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Clinical and functional characteristics of the cardiovascular system involvement in various variants of ankylosing spondylitis

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Annation: Inflammatory and degenerative spinal diseases are one of the pressing problems of modern rheumatology due to the high prevalence, frequent incidence of diseases of young and middle-aged men, frequent lesions of internal organs, early disability of patients, socio-economic damage caused to the patient and society.

Since 1892, when V.M.Bekhterev described the main clinical manifestations of the disease and suggested that it should be singled out as a separate nosological form, researchers from the leading countries of the world have achieved certain success in studying its nature, mechanisms of development, as well as treatment and rehabilitation of patients. Nevertheless, ankylosing spondylitis (AC), which is regarded as a disease of the musculoskeletal apparatus, affecting mainly young men, remains one of the leading socio-economic problems of our time, leading to disability in working age.

Keysword: concentrıc hyper, left atrium, aortic root, resistance index, common carotid artery, diastolic dimension, miocardial wall index.

Contraindications for inclusion in the study were seropositive arthropathies (presence of rheumatoid or antinuclear factors), absence of radiologically confirmed signs of sacroileitis and/or ankylosing spondylitis, other arthritis without damage to the joints of the spine and sacroiliac joints, presence of severe systemic manifestations of the underlying disease, endocrine pathology, chronic obstructive pulmonary disease. Patients with a history of cardiovascular disease (coronary heart disease, cerebrovascular disease, peripheral artery disease, or heart failure) were excluded. This also applied to type 2 diabetes mellitus or patients with two levels of glucose in fasting plasma on different days at the time of diagnosis or for a long period of observation> 125 mg/dL, as well as patients with chronic kidney disease (glomerular filtration rate <60 ml/min), as they are considered to have a high or very high risk of cardiovascular disease according to current recommendations.

Anamnesis of pelvic bone lesions, synovitis, enteritis, extra-articular manifestations (anterior uveitis, psoriasis and inflammatory bowel disease), syndesmophytes, and HLA-B27 status were also assessed. In addition, hereditary history of early cardiovascular disease in close relatives, abdominal circumference, body mass index, blood pressure during the study and history of traditional cardiovascular risk factors (smoking, hypertension, dyslipidemia and obesity) were collected.

Patients receiving glucocorticoids were not included in the study.

The average age of the patients was 35.6±2.3 (including 49 men, 6 women, the average age of men was 35.5±3.1, and 36.6±1.2 in women)

The following general clinical examination methods were used to solve the set tasks: anamnestic, clinical and rheumatological examination and laboratory instrumentation (general blood analysis, general urine analysis, pelvic bone radiography, rheumofactor, C-reactive protein, Streptosine O antibodies, presence of HLA-B27, electrocardiogram, echocardioscopy, ultrasound examination of kidneys and liver, chest P-graphy). All patients were classified by gender. All patients were assessed for age, age, age of the disease, baseline and anti-inflammatory drugs, blood pressure, pulse rate, form and activity of the disease, and FNS.

Age characteristics of patients with ankylosing spondylitis

№/№	Age	Female		Male		Total	
		abs	%	abs	%	abs	%

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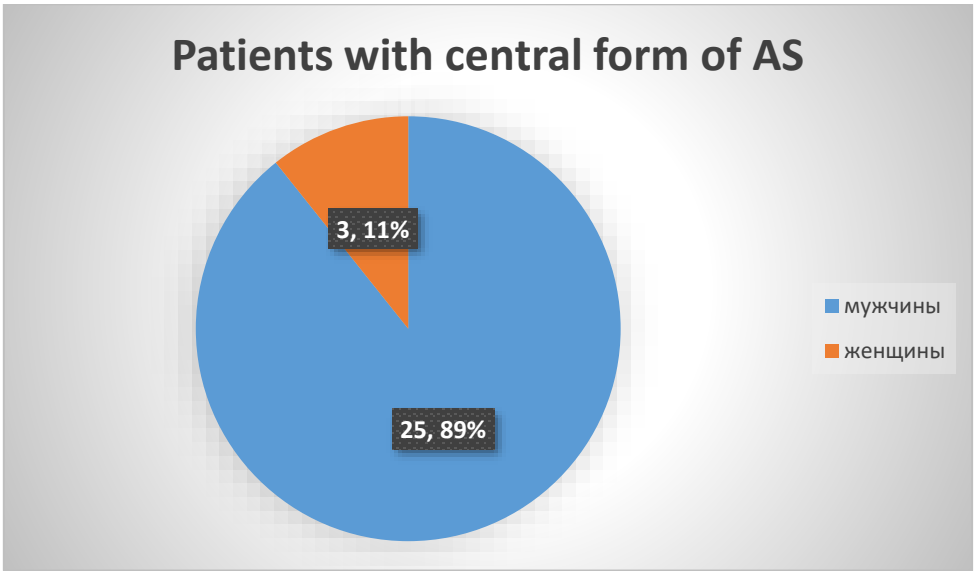
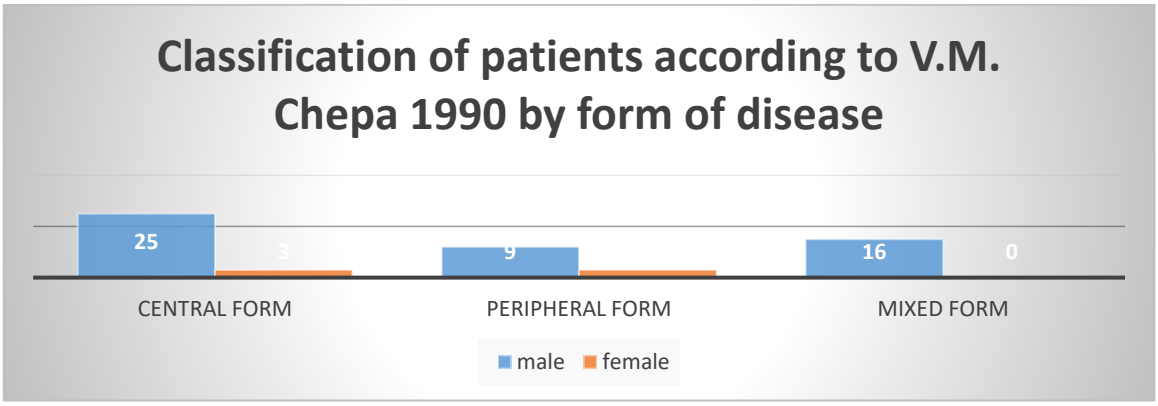
1	<30	0	0 %	10	18,8%	10	18,8%
2	30-40 years old	5	9,4%	25	47,1%	30	56,6%
3	>40	1	1,8%	12	22,6 %	15	24,5%
Total		**6**	**11,3 %**	**47**	**88,6%**	**55**	**100%**

As can be seen from this table, men and women aged 30-40 years made up the largest part of the total population of patients. This is another indication of early disability and the need for an in-depth clinical examination.

All patients were assessed for the form of the disease according to the 1990 Chepa V.M. classification. Patients with AC were classified into central, peripheral and mixed AS forms. In total 28 (51%) patients had a central form of AS. Of these, 25 were men and 3 were women.



Peripheral form of AS was observed in 11 (20%) patients. Of these, 9 were men and 2 were women. Mixed form of AS was observed in 16 (29%). The morbidity of women with this form of the disease was not observed.



Patients with AS were separated by duration of the disease: up to 1 year, from 1 to 5 years, from 5 to 10 years, more than 10 years (Table 2.2).

Table 2.2
Characteristics of patients with ankylosing spondylitis by disease duration

№/№	Duration of the disease	Male		Female		Total	
		abs	%	abs	%	abs	%
1	Up to 1 year	1	1,8%	-	-	1	1,8%

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2	1-5 years	12	21,8 %	3	5,4 %	15	27,2%
3	5-10 years	12	21,8%	-	-	12	21,8 %
4	More than 10 years	24	43,6%	3	5,4%	27	49%
Total		**49**	**89 %**	**6**	**10,8%**	**55**	**100%**

Patients with more than 10 years of illness were the largest group of patients in the surveyed population (49%), followed by AS patients with 1-5 years of illness (27.2%). If we take up to 5 years in total, this figure was 29%. Patients with a prescription period of 5 to 10 years or more were the same among women and those with a prescription period of more than 10 years prevailed among men.

In the study of the functional capabilities of the patient in terms of functional insufficiency of joints (FIJ), the following is noted according to Table 2.6.

Table 2.6

Characteristics of patients with ankylosing spondylitis by the state of functional insufficiency of joints (FIJ)

№/№	The level of FIJ	female		male		Total	
		abs	%	abs	%	abs	%
1	FIJ I	-	-	-	-	-	-
2	FIJ II	1	1,8%	40	72,7%	41	74,5%
3	FIJ III	5	9%	9	16,3%	14	25,4 %
Total		**6**	**9,8%**	**49**	**89%%**	**55**	**100%**

As it can be seen from the table above, among the surveyed 55 AS patients, the patients of the FIJ of II degree prevailed - those who lost their professional abilities.

Taking into account that young people prevailed among the patients surveyed, we can once again see the social significance of AS. The degree of disability of AS patients in the sexual section practically differed.

As it is known, the degree of FIJ in AS is mainly conditioned by the degree of radiological changes on the part of joints as a whole (Table 2.7).

It has been established that in the early stage of AS up to 1 year radiological examination of joints may not reveal initial changes in the affected joints [14]. In this connection, methods of magnetic resonance imaging (MRI) have become widely used.

Out of all examined patients more than a half of the part (66,0%) had radiological changes of the II stage that is also connected with the specificity, prevalence with less limitation of AC. Also, stage III of radiological changes prevailed to the same extent in women and men. X-ray III and IV degrees were noted only in 9.4% of patients with AS.

Background indices of the examined population of AS patients corresponded to earlier (initial) changes of morphological-structural character.

In addition to these, 4 clinical indicators of disease activity (Bath Ankylosing Spondylitis Disease Activity (BASDAI) and Ankylosing Spondylitis Disease Activity Score (ASDAS)), functional index (Bath Ankylosing Spondylitis Functional Index (BASFI)), metrological index (Bath Ankylosing Spondylitis Metrology Index (BASMI)) were evaluated in all patients

Included electrocardiographic examination of the heart in 12 common leads. ECG was performed with the help of "Cardiolite AT 1" apparatus of "Shiller.uz" company (Switzerland). Voltage characteristics characteristic for left ventricular hypertrophy were determined:

1) Voltage criterion or Sokolov-Layon index (S1+Rv5>3.5 mW);

2) internal deviation time index;

In addition, special attention was paid to conductivity and heart rhythm disturbances: synoatrial blockade, atrioventricular blockade (A/v), blockade of the left leg of the Hıs bundle and complete blockade of the right leg of the Hıs bundle, extrasystole, tachy- or bradyarrhythmia.

The radiological stage of the disease was determined (by Steinbroker) by the radiography of the pelvic and spine bones.

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All patients underwent echocardiographic (ECHOX) examination on the MEDISON 8000 LIGHT ultrasound diagnostic apparatus (South Korea) with a 2.4 mHz cardiac sensor in accordance with the recommendations of the American Association of Echocardiography, in one-dimensional and two-dimensional mode in standard echocardiographic positions [13].

When measured in one-dimensional mode, the measurements were performed via parastern access along the long axis of the left ventricle in accordance with the recommendations of Penn Convention Method [16]. The following parameters of intracardiac hemodynamics were studied: the end diastolic and systolic dımensıons of the left ventricle (EDDLV, ESDLV mm), thickness of the interventricular septum (IVCT mm) and the posterior wall of the left ventricle (PWTlv mm) into the diastole. The indices of end diastolic and end systolic dımensıons of LV (EDD, ESD ml.) were calculated by L.E. formula. Teichholtz et al. [13].

In order to assess the diastolic filling of the left ventricle, a transmitral flow was recorded. The following parameters were considered: peak velocity of early diastolic filling of the left ventricle (velocity E) (m / s); peak speed of late diastolic filling (speed A) (m / s); peak integral of early diastolic filling (integral E) (m); peak velocity integral of late diastolic filling (integral A) (m); the ratio of the integral A to the integral E (integral A / E) (unit); the ratio of the integral E to the general integral of the transmitral flow (integral E / general integral) (units); the ratio of the integral A to the general integral of the transmitral flow (integral A / general integral) (unit); isovolumic relaxation time (IST) (ms); end-diastolic pressure in the LV cavity (EDP) (mm Hg) [20]; end diastolic straın of the LV wall (EDSW) (dyne / cm²) [12].

In addition, the presence (if any) of areas of local myocardial contractility (dyskinesia, akinesia, etc.) of the myocardium, ınduratıon of IVC, papillary muscle dysfunction, mitral valve prolapse, valve changes, the presence of rheumatic nodules, and other changes were determined.

Determination of the functional state of the endothelium

Ultrasound examination of vessels of the extracranial section of the carotid and vertebral arteries, brachial artery was performed on a SoneScapeSSI 5000 duplex apparatus (China) according to the method of D. Celermajer et al. [6,8] with a linear sensor 7.11 MHz, convex sensor 3.5 MHz, cardiac sensor 2.5-5.0 MHz with determination of the tortuosity of vessels, linear velocity of blood flow, with analysis of the structure of the walls of blood vessels, the thickness of the intima-media complex (TIM), the presence of atherosclerotic plaques (AP) and the degree of stenosis. The normal value was considered to be TIM no more than 0.9 mm. During research, B-mode, color and energy Doppler modes were used.

Estimation of the intima-media complex thickness.

Measurements of the thickness of the intima-media complex (TIMC) and the resistance index (RI) of the common carotid artery (CCA) were carried out in B-mode, using the color duplex scanning method. TIMC was measured 1 cm from the start of carotid bifurcation along the posterior wall of the CCA [19]. The transverse (diastolic) diameter of the CCA was determined with optimal visualization of the near (front) and far (posterior) walls of the CCA 2-3 cm proximal to the carotid bifurcation.

In the 55 examined patients with AS, the clinical features of the course of AS were studied. According to the results of the analysis, it has been found out, that only 30% of patients took basic drugs on a regular basis. And 70% of patients for various reasons did not take basic drugs on a regular basis. And non-steroidal anti-inflammatory drugs were taken only to stop the emerging pain.

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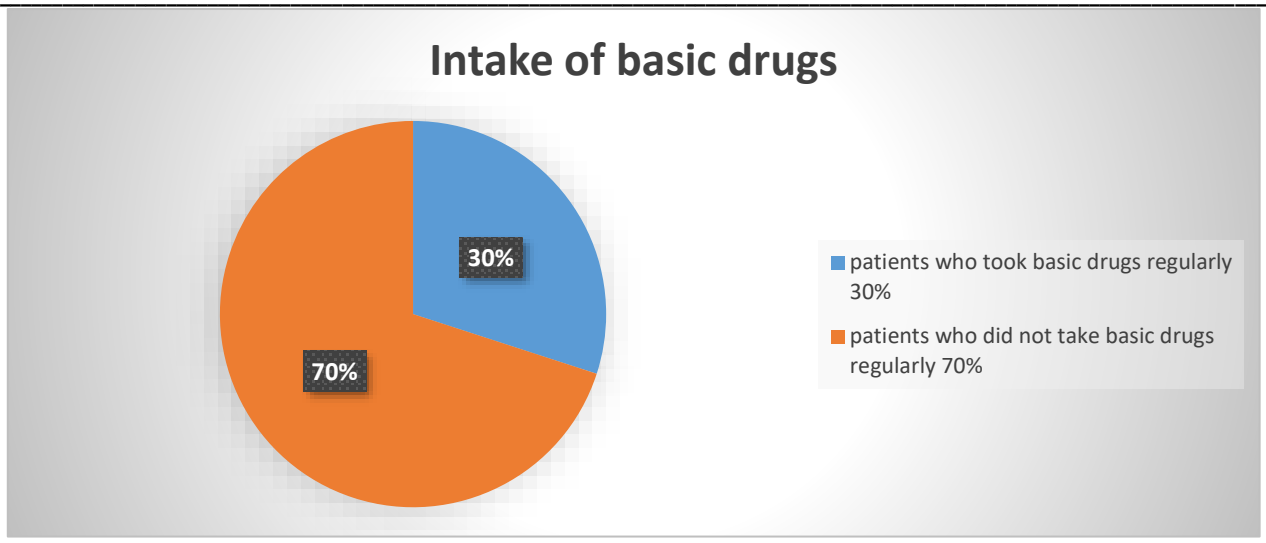
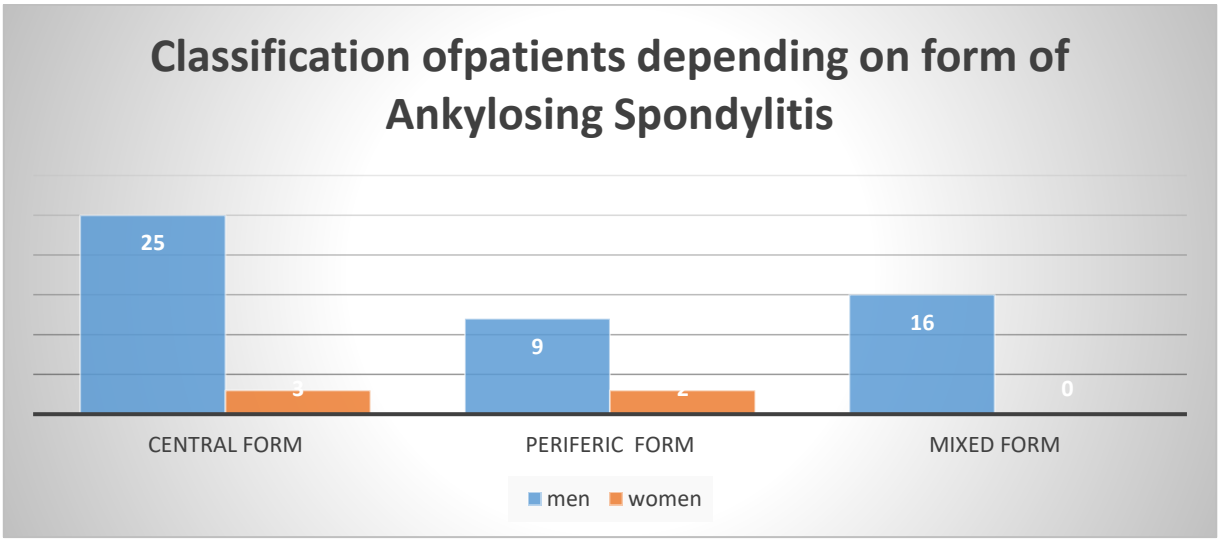
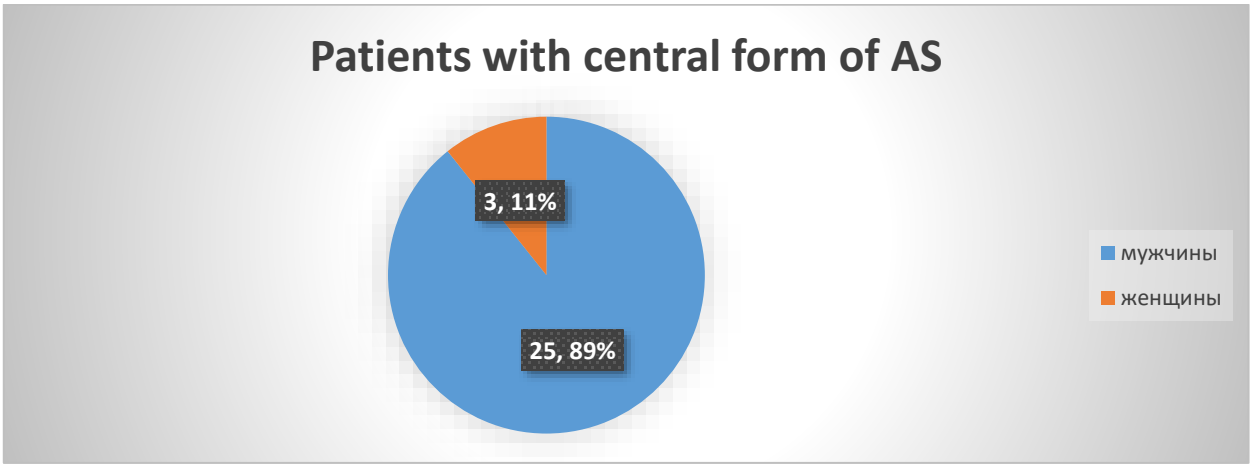


Patients who did not take basic drugs on a regular basis differently explained the reason for not using: 1) for financial reasons; 2) due to side effects of the drug; 3) due to inattention to his illness; 4) due to lack of information about the complications of this disease; 5) for the aforementioned mixed reasons.
All patients were evaluated for the form of the disease depending on the location of the spine and joints pathology.



A total of 28 (51%) patients had a central form of AS. Of these, 25 are men and 3 are women.



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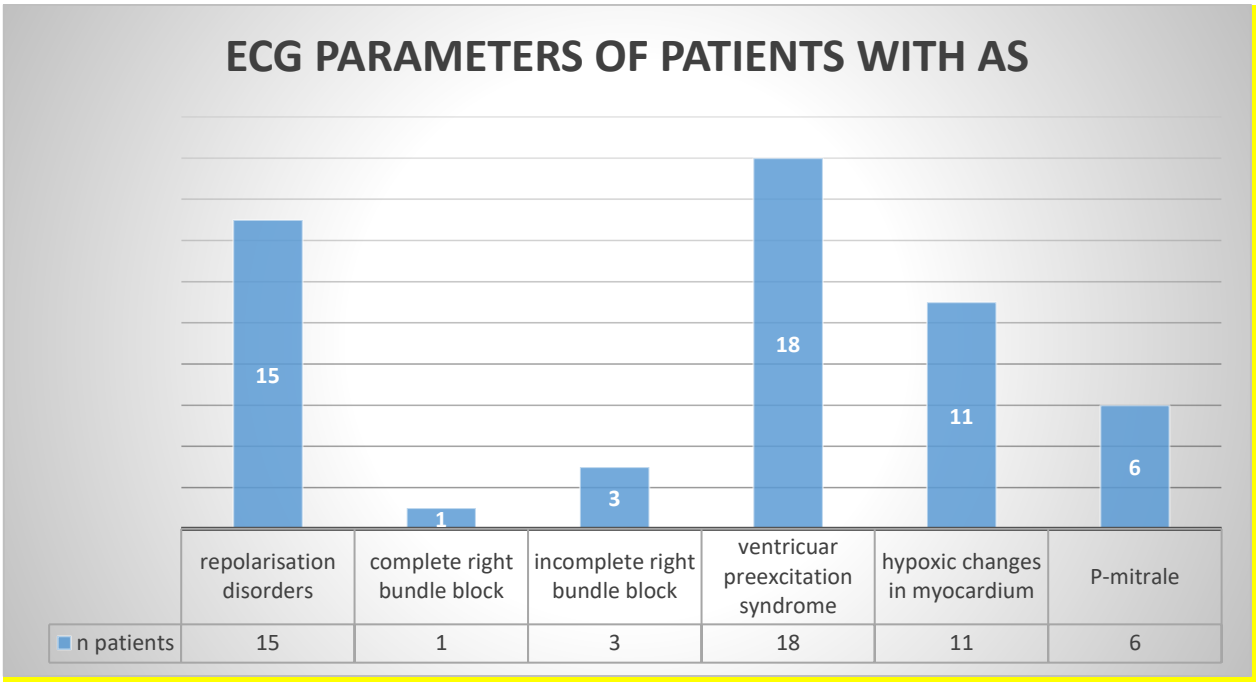
The peripheral form of AS was observed in 11 (20%) patients. Of these, 9 are men and 2 are women.
A mixed form of AS was observed in 16 (29%). The incidence of women with this form of the disease was not observed.
Patients with AS for the duration of the disease were divided: up to 1 year, from 1 to 5 years, from 5 to 10 years, more than 10 years.
In the examined population, patients with disease duration of more than 10 years made up the largest group (49%), second place was taken by patients with AS with a disease duration of 1 year to 5 years (27.2%). If taken as a whole up to 5 years - this indicator was 29%. Among women, patients with disease duration of 5 to 10 years and more than 10 years were the same, and among men, patients with a history of more than 10 years were prevailing.



In the analysis of systolic BP by gradation, it was found that 8 patients had SBP values between 140-160 mmHg, 31 patients had SBP values between 120-139 mmHg, 5 patients had SBP values between 110-119 mmHg, and 11 patients had SBP values below 100 mmHg.The arithmetic mean value of the pulse of patients with AS was 82.1 beats per min, which indicates tachycardia, i.e. indicates the presence of heart damage.
An ECG study showed the following changes: 15 patients had repolarization disturbances in the posterior wall of the left ventricle, one patient had complete blockade of the right bundle, 3 patients had an incomplete blockade of the right bundle, 18 patients had a preexcitation syndrome, 11 patients had hypoxic changes in the myocardium, 6 patients had P-mitrale. Only 2 patients did not have any pathological changes on the ECG.
When comparing the obtained electrocardiographic data with the duration of the disease, the following data were obtained: repolarization disorders in the posterior wall of the left ventricle were observed in patients with AS disease duration of 13.5 years on average, complete blockade of the right bundle - 12.5 years, incomplete blockade - 4 years, the preexcitation syndrome of 8.7 years, hypoxic changes in the myocardium of 11.9 years.
When comparing the results of electrocardiographic studies with the form of the disease, the following results were obtained:

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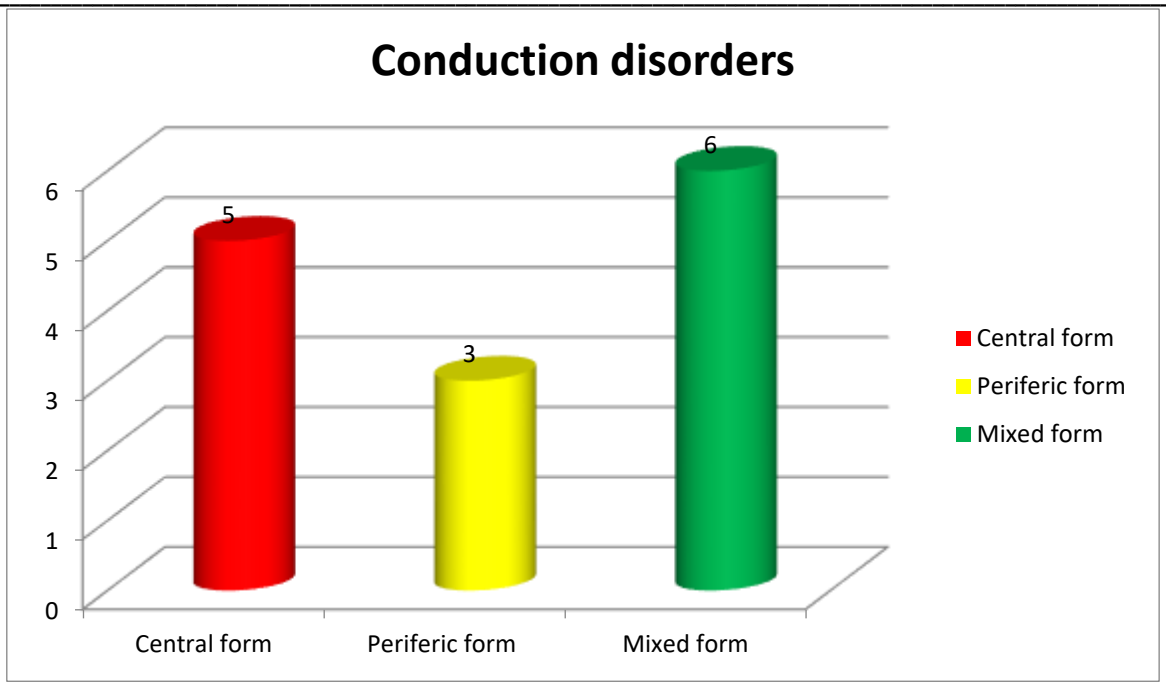
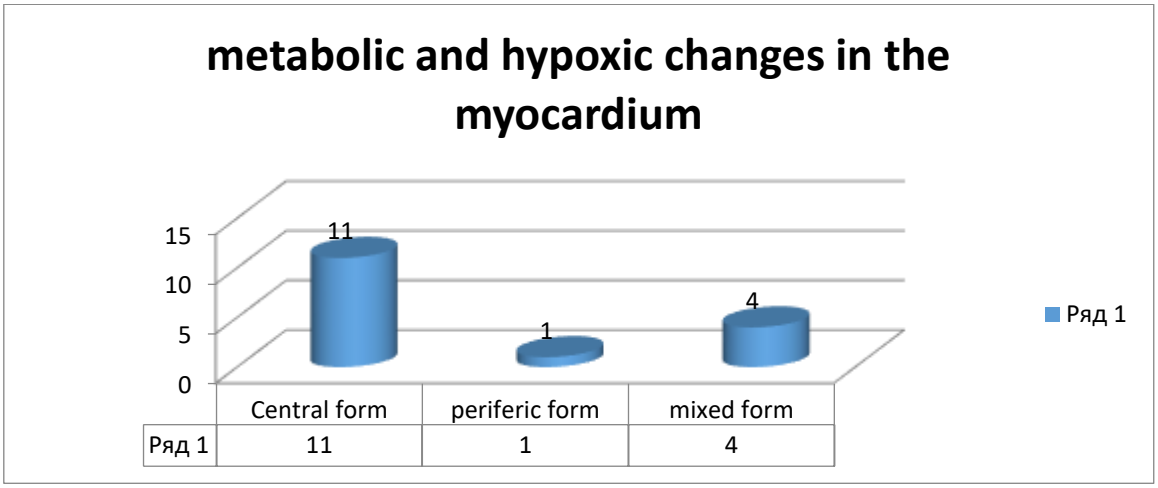
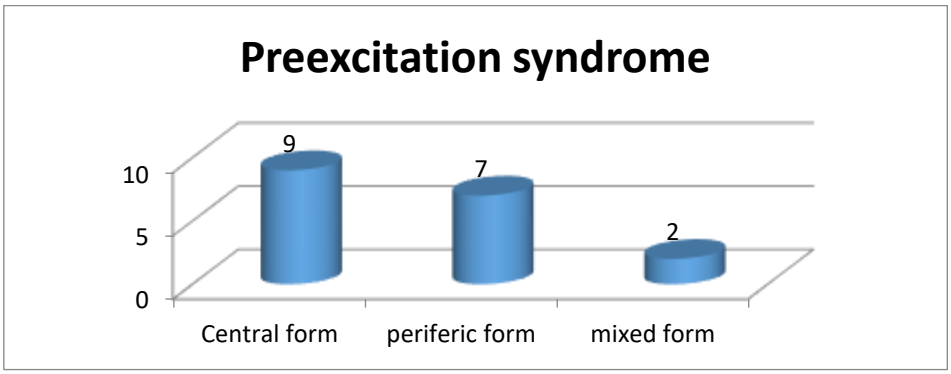


Conduction disorders (difficulty or deceleration of AV conduction, complete blockade or incomplete blockade of the bundle) were observed in only 14 patients. Of these, 5 patients suffered from a central form of AS, 3 from a peripheral form of AS, and 6 patients had a mixed form of AS.



In analysis of the number of metabolic and hypoxic changes, were noted the following results: 11 patients (20%) with hypoxic and metabolic changes in the myocardium had a central form of AS, 1 (1.8%) of the patient had a peripheral form of AS and 4 (7.2%) of the patients had a mixed form of AS.



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During the analysis of the electrocardiographic signs of the preexcitation syndrome , it was found that 9 patients with signs of preexcitation syndrome had a central form of AS, 7 patients had peripheral form of the disease and 2 patients had mixed form of AS.

So, in the study of the cardiovascular system in 55 patients with AS it was found that not all patients took non-steroidal anti-inflammatory and basic drugs on a regular basis, for various reasons, which exacerbates the inflammatory process in the body.

In analysis of the disease form according to the level of damage to the spinal column and joints, it was noted that more than half of the patients have a central form of the disease. This indicates the highest prevalence of the central form of AS among the Uzbek population. And analysis by the duration of the disease, showed that the majority of patients (49%) were patients with a morbidity anamnesis of more than 10 years, which is important in assessing cardiovascular lesions by the duration of the disease. If we take into account that among the examined patients there were predominantly young people, we can once again see the social significance of AS.

The degree of disability in AS patients by gender practically did not differ.

Other parameters showing the activity of the disease (ESR and CRP) and the degree of damage to the spine and sacroileal articulation (X-ray of the spine and pelvic bones) also provided information about the moderate activity of the disease.

Blood pressure and pulse of patients also tended to increase, which once again indicates damage to the cardiovascular system.

An ECG analysis of patients with AS showed that only 3.6% of patients had no pathology on the ECG. And the rest of the patients (96.3%) had blockades of various degrees, extrasystoles, arrhythmias, hypoxic changes and repolarization disorders. ECG data provided invaluable information on the heart health status of patients with AS. When comparing the ECG findings of patients with AS with the duration of the disease, it found out that in patients with a history of more than 10 years, ECG changes were observed: disturbances in repolarization processes in the posterior wall of the left ventricle, complete blockade of the right bundle, hypoxic changes in the myocardium. In the analysis of ECG changes depending on the form of the disease it was noted that the majority of patients with: conduction disorders, metabolic and hypoxic changes in myocardium had a central form of disease. The greatest number of patients with P-mitrale were patients with peripheral form of AS. The number of patients having central and peripheral form with the syndrome of premature ventricular repolarization was almost the same.

According to transtoracic echcardioscopy, the majority (60%) of the examined patients had no pathology. The remaining patients had: aortic regurgitation, slight bradycardia and a decrease in ejection fraction.

Although valuable information was obtained during the study, this study has many limitations: firstly, a small number of patients participated in the study; secondly, not all patients used drugs on a regular basis, which can lead to distortion of the results.

The specificity of this study is a comparison of the results with the duration and form of the disease, which is difficult to find in other studies.

A lot of scientists wrote about the involvement of the cardiovascular system in AS. One of the primary pathological explanations for valvular pathology in AS was given by Bulkley and Roberts when they studied autopsy materials of 8 AS patients, according to their aortic root expansion due to fibrous growths along the intima [7]. In deeper studies, it was observed that cellular inflammatory process, which leads to endoarteritis of the aortic root and valves and which is supported by platelet aggregation, leads to thickening of the tissue, as well as to aortic valve insufficiency due to stimulation of fibroblastic hyperactivities [8.9]. In their study, Roldan et al [9] examined the aortic root and valves using transthoracic echocardiography (TTE) in patients with AS and found root and valve pathologies in 82% of patients with AS compared with the control group.

Involvement of the heart in the form of impaired conduction or aortic insufficiency was found in 5-10% of patients with AS [10,11]. Disorders of conductivity may initially be periodic, but eventually becomes constant [12]. In his research Diketal. A statistically significant high prevalence of AS patients with first-degree AV blockade was determined, as well as the relationship of this type of blockade with the duration of disease activity [10]. A. Yildirir et al. demonstrated that calculating the dispersion of Q-T on an ECG provides valuable information about the possible development of arrhythmia [14]. Thus, patients with an increased risk

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of arrhythmias may be referred for a more detailed examination to assess cardiac signs of rheumatic disease [15].

The results of our study are consistent with the results of previous studies, although there were population differences between them.

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