty arthritis
+ C. deforming osteoarthritis
D. rheumatoid arthritis
E. psoriatic arthritis

8. In man, 44 years old, appeared a sudden sharp pain in the small joints of the feet, knee, fever up to 380C. These complaints emerged after a long walk in tight shoes. Objectively: swollen joints. Hyperemic skin over them, shelled. CBC: ESR - 30 mm/h, CRP+++. Levels of uric acid - 0.660 mmol/l . What is the most likely diagnosis ?
+ A. Gouty arthritis.
B. Rheumatoid arthritis
C. deforming arthritis
D. Psoriatic arthritis
E. Reiter's disease

9. Woman, 52 years old, complains on pain in the knee joints increasing in movement. She suffers for 5 years. Body temperature is normal. Crunching in the knee joints during flexion. On X-ray of the knee: narrowed joint space, subchondral osteosclerosis, osteophytes at the edges. What is the most likely diagnosis?
A. Gouty arthritis.
B. Rheumatoid arthritis .
+ C. Deforming osteoarthritis .
D. Psoriatic arthritis .
E. Reiter's disease .

Test tasks to topic №9

1. 35 years old patient admitted to the hospital with complaints on pain in the left sternoclavicular and knee joints, lower back. Acutely ill, with a temperature rising to 380C. Objective: left sternoclavicular and knee joints are swollen, painful on palpation. In CBC L.- 9,5G/l, ESR-40 mm/h, fibrinogen - 4.8 g/l, uric acid - 0.28 mmol/l. In scrapings from the urethra - chlamydia. What is the diagnosis in this case?
A. rheumatoid arthritis
B. Ankylosing spondylitis
C. gout
+ D. Reiter's syndrome
E. rheumatic arthritis

2. Youth 16 years old admitted to the rheumatology department with complaints on pain in the large joints, swelling and redness of the left knee joint, temperature 37.90C. The abovementioned complaints appeared 5 days ago, after suffering quinsy. What is the most likely diagnosis?
+ A. Reactive arthritis
B. Rheumatoid arthritis
C. Deforming arthrosis
D. Gout
E. Rheumatoid arthritis.
3. 34 years old patient complains on pain in the knee and ankle joints in motion, burning eyes and cramps when urinating. Objectively: the left knee joint increased in volume, the skin over it hyperemic, hot to the touch, movement in the joint is limited due to pain. Conjunctival hyperemia, urethral mucous and serous discharge. What type of pathogen is most likely to be determined in the study of scrapings from the urethra?
A. gonococcus
+ B. chlamydia
C. staphylococcus
D. mycoplasma
E. Trichomonas
4. 25 years old patient noted burning in the urethra, which increased when urinating. After playing football there was a sharp pain in the Achilles tendon and in right knee, it's swelling, subfebrile temperature. In the CBC was revealed: elevated ESR, leukocytosis with a left shift. The most likely diagnosis?
A. traumatic arthritis
B. tubercular arthritis
C. Rheumatic arthritis of the knee
D. rheumatoid arthritis
+ E. reactive arthritis
5. The patient, 25 years old, complains on pain in the tibial joints, increasing the temperature to 38°C, discomfort sensations in the eyes, "the eyes are full of sand." Objective: increased tibial joints, restricted movement in them. What is the diagnosis in the patient?
+ A. Reiter's disease
B. rheumatism
C. rheumatoid arthritis
D. osteoarthritis
E. gout
6. The patient, 25 years old, complains on pain in the tibial joints, increasing the temperature to 38 °C, discomfort sensations in the eyes, "the eyes are full of sand." Objective: increased tibial joints, restricted movement in them. Which examinations should be hold on?
A. Complete blood count
B. Reaction Vaal – Rouse
+ C. Urethral swab for chlamydia

D. proteinogramma
E. immunogram
7. A patient 40 years old is ill for 8 years. Complains on pain in the lumbar area during exercise, in the cervical and thoracic region, especially when coughing, pain in the right hip and knee joints. Objectively: the trunk is fixed in position forward inclination with lowered head, atrophy of the gluteal muscles. X-ray of the spine: osteoporosis of the vertebras, ossification of the longitudinal ligament. Which one is most likely diagnosis?
+ A. ankylosing spondylitis
B. tubercular spondilitis
C. psoriatic spondyloarthropathy
D. Spondyloarthropathy on the background of Reiter's disease
E. osteochondrosis
8. Female 22 years old admitted to the rheumatology department with complaints on pain in the joints, swelling of the large joints, redness of right ankle, weakness, T-39,60C. The abovementioned complaints appeared 3 days before admission to the hospital, after a sore throat. ESR-32mm/h. Your preliminary diagnosis?
A. Gout
B. Rheumatoid arthritis
C. deforming arthrosis
D. Scleroderma
+ E. Reactive arthritis
9. 17 years old young man went to the doctor complaining on pain and swelling in the right ankle. There was no Injury. Two weeks ago was treated for conjunctivitis. On examination - right ankle enlarged due to edema, hyperemia of the skin, the local temperature is increased. Active movements are limited, painful. In the CBC: leukocytes– 11G/l, ESR -24 mm/h. In general analysis of urine: protein - 0.088 g/L, WBC 10-12 in the field of vision, RBC-0-1 in the field of vision. Select the most likely diagnosis.
A. gouty arthritis
B. rheumatic arthrosis
C. rheumatoid arthritis
+ D. reactive arthritis
E. deforming arthritis
10. 35 years old patient admitted to the hospital with complaints on pain in the left sternoclavicular and knee joints, lower back. Acutely ill, with a temperature rising to 380C. Objective: left sternoclavicular and knee joints are swollen, painful on palpation. In CBC: L.- 9,5 G/l, ESR-40 mm/h, fibrinogen - 4.8 g/l, uric acid - 0.28 mmol/l. In scrapings from the urethra - chlamydia. Which group of antibacterial drugs will be most effective in this case?
A. semisynthetic penicillins
B. Cephalosporins
+ C. Tetracyclines
D. Fitouroantiseptics
E. Aminoglycosides

11.Youth 18 years admitted to the rheumatology department with complaints on pain in the large joints, swelling and redness of the left knee joint, discomfort when urinating, "dry eyes", increasing of the temperature to 37.9°C. He told that he had unprotected sex with three women. What is the most likely diagnosis?
+ A. Reiter's disease.
B. Rheumatoid arthritis.
C. Deforming arthrosis .
D. Gout .
E. Rheumatoid arthritis.
Test tasks to topic №10.
1. In a patuient with gout appeared an acute arthritis attack of 1st metatarsophalangeal joint of the right foot. Joint is cyanotic, very painful, swollen . In CBC: L. 17 G/l, ESR 42 mm/h. Choose the most effective option for initial therapy:
A. delagil
B. ethacrynic acid
C. dimeksid
D. betamethasone
+ E. colchicine
2. 49 years old patient complains on pain and swelling of the small joints of the right foot, redness of the skin over them, rise of body temperature to 38°C, appeared three days ago. Over the past 6 years had several attacks of arthritis, which lasted up to 7-10 days. In history: chronic tonsillitis. On examination: metatarsophalangeal joints of the right foot increased in volume, enlarged, movement of the joints very painful. Other joints without pathological changes. ESR-26 mm/h. The mechanism of development of this disease ?
A. Decreasing of chondroitin sulfate
+ B. Increased uric acid biosynthesis
C. Antibodies to native DNA
D.Overproduction of autoantibodies to collagen
E.Immune response to streptococcal infection
3. Male 55 years old admitted to the hospital due to attacks of renal colic, recurrent throughout the year. Objectively: in the ears and right elbow nodules are covered with thin shiny skin. Ps-88 bpm. BP-170/100 mm Hg. Positive Pasternatsky symptom from both sides. Which lab test is necessary for determining the diagnosis?
+ A. uric acid
B. urine sediment
C. lactic acid
D. reumatoid - factor
E. ESR
4. Female 27 years old admitted to the rheumatology department with complaints on joint pain, swelling and redness of the right ankle, weakness, T37,80C. The abovementioned complaints appeared 3 days before admission, after undergoing intestinal infection. ESR-32 mm/h. Your preliminary diagnosis?
A. Gout .
B. Rheumatoid arthritis.

C. deforming arthrosis
D. Scleroderma .
+ E. Reactive arthritis .
5. A patient with chronic gout after diet violation began to "feel" the knee and the 1st metatarso- phalangeal joints. Visually these joints minimum hyperemic not swollen. In the CBC: L. -7.2G/l, ESR 12 mm/h. Select the planned therapy:
A. delagil
+ B. allopurinol
C. dimeksid
D. betamethasone
E. colchicine
6. A patient 58 years old with chronic gout after diet violation appeared "disturb" in the 1st right metatarso- phalangeal. Visually, this joint is not changed. Uric acid - 480 mmol/l. Creatinine clirens - 68 ml/min. Daily excretion of uric acid - 246 mmol/L/ day. Urolithiasis missing. Select the planned therapy :
+ A. probenecid
B. diclofenac
C. dimeksid
D. betamethasone
E. colchicine

9. Individual assignments for students relating to theme for classes.

9.1. Selectable themes:

- independently selected topics respectively Rheumatology chapter;
- offered by lecturer.

9.2. Form of individual work performance:

- review of the actual problem;
- thematic analysis of clinical patient with nontypical or severe disease;
- review of new methods of diagnosis and treatment in rheumatology;
- review materials rheumatology conferences;

9.3. Presentation forms:

- A report for student conference of the Department clinic, etc.

Methodical recommendation is made by: professor Tykhonova S.A.

Updated by ass. professor Kholopov L.S.