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CLINICAL AND PARACLINICAL PECULIARITIES OF STRESS-DEPENDENT DISTURBANCES OF HEART ACTIVITY IN CHILDREN GOING IN FOR SPORT

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ABSTRACT — 40 children, 10–14 years of age, going in for acrobatics during 6 months were under observation in the aim to study the level of activity of myocardial fraction of creatin-phosphokynaza (MF-CPhC) and troponin – T in blood serum and the main spectral indices of heart rhythm variability (TP, VLF, LF, HF). It was stated that the disturbance of heart activity in young sportsmen to be connected with decrease of energetics in cardiomyocytes. In diagnostics of stress-dependent cardiomyopathy alongside with clinical data it should be important to take into consideration the levels of troponin-T and activity of MF-CPhC in blood serum on the phone of decrease of main spectral indices of heart rhythm variability.

KEYWORDS — children, sport, children going in for sport, disturbances of heart activity, biochemical indices (MF-CPhC, troponin-T), spectral indices of heart rhythm variability.

The problem of estimation of heart activity condition in children's cardiology was and is still actual. It is due to higher demands to training of young sportsmen, on the other hand because of formation of different morphofunctional changes in organs and systems of children under the influence of physical strain. It is known that the organism of young sportsmen may be dependent on physical and psychic components.

At the same time, pathogenesis of disturbances of heart activity is not yet studied. Their clinical manifestations are characterized by changes of heart rhythm, metabolic disfunction of myocardium and are explained by some scientists as stress-dependent cardiomyopathy[1, 2, 3].

It is well-known that the changes of levels in activity of myocardial fraction of creatinphosphokinaza (MF-CPhC), troponin-T and etc. in blood serum may reflect the condition of myocardium and its energetic potentials. At the same time to define the parameters



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of heart rhythm variability should be considered the most informative method of quantitative value of vegetative regulation of heart rhythm and its energetic supply as the response on any stress influence [4, 5, 6, 7]. Combined investigation of these biochemical and instrumental data in stress-dependent cardiomyopathy among young sportsmen should be of definite interest.

The aim of investigation:

to find out the pathogenetic and diagnostic features of stress-dependent disturbances of heart activity in children going in for sport.

THE CHARACTERISTIC OF CHILDREN AND METHODS OF INVESTIGATION

On the base of SBEHP AR regional curative-physicalculture dispansery and polyclinics of Astrakhan there were observed 93 children (63 girls and 30 boys) at the age of 10-14 years (middle age 12 ± 0.5) going in for acrobatics for 6-8 hours in a week during 6 months. The criteriae of exclusion were: presence of organic damages of cardio-vascular and nervous systems, chronic diseases and acute respiratory infections. The investigations were conducted during basic cycle of training in autumn-winter period. Control group was 22 conditioned healthy children of the same age going in for sport less than 5 months.

The methods of investigation included the examination which consisted of: physical observation of organs and systems paying attention to cardiovascular ones. There was studied the condition of levels of activity MF-CPhC by method of IFA, content of troponin-T by enzyme-immune test system of Beringer Manheim firm. They were examined according to standard ECG, Holter monitoring of ECG (Cardio-technic-4000); echocardiographic investigation (Echo-CG), with interpretation of data according to standard, veloergometry (VEH) to protocols of Bruce. Besides it, there was studied the main spectral parameters of heart rhythm variability by apparatus "Polyspectrum-12E" at rest and orthostatic probe. The analysis of results in investigation were done with usage of general methods of variative statistics (Statistika-6,0).

RESULTS AND DISCUSSION

From 93 sportsmen there were formed 2 groups of children using method of simple randomization. The first group had 53 children without clinical and paraclinical features of disturbances of heart activity. The second one had 40 children having features of stress-dependent cardiomyopathy. Making thorough analysis of clinico-instrumental data of the 2nd group there were defined 2 subgroups: the 1st — with disturbances of heart rhythm — 21 children (52,5%), the 2^{nd} — with metabolic changes in myocardium — 19 (47,5%).

In formation of subgroups there were taken into consideration the following clinical data: weak heart sound, soft systolic sound, changes of heart rhythm (tachycardy, bradycardy, extrasystoly).

On the ECG there were found out: sinus tachybradycardy, epiventricular extrasystoly, disturbances of repolurization (changes of T-wave, depression of ST segment). In Holter ECG there was found out 2500–5000 (3500) epiventricular extrasystoly. In Echo-ECG: there was the decrease of diastolic myocardial function.

In the 1st subgroup of examined sportsmen there were found out the following disturbances of heart rhythm clinically: bradyarhythmy in 9 (42,9%), tachyarrhythmy — 7 (33,3%), extrasystoly — 6 (28,57%) and some other cases but rarely. They were confirmed and stated exactly in ECG-diagnostics: sinus bradyarhythmy in 9 (42,9%); in 6 cases (28,6%) there were found out multiply epiventricular extrasystoly, moderate sinus tachycardy — 3 (14,3%), in Holter-ECG there were 2500–5000 (3500) epiventricular extrasystoly. In Echo-CG there were no significant changes.

In the 2^{nd} subgroup there were observed clinically: suppression of heart sounds — 15 (78,94%), systolic

noise -4 (21,5%). In ECG there was defined: the presence of changes in wave T -12 thoracic parts -9 (47,4%); Holter-ECG - without peculiarities. In Echo-CG diastolic disfunction was marked in 12 (63,16%).

Further, in these two subgroups and control group there was made the investigation of levels in activity MF-CPhC and troponin-T in blood serum and studied the condition of the main spectral parametres BPC: general power of spectrum (TP), very low frequency (VLF), low frequency (LF), high frequency (HF) diapozones. It was found out that the most expressed changes had undergone the levels of troponin-T and activity MF-CPhC in blood serum in subgroup of children with myocardial disfunction (p<0,01; $p_1<0,05$). At the same time the children of 1st subgroup (table 1) their changes were statistically not exact (p<0,1; $p_1<0,05$).

In estimation of spectral parameters BPC the most expressed changes were marked in orthoprobe. In comparison of data of the main parameters BPC there was defined the decrease of them in studied subgroups in accordance with the same among conditioned healthy children. Besides it, statistically significant differences of these data in children of the 1st and 2^{nd} subgroups were not determined (p>0,05; p₁>0,1; p₂>0,05; p₃>0,1). It may prove that the disturbances of heart rhythm and myocardial disfunction in young sportsmen may take place on the phone of decrease of energy supply of the organism.

The attention was paid to the fact that the increase of levels MF-CPhC and troponin-T in the 2nd subgroup were correlated with the decrease of data TP, VLF, HF (K=0,75; $K_1=0,77$; $K_2=0,79$). It was due to metabolic disturbances taking place in myocardium on the phone of physical overstrain in young sportsmen.

In most children of the 1st subgroup the increase of levels MF-CPhC, troponin-T was not correct and correlated dependence of them from the main data BPC was not defined. At the same time 8 (38%) children had the increased level of activity MF-CPhC, troponin-T and it was correlated with the decrease of VLF, HF (k=0,32; $k_1=0,54$). So, in this subgroup there were not only the disturbances of heart rhythm but there may be the onset of disturbances of metabolic processes in myocardium. It was defined that the disturbances of heart rhythm: epiventricular extrasystoly, sinus tachycardy in the most degree were connected with decrease of dataTP, HF and in the less degree with the changes of markers of myocardium disturbance. These children, also as the sportsmen with myocardial dysfunction, demand special attention and usage of correcting therapy.

Data	Control group (n=22)	First subgroup (n=21)	Second subgroup (n=19)
MB-CPhC(f/I)	27,4 ±0,4	32,1 ±0,3*	51,6±0,4**#
Troponin-T (ng/l)	0,039±0,006	0,041±0,006*	0,086±0,005***#
ТР(мс ²)	3421,4 ±556,4	2922,4±504,1**	2116,2±526,4**##
VLF(mc ²)	1269,2 ±432,4	1100,2±422,4*	907,2±231,4*##
LF(мс ²)	1012,2±465,4	909,1±421,4*	508,4±207,1**#
НF(мс ²)	782,4±284,1	675,1±274,1*	412,4±128,4*#

Table. The condition of laboratory-instrumental data in studied groups of children

— meaninas of reality in comparison of data with conditionally healthy: *---p>0,05; ***---p<0,05; ***---p<0,01.

It was found out that metabolic stress-dependent disturbances of heart activity in the most cases may be found in cases of disturbances of energy supply of the organism which were characterized by decrease of the main parameters of BPC, correlating with changes of levels of biochemical markers of myocardium damage.

So, it was stated that the disturbances of heart activity in young sportsmen were connected with the processes of decrease of energy in cardiomyocytes. It may be due to increase of energy usage during lessons of sport and also by insufficiency of the main energetic substrates. In the diagnostics of stress-dependent cardiomyopathy alongside with clinical data it should be important to take into consideration the changes of levels of troponin-T and activity MF-CPhC in blood serum on the phone of decrease of the main spectral data of heart rhythm variability.

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Viktor Paramonov, *surgical oncologist, author of operative techniques in otolaryngology*



Denis Novikov, Surgeon



It started with rented premises at Hospital of Military Construction with 3 wards, comprising 5 patients and about 15 employees. Later the premises were extended to 8 wards for 16 patients. Up to 1000 surgeries annually had been performed there. It enabled to implement in practice the idea of such serious medical business as a surgical clinic and in February 2007 on the basis of refinance the construction of the own building had been completed and the clinic moved in its own new home. This moment is the birthday of the new clinic with ambulatory admission, 11 wards, 28 beds and 65 members of staff. 20282 patients came to the clinic during the first year (February–December 2017) and 1978 surgical invasions were performed.

Number of patients coming to our clinic has been annually increasing, which has been properly responded by the management. On the basis of refinance new diagnostic centers have been set up in various towns of Saratov and Volgograd regions.

To date the clinic comprises 7 buildings and more than 550 employees. During 2016 2016 almost 10000 surgeries were conducted, among them 5443 in-house surgeries and 4570 ambulatory invasions, which accounts for about 15% of all surgeries in Saratov. This is a very serious contribution not only to the patients but also to the state, which reduces its financial burden and improves health of the citizens whereas replenishes the budget of Saratov Region with taxes. More than 1 million people have visited out clinic for this period. In average 600–700 patients are admitted daily.





Ruslan Bikbaev, Urologist

Alexander Davydov, Surgeon

One of the distinguishing features of the clinic is the level of diagnostics. Due to a high competition, the clinic has to purchase the latest equipment. Thus, ultrasound imaging is carried out on 13 high-quality devices, CT scan is performed on 4 devices.

From our first days we have been providing stationary and ambulatory medical care on more than 60 kinds of medical services.

The proportion of surgeries is high among all treatments conducted in the clinic — 1152 (21,13%) in 2016. It included cholecystectomies, herniorrhaphy, surgeries on large and small intestine, gastric resections and gastrectomies, operations at tumors of liver, spleen, pancreas and not-organ tumors of abdominal cavity and retroperitoneum, removal of hemorrhoid tags, anal sphincterotomy, mastectomy, breast sector resections, surgeries on lung cancer and many others. Majority of these invasions are performed endoscopically.



One important specialization is head and neck cancer surgeries, including resection of thyroid glandpeзекции and thyroidectomy, resection of larynx and laryngectomy, surgery on metastatic lymph nodes (neck dissection, Crile operations), operations on osteosarcoma, resection of tongue, carotid artery surgeries, reconstructive surgeries of larynx and trachea.

The range of urological operations includes endoscopic clipping of internal ovary artery, Hydrocelectomy (Bergmann, Winkelmann), varicocelectomy (Ivanissevich), transurethral resections of the prostate, nephrectomy, prostatectomies, cisto-, pielo and nephrolithotomy, operation of renal cysts, phalloplasty, orchidectomy, circumcision etc.

Ear, Nose and Throat Topics were represented in 2016 with 506 operations (9,3%) such as tonsillectomy, tonsillotomy, laser cryptolysis with the help of device "surgitron", excision of nasopharyngeal cysts, endoscopic polytomies, conchotomy, septoplasty, rhinoplasty пластики (nasal bone and cartilage), Removal of nasal adhesions, sinus surgery and frontal sinusotomy, either via endoscopical or external access.

Since 2012 the department of ophthalmology has been working at our clinic. Unique high-tech surgeries on retina at the level of several thousand microns are carried out there. Daily 10 to 15 ophthalmological patients are treated in the clinic. The range of ophthalmological operations includes: phacoemulsification, all types glaucoma (laser and surgical), vitrectomy, laser photocoagulation etc. Last year 1870 operations were performed.

All kinds of operative invasions are carried out with account of intraoperational cytological examinations whereas a result of a histological examination made at our own histological lab is ready in 1 or 2 days.

Since 2009 Reproduction Centre has been added to the clinic. Since 2012 our Reproduction Centre occupies the first place at Volga Federal District, the second place in Russia and is awarded with the *Chrystal Test Tube*. During eight years of work of our reproductologists 2 babies have been born daily. To date the efficacy of the Reproductive Centre comes to 45,5%, which exceeds world rates.

Despite of large number of treated, mainly surgically, patients (98,26%) - 5443 only in-house operations according to 2016 data, the number of complication and mortality is very low. Wound infections were not reported due to careful adherence to the rules of aseptic and antiseptic. Our experienced staff, who carefully processes the wounds and provides professional care at an early postoperative stage should be acknowledged for this. General mortality came to 0,047% (2 patients). In both cases the deaths were caused with cardiac complications. The reason of such low mortality is a very accurate preoperational examination enabling to estimate a risk degree of an operative treatment in a specific patient as well as a possibility to conduct corrections of comorbid diseases. Great importance is attributed to the competence and experience of the surgeons and effective and coordinated teamwork of operation teams, which allows shortening anesthesia time. And anesthesia methods are carefully weighed against the degree of invasion. During postoperative period not only corrections of the primary process takes place, but also the correction of comorbid diseases.

10 years of work of the private surgical clinic has demonstrated not only its survival but also displayed a number of advantages. Efficiency of such clinic is several times higher than municipal institutions. Not only due to internal management but external factors such as, for example, predispositions of Federal Fund for compulsory medical insurance as well. According to the Fund, a minimal stay of the patient in the clinic should be not less than 4 days. Our experience shows that successful restoration of patients after many surgeries may be restricted to 2–3 days in the clinic, which cuts down the cost of treatment and intensify bed turnover.

We believe that the experience of *Clinic of Doctor Paramonov* may be interesting for both private and public medical institutions in Russia and abroad.

CLASSIFICATION OF FACIAL TYPES IN VIEW OF GLATHOLOGY

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ABSTRACT — The outcomes of the study involving 187 persons with physiological occlusion, offered the basis for a classification involving 9 basic types depending on the gnathic index and the dental value. The gnathic facial index was calculated as ratio between the face diagonal (t - sn) to its width (t - t). The index within the range of 83–93% was typical of the mesognathic type of face. A lower index (below 83%) pointed at the brachygnathic type of face, while an increase in the index was characteristic of the dolichognathic type. The dental indicator of the face was estimated subject to the diagonal (t - sn). For the normodontia type, the diagonal value was 122 mm to 130 mm. Lower diagonal values (lower than 122 mm) was indicative of the micro-facial type of face, whereas an increase in the value (above 130 mm) – the macro-facial type of face. The data obtained can serve guide for determining the sizes of dental arches.

KEYWORDS — gnathic facial types, facial width, facial diagonal, gnathic facial index, dental type of face, normodontia, microdontia, macrodontia.



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Human face has been the focus for research since ancient time, while the issue still remains relevant. One of the major directions for studying human face is clinical [9, 25, 27, 28]. There have been numerous methods proposed for studying and classifying certain facial types [26, 32].

In clinical dentistry, human face is assigned a special role when it comes to the choice of methods for orthodontic and prosthetic treatment [20, 21].

Methods for determining the proportion between the teeth and individual facial parameters have been proposed [4, 23].

To evaluate the facial profile, the methods developed by A.M. Schwarz are employed with 9 profiles identified – mesofrontal, transfrontal and cisfrontal, where the profile can be straight or oblique anterior/ posterior [24].

At the same time, we found no data concerning the facial types from the stance of gnathology even though the contemporary literature offers numerous accounts focusing on the shape and dimensions of the dental arches in cases of physiological occlusion [8, 13,15, 16, 17, 19, 22, 29, 31].

There are basic odontometric and linear parameters presented for dental arches at various gnathic forms [1, 3, 5, 6, 10, 12, 14, 18, 30].

Clinical orthodontics is in extreme need of such studies, where the outcomes allow making conclusions regarding various prescriptions for brackets and indicate the dimensions of metal arches when treating patients employing the edgewise technique [2, 7, 11].

Special literature, however, contains not enough information about the facial types depending on the size of the dental arches and the gnathic forms of the dental arches.

Given that, the purpose of this study was to determine the facial types depending on the size of the teeth and the gnathic parameters of the dental arches.

MATERIALS AND METHODS

A biometric examination of the face and plaster models of the jaws was performed involving 187 people (age 18–30) with physiological occlusion of permanent teeth.

The type of face was determined through the dental score and the gnathic index.

The dental type of face was determined following the face diagonal indicator measured between the t (tragion) and the sn (subnazale) points. The t point was located on the upper edge of the ear tragus whereas the sn point was taken as the infranasal spot.

The diagonal measuring in the range of 123–130 mm was typical of the normodontia type of face. A higher value of the diagonal was typical of the macrodontia type, while the microdontia type featured a shorter diagonal (fig. 1).

The gnathic facial index was calculated as the percentage of the diagonal dimensions to the transversal ones. The diagonal dimension was accepted as the value of t–sn. The transversal dimensions were measured between the spots of t–t. The facial type was considered mesognathic in case the value was 83% to

93%. With a gnathic index less than 83%, the type of face was defined as brachygnathic, whereas an increase in the index bringing it above 93% was typical of dolichognathic type of face (fig. 2).

In addition, the patients had their dental arches determined. The major indicators characterizing the type of the upper dental arches were dental and gnathic.

The dental index was determined through the length of the dental arch, which was calculated as the sum of the crown widths (mesial-distal diameters) of 14 teeth (not taking into account the variable third permanent molars) (fig. 3).

The sum of the crown widths of the 14 upper teeth lying within the range of 112–118 mm revealed the normodontia dental arch type. An arch length below 112 mm revealed microdontia, while macrodontia was observed in case the value went above 118 mm. Thus, the major dental types of the upper dental arches were determined as normodontia, macrodontia and microdontia.

To determine the gnathic type of the dental arch, two main and relatively stable indicators were used the size of the teeth and the width of the upper dental arch between the second molars.

The measuring points of the second molars were located on the vertices of the vestibular distal tubercles near the occlusal contour of the crowns (fig. 4).

The ratio of the crown widths half-sum of the 14 teeth to the width of the upper dental arch was indicative of the dental index of the arch, which determined its gnathic type. In case of index values within 0.9–0.97, the type of the dental arches was referred to as mesognathic. The index value below 0.9 was attributed to the brachygnathic type, while a value above 0.97 — to the dolichognathic type of dental arches.

A comparative analysis of the main facial parameters and the upper dental arches for all types of face was carried out.

The statistical processing was performed directly from the common data matrix of ECXEL 7.0 (Microsoft, USA) also involving certain features offered by the STATGRAPH 5.1 (Microsoft, USA) software, ARCADA (Dialog-MGU, Russia), and implied detecting the median values, its mean root square deviation, and the non-sampling error. Further on, following the patterns commonly employed for medical and biological studies (sample numbers; type of distribution; non-parametric criteria; reliability of the difference of 95%, etc.) the significance of the sampling difference was evaluated subject to the Student's criterion (t) and the respective significance index (p).



Fig. 1. Facial diagonals — normodontia type (a); macrodontia (b), and microdontia (c).



Fig. 2. Cephalometric points used to define gnathic type of person: *a*, *b* — frontal plane; *c*, *d* — sagittal plane

d





Fig. 3. Photographs of plaster models of the upper jaw (a) and lower jaw (b) with plotted contours of the tooth vestibular arc



Fig. 4. Width, depth and diagonal of the dental arches of the maxilla (a) and lower (b) jaw

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RESULTS AND DISCUSSION

The outcome revealed that people with physiological occlusion of permanent teeth featured 9 main types of face. Based on the evaluation of the gnathic types, there were three major forms of face determined – mesognathic, brachygnathic and dolichognathic. For each gnathic type, 3 dental types were identified: normodontia, macrodontia and microdontia.

For each type of face, the main parameters of the face and the dental arches were evaluated. The study showed that people with physiological occlusion and mesognathic normodontia type of face, the face diagonal (t - sn) averaged 123.84±2.54 mm, while the width of the face between the points t-t was 140.48±2.89 mm. In this regard, the gnathic index of the face was 88.15±2.07. The results of the dental arches evaluation for this type of face showed that they, too, corresponded to the mesognathic normodontia type. The sum of the crown widths of the 14 teeth was 114.66±2.87 mm; the width of the dental arch between the second molars was 61.08±1.79 mm, and the arch index was 0.94±0.03.

In people with mesognathic macrodontia type of face, the face diagonal exceeded significantly that in people with normodontia and was 133.04 ± 2.13 mm. At the same time, the width of the face between the points was 146.09 ± 2.53 mm, while the gnathic facial index was 91.06 ± 1.99 . The results of the dental arches evaluation for this type of face showed that the length of the dental arch was 120.95 ± 2.04 mm; the width of the dental arch between the second molars was 64.93 ± 2.13 mm, and the arch index was 0.93 ± 0.02 .

For the mesognathic microdontia type of face, the diagonal dimensions were significantly smaller than those for the other dental types of the mesognathic face and were 117.01 ± 1.93 mm. The width of the face was 134.83 ± 2.38 mm, whereas the gnathic index was 86.78 ± 2.45 and pointed at the mesognathic type of face. The dental arches parameters were as follows – the arch length was 109.36 ± 1.87 mm; the arc width was 58.62 ± 2.27 mm, and the dental index was 0.93 ± 0.02 .

The study of people with the brachygnathic normodontia type of face revealed that the diagonal of the face (t-sn) was 124.33 ± 2.39 mm, and corresponded to a similar size observed in persons with the mesognathic type of face. During that, the transversal dimensions of the face were significantly above reaching 146.09 ± 2.24 mm. In this regard, the gnathic index of the face was 91.06 ± 2.43 . The results of the dental arches evaluation in the type of face in question indicated that they also corresponded to the brachygnathic normodontia type. The length of the dental arch was 115.12 ± 2.54 mm; the width of the dental arch between the second molars was equal to 67.82 ± 1.88 mm, while and the arch index was 0.85 ± 0.04 .

Persons with the brachygnathic macrodontia type of face had their face diagonal significantly exceeding that of the normodontia cases, and the value was 133.11 ± 2.54 mm. The width of the face between the points was 162.92 ± 2.61 mm, and the face gnathic index was 81.7 ± 2.04 . The evaluation of the dental arches in this type of face showed that the sum of the crown widths for the 14 upper teeth was 122.83 ± 1.95 mm; the width of the dental arch between the second molars was 71.28 ± 2.24 mm, and the arch index was 0.86 ± 0.03 .

In the brachygnathic microdontia cases, the diagonal dimensions were significantly below those for the other dental types of the mesognathic face, being equal to 115.93 ± 3.42 mm. The face width was 143.02 ± 2.14 mm, while the gnathic index was 81.05 ± 2.14 and revealed the brachygnathic type of face. The dental arches parameters were as follows – the arch length of 107.34 ± 2.49 mm; the arch width – 61.75 ± 1.92 mm, and the dental index of 0.87 ± 0.02 .

The outcomes of the study revealed that people with dolichognathic normodontia type of face had a face diagonal of 126.56 ± 2.94 mm, with a width of the face between the points t-t equal to 131.82 ± 2.67 mm. Given that, the gnathic index of the face was 96.0 ± 2.17 . The results of the dental arches evaluation for this type of face showed that they also corresponded to the dolichognathic normodontia type. The length of the upper dental arch was 116.11 ± 2.44 mm; the width of the dental arch between the second molars was 57.82 ± 1.93 mm, and the arch index was 1.0 ± 0.02 .

People with dolichognathic macrodontia type of face featured a face diagonal that exceeded significantly that typical of normodontia, and was 131.92±2.19 mm. The width of the face between the points was 136.91±2.26 mm, while the facial gnathic index was 96.35±1.92. The results of the evaluation of the dental arches typical of this type of face showed that the length of the dental arch was 121.03±2.55 mm; the width of the dental arch between the second molars was 60.85±2.29 mm, whereas the arch index was 0.99±0, 01.

In the dolichognathic microdontia type, the face diagonal dimensions were significantly below those of the other dental types of the mesognathic face, and were 116.64 ± 2.78 mm. The width of the face was 122.08 ± 2.49 mm, and the gnathic index was 95.54 ± 2.13 . The parameters of the dental arches were as follows – the arch length was 109.01 ± 1.98 mm; the arch width was 54.02 ± 2.59 mm, and the dental index was 1.0 ± 0.02 .

CONCLUSIONS

1. A classification of facial types proposed featuring 9 basic types depending on the size of the gnathic index and the dental index.

2. A rationale for the concept of the facial gnathic index offered, where the index in question is shown as the percentage ratio between the face diagonal (t-sn) and its width (t-t).

3. The gnathic index of 83–93% is indicative of the mesognathic type of face. A decrease in the index (below 83%) is an indication of the brachygnathic type of face, whereas an increase in the index (over 93%) is a feature typical of the dolichognathic type of face.

4. The facial dental index is estimated based on the diagonal dimensions (t–sn). For normodontia type of face, the diagonal value lies within the range of 122 mm to 130 mm. Smaller diagonal dimensions (less than 122 mm) reveal the microdontia type of face, while an increase (above 130 mm) means a macrodontia type.

5. The data obtained through the study may be employed to determine the size of the dental arches.

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14

BODY IMAGE INSATISFACTION: A GENDER APPROACH AMONG BRAZILIAN ADOLESCENTS

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ABSTRACT — The aim of this study was to determine the prevalence of body image satisfaction or insatisfaction among adolescent students of 14 to 19 years old. 855 adolescents of public schools (466 female and 389 male) from three municipalities of "Medio Araguaia Region" were evaluated (adesion rate was 94.8%, since only one school did not engage the study). Body image satisfaction or insatisfaction was measured by using the Loland's Body Satisfaction Scale. One third of the adolescents was neither satisfied nor dissatisfied with their body images. The insatisfaction with body weight was higher among female (45.73%) compared to the males (39.84%), a gender difference which was statistically significant (p=0.02). Female adolescents had also higher insatisfaction with gluteus, thigs and legs, breasts, and muscle tone when compared to male gender. Female gender was not satisfied with legs, whereas among boys there were a higher satisfaction with legs. Regarding waist, there was more satisfaction among girls compared to the boys. These results reinforce the necessity to break body beauty models imposed to the girls and female adolescents since body stereotypes cause great societal pressures linked to negative mood and mental health problems amongst adolescents.

INTRODUCTION

Body image can be defined as the body representation in our mind, that is, the way in which the body presents to us 1.

Adolescence which is marked by intensive biopsychosocial changes is an important and crucial transition to adult life [2]. Although both gender show concerns regarding body image, there are different body perceptions among girls and boys [3,4]. In general, girls are less physically active, but present more body image depreciation [5].

Modern economy and society explore female body image, imposing beauty patterns which are reproduced as massive forms of controlling body appearence, weight and height [6,7].

Remembering the historical evolution of the female figure, we see that obesity was value and represented in arts, contrary to what is currently advocated. There is a growing demand for lean appearance and

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forms of weight loss, often in detriment of the subject's health [8].

Brazil has a growing number of plastic surgeries and has been listed in the world's ranking of cosmetic plastic surgeries [9]. From 2009 to 2012, the number of cosmetic plastic surgeries in adolescents raised from 37,740 procedures to 91,100 (141%) according to the Brazilian Society of Plastic Surgery [10].

The actual economic and societal model has imposed a pattern of body silhouette as a synonymous of "beauty" which in fact is totally outside normal nutritional and health standards. This model of "beauty" and "slim" body has caused diverse mood and affective disorders as well as health problems among young and adults, especially between female adolescents and women [11]. Body image dissatisfaction increased at 3.7-fold the risk of depressive symptoms among adolescents, according to a recent study [12].

Then, the aim of the current work was to investigate the body image satisfaction and unsatisfaction among school adolescents and verify possible gender differences in body image unsatisfaction/satisfaction.

MATERIALS AND METHODS

In order to perform a prevalence study regarding body insatisfaction/satisfaction, we developed an observational, quali-quantitative study [13], covering a representative population of adolescents from public schools of Aragarças (Goiás state), as well as Barra do Garças and Pontal do Araguaia (Mato Grosso state) with ages between 14 and 19 years old (n=855, female = 466; male = 389).







Inclusion criteria were interest in engage the study, being student of public school, and present the preconized age (14 to 18 years old). No interest to engage the study was the unique exclusion criteria.

Body insatisfaction/satisfaction and its parts was evaluated by the use of the validated Portuguese version of the body satisfaction scale of Loland [14], a measurement scale with 15 items. For each 14 body parts and the hole body, the subject give a concept according to a Likert type scale, ranging from 1 to 5 (1– very unsatisfied, 2 – unsatisfied, 3 – neither satisfied, nor unsatisfied, 4 – satisfied and 5 – very satisfied).

The mean and standard deviation between the variables (age and gender) were compared using z test calculated by Epidemiologic Tools software^{*} (Australia). Statistical differences were considered significant when p<0.05.

RESULTS

The insatisfaction (the sum of the categories very unsatisfied, unsatisfied and not satisfied, nor unsatisfied) with body weight was higher among female (45.73%) compared to the males (39.84%), a gender difference which was statistically significant (p= 0.02). A third of the adolescents of both gender was neither unsatisfied nor satisfied with their bodies.

A quintile of the adolescents from both gender was neither unsatisfied nor satisfied with their body weight, whereas the unsatisfaction with body weight was higher among female adolescents (p=0.02).

The unsatisfaction with legs and abdomen was also higher among female than male adolescents, with statistical significance (p=0.01 and p=0.041, respectively). However, it should be noted that 60% of the adolescents were satisfied with their legs and abdomen.

Regarding unsatisfaction with gluteus, female adolescents were also more prone to be dissatisfied when compared to the male adolescents (p=0.01). Furthermore, a quarter of the adolescent students was neither unsatisfied nor satisfied with their gluteal regions, but 60% of the adolescents were satisfied or very satisfied with that body part.

The trend of satisfaction with waist was higher among female compared to male gender (p=0.02).

Considering the satisfaction with breast, an intimate body part and a simbol of femininity, or with the chest/thoracic region among male, about a fifth of the students was unsatisfied with that body part. In addition, there was more male adolescents neither satisfied nor unsatisfied with toracic region in relation to the female students (p=0.02).

In spite of the fact that 25% of the adolescents was neither unsatisfied nor satisfied with their arms,

male students were more satisfied with their arms compared with the female adolescents (p=0.039).

The great satisfaction with body shape and muscle tonus reached only 13.6% and 8.15% of the male and female students, respectively. 30% and 28% of male and female adolescents, respectively, were neither satisfied nor unsatisfied with body shape and muscle tonus and a fifth of the students was unsatisfied or very unsatisfied with body shape and muscle tonus.

At the age 14y, the highest body image unsatisfactions for female students were weight, muscle tone and the abdomen, whereas the highest body image unsatisfaction of male adolescents were muscle tone, height, weight, and abdomen. Those and other body image unsatisfactions were represented in fig. 1.

Among the 15y students, the highest body image unsatisfactions for female adolescents were weight, hair, muscle tone and the height, whereas the highest body image unsatisfaction of male adolescents were muscle tone, weight, and abdomen. Those and other body image unsatisfactions were represented in fig. 2.

Considering the 16y students, the highest body image unsatisfactions for female adolescents were weight, abdomen, and legs, whereas the highest body image unsatisfaction of male adolescents were weight, abdomen, muscle tone, and the chest. Those and other body image unsatisfactions were represented in fig. 3.

Regarding 17–18y students, the highest body image unsatisfactions for female adolescents were muscle tone, weight, and breast, whereas the highest body image unsatisfaction of male adolescents were weight, arms, and muscle tone. Those and other body image unsatisfactions were represented in fig. 4.

DISCUSSION

The social media impacts the body culture and has strengthened the foundations of a thinness body image among female adolescents and women or the imposition of a muscle/virile body silhouette among boys and men [15]. While female adolescents obsessively strived to maintain or lose weight, male adolescents try at all cost to acquire weight and body mass according to an Australian study [16]. Similar patterns of body image was also verified among adults in Brazil [17].

Although 60% of the adolescents have been satisfied with their body images, one third of this population, without gender differences, was not unsatisfeid neither satisfied with their bodies. This hesitation with body image could be a reflex of the adolescence life stage, a transition of childhood to adult life [2].

The unsatisfaction with body weight was higher among female students compared to male gender. This is in accordance with studies which have been



Fig. 1. Body unsatisfaction among 14 years old adolescents



Fig. 2. Body unsatisfaction among 15 years old adolescents



Fig. 3. Body unsatisfaction among 16 years old adolescents



Fig. 4. Body unsatisfaction among 17-18 years old adolescents

demonstrated female gender suffer an intense and continous social coercion by means of advertising and other kinds of social communication [18] to maintain or lose weight, whereas male adolescents are pressed to gain weight and body mass [16]. This coercion of women's body beggins in infancy and adolescence [11] and generates a negative distortion of the self body image which enhance during adulthood and has been related to many adverse consequences to subject's health and physical integrity [17,19,20].

Considering yet the body weight, a fifth of the school adolescents was neither unsatisfied, nor satisfied with their body weights which also reinforce the concept of transition and body acceptance during adolescence. In this manner, Conti et al. [21] reported 31% of female adolescents were unsatisfied with their body weights. In the same study, the unsatisfaction with breasts (20%) and abdomen (18%) were also raised among female adolescents. The male adolescents from Conti's study 21 presented raised unsatisfaction with weight (35%), abdomen (25%) and thigs/legs (23%). A Brazilian study with 2,149 female students, from 14 to 18y, revealed that 93.6% of the female adolescents would like to change their bodies and 42.5% was unsatisfied with their body weights [22]. In the present study, 32.4% of the female school adolescents was unsatisfied (very unsatisfied and unsatisfied) with their body weights. A German study observed that female adolescents were much more affected and prone to give in to group pressures to change the body and develop negative body images than their male counterparts [23].

Considering gluteus region as well as legs the unsatisfation was also increased among female school adolescents compated to male counterparts. This important unsatisfaction among female adolescents with gluteus corroborates the Sudo e Luz [24] study which demonstrated the increased desire and execution of breast plastic surgery to receive silicone implants in order to raise the volume of breasts and buttocks.

The abdominal region was also a matter of unsatisfaction among adolescents. Once more, female adolescents declared being more unsatisfied with this body part in relation to the male counterparts.

About a fifth of the adolescents, with no gender variation, was unsatisfied with breast or chest. However, there was more male adolescents that was unsatisfied or, in the opposite side, satisfied with their chest compated to the female gender. This undoubtedly reveals the importance and appreciation of men's muscular and muscular chest as a part of body culture. This unsatisfaction with chest appearance of male adolescents reinforces the relevance of a "male and virile body" in the formation of men's identity according to the classic discussion of Bourdieu [25]. Although they were not so satisfied with their chests, male adolescents were more satisfied with their arms than their female counterparts. But, once more time there was hesitation regarding satisfaction with this body part, since a quarter was not unsatisfied, neither satisfied.

In the current study, about 30% of female and 28% of male adolescents were not unsatisfied, nor satisfied with their body tone and muscle appearance and a fifth of them was very unsatisfied or unsatisfied with these body parts.

Beoynd the discussion of Bourdieu [25], the results of the current work also need to be interpreted at the light of other psychosocial theories, such as the social representation theory. According to Moscovici [26] the subjects in their representative actions did not passively reproduce an object, idea, or concept, but they reconstruct them as active subjects who grasp and fit into their social and material universes. This means that imposed beauty patterns, especially to the young female and women, are introjected causing high self-collection for the control of the body and, in the difficulty in doing so, great psychosocial frustration which has support in the scientific literature [27, 28].

CONCLUSION

A third of the adolescents was not either unsatisfied nor satisfied with their bodies. Furthermore, the unsatisfaction with weight, gluteus, legs/thigs, breasts (or chest), and muscle tone was higher among female school adolescents in comparison to male gender. The results reinforce the necessity to break up with the body beauty paradigms socially imposed to women and search for community strategies towards equity and sustantability in gender relations.

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COMPLEX APPROACH TO PHYSICAL HABILITATION IN PARKINSON'S DISEASE

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ABSTRACT — Habilitation is an important part of a complex approach to treatment and rehabilitation of patients with severe movement disorders, including Parkinson's disease. Today, Parkinson's disease is one of the socially significant diseases in the World. The steady increase in the number of patients associated with the aging of the population and better diagnosis of primary disease. Unfortunately, treatment of Parkinson's disease in many cases includes only the pharmacological treatment. At the same time, a complex approach to the use of non-pharmacological methods of treatment and rehabilitation can improve the quality of patients' life. This article presents modern approaches physical habilitation in Parkinson's disease.

KEYWORDS — Parkinson's disease, habilitation, rehabilitation, treatment, exercise therapy, balneotherapy, peloid therapy, transcranial magnetic stimulation, transcranial electrical stimulation, diet therapy, massage, occupational therapy.

INTRODUCTION

Parkinson's disease (PD) is one of the most common neurodegenerative diseases of central nervous system [1]. The prevalence of parkinsonism in Russia reaches up to 186.5 per 100 000 population, 75% of them are cases of PD (prevalence PD — 139.9 per 100 000 population). It is expected that over the next twenty years the number of patients will double [2].

Motor symptoms include three core features: hypokinesia, rest tremor and postural instability. Usually, the disease is characterized by unilateral onset. During one or two years symptoms gradually affect other limb the same side. Furthermore, dyskinesia and wearing "off" occur in 37.7% and 73.6% of patients respectively in 15–20 years of the onset of disease and in 55.3% and 76.3% of patients in 21 years or more respectively [3].

The main method of treatment of PD currently remains pharmacotherapy. However, until now possible only symptomatic treatment of PD. Effective pathogenetic and etiological treatment has not been developed to date [4].

In addition to the medical treatment throughout the disease it is recommended comprehensive use of non-drug methods such as physical therapy, kinesiotherapy, massage, diet therapy, psychotherapeutic support, etc. [5].

Habilitation

(*abilitatio*; *habilis* — a comfortable, adaptive) is medical and/or social activities for people with disabilities aimed at their adaptation to the daily and professional life. Habilitation involves a comprehensive approach (behavioral, drug-free, and medical) to care for people with progressive hereditary diseases and congenital malformations [6]. The aim and tasks of habilitation in PD are the reducing disease progression; the improving cerebral metabolism; stimulation of endogenous dopamine synthesis; the decreasing pain sensitivity and activation of sensory balance; normalization of function of the neuromuscular system; normalization of mental and emotional state; the improving the selfservice function; the increasing social activity [7].

Principles of physical habilitation in PD

Early initiation of habilitation measures to reduce or prevent a number of complications of early PD. Habilitation in PD must start and be carried out against the background of pharmacotherapy. With the gradual increase in the intensity of habilitation measures in some cases it is possible a gradual reduction in the dose of drugs. It is important systematic and duration, phasing and complexity of habilitation measures in PD using all available and appropriate habilitation activities. Multidisciplinary approach to the habilitation of patients with PD is to participate in the habilitation process of various specialists: neurologists, physiotherapists, kinesiologists, psychologists, speech therapists, social workers, neurosurgeons. It should be taken into account individualization habilitation program and its social orientation, participation in the process of habilitation of the patient, his relatives and friends, the use of methods of control of the adequacy and effectiveness of habilitation loads, as well as adjust the habilitation program in accordance with the course and stage of disease [8].

Russian scientists have proposed to divide patients with PD into 4 main groups: 1) patients with initial manifestations of the disease up to 50 years old; 2) patients with initial manifestations of the disease 50–70 years old; 3) patients with advanced stage of the disease with concomitant diseases; and 4) patients after surgical treatment [7]. This approach is important to consider when drawing up individual programs habilitation of patients with PD.

Physical therapy in PD

The aim of physical therapy — reduction the rigidity, hypokinesia, tremor, depression; the slowing of disease progression; the improving cerebral metabolism; increase physical activity of the patient with PD [9].

Balneotherapy

is recommended in the early stages of PD to reduce symptoms, improve overall body tone, and improve psycho-emotional status. Sodium chloride baths are recommended to reduce the rigidity and the presence of co morbidity among patients. Hydrogen sulfide baths are appointed in the presence in patients with cardiovascular disease. Radon baths are suitable in the presence of concomitant diseases of the musculoskeletal system and the peripheral nervous system. Alpha radiation of radon stimulates cerebral metabolism, activates the production of biologically active substances, and improves the adaptive processes of the organism. For the purpose of relaxing and sedative effect can be used iodine-bromine baths. This leads to a positive impact on the psycho-emotional sphere of patients and reduces rigidity and tremor [7].

Peloid therapy

This method reduces the excitability of the spinal motor neurons, enhances the functional lability of neuro-motor apparatus, and activates the central nervous system [10]. Thermal mud treatment is assigned for reducing the severity of rigidity, hypokinesia, and tremor. It should be noted that the presence of benign oncological processes, even outside the overlay area of mud applications, is an absolute contraindication to peloid therapy.

Preformed physical factors

Electrophoresis was carried out various drugs for activate the cerebral circulation, improve trophic processes in the brain, providing a hypotensive action, and reduce the symptoms of PD. It uses nicotinic acid, ascorbic acid, potassium iodide or sodium iodide, drotaverinum, dibazolum, aminophylline by the neck and orbito-occipital technique. Electrophoresis of L-DOPA (appoint endonasal or fronto-occipital technique) is effective in patients with akinetic-rigid PD. Tremor, arterial hypertension and mental disorders are contraindications for this method [7].

Electrotherapeutic sleep therapy

largely reduces the severity of rigidity and rest tremor, lesser extent — hypokinesia. In addition, electric sleep reduces depression, anxiety and cognitive disorders. Electric sleep procedures conducted by the orbito-occipital technique. It is recommended in patients with akinetic-rigid, shaking-rigid PD.

The Institute of balneology, physiotherapy in Moscow were developed therapeutic complexes for patients with PD, which included decimeter waves therapy (DMW-therapy), sinusoidal modulated currents (SMC-therapy), hydrogen sulfide and radon baths.

The complex number 1 includes the consistent application of the therapy sinusoidal modulated currents, then hydrogen sulfide and radon baths. The method of electrical stimulation on the extensor muscle group with a threshold current intensity, causing painful cuts was proposed. This complex recommended for PD patients with hypokinesia and rigidity. *The complex number 2* includes DMW-therapy, hydrogen sulfide baths, therapeutic exercise. It improves the functioning of the sympathetic-adrenal system, vegetative functions, and stimulates the metabolism of the brain cells. DMW-therapy enhances cerebral blood circulation, activates the exchange of neurotransmitters. Elderly patients in the presence of cerebral arteriosclerosis DMW appointed on neck region. The impact of DMW on neck region has a reflex effect on the adrenergic structures of the brain and dopamine centers in the basal ganglia and segmental apparatus of the spinal cord (motor and intercalary neurons) which are responsible for the symptoms of Parkinson's disease. Then therapeutic exercise carried out for 30–40 minutes [7].

The complex number 3 includes hydrogen sulfide baths, inductothermy on neck region, exercise therapy, electrophoresis of drugs, and thalassotherapy. The course is 15-20 procedures every day or every other day.

Methods of physical habilitation after surgical treatment of PD

After the surgical treatment of PD used the same program, as well as in patients who do not need surgery. The complex number 1 including SMC-therapy, balneotherapy (hydrogen sulfide and radon baths), or the complex number 2 consisting of DMW-therapy, balneotherapy (hydrogen sulfide baths), physiotherapy is recommended. Psycho and reflexology, if necessary - social and labor rehabilitation are recommended for inclusion in the complex habilitation of patients with PD [7].

Transcranial magnetic stimulation (TMS)

The method is based on the impact of the pulse magnetic field for various brain structures and inducing therein electric current. Repetitive TMS of the prefrontal cortex causes increased release of dopamine in the caudate nucleus on the side of stimulation and stimulation in the posterior cranial fossa projection increases dopamine concentration in the blood and cerebrospinal fluid [11]. Other results of TMS are antidepressant and metabolic effects, activation of neuroplasticity, and normalization of cerebral blood flow [12]. TMS significantly reduces anxiety, depression and cognitive impairment. These effects are due to the pronounced influence of the magnetic field on the serotonergic and histaminergic systems, opiate receptor system, glial activation and strengthening of inhibitory processes in the brain [11].

Transcranial electrical stimulation (TES)

is based on the impact on the structure of the brain stem of small amplitude pulse currents (up to 3 mA) with a rectangular asymmetric bipolar pulse shape. This effect in PD patients leads to the activation the brain alpha rhythms, normalization of other brain biorhythms, increasing the concentration of serotonin, acetylcholine, met-enkephalin and beta-endorphins. There is evidence on the positive effects of TES in the treatment of emotional and volitional disorders in PD, reducing depression and anxiety, and the normalization of nocturnal sleep [13].

Therapeutic exercise

As a result of clinical and experimental studies have provided evidence of the positive effects of exercise on the dopamine metabolism. Thus, the method of positron emission tomography revealed that brisk walking for an hour without specific therapy increases the release of dopamine from the nigrostriatal dopaminergic neuronal endings in patients with PD [14]. Furthermore, it is shown that moderate physical activity increases the absorption of levodopa in intestine, which contributes to a better efficacy. There was a significant increase in daily activity, improving walking (increase stride length, tempo), a decrease in postural instability, reducing the "pour" during walking [15]. In addition to improving motor function, the positive effect of physical activity appears to change the psychological state - increasing satisfaction with their health and quality of life [16].

The main tasks of exercise therapy in PD are the maintenance of general motor activity, increase muscle strength and flexibility, facilitating the initiation of movements, the improvement joint mobility, the maintenance correct posture, the improvement walking and maintaining balance, prevention of contractures and pain syndromes, prophylaxis of respiratory disorders, and injury prevention.

The basic principles of exercise therapy in PD: 1) regularity of employment (daily); 2) dosed physical activity; 3) rhythmic accompaniment sessions using external acoustic (account, music) or visual (light bulb flashing, markings on the floor) impulses; 4) exercise therapy for all muscle groups and joints (including mimic muscles); 5) inclusion exercises for coordination and elements of sports in the early and advanced stages of the disease; 6) the use of weights (dumbbells, expanders, weights) and gymnastic articles (balls, sticks, rope); 7) aerobic exercise since early stages of the disease ("Swedish walking", walking, training on a stationary bike, swimming); 8) conduct of exercise therapy in the later stages of the disease during the period of drug action ("on"-period) [14].

For example, fig. 1 and 2 show exercises for improving joint mobility. Fig. 3 demonstrates the training of fine motor skills of hands.

THE TACTICS OF MOTOR REHABILITATION IN VARIOUS STAGES OF PD (STAGES 1-4 BY HOEHN AND YAHR)

The main task of exercise therapy in the early stages of the disease (stages 1–2) is the maintenance or improvement of general motor activity, prevention the formation of secondary musculoskeletal disorders as a result of the major symptoms of the disease. For improve the general motor activity and its adaptation possibilities, exercises with the simultaneous implementation of several motor programs or tasks to maintain attention are recommended. For example, continued walking with long strides or exercise turns during a phone conversation, arithmetic account etc. Foot and turns tests in the different situations can be recommended: in the plain, at a slant, the open spaces and the passage of the bottlenecks, in the free areas or in the presence of people and others [5].

In the advanced stage of PD (stage 3) the need to maintain the correct posture and correction of altered posture, improvement of walking, maintain a balance and prevention of falls are added. Focus the attention of the patient on the main aspects of walking (step width and rhythm control) and turns (alignment of the body and leg movements) contributes to the improvement walking and postural control on the background of disturbed automatism. In contrast to the recommendations in the early stages, patients are recommended to avoid situations that require the simultaneous execution of multiple tasks, divert attention from the action performed [17].

The main task of exercise therapy in the advanced stages of the disease (stages 4-5) is patient education correct strategies for the movement as much as possible maintain a daily locomotor activity and functional independence; prevention of the formation of contractures and respiratory disorders. Active attention of patients to goal setting of the planned actions and thinking through the sequence of implementation of each component of its motion is required to replace the lost (to varying degrees) motor automatism [14].

ORGANIZATIONAL RULES OF EXERCISE IN PD

Conduct exercises better during the good health of the patient on the background an optimal effect of antiparkinsonian drugs. In some cases, exercise in the morning (before the first dose) contribute to improving the well-being and allow to take a dose of dopaminergic drugs later. Physical exercise should be increased gradually. Performing exercises with active movements begin with 2–3 repetitions and then increase repetitions multiplicity up to 5–10 times.



Fig. 1. Exercises for improving joint mobility (photo by authors)



Fig. 2. a – initial position; b, c – steps of exercise (photo by authors)



Fig. 3. a–*e* — sequence of fingers and hands motions during exercise (photo by authors)

Exercises to stretch the muscles begin since hold postures for 1-2 minutes, gradually increasing the duration up to 3-5 minutes. Exercises should bring a sense of pleasant fatigue. Do not exceed the loads until the feelings of exhaustion or pain in muscles and joints. If the patient has heart disease, he should discuss with doctor the planned training program. When the unpleasant sensations in the head ("lightness" or "heaviness", darkening) during exercise, the patient should sit or lie down. Most likely, this condition is caused by reduction of blood pressure in the upright position of the body. It is necessary to measure blood pressure at the time of "discomfort" and spend orthostatic test at rest.

Should be noted that number of patients at increased physical activity is characterized by faster "depletion" effect of a single dose of levodopa. In case of early reduction of drug action, the patient may take next dose drugs before the scheduled hour. Before starting the exercises should sure that patients understand the tasks of exercises and the sequence of its constituent parts. In severe PD the number of authors offers to reduce symptoms of disease such as hypokinesia, muscular rigidity, tremor, postural instability with a special cycle of exercises: 3 dynamic, 3 static exercises and exercises to improve mobility in the joints [18].

OTHER NON-PHARMACOLOGICAL METHODS OF HABILITATION IN PD

Diet therapy is an important part of the program habilitation PD patients. This is due to the following features: the presence of symptoms of damage to the autonomic nervous system, the impact of certain proteins on the bioavailability of levodopa, underweight, motor activity of the patient [19]. If the patient has daily fluctuations in motor function with on-off periods, a diet low in protein is recommended during the daytime and a diet high in protein — in the evening. At night should be limited fluid intake. Herbal teas (mint, lemon, chamomile and others.) are recommended instead of black tea and coffee. The consistency of the food must not impede swallowing (creams, mashed potatoes, peeled, chopped or grated vegetables and fruit) [17, 20].

Massage. The procedure should affect the neck region, back, paravertebral areas, and extremities. Duration of procedure is 10–20 minutes. The treatment course consists of 15–20 procedures that are performed daily or every other day in combination with one of the following methods — hydrogen sulfide baths, electrophoresis of drugs, inductothermy, physiotherapy, and sea bathing [21].

Ergotherapy (occupational therapy) enables patients to adapt to their disease, increase their independence, teaching specific skills self-service. Ergotherapy in PD includes main points: self-service, work and leisure [22].

Apitherapy. The mechanism of action is exogenous dopamine replacement therapy contained in bee venom stimulation biogenic amine system, the activation of the dopaminergic systems of the organism. Apitherapy also reduces the level of cholesterol, contributes to hypocoagulation and vasodilation. In addition, amino acids that are part of apitoxins provide the basis for synthesis of nerve fibers. The improvement observed in all forms of Parkinson's disease in the form of reduced rigidity, tremor, improvement walking [23].

Correction movements using biofeedback therapy in PD is based on visual monitoring of posture using stabilometric systems [24]. In the early stages of the disease, and in patients with moderate postural disorders games with posture control using stabilometric platform used. In patients with severe PD uses only computer-stabilometric games, because in these patients the process of formation of skill arbitrary posture control is broken. The positive effect of biofeedback therapy on the severity of hypokinesia and postural instability was observed [24].

CONCLUSION

Thus, there is a wide range of non-drug treatments for Parkinson's disease. Appropriate combination of these methods with a specific drug significantly improves the quality of life of patients. Clinical experience shows, when the patient remains active and relatives are actively involved in the rehabilitation process, the disturbed functions recover faster and more fully.

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DISORDER PATTERNS OF THE MYOCARDIUM PERFUSION OF THE CIVIL AVIATION PILOTS

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INTRODUCTION

The arsenal of the radiation research methods is the most informative part of the diagnostic methods of the clinical medicine; they make it possible to "in vivo" examine both anatomical and functional characteristics of different organs and systems. However, each of the methods (R-CT, MRI-tomography, ultrasound and radionuclide research methods) has its positive and negative sides and limits of information value.

The last circumstance is particularly vital for the study of such multi-functional organs and systems like the heart. In this connection the clinician doctor faces a serious challenge — the choice of the clinically expedient and methodologically most informative research method for the specific clinical aim, especially of the people with specific working conditions like pilots with 20 and more years of working experience.

RELEVANCE

Taking into account the work specificity (the occurrence of positive and negative overloads, vibration and noise) the methods of heart topography, enabling to approach the pathophysiological mechanisms of the disorders of the myocardium perfusion most closely have been chosen by us in the framework of the current research. [1, 2, 3]. The condition of the myocardium perfusion of the patients who have not suffered from myocardial infarction, but have an expressed pain of various intensity levels, is a complex clinical task of current importance. It gets even more complicated due to a great many ambiguous factors influencing the development of the pathological process, that are present in the air crew with at least 20 years of experience.

We have not found any research and works on this topic in the available literature with the use of scintigraphy.

AIM AND OBJECTIVES

Based on the above mentioned, the aim of the present study was to examine the myocardium perfusion of the air crew with the exposure of the peculiarities of this disorder. To reach these aims the following objectives have been set:

- 1. The definition of the disorder of the myocardium perfusion.
- 2. The exposure of the disorder section and the area of the myocardium damage.
- 3. The reaction of the myocardium on the pharmacological assay and the exposure of the change peculiarities on the stress factor.
- 4. The exposure of general and specific patterns of myocardium perfusion disorders of the left ven-

tricle in case of rest and pharmacological load and their comparative characteristics.

5. The peculiarities of perfusion disorders of the air crew.

MATERIALS AND METHODS

16 individuals (pilots with a working experience of over 20 years) without any clinical and laboratory indications of a past myocardial infarction have been examined. The reasons for referral were unstable angina pectoris, arrhythmia and oscillation of the arterial pressure.

All the patients underwent echocardiography with a Treadmill test and all the clinical biochemical tests.

Research methodology is perfusion scintigraphy with radioactive technetium and an MIBI (Technetril) kit. The research was carried out on the"SPECT" camera ("Mediso" - Hungary). The step of the tomographic scanner is 5,60, the angle of the detector rotation around the heart is from 60° to 240° . The number of shots is 32. The section is 5mm along all three tomographic axes. The research was carried out in 2 stages: the first one an hour after intravenous Tc-99m-MIBI, with 22–24 mGi activity, the second one right after the first tomography after taking two nitroglycerine pills. The final assessment of the obtained information was given in the form of qualitative and quantitative assessment of the level of the myocardium perfusion disorder along the three axes, all the sections on the basis of the "heart map" and the overall percentage of the myocardium damage of the left ventricle [1, 2, 4].

Afterwards a comparative characteristics of tomo-scintigram was performed before and after the loading test.

To optimize the interpretation of the tomographic data the following standards have been chosen- the program pack of IAEA and the IAEA guidelines for the assessment of the perfusion disorder.

The normal seizure is assessed in case of diffuseuniform redistribution of the indicator from 100% to 70% from the administered activity, an insignificant reduction of the bloodstream being 70–50%, mean being 50–30%, significant being 30–10% and profusion absence being 0–10%.

Another benchmark for the assessment of the disorder level of the left ventricle myocardium is the number of damaged segments by the nine-segment model.

In case of 1-2 segment damage — the perfusion damage is insignificant, in case of 3-4 — it is moderate, in case of over 5 segments- perfusion damage is significant.

RESULTS AND DISCUSSIONS

The following results have been obtained:

- 1. Profusion disorders of different levels have been discovered in all the individuals under examination.
- 2. More vulnerable sections were localized along apical septal and anterolateral walls of the left ventricle. Bigger areas of damage are on the back wall from the septum to the lateral sections. Accordingly, the reduction level was 50% and the number of segments was 3–4.
- Signs of concentric hypertrophy of the left ventricle myocardium were discovered in 90% of patients and signs of eccentric hypertrophy were discovered in 10% : reduction level of the latter reached 70% and the number of segments was 4–5.
- 4. During the comparative assessment of the two stages of research(rest and stress) mainly signs of activity redistribution (91%), signs of hidden faults (57%), signs of stealing(36%), improvement of the general profusion of two patients and improvement of local areas of 36–38% have been revealed.

The last fact (improvement of local areas) is the most important clinical pathophysiological sign of the possible recovery of the myocardium perfusion.

The analysis of the tomoscintigraphy results makes it possible to assume that the condition of the myocardium perfusion of the left ventricle of the air crew can be a model of hibernated myocardium, described by Rahimtoola S.H.(1980) and μ Narahara R.A.(1990).

The main task of the present report is the definition of the zones of reversible ischemia and areas of nonviable myocardium. The perfusion disorders, as described by Narahara R.A. (1990) can be revealed in the areas of viable, but "hibernated" or deafened myocardium as well.

Naturally the best method of identifying the hibernated zones is PET-tomography.

Perfusion single-photon tomography at rest and myocardium scintigraphy in combination with nitroglycerine assay made it possible to show the increased indicator accumulation with the method of the qualitative analysis. Myocardium viability (in different segments of the left ventricle myocardium) was revealed in almost one third of the patients.

The authors (Rahimtoola S.H. µ Narahara R.A.) [6, 7] have singled out a fundamental moment of the hibernation essence, that "oppression of the retractive function of the myocardium proceeds parallelly" with the ischemia level. At the same time decrease of the inotropic function of the hibernated myocardium is presented as the regulatory defensive reaction in response to the energy deficit in cardiomyocytes.

All the clinical conditions which can lead to myocardium hibernation are seen in the examined group, conditioned by the permanent harmful professional work factors.

From the practical point of view the presence of hibernated myocardium is a weighty prognostic factor for the recovery of the damaged perfusion.

Pathophysiological mechanisms of the obtained results

In case of the coronary blood flow to the critical level or in case of relative supply insufficiency of the myocardium with oxygen there emerges oxygen starvation on "the respiratory chain" level. As a result of termination of the aerobic catabolism glycogenolysis and anaerobic glycolysis are reinforced, in which case energy production volume is in direct relation to the blood supply of the myocardium. The latter circumstance emphasizes the significance of the myocardium perfusion study to determine the level of ischemia of the cardiac muscle.

The principal sign of ischemia is that the need for macroergic phosphates increases their formation speed and as a result the level of these compounds in the cell decreases quickly. After a few seconds of total ischemia creatine phosphate supply in cardiomyocyte is totally exhausted [5].

The effective perfusion contributes to the recovery of the retractive function of the reversibly damaged cardiomyocytes only after the normalization of energy production and decrease of the intracellular calcium concentration. Sometimes the recovery of the retractive function of the heart after the restoration of coronary blood flow takes place with some delay ("Deafness of the myocardium"). [3, 8].

In case of the absence of adequate reoxygenation of the heart the ischemic changes of the intracellular metabolism lead to structural morphological changes of cardiomyocytes right up to their death with the formation of postinfarction cicatrices. The consequence of such a disorder (damage) is the irreversible disorder of the retractive function of the myocardium [3].

Thus, myocardium tomoscintigraphy is one of the necessary examinations as an indicator of the myocardium perfusion condition and predictor of the possible complications.

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STRATEGY FOR USE OF DIFFERENT DORSAL INSTRUMENTATIONS IN CHILDREN WITH ADOLESCENT IDIOPATHIC SCOLIOSIS

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INTRODUCTION

Although etiology of adolescent idiopathic scoliosis (AIS) remains unknown, it's well known that Heuter-Volkmann law contributes to progression of spinal deformity forcing vertebrae to turn into wedgeshaped and making vicious cycle onset [1, 2, 6]. Main treatment options include observation, conservative treatment and surgery [1]. Surgery is recommended in skeletally immature patients with Cobb angle exceeding 40° or rapid progression [1]. Surgical treatment options include anterior fixation, posterior fixation or its combination and no difference found between Cobb angle correction between anterior and posterior constructs [3, 4]. There are a lot of dorsal instrumentations for AIS treatment in conditions of incomplete spinal growth, only few of them studied for influencing on subsequent spinal growth: growth friendly hook instrumentation with sliding rods (HISR) and transpedicular screw fixation (TSF) construct [5,9].

AIM OF STUDY

The aim of this prospective longitudinal nonrandomized study was to define indications for use of different dorsal instrumentations in children with AIS according both to their spinal growth modulation (spine remodeling) effect and effectiveness of spinal deformity correction.

MATERIALS AND METHODS

The study started in 2004 and now is on go. By the end of 2016 we collected data of 293 children. 35 were excluded mainly due to insufficient data. In summary 258 children, 32 boys (12,4%) and 226 girls (87,6%) were included in the research by the end of 2016. Patients were divided into 3 groups according to the type of instrumentation used for operative correction of spinal deformity. 1st group is represented by 198 children (74%) instrumented with hook instrumentation with sliding rods permitting consequent spinal growth. 2^{nd} group is represented 22 (9%) children instrumented with hook instrumentation with locked rods (HILR). 3rd group is represented by 44 children (17%) instrumented with transpedicular screw fixation constructs (TSF). We also divided patients for 2 age groups based on age at the moment of surgical treatment for thorough assessment of correction effectiveness: 12 years old and younger; 13 y/o and older. Complex analysis of all scoliosis deformity parameters was carried out, major of them were Cobb angle and its correction rate (CR), apical vertebral rotation and its correction rate and its correction rate (AVRCR), Risser testvalues (R0–R5), stability index (SI), King type (I–V). Mean follow-up was 27±0,7 months with consequent follow-up periods: 5 days after surgery, 6 months, 12 months, 24 months and final follow-up. We used comprehensive morphometric assessment of spine evaluating plain AP radiographs of the spine in Radiant DICOM Viewer computer program (fig. 1).

The most important morphometric analysis data which represents the severity of vertebral bodies and intervertebral discs wedging areconcave-convex vertebral body height ratio (CCVB) concave-convex intervertebral discs height ratio (CCID). The values of these parameters should ideally be near 1. Other parameters include concave disc-body ratio (ConcaveDB) and convex disc-body ratio (ConvexDB). These parameters represent whether vertebral bodies or intervertebral spaces contribute more for spine remodeling after instrumentation. Complex statistical analysis was made in Statistica 10.0 program using Kruskal-Wallistest for independent variables, Friedman ANOVA for dependent, Spearman criteria for correlations and Pearson Chi-Square for qualitative variables.

RESULTS AND DISCUSSION

The highest correction rate (CR) early after operation were obtained in 1^{st} group (76,6±0,9% versus 68,6±1,5% in 2nd group and 66,4±3% in 3rd group, p<0,001). Despite the results of CR at final follow-up, the highest increase of CR during follow-up period was obtained in 3^{rd} group (+2,3±0,4% versus CR change $+0,3\pm0,2\%$ in 1st group and $-1,7\pm1,3\%$ in 2^{nd} group; p<0,0001), showing better post-operative overcorrection comparing to other groups. No statistically significant differences of AVRCR value both at final follow-up and total increment were found between 1st group and 3rd group (total AVRCR increment in 1st and 2nd groups were -0,23±0,3% and $-0.97\pm1.4\%$ respectively; p=0.3) while loss of AVRCR obtained in 2nd group during follow-up period (-4,12±1,29%; p=0,0008). We built correlation matrices for the thorough analysis of correlations and found some significant (p < 0.05)correlations between CR, AVRCR and a few of important parameters such as pre-operative Cobb angle (r=-0,46), Age (r=-0,3), Risser (r=-0,29) and SI (r=-0,2)which means that better correction can be achieved using active surgical strategy with early surgery in growing adolescents with AIS. representing better post-operative over correction if there is TSF construct applied. The highest rate of technical complications, such as rod failure or migration obtained in 1st group (16,6% versus4,5% in 2nd groupand 4,5% in 3^{rd} group, p=0,0009; fig. 2) as well as rate of related reoperations (20,8% versus 4,5% in 2nd group and 4,5% in 3rd group). Very important feature is that

AP X-RAY evaluation parameters:

- Concave-Convex Vertebral Body height ratio (CCVB) = A/B (VERTEBRAL WEDGING)
- Concave-Convex Intervertebral Disc height ratio (CCID) = C/D (INTERVERTEBRAL SPACE WEDGING)
- Concave Disc/Body height ratio (ConcaveDB) = E/F
- Convex Disc/Body height ratio (ConvexDB) = G/H
- Oriented line through vertebral endplat

RADIANT DICOM VIEWER Distances measurment



COMPLICATIONS Pearson Chi-Square = 0,07

M-L Chi-Square = 0,01

	HISR	HILR	TSF	ALL
No complications	74,0%	86,4%	86,4%	78%
Rod fracture	4,2%	0,0%	0.0%	3%
Seroma	5,2%	4,5%	4,5%	5%
Rod migration	8,3%	0,0%	0.0%	6%
Suppuration	4,2%	4,5%	4,5%	4%
Seroma&Rod migration	0,0%	0,0%	4,5%	1%
Rod migration&Suppuration	2,1%	0,0%	0,0%	2%
Rod fracture&migration&suppuration	1,0%	4,5%	0,0%	1%
Rod fracture&migration&wound disrepancy	1,0%	0,0%	0,0%	1%

Fig. 2.

construct-associated mechanical complications in 1st group noticed mostly in children underwent surgery at the age after 13 years old (67% migrations and 50% breakages). It could happen with insufficient dorsal fusion forming at the end of spine growth due to loose hook-road connectives allowing rods to slide simultaneously with spine growth. However using stable (non-slide) rod constructs can lead to crankshaft phenomenon developing as the result of spinal fusion during spinal growth period [7].

Morphometric analysis shows highest rates of CCVB and CCID at final follow-up in 1st group; $0,99\pm0,002$; p=0,001 and $0,87\pm0,029$; p=0,001 respectively (fig. 3), while highest increment of CCVB obtained in 1st group (+0,04±0,001; p=0,004) and highest increment of CCID — in 3rd group: -0,04±0,02; p=0,05 (fig. 4).The worst results at the final follow-up and total increment of CCVB





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Fig. 4.

 $(0,87\pm0,04; -0,0\pm0,03; p=0,009)$ and CCID $(0,75\pm0,06; -0,0\pm0,03; p=0,001)$ obtained in 2nd group comparing to other groups. These results represent vertebral bodies remodeling which means turning them from wedge-shaped to normal shape (it's supposed for vertebral body heights to be equal to each other on concave and convex sides of spinal deformity). Taking to account obtained results we can state that finally the best spine remodeling occurs while using HISR earlier in skeletally immature patients trying to avoid any delay.

Other important parameters include ConcaveDB and ConvexDB. These parameters are interesting for its results interpretation. One of last studies showed that there aren't any changes in intervertebral discs that can be related to growth in children after 10 years old [10]. The point is that aforementioned parameters doesn't have exact normal values especially in deformed spine, but it's obvious that ConcaveDB and ConvexDB ideally should be equal in normal spine to be symmetric. Furthermore, total increment of these parameters should be ideally equal to each other during growth to allow the spine having symmetric residual growth. If that condition achieved there is a physiological symmetric vertebral body growth allowed without any mechanical modulation which may cause concave side of vertebral body to overgrow that on convex side after deformity correction. We found that difference between values

of ConcaveDB (0,17±0,012) and ConvexDB $(0,20\pm0,013)$ at the final follow-up in 1^{st} group (p=0,0001) are equal to the same difference in 3^{rd} group (0,19±0,026) and 0,22±0,019 respectively; p=0,0001). Otherwise the most physiological and symmetric total increment of ConcaveDB (-0,02±0,019) and ConvexDB $(-0,01\pm0,024)$ obtained in 3rd group (p=0,01) comparing to the same values 1stgroup (-0,07±0,012 and -0,05±0,013 respectively; p=0,01) — fig. 5. We also measured central intervertebral spaces within the curve before and after operation and found the highest increment to be in 3^{rd} group (+4,4±0,7 versus 2,1±0,13) and 1,3±0,3 in 1st and 2nd groups respectively), which means better intraoperative spine distraction in 3rd group and lower pressure to growth plates resulting in better growth modulation. Thus postoperative changes are more physiological in TSF construct comparing to HISR.

Finally, we made a special ranking system using major parameters of our study which represents correction effectiveness (CR, AVRCR, complications rate) and post-operative spinal remodeling (CCVB; CCID; ConcaveDB and ConvexDB). We compared 2 major values for these parameters between different groups: value at the final follow-up and the value of total increment (fig. 6) and found out, that the best construct for final follow-up values is HISR and for total increment values — TSF construct in case of applying at the age of 13 y/o and older because of the absence of any advantages of HISR for correction effectiveness but significantly better post-operative remodeling obtaining by TSF construct applying. We suppose there is also a need of further research for use of TSF constructs in skeletally immature patients using these parameters due to a recent study where author showed absence of crankshaft phenomenon forming [8].

CONCLUSION

We believe that hook instrumentation with sliding rods is preferable for use in children with AIS before 12 y/ oand Risser 0–1 with either subsequent construct replacement for TSF instrumentation or using strains for rods locking to achieve sufficient dorsal fusion. We believe that TSF construct is preferable for use in children after 13 years old and Risser 2–4 due to better post-operative spine remodeling, lower technical complications and reoperations rates. It's possible to use HILR only in children reached Risser 4 after age of 13 in case of contraindications presence for use of TSF construct.

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NCREMENT-BASE	DRAN	KING		FINAL FU value - BA	ASED RAN	KING	
	HISR	HILR	TSF		HISR	HILR	TSF
CR%	11	Ш	1	CR%*	1	111	1
AVRCR%	1	Ш	11	AVRCR%*	1(11*)	11	11(1*)
CCVB	1	=	11	CCVB	1	111	11
CCID	111	11	1	CCID	1	111	11
ConvexDB	11	Ш	1	ConvexDB	1	111	11
ConcaveDB	11	111		ConcaveDB	1	Ш	11
Complications		1	1	Complications	11	1	1
TSF recomm	nende	d		HISR recomm	ended		

Fig. 6.

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TO THE ISSUE OF STUDYING THE PREVALENCE OF ANTIBIOTIC RESISTANCE AMONG THE POPULATION

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The World Health Organization (WHO) regards the problem of antimicrobial resistance as one of the highest priorities, as evidenced in the development of the *Global strategy to contain microbial resistance to antimicrobials*. The global strategy includes the rational use of antibacterial drugs by medical stuff, the development of decision-making skills for parents and children for prevention of antibiotic resistance. Often among the population, there is self-medication with antibiotics, using of antibiotics on the recommendation of friends, relatives. All this contributes to spreading of antibiotic resistance, beginning with early childhood.

DESIGN AND METHODS

We surveyed 277 ill children's' parents who were on treatment in the primary health care unit. The selection and formation of the study group were carried out by random sampling. The interview was was held in polyclinics №1, №3 and polyclinic *Vita* in Karaganda.

Criteria of the selection for inclusion in the study were: parents of sick children aged 0 to 17 years, verified diagnosis, informed consent of the patient, absence of contraindications. Exclusion criteria were: the presence of severe organic pathology, concomitant diseases in the stage of decompensation and subcompensation.

The method of data collection: a survey method, individual interviewing.

Research tool:

The questionnaire developed by a team of researchers, Andre M, Vernby A, Berg J, Lundborg CS, Karolinska Institutet, Stockholm (Sweden). The questionnaire consists of 5 blocks: introduction; access to antibiotics; scope and effectiveness; side effects and resistance, doctors' habits and patient/doctor relationship. In this paper, we present the results of a study on 1 block, consisting of 15 questions.

Statistical processing of data obtained at all stages of work was performed using the SPSS Statistics software package.

RESULTS

Among 277 respondents 21,3% were fathers and 78,7% were mothers (fig. 1). The most common age was 21–30 years (32,1%), 28,41% of respondents were in their thirteens, 17,71% of respondents were in age between 41–50 years, while 9,96% respondents' age was between 51 and 60 years, 7,75% of respondents were in age between 61–70, 3,32% of respondents were in their seventies, and 0,74% respondents' age were 20 years old (fig. 2).

In the study of respondents' education level, it was found that 62,73% of respondents have universityhigher education, 34,69% have secondary professional education and 2,58% of respondents have compulsory school education level. It is also important to note that 16,61% of respondents have graduated secondary medical education or they had courses in medical care, 5,17% of them is men and 19,72% of them is women.



Fig. 1. Differentiation of respondents' sex



Fig. 2. Differentiation of respondents' age

According to our data, 87% of respondents knew names of antibiotics, often respondents mentioned penicillin. The rest of respondents (13%) could not mention names of antibiotics.

According to data research it was identified that 96,31 % of parents have experienced antibiotic treatment: 89,66% of them were fathers and 98,12% of them were mothers. We analyzed experience of antibiotic usage depending on respondents' age. It was identified that 98,85% of 21–30-year-old-respondents, 98,7% of respondents in their thirties, 95,83% of 41–50-year-old-parents, 81,48% of respondents in age category 51–60, all parents between 61–70 years old and 20 years old, and 88,89% of 71–80-year-oldrespondents have ever taken antibiotics. This analysis shows following correlation: children's mothers and young respondents are more likely to take antibiotics.

In comparative analysis of number of have taken antibiotic therapy courses in was revealed that 10,34% of respondents have used antibiotics once, 64,37% of parents have used antibiotics less than 10 courses, while 25,29% of respondents have used antibiotics more than 10 courses.

13,46% of fathers and 9,57% of mothers were in the group, in which antibiotics have used only once. In the study quantity of antibiotic therapy courses depending on parents' ages it was found that prevailed respondents in group of age 21–30 years old, 71–80 years old and 31–40 years old (consequently 13,95%, 12,5% and 11,84%), 51–60-year-old-respondens were relatively less – 9,09%, and 6,52% of respondents were in category of 41–50 years.

59,62% of men and 65,55% of women have treated with antibiotics less than 10 courses. Age differentiation showed the following results: 62,79% of respondents were in their twenties, while 65,79% of them were in age category between 31–40 years, 41–50-year-old-respondents were significantly more (76,09%), 40,91% of parents' age were between 51 and 60, 61,9% of respondents were in their sixties, 62,5% of them were 71–80-year-old, also it is important to note that all 20 years old parents were in this group.

The experience of taking more than 10 courses of antibiotic therapy was among 26,92% of fathers and 24,88% of mothers. More than 10 courses of antibiotic therapy have been the most among 51–60-year-old-respondents (50%), 23,26% of parents were in age group of 21–30-year-old, while 22,37% of them were in their thirties, 17,39% of respondents were in 41–50-year-old age group, 38,1% of parents' age was between 61–70 years, along with it a quarter of respondents were in their seventies.

According to data about prescription of antibiotics, it was identified, that 48,28% of people took antibiotics within the last 12 months, 46,36% of respondents took antibiotics more than 12 months ago, and the rest 5,36% of them took antibiotics last time more than 10 years ago.

As reported by surveyed parents, that treated with antibiotics within the last 12 month, 36,54% of them were men and 51,2% of them were women. The age division was as follows: 58,14% of parents were in their twenties, the number of parents from 31–40 years and 41–50 years age groups were almost the same (consequently 50% and 52,17%), 36,36% of parents age were between 51 and 60 years, 28,57% of respondents age were 61–70-years-old.

59,62% of fathers and 43,06% of mothers took antibiotics last time more than 1 year ago. 36,05% of asked people's age were 21–30-year-old, while the number of parents from 31–40 years and 41–50 years age groups were few more (consequently 43,42% and 45,65%), 54,55% of respondents were in their fifties, 66,67% of respondents' age were between 61–70, and all respondents from age group 71–80-years and 20 years took antibiotic more than 1 year ago.

Parents who took antibiotics more than 10 years ago were relatively few: 3,85% — men, 5,74% — women. Predominated 51–60-year-old age group (9,09%), 31–40-year-old-parents were significantly less (6,58%), 5,81% of parents' age was between 21 and 30 years, while 2,17% of respondents were in their forties, 4,76% of surveyed people's age was between 61–70-years. According to respondents, 88,49% of their children have received antibiotics, 88,24% are men's children and 88,52% are women's children. Age differentiation showed the following results: 91,49% of respondents were in their twenties, while 92,31% of them were in age category between 31–40 years, 41–50-year-old-respondents were significantly less (80,95%), 87,5% of parents' age were between 51 and 60, all of respondents were in their sixties, a half (50%) of them were 71–80-year-old.

89,43% of children have treated with antibiotics less than 10 courses, at the same time 10,57% parents said that their children have used antibiotic treatment more than 10 courses.

According to 90,74% of mothers and 80% of fathers their children have taken antibiotics less than 10 courses. The quantity of 21–30-year-old-parents and 41–50-year-old parents was almost the same (consequently 88,37% and 88,24%), while the number of parents in their fifties and sixties was the same (85,71%), 91,67% of respondents' age was between 31 and 40, all of 71–80-year-old-respondents' children have taken less than 10 courses of antibiotic therapy.

20% of men and 9,26% of women claim that their children have used antibiotics more than 10 courses. In terms of age aspect the results were as follows: quantity of 21–30-year-old-parents was 11,63%, while 31–40-year-old-parents' quantity was equal to 8,33%, 11,76% of respondents were from 41–50-years-old age group, 14,29% of surveyed people were in their fifties, analogical quantity was among 61–70-year-old-people.

According to our data, 67,48% of parents consider that their children used antibiotics within last 12 months, at the same time 32,52% of respondents claim that children took antibiotics last time more than a year ago.

46,67% of fathers and 70,37% of mothers said that their children took antibiotics within last 12 months. Assessment of age shows predomination of 41–50-year-old-parents (82,35%), 71,43% of respondents were in their sixties, while 69,77% of parents were from 21–30-years-old age category, 62,5% of respondents were in their thirties, and 57,14% parents age was between 51 and 60 years.

55,33% of men and 29,63% of women treated children with antibiotics more than 12 months ago. 30,23% of respondents were in their twenties, while 37,5% of them were in age category between 31–40 years, 41–50-year-old-respondents were significantly less (17,65%), 42,86% of parents age was between 51 and 60 years, 28,57% of respondents were in their sixties, and all of surveyed people were 71–80-year-old.

Summarizing the above, it should be noted that the majority of respondents had a higher education

level, this probably allowed most of the parents to be aware of antibiotics. In addition, this fact can also be explained by the frequent prescription of penicillin both to the parents themselves and to their children. Both in the anamnesis of the parents and in the anamnesis of children, a significant experience in taking antibiotics was noted, up to 10 courses of treatment had a large part of both parents and children. But the category of respondents that has taken more than 10 courses of treatment during the last 12 months poses a danger. The obtained data testify to the existence of grounds for the assumption that in the anamnesis of these respondents, there seems to have been an unreasonable antibiotic therapy and prerequisites for the formation of antibiotic resistance both among mothers and among fathers.
QUESTIONS OF FORMATION OF OXYGEN DEBT IN THE CONDITIONS OF LARYNGEAL OR HYPOPHARYNGEAL CANCER (LITERATURE REVIEW)

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ABSTRACT — This article provides a detailed literature review with the analysis of the impact of comorbid pathology on the course and prognosis of the primary tumor process. The illuminated factors that influence oxygen delivery to the tissues and the reasons for the rise of oxygen and substrates demand in terms of growth of laryngeal or hypopharyngeal cancer. The oxygen debt is formed, which affects results of the treatment.

KEYWORDS — laryngeal or hypopharyngeal cancer, comorbidity, airway obstruction, mucociliary insufficiency, hypoxemia.

Modest results of treatment [1, 2, 3] and survival [4] of patients with laryngeal or hypopharyngeal cancer are accounted with both a delay in seeking treatment and the combination of main diseases with different pathological processes (up to 77,9% [5]). This very combination of the main and comorbid pathology created a condition for disproportion in oxygen delivery and its need. This disproportion slows down restoring processes and enhanced the so called "hidden" background pathology, which accounts for progress and outcome of postoperative period and the illness in whole. However, in the specialized community there is no adequate evaluation of the impact of concomitant processes on reduction of oxygen delivery in tissues and in the same time increased demand of oxygen and substrates in patients with this pathology.

In one source [6] hypoxia, which is formed at heavy forms of tumors of the larynx/hypopharynx is recognized as one of the factors of unfavorable outcome. The marker of hypoxic changes, tumor necrosis factor of ((TNF)) has multiply exceeded the control data. Variable Illnesses, accompanying the main hypopharyngeal tumor process, were admitted as a key prognostic variable, which should be treated as a major compound at prognosis of treatment outcome. [7].



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At a certain degree the importance of such approach is confirmed by existing dependence of the influence of disorder of trophic status on the outcome of oncological process. [8]. Works on efficiency of nutritional therapy in such patients [9] also confirm the importance of correction of forming oxygen (=trophic) debt.

In patient with laryngeal or hypopharyngeal cancer despite importance of such risk factors as delay in seeking treatment and a high degree of invasion, the comorbidity degree is more decisive for outcome. Expressed comorbidity (48,3%) with high parameters of the Charlson comorbidity index was reported in the study [10]. In another work [11] the authors regard cardiological illnesses as a primary comorbid pathology in this patients. Thus, in 16,3% patients with surgery of tumors in head or neck various cardiologic problems were reported. It should be mentioned that the age of respondents was above 70 years.

Nevertheless, most of researches consider syndrome of bronchial obstruction and obstructive lung disease (OPD) as most frequent comorbid pathologies [1, 12, 13, 14].

Progressive obstructive changes during hypopharyngeal cancer process are displayed with manifested respiratory failure (RF). Studying the impact of methods of anesthesia on development of respiratory failure at surgical removal of larynx/hypopharynx

tumors revealed initial lung-bronchial pathology in all the patients, ventilation failure in 75-80% (in $\frac{2}{3}$ of patients as an obstruction). However, speed parameters of ventilation were reduced in 25–55% irrespective of anesthesia methods. And restrictive changes were kept in 100% cases, whereas cases of bronchitis in postoperative period were observed in one third of all the patients. This study [15] found development of different chronic lung diseases in postoperative period in more than in half of the patients. The conclusions of the work indicated that the presence of obstructive and drainage bronchial disorders before the surgery, promotes the development of complications in the bronchial-respiratory system in postoperative period. It is important that manifested disorders in speed indicators of air stream in distal department of the respiratory tree are still preserved after removal of obstruction in proximal department (after surgical removal of the tumors).

The limitation of speed of air stream, being a main pathophysiological criterion of the bronchial obstruction, interrupts the mechanics of aspiration, ventilation/perfusion conditions, regulation of the ventilation [16, 17, 18]. Therefore, COPD manifestations under developing of proximal obstruction of the airways are difficult for clinical assessment. Expiratory limitations in patients with stenosing tumors of larynx/hypopharynx in combination with alterations in the speed of inspiration airway cause changes in aspiration volumes and proportions, which leads to worsening of alveolar ventilation and reduction of blood oxygenation.

The first system experiencing the most strain in the condition of proximal and distal stenosis of the airways is the system of mucociliary clearance. Changes in ventilation parameters leads to overload and dysfunction of the apparatus of mucociliary clearance, which is a characteristic process in the pathogenesis of bronchopulmonary diseases [19, 20]. Proximal obstruction under a tumor process with inflammatory conditions of tracheobronchial tree [21, 22], distal bronchial obstruction independently or in combination put a strain on work of the mucociliary apparatus up to the degree of failure (Mucociliary Transport Failure). The severity of MTF depends directly upon the degree of bronchial obstruction and correlates with the manifestation of endoscopic features of the inflammation and hyperactivity of the bronchi [23]. The degree of MTF is determined not only by the severity of morphological changes [24, 25], the activity of inflammation process in mucosa of bronchi, manifestation of the disorders in structure and functions of cilium apparatus [26], but also by deterioration of viscosity properties of bronchial secretion [27, 28].

Deterioration of speed parameters of gas stream, MTF, bacterial access provide a provocative influence on the immunity, reaction of inflammation in the respiratory system and the course of comorbid diseases. Significant increase in the level of anti-inflammatory cytokines under cancer pathogenesis in organs of respiration are reported by the authors [29, 30]. As a result of the described processes there is manifestation of bronchial obstructions leading to hypoxemia.

Depression of the immune system under tumor progressing is responsible not only for inflammation response but also for the strain in the systems of antibacterial and antiblastoma protection [31, 32]. The strain in anti-inflammatory cellular immunity and antibacterial protection increases demand for oxygen in cells and organs. It was not the purpose of our literature review to provide a detailed study of systems of antiblastoma and antibacterial protection. Nevertheless, the very fact of the strain in these systems and therefore the increase in energy need of the cells has gained importance for development of oxygen imbalance. Summing up, increase in parameters of the right part of oxygen equation (supply = consumption) disrupts the equation and in conditions of reduced oxygen supply leads to oxygen debt in tumor patients.

The problems of dividing function of larynx/hypopharynx. At before-surgical stage dividing function of larynx/hypopharynx plays less importance in forming mucociliary insufficiency than changes in speed characteristics of airways and inflammation. However, they display in involuntary swallow movements, difficulties in swallow, swallowing in small quantities, throat-clearing [33], which leads to microaspiration and exhaustion in mechanism of mucociliary clearance.

A constant effort during an act of breathing accompanied by increase in proximal obstruction of the airways results inevitably in functional exhaustion and less productivity of the muscles involved in the act of breathing. The exhaustion processes of these function of aspiration muscles in patients with larynx/ hypopharynx tumors can be described as muscular insufficiency (MI). As a response to resistive strain there is an increase in inspiratory activity of the muscles of larynx/hypopharynx [34], increasing oropharyngeal space and preventing upper respiratory tract from occlusion under forced inhalation. Discoordination in the work of respiratory muscles weakens them, causes changes in biomechanics of a breathing act and disrupts the pattern of ventilation to hyperventilation and hypoxia. There is a hypothesis that the subject to exhaustion is diaphragm and additional muscles (intercostal and pharyngeal muscles) in various degrees. Electromiagraphycal examination [35] of different

groups of respiratory muscles under a forced load showed that decrease of summed functional reserve on the respiratory system is determined by deterioration of functional less in a diaphragm and more in thoracic and other auxiliary respiratory muscles. Diaphragm seemed to be more resistant to strain. [36, 37, 38, 39].

Thus, the progression of tumor creates conditions for reduction of speed of gas flow on proximal level, strain in work of respiratory muscles with narrowing of oropharyngeal airway space and impairment of mucociliary transport, changes in respiratory volumes, development and/or provocation of distal obstruction with poor secretion drainage. The general pathophysiological mode of formation of oxygen debt explains a mutual burden of laryngeal tumors and bronchial obstruction. The result of above mentioned processes is the formation of «hypoxia of delivery».

From the other side a high oxygen demand is connected with the processes of secondary bacterial infection on the background of cancerous intoxication with the strain of systems of antiblastoma and antibacterial protection as well as muscle exhaustion. In the total increased oxygen consumption there is also a role of the energy consumptive postoperative period after tumor removal.

Our own experience of the frame of our clinic confirms the proposed strategies for combined treatment in patients with laryngeal or hypopharyngeal cancer. One-stage radical surgery enables to reduce intoxication and to correct oxygen imbalance – "hypoxia of consumption".

In conclusion, it should be mentioned that unsatisfied oxygen needs lead to manifestation of either latently or openly developing processes, which may display in exacerbation of comorbid and background pathology and complications of the course of postoperative period. This gives evidence to clinical importance of the record of trophic status (formed cases of dysoxia) on all stages of operative treatment in patients with laryngeal or hypopharyngeal cancer.

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RELATIONS BETWEEN SOMATIC, NEUROPHYSIOLOGICAL AND PSYCHOPHYSIOLOGICAL MARKERS OF HUMAN HEALTH

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ABSTRACT — THE PURPOSE of this paper is to investigate relations between somatic, neurophysiological and psychophysiological markers of human health and to find out these markers' associations.

METHODS: anthropometry, bioimpedancemetry, biological age determination, electroencephalography, evaluation of anxiety and depression levels. A total of 1000 young healthy persons were examined (409 males and 511 females). RESULTS: inverse correlation has been revealed between sexual dimorphism index (SDI) and the level of selfreported anxiety according to the Beck Anxiety Inventory. Insignificant alterations in situational and interpersonal anxiety alongside with significant increase in depression level were common to persons with low body mass indices (BMI). Low scores in situational and interpersonal anxiety together with low depression level were revealed in persons with increased BMI. Increase in anxiety was found in both males and females with sexual inversion, more often in male gynecomorphs. The degree of situational anxiety level elevation (in points) was positively correlated with the degree of sexual inversion manifestation. CONCLUSION: the present research has demonstrated interrelation (association) between somatic (BMI, sexual inversion), neurophysiological (coherence coefficient) and psychophysiological (anxiety and depression level) markers in healthy adolescents.

KEYWORDS — human, health, somatic status, anthropometry, sexual dimorphism index (SDI), body mass index (BMI), electroencephalography, anxiety, depression, markers.

INTRODUCTION

National programmes of Healthcare development in the Russian Federation are aimed at disease prevention and healthy lifestyle promotion in the Russian population [1, 2, 7, 13]. Our previous studies have demonstrated that human physical health and human psychological health form an integral unit [5, 7]. Indicators of physical development have been identified that could be used as markers or predictors of socially significant diseases.

The purpose

of the present study is to investigate relations between somatic, neurophysiological and psychophysiological markers of human health and to find out these markers' associations.

METHODS

The investigation was carried out at the premises of the "Morphology and Physiology of a Healthy Person" research educational centre at Prof. V.F. Voino-Yasenetsky Krasnoyarsk State Medical University (KrasSMU). The study was approved by the KrasSMU Ethics Committee. Inclusion of healthy volunteers was performed upon informed consent signing. The volunteers received no reward for participation in the study. Examination of the volunteers was free of charge. Population of the city of Krasnoyarsk and the Krasnoyarsk Territory became the object of the research. A total of 4919 males and females at the age over 18 were examined. Among the study participants there were representatives of three age periods: adolescence, adulthood, old age. For the present study, a group of healthy adolescent volunteers was formed that comprised 409 young males and 511 young females. Methods of examination included anthropometry with somatometry indices calculation, bioimpedancemetry, biological age determination, electroencephalography, as well as evaluation of anxiety and depression levels.

Following the classical method of V.V. Bunak (1931), anthropometry was performed with the use of a standardised toolset [3]. A total of five markers were defined: height and weight, transverse thoracic diameter, shoulder and pelvic diameters. Bioimpedancemetry was conducted by means of the ABC "Medass" analyser (RF). Fat, muscular, bone and lean body masses were evaluated. Additionally, total body water, active cell mass (ACM), basal metabolic rate and phase angle were measured [8]. Moreover, index constitution assessment was performed. The BMI made it possible to reveal alterations in body mass [4]. The sexual dimorphism index (SDI) detection by the method of D. Tanner allowed us to evaluate the degree of compliance of the constitution with the phenotypic sex including andromorphy, mesomorphy, and gynecomorphy [12]. The ageing rate coefficient (ARC) and biological age were evaluated by methods of A.G. Gorelkin and B.B. Pinkhasov, correspondingly [9].

Electroencephalography (EEG) was performed by means of a "Neurocartograph" computer complex (MBN, RF) including spectral, power and coherence methods of analysis. Characteristics of neurophysiological maturity of brain bioelectrical activity, inter- and intrahemispheric connections status were evaluated [5, 10]. Assessment of the levels of anxiety and depression was performed by means of the Beck Anxiety Scale [11].

Statistical processing of the study results was carried out by means of SPSS 22.0, "StatPlus Professional 5.8" and Microsoft Excel 9 (USA). The type of data distribution was defined using the Kolmogorov-Smirnov Criterion. The Spearman's non-parametric correlational criterion was applied for evaluation of the statistical significance of associations between the studied parameters.

Two-phase clustering and visualisation by means of varying regression diagrams were used. Data mining analysis based on decision trees was applied to assess associations between various anthropometric and neurophysiological parameters [6]. Results and their discussion. Statistically significant correlation between physical (SDI), neurophysiological (coherence coefficient) and psychophysiological (levels of anxiety and depression) status markers was found. In particular, inverse correlation between SDI and self-evaluated anxiety level according to the Beck Anxiety Scale was revealed. However, correlations between neurophysiological and psychophysiological markers were medium or weak (fig. 1). A method of two-stage cluster analysis was used to identify group similarity between studied index characteristics (fig. 2).

Shifts into elevated levels of depression, situational and interpersonal anxiety were peculiar to persons with normal levels of BMI. Low indices of situational and interpersonal anxiety and depression were found in persons with slightly increased BMI. Insignificant alterations in situational and interpersonal anxiety



Fig. 2. Comparison of clusters by somatic (BMI), neurophysiological and psychophysiological markers

alongside with significant increase in depression level were common to persons with low body mass indices (BMI). Low scores in situational and interpersonal anxiety together with low depression level were revealed in persons with slightly increased BMI.

The somatisation subscale (one of the Beck Anxiety Scale criteria) was used for qualitative and quantitative evaluation of depression. The decision tree analysis showed statistically significant correlation between the somatisation subscale rate (in points) and the examined volunteers' sex (fig.3).

A regressor variable diagram of the level of prevailing anxiety in males and females depending on their SDI made it possible to visualize a particular association (fig. 4). The existence of this association was confirmed by the data from decision tree, as shown in fig. 5.

Sex_female/male_(0/1)



Somatisation disorder subscale score



Fig. 3. Decision Tree Based Depression Classification in relation to sex

Prevailing elevation of anxiety level was inherent in persons with the average SDI of 79.7. This index was typical for female mesomorphs and male gynecomorphs. Prevailing anxiety was found to be equal or lower than 0 points (subgroup 1) in 50% of the surveyed subjects and above 0 points in the other 50% of the volunteers (subgroup 2). In subgroup 1, SDI was 82.3 which is associated with andromorphy



Fig. 4. A regressor variable diagram of the level of prevailing anxiety in males and females depending on their SDI



Sexual dimorphism index (SDI)

Adjusted P =0,048, F=6,222

Degrees of freedom 1=1, Degrees of freedom 2=48



Fig. 5. A Decision Tree for prevailing anxiety level in males and females in relation to SDI

in females and gynecomorphy in males. In the second subgroup, SDI was 77.1 which is common to female mesomorphs and male gynecomorphs.

In general, elevation of anxiety in both males and females with sexual inversion was revealed, more often

in male gynecomorphs. The degree of situational anxiety level elevation (in points) was positively correlated with the degree of sexual inversion manifestation. **CONCLUSION**

The present investigation has demonstrated the existence of interrelation (association) between somatic (SDI, sexual inversion) neurophysiological (coherence coefficient) and psychophysiological (anxiety and depression levels) markers in healthy adolescents. This means that both BMI and SDI can be used as additional markers to evaluate neuropsychophysiological health of the population.

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FEATURES OF PREGRAVID MANAGEMENT AND PREVENTION OF COMPLICATIONS IN WOMEN WITH CARDIOVASCULAR PATHOLOGY (LITERATURE SURVEY)

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ABSTRACT — The article describes the modern principles of management and examination of pregnant women with various forms of cardiovascular system pathology. Normal pregnancy is always associated with significant hemodynamic overload, water retention, increased circulating blood volume and, as a consequence, cardiac output. In the face of altered hemodynamic associated with the presence of any cardiovascular pathology, danger to the mother's health (especially at the time of birth) and child (during the entire period of gestation).

KEYWORDS — pregnancy, cardiovascular disease, pregravid management, extragenital pathology, thrombotic complications, anticoagulant therapy.

Cardiovascular disease remain a major cause of pregnancy and labor complications, intrauterine growth restriction and are associated with a high level of maternal and perinatal mortality [3, 5]. Advances in the early diagnosis of heart disease, as well as the latest achievements in the field of cardiovascular surgery, have significantly expanded the reproductive potential of this group of patients. As a consequence, the majority of patients with cardiovascular pathology express a desire for their own pregnancy [5, 8].

In general, pregnant women with heart disease are very difficult group of patients, regardless of the type of pathology. Typically, such women by the time of pregnancy planning also have associated somatic chronic diseases (gastro-intestinal pathology, respiratory disease), which on the one hand, have a further negative impact on the course of pregnancy, and the other, make necessary pregravid preparation. Morover, hemodynamical changes during pregnancy (increased cardiac output, decrease blood pressure, increased heart rate), in women with heart disease adversely affect the processes of placentation and utero-placental blood flow formation. This leads to chronic tissue hypoxia and, consequently, to the development of pregnancy complications. Women with heart disease



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have a higher risk of operative delivery due to the cardiovascular indications. Newborns of mothers with heart disease often have lower Apgar score, lower growth and weight characteristics, which could affect their future physical and mental development [8, 9].

Cardiovascular disease in pregnant women represent a rather heterogeneous group of disorders that are associated with increasing maternal age and the high rate of cardiovascular risk factors, including diabetes mellitus, hypertension and obesity. Moreover, improved results of surgical treatment of congenital heart defects led to an increased number of patients with heart defects that can acheive succesfull pregnancy. [11] The most common cardiovascular diseases in pregnant women include hypertension (6-8% of cases) [10], congenital heart disease, mainly characterized by a blood shunts [3, 5], and acquired heart defects [7]. Neonatal complications occur in 20-28% of patients with heart disease, with neonatal mortality ranging from 1 to 4%. The risks of maternal and neonatal complications are closely correlated with each other [2, 13]

CURRENT STATE OF PREGRAVIDARY ASSESSMENT OF PREGNANCY COMPLICATIONS RISKS IN WOMEN WITH CARDIOVASCULAR DISEASE

The risk associated with pregnancy depends on the nature of heart disease and the clinical condition of the patient. There are several approaches to assessing the risk of cardiovascular complications in pregnant women. For example, it is possible to assess the risk associated with a particular disease. In general, the risk of complications depends on the complexity of the disease [2]. Severe scales have been developed, including the best known and most commonly used CARPREG index. It has been validated in several studies, and can be used to assess the risk of complications in the mother, although the risk assessment may be overestimated [14, 15].

CARPREG risk index: each predictor is assigned 1 point. The risk of cardiovascular complications in pregnant women: 0 points — 5%, 1 point — 27%,> 1 points — 75%

CARPREG Index takes into account:

- 1. History of cardiovascular events: heart failure, transient ischemic attack, stroke or arrhythmia before pregnancy.
- 2. The initial NYHA functional class > II or cyanosis
- 3. Obstruction of blood flow in the left chambers of the heart (mitral orifice area of 30 mm Hg)
- 4. Left ventricular systolic dysfunction (ejection fraction <40%)

There is also a modified classification of the World Health Organization [14, 15]. This classification integrates all known cardiovascular risk factors, including underlying heart disease and related disorders. It includes contraindications to pregnancy, which are not taken into CARPREG index (Table 1).

In women who belong to Class I according to the WHO classification, the risk of cardiovascular complications is very low, so during pregnancy observation of the cardiologist may be limited to 1-2 visits. In patients with class II disease the risk of cardiovascular complications from low to medium, so it is advisable

 Table 1. Modified classification of the risk of cardiovascular complications

 in pregnant women, proposed by WHO

	Risk class	Risk of complications					
	I	The risk of the mother's death is not increased; the risk of complications is not increased or increased only slightly					
	II	The slight increase in the risk of maternal death or moderate increase in the risk of complications					
	III	A significant increase in the risk of maternal mortality and the likelihood of serious complications. It is recom- mended to consult a specialist. Intensive surveillance of cardiologist and obstetrician during pregnancy, labor and and in the postpartum period is needed					
	IV	High risk of maternal mortality and severe complications. Pregnancy is contraindicated. In the case of pregnancy, it is recommended to interrupt it. If a woman decides to continue the pregnancy, intensive monitoring is needed					

to contact a cardiologist in each trimester. If a woman belongs to Class III, then there is a high risk of complications. In such cases, she should be encouraged to frequent (every 1–2 months) consultation of cardiologist and obstetrician during pregnancy. In women belonging to Class IV, pregnancy is not recommended. If such a patient becomes pregnant and refuses to terminate the pregnancy, she should be inspected every month.

Overall, cardiovascular disease significantly reduces the reproductive potential of women of childbearing age. Adequate correction allows to compensate the pathological process and to choose the individual stragegy of pregnancy managment. Timely and complex correction of cardiovascular disease at the pregravid stage may allow to significantly improve reproductive potential.

For the early detection of cardiovascular diseases in the pregravid period obstetrician-gynecologists should always perform the initial screening in women of reproductive age to determine risk group according to the established criteria followed by further examination (ECG, echocardiography, Holter monitoring, special laboratory tests).

Overall consultation includes three main stages: pregravid, gestational and postpartum. At the pregravid stage assessment of the functional state of cardiorespiratory system is performed and further diagnostic steps and specialists consultations are planned to determine risks. After that overall conclusion about planned pregnancy should be done.

Already in the primary visit at the stage of pregnancy planning obstetrician-gynecologist should ask woman's history, conduct a thorough medical examination, assess a presence of signs of cardiovascular disease, including congenital heart defects, rheumatic fever, infective endocarditis. Particular attention should be payed to the previous heart surgeries, postoperative period, it is necesserly to examine medical records.

In women of reproductive age from the group of risk before the planned pregnancy complex examination of the cardiovascular system should by performed including ECG, X-rays, echocardiography, if necessary Holter monitoring, transesophageal echocardiography, stress tests, veloergometry and coronarography. Laboratory studies may include blood cultures (in endocarditis) and markers of the rheumatic process activity. Woman should be reffered to cardiologist and other specialists as needed, including genetic.

In the second visit doctor examines the results of functional and laboratory studies, conclusions of experts, patient's medical records and make a decision about the degree of risk. As mentioned above pregnancy planning in women with heart defects is possible only in I and II risk classes.

PREVENTION OF THROMBOEMBOLIC COMPLICATIONS DURING PREGNANCY IN WOMEN WITH HEART DISEASE

According to A. James et al. (2006), who analyzed more than 12 millions of delivery during the period from 2000 to 2002 in the US, one of the leading factors for cardiovascular complications in pregnancy is advanced age [2]. Other risk factors are not different from those of non-pregnant women and include smoking, hyperlipidemia, diabetes mellitus and cardiac pathology in the family history [7]. In addition, factors that increase the risk of cardiovascular complications in women include oral contraceptives, especially in combination with smoking, and the use of assisted reproductive technologies in the late reproductive age [16].

Most patients with cardiovascular disorders are at high risk for thromboembolic complications. Given the fact that the pregnant woman lives in a state of hypercoagulability, anticoagulation therapy in pregnant women with heart disease is extremely important and challenging.

Most researchers indicate that treatment with UFH and LMWH is safe for fetus [4]. These drugs do not cross the placenta, and do not possess the ability to cause teratogenic effects, but theis use is associated with increased risk of bleeding [1, 4], osteoporosis, heparin-induced thrombocytopenia [14, 15]. In general, LMWH has the following potential advantages over UFH during pregnancy:

1) causes less heparin-induced thrombocytopenia; 2) has a longer plasma half-life and a more predictable dose response than UFH;

3) has a higher availability of applications without the need for laboratory monitoring and the possibility of using a single day dose;

4) a lower risk of heparin-induced osteoporosis;

5) appears to have a lower risk of bleeding complications.

Current clinical guidelines are almost entirely based on non-randomized studies.

With regard to oral anticoagulants, warfarin use should be limited to patients with artificial heart valves. If the warfarin dose does not exceed 5 mg per day, the risk of embryopathy is very low. Pregnant should be transferred to heparin at the 36th week, with close monitoring, preferably using anti- Xa factor at the level of > 0.55 IU/mL. If anti-factor Xa test is not available, aPTT level should be maintained at or above the value that exceeds 2 times the normal interval to provide increased efficiency of heparin in the III trimester.

DELIVERY IN PATIENTS WITH CARDIOVASCULAR DISEASE

Spontaneous onset of labor is preffered over induced labor in most women with heart disease and with normal heart function. The time of delivery is selected individually, taking into account the state of the cardiovascular system, cervical ripeness, fetal lung maturity and fetal viability. Strong recommendations are missing due to the lack of prospective data and information on the role of the individual characteristics of the patient, so the tactics should be chosen individually.

In women with mild heart disease tactics of labor management is the same as in healthy pregnant women. Vaginal delivery is preffered. Mechanical methods of labor induction, such as use of Foley catheter have advantages over drugs, particularly in patients with cyanosis, in which the decrease in peripheral vascular resistance and / or arterial pressure may have serious consequences. [6]

An individualized strategy of labor management should be elaborated, including labor dates (spontaneous or induced), labor induction method, plan of analgesia/regional anesthesia and the necessary level of monitoring. If there is a high risk of complications, the delivery is advantageously carried out in a specialized center under the supervision of multidisciplinary team. Vaginal birth is associated with less blood loss and reduced risk of infection venous thrombosis and thromboembolism compared with caesarean section [13]. Overall, cesarean section is justified in the presence of obstetric indications. The absolute contraindications to vaginal birth are not strongly defined, as they largely depend on the mother's condition to the beginning of labor.

After the onset of labor it is necessary to monitor systemic blood pressure and heart rate, as the epidural anesthesia may cause hypotension. If necessary, a pulse oximetry and continuous ECG monitoring should be used. Cardiac catheterization for hemodynamic parameters monitoring is rarely needed, since it is accompanied by an increased risk of arrhythmias, bleeding and thromboembolic complications after catheter removal [13].

During labor, the preferred position of the woman is lying on her left side to reduce the influence of uterine contractions on hemodynamics [6]. Uterine contractions should lead to prolapse of the fetal head without straining to avoid the undesirable effects of Valsalva maneuver. To facilitate delivery, forceps or vacuum extraction can be used. It is necessary to carry out continuous monitoring of fetal heart rate.

Labor management in women with pathology of the cardiovascular system, receiving anticoagulants: by the 36th week of pregnancy, oral anticoagulants should be replaced by LMWH or UFH. Women receiving LMWH, should be transferred to intravenous unfractionated heparin for at least 36 hours prior to induction of labor or a caesarean section. UFH should be canceled for 4–6 hours before scheduled delivery. UFH treatment is resumed after 4–6 hours after delivery in the absence of hemorrhagic complications.

Labor is accompanied by marked changes in hemodynamics and blood volume, especially in the first 12–24 hours, which may cause a decompensation of heart failure in women with organic heart diseases. Therefore hemodynamic monitoring should continue for at least 24 hours after birth [14, 15].

Thus, at present, the problem of cardiovascular disease in pregnant women which leads to a potentially dangerous conditions for both the mother and the child is becoming increasingly important. Such tendency is associated with an increased prevalence of cardiovascular risk factors among women. The impact of these risk factors is enhanced by physiological changes in the cardiovascular system, characteristic for pregnancy.

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THE ROLE OF CYTOKINES IN THE FORMATION OF MORPHOLOGICAL CHANGES IN THE SKIN WITH LEPROSY

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ABSTRACT — Sixty leprosy patients aged 65 to 80 years were examined. Of these, 45 are with multibacterial MB (multybacillary — MB) and 15 are with low-bacterial PB (paucibacillary — PB) forms of leprosy. The process was in a state of steady regress in the patients examined. In all patients, the plasma concentration of pro-inflammatory cytokines — IL-1 β , IL-8 and tumor necrosis factor-alpha (TNF- α) was studied and a histological examination of the biopsies of affected skin sites was performed. The results of the study indicate that a significantly higher content of IL-1 β and IL-8 in the blood of patients with low-bacterial forms of leprosy in comparison with multibacterial forms. When studying the content of TNF α , an opposite trend was observed. At the same time, morphological changes are more pronounced in patients with low-bacterial forms of leprosy.

KEYWORDS — leprosy, cytokines, hepatitis, morphology, skin biopsy, macrophages.

Leprosy is a spectral disease, the severity of which varies from localized, or tuberculoid, to disseminated, or lepromatous, forms with intermediate variants. Symptoms of leprosy depend on the difference in the immune status of infected individuals [1]. At the tuberculoid pole, the disease is more limited, and bacteria tend to accumulate in well-defined granulomas. At the lepromatous end, the disease is characterized by diffuse multi-bacillary lesions, where numerous bacteria are found mainly in tissue macrophages, particularly the skin, in Kupffer cells of the liver, as well as in Schwann cells of peripheral nerves. Cytokine activation is critical for inducing protective inflammatory immunity by macrophages and polymorphonuclear leukocytes (PMN) in the infection site in the initial stages of infection to form granulomas and to limit the spread of the disease. Thus, the spectrum of





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the immune response to M. leprae serves as a model for studying the role of cytokines in the pathogenesis of the leprosy process [2].

In the formation and flow of the process, the main role belongs to the degree of susceptibility of the macroorganism, which is due to the level of cellular immunity in relation to the pathogen. Most people are resistant to leprosy and therefore the comparative ease of transmission is combined with a relatively low incidence.

To date, the literature has accumulated enough evidence that the pathological deviations of the immune response are associated with impaired cytokine production. Among the cytokines that play a key role in coordinating immune responses, a special place is occupied by pro-inflammatory cytokines, which are the main mediators of development, both local inflammatory reaction and acute response at the body level.

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Methods:

Materials from 60 leprosy patients aged 65 to 80 years were examined. Of these, 45 — with multibacterial MB (multybacillary — MB) and 15 with lowbacterial PB (paucibacillary – PB) forms of leprosy. The average duration of the disease was about 35 years. Specific manifestations on the skin of patients were practically absent or had a residual character. The results of the bacterioscopy of the skin were negative. At the same time, the majority of the subjects observed neurological disorders characteristic of leprosy with motor, sensory and trophic disorders. 15 patients with MB forms of the disease had clinical signs of liver failure, manifested as a syndrome complex, characteristic of chronic persistent hepatitis. Morphological and functional disorders of the liver in this contingent of patients are chronic and associated with at least several etiological causes. Among them — in the first place — a long-term systemic mycobacteriosis (due to the tropicity of Mycobacterium leprae to Kupffer cells of the liver), as well as the autoimmune factors associated with it. The long-term impact on the liver of antibacterial chemotherapeutic drugs and, in some cases, the concomitant infection with HCV or HBV viruses, is of definite importance. These patients, together with etiotropic treatment received hepatoprotectors - "Carlsil", "Essentiale" and Vitamin Complexes. In all patients, the plasma concentration of pro-inflammatory cytokines-IL-1β, IL-8 and tumor necrosis factor-alpha (TNF- α) was investigated using test kits of "Protein Contour" (St. Petersburg, Russia)

The results of the study indicate a significantly higher content of IL-1 β and IL-8 in the blood of patients with PB forms of leprosy in comparison with MB patients $(36.7\pm3.3 \text{ pg/ml to } 23.6\pm3.7 \text{ pg/ml and})$ 12.2 ± 4.3 pg/ml to 4.3 ± 0.8 pg/ml, respectively). Concerning TNF- α , the opposite tendency was observed: in patients with BP form of leprosy, the concentration was 38.5±9.6 pg/ml, and in patients with MB form of leprosy was 52.6±11.5 pg/ml. The analysis of the cytokine level dependence on the fact that the patient has leprosy chronic persistent hepatitis showed that if there were practically no differences between patients with and without hepatitis with regard to IL-1ß and IL-8, then TNF- α significantly exceeded its level in patients With a violation of hepatic function up to 102.6±2.1 pg/ml.

The relatively high levels of IL-1 β and IL-8 in patients with PB form of leprosy, compared with patients with MB form of leprosy, apparently reflects differences in the state of cellular immunity in these forms of the disease. For PB form of leprosy is characterized by a high level of cellular immunity with respect to M.leprae, while for Mb form of leprosy the intensity of cellular responses to M. leprae is variable and practically absent in lepromatous leprosy. Elevated levels of TNF- α in patients with MB form of leprosy may be due to a higher prevalence among them of lesions of visceral organs, especially the liver, which is associated with the persistence of M. leprae in their body for many years.

Patients with MB forms in the biopsy specimens from the affected skin had numerous, merging infiltrates lying in the deep layers of the dermis, consisting of non-vacuolizing macrophages with a small admixture of scattered lymphoid cells and single polymorphonuclear leukocytes (fig. 1).



Fig. 1. Numerous, confluent infiltrates, lying in the deep layers of the dermis. Staining with hematoxylline and eosin. In. 100.

Macrophages contained fat dispersions scattered throughout the cytoplasm, colored with Sudan III in various shades from brownish-yellow to orange-yellow in color. In most of the described drugs, nerve damage was not detected. The content of mycobacteria was determined during staining according to Tsil-Nielsen.

In patients with PB form in the sections of biopsy specimens of skin lesions, there were multiple large infiltrates without clear foci and moderately pronounced infiltration sites around vessels, nerves and sebaceous and sweat glands, consisting of epithelioid cells and a small number of lymphocytes. On some drugs, the number of lymphocytes predominated over the number of epithelioid cells. Single multinucleated cells with large vacuoles were encountered. Between the epidermis and granuloma there was a very narrow free zone. Occasionally, infiltrated, mainly lymphocytes, nerves containing single mycobacteria granular or homogeneous infiltrated the field of vision.

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THE PROCESSES OF APOPTOSIS IN THE BONE MARROW AT THE STAGES OF POSTNATAL ONTOGENESIS UNDER THE INFLUENCE OF SULFUR-CONTAINING GAS (EXPERIMENTAL RESEARCH)

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ABSTRACT — In the course of the experimental study, we evaluated the state of bone marrow apoptosis of the femur of white nonlinear male rats from 36 to 730 days of ontogenesis: intact and exposed to sub-toxic doses of sulfur-containing gas $(90\pm3 \text{ mg/m}^3)$. The industrial natural sulfur-containing gas of the Astrakhan gas condensate field was used as a toxic agent. Analysis of the results obtained in the course of the experiment allows us to assume that the conditions of the subtotal effect of the sulfur-containing gas activate pro-apoptogenic proteins, leading to a disruption in the regulation of apoptosis. When exogenous pollutants are exerted, the proliferative activity of bone marrow structures is inhibited against a background of relatively low intensity of regenerative processes.

KEYWORDS — apoptosis, sulfur-containing gas, rats, postnatal ontogeny.

The phenomenon of apoptosis is the result of the action of various factors leading to cell death. It is known that the development of various diseases (neoplasms, cardiovascular, acute and chronic inflammatory processes, diabetes mellitus, etc.) is associated with violations of mechanisms for the realization of apoptosis, leading to its excessive activation or inhibition [2, 9]. Along with this important link in the pathogenesis of these diseases is the imbalance of oxidative metabolism [4, 5].

Among hematological diseases, in which the apoptosis increases, anemia of different genesis predominates (refractory anemia, aplastic anemia, anemia associated with impaired blood formation, etc.), and inhibition of apoptosis is noted in the tumor transformation of hematopoietic cells [6, 7].

The production hazards of a gas producing enterprise, among which sulfur-containing gas occupies



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a leading position, adversely affect various systems of the human body [1, 3, 8]. Significant tension of adaptation mechanisms leads to premature aging and development of cardiovascular diseases, hematopoiesis diseases associated with this condition. According to the research of some authors [1], under the influence of production factors of a gas producing enterprise, a disorder of apoptosis regulation, imbalance in the system of oppositional cytokine pools and antioxidant protection is observed in persons without somatic pathology. Consequently, apoptosis plays an important role in regulating the state of stable equilibrium in a rapidly renewing tissue system, which includes the erythroid population of red bone marrow.

MATERIALS AND METHODS OF RESEARCH

The experiment was performed on 75 white non-linear male rats. Two groups of species were formed: I. control; II. Impacted with sulfur-containing pollutants. Each species consisted of four groups of 10 individuals in each, the animals in which were at the same stages of individual development as people during postnatal ontogeny (Table 1). Group II were exposed to gaseous sulfur-containing pollutants at the time when the animals in them were of age: immature (young) — from 6 to 36 days, mature I — from 368 to 398 days, mature II — from 472 to 502 days and presenile age — from 700 to 730 days.

Table 1. Correspondence of the terms of development of experimental animals in accordance with the periods of postnatal ontogenesis of man

Men	Laboratory rats			
Period	Period	Ontogenesis day		
Childhood	Immature (young)	6–36		
Adult age, I period	Mature I	368–398		
Adult age, II period	Mature II	472–502		
Elderly age	Presenile	700–730		

Toxicant was the natural stratal dehydrated gas from the Astrakhan gas condensate field. The experiments used the concentration of natural gas in the air-gas mixture of the chamber, which is 90 ± 3 mg/m³ when measured by hydrogen sulphide, which is 30 times greater than the maximum permissible concentration of hydrogen sulfide for working areas with simultaneous presence of hydrocarbons.

Inhalation with sulfur-containing gas was carried out for 4 hours in the autumn-winter seasons by a static method, with simultaneous presence in the chamber of 5 individuals daily for 30 days, except on Sundays, strictly from 10 to 14 hours, the temperature in the chamber was $+22\pm2^{\circ}$ C. Relative humidity during the experiment increased from $53\pm4\%$ to $66\pm6\%$. The gas concentration and experimental conditions fully comply with the requirements set forth in the WHO publication "Principles and methods for assessing the toxicity of chemicals".

As a control, rats of similar experimental age groups were studied, which for 5 days were kept in a hermetically sealed primer chamber for the same time and under the same conditions as the experimental ones, but without the presence of a sulfur-containing gas. In our work the immunohistochemical method was used to study the content of i-NOS in different age groups in normal and sub-toxic effects of sulfurcontaining pollutants, antibodies and diluents from Spring Bioscience (USA) were used. All materials were subjected to statistical processing to establish the reliability of the data obtained when analyzing the results of the study. Materials were processed on a personal computer using programs "Microsoft Office Windows 2007", "Microsoft Office Excel 2007".

RESULTS OF A RESEARCH

A positive reaction to the i-NOS protein was not detected in our study in both mature subgroups and subgroup of young animals, which allows us to state that there is no exogenous and endogenous stimulation of endothelial cells (Fig. 1). In the presenile subgroup of animals, a weak positive reaction to i-NOS was observed predominantly in the inner part of the compact substance, in the spongy substance of the bone beams of the positive reaction was not noted, as in the other subgroups.

Against the background of sub-toxic effects of sulfur-containing pollutants, positive-colored areas of the red bone marrow are revealed. The weakest reaction is determined in the 1st adult subgroup of animals, i-NOS-positive endotheliocytes are detected in the vessels of the bone trabeculae. In the second mature subgroup, the i-NOS-positive reaction is produced not only by endothelial cells of a compact substance, but also by single cells in a spongy substance. The most pronounced reaction is observed in a young subgroup of laboratory animals. I-NOS-positive endotheliocytes are defined in the sinusoidal capillaries of the bone marrow. This may be the result of insufficient maturity of enzyme systems producing inducible NO-synthase in response to exogenous stimulation with sulfurcontaining pollutants. Nitric oxide formed in excess through true pores enters the hematopoietic islets, where it causes apoptosis of the hematopoietic elements, acting as an active radical.

In our work, we studied the expression of one of the proapoptogenic proteins — Bax. In a young subgroup of animals, a weak positive reaction to this protein is determined, mainly in a compact substance of bone tissue. Spongy substance contains single cells with signs of the protein being studied.

As the animals age, the activity of proapoptotic proteins increases. A positive reaction to Bax in all structural components of bone tissue is determined: in both compact and spongy substances.

After exposure to sub-toxic doses of sulfurcontaining pollutants, pro-apoptogenic proteins are activated in all subgroups under study (Fig. 2).





Fig. 1. Negative immunohistochemical reaction to i-NOS in red bone marrow structures in a young subgroup of animals

Fig. 2. Strongly positive reaction to Bax in bone marrow structures in a young subgroup of animals against a background of sub-toxic effects of sulfur-containing pollutants

Fig. 3. Positive Ki-67 reaction in red marrow cells in a young subgroup of animals

The proliferation index of Ki-67 (%) was calculated by counting the number of immunopositive nuclei to the total number of nuclei. Counting was performed in at least 10 fields of vision. In the study of histological preparations, a high proliferation index was observed in all experimental subgroups. The largest was recorded in a young subgroup. Ki-67-positive cells were determined in all studied fields of vision (Fig. 3).

After exposure to natural gas, the proliferation index decreased, the severity of the immunohistochemical reaction decreased, especially in the presenile subset of animals. This suggests that the effect of exogenous pollutants inhibits the proliferative activity of bone marrow structures against a background of relatively low intensity of regenerative processes.

Thus, in the course of the experimental research, we found that, under the conditions of a sub-toxic sulfur-containing gas, one of the important links in pathogenesis is the activation of proapoptogenic proteins, which leads to a disruption in the regulation of apoptosis. The effect of exogenous pollutants inhibits the proliferative activity of bone marrow structures against a background of relatively low intensity regenerative processes.

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FEATURES OF CHANGES OF THE ERYTHROBLASTIC ISLANDS ON THE STAGES OF POSTNATAL ONTOGENESIS UNDER TOXIC STRESS AND PHARMACOLOGICAL CORRECTION

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ABSTRACT — The study found that the process of erythropoiesis is dependent directly on the age group of experimental animals. The toxic effects of exogenous pollutants leads to a decrease of erythroid islands regeneration processes in the bone marrow dramatically reduces appear erythroid islands in involution. Especially vulnerable are the group of young and old animals during ontogeny. Against the background of the drug "etoksidol" with a strong antioxidant effect of the number of erythroid islands remodel increases in all study groups of experimental animals.

KEYWORDS — erythropoiesis, red bone marrow, a sulfur-containing gas, the experimental animals.



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Disturbance of the natural balance in a surrounding medium, connected with air pollution, water, soils, the emergence of emergency situations provoked by economic activity of the person by the beginning of our century essentially changed a natural xenobiotic profile of many territories that is especially shown in urbanized regions. From numerous technogenic toxic gases – the pollutants which are contained in the atmosphere and in the air of industrial production have the greatest value. Permanent release into the environment these pollutants leads to their accumulation, especially in the continuous production on oil and gas processing plants, which ultimately leads to chronic ecotoxicity of the environment [1, 2, 3, 5, 8].

The system of red blood is very sensitive to influences of production adverse factors of industrial en-



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vironmental factors [4, 10, 12]. The modern research shows that the majority of xenobiotics has pro-oxidant properties. There is an activation of peroxide oxidation of lipids, balance upset between the formation and destruction of peroxides and excess accumulation of toxiferous free radicals in a blood plasma and erythrocytes, which is an important component of the pathogenesis of negative conditions, in particular, of violations of erythropoiesis [7, 9; 13]. In this regard, the problem of protection of system of a hematopoiesis of the population living in the zone of influence of gas-chemical enterprises from influence of gaseous sulfur-containing pollutants, remains urgent now [14, 15].

The purpose of our research was the studing of feature of changes of the erythroblastic islands (EI) of red bone marrow at stages of a post-natal ontogenesis in the conditions of influence of sulfur-containing pollutants, and also at and pharmacological correction of antioxidant of a new generation — the medicine "ethoxydale". The properties, characteristic of this medicine, are: improvement of rheological behavior of blood, strengthening of cell metabolism, a high antioxidant activity, the ability to an inhibition of processes of peroxide oxidation of lipids, membraneprotective effect, speed of approach of effect, and also lack of negative consequences from its application [1].

The experiment is made on 72 white not purebred rats, who are contained in standard vivarium conditions in accordance with the "Rules of laboratory practice in the Russian Federation" (the order of MH of the Russian Federation № 708n from 23.08.2010). Group of three types were formed: I. — control; II. exposed to sulfur pollutants; III. — treated as a protector domestic product "etoksidol" (JSC "Synthesis") intragastrically at a dose of 2.5 mg/kg, one time a day every day of the experiment.

As a toxic agent the natural drained gas of the Astrakhan gas condensate deposit was applied. In experiments the concentration of gas in steam-and-gas mixture making 90 ± 4 mg/m³ of hydrogen sulfide, which is 30 times more of threshold limit value of a hydrogen sulfide for working zones at simultaneous presence of hydrocarbons was used.

The priming sour sulfur-containing gas was carried out 4 hours in autumn and winter seasons by a static method with simultaneous stay in the camera of 6 individuals daily within 30 days, except Sundays, strictly from 10 to 14 o'clock, temperature in the camera was $+22\pm2^{\circ}$ C. The relative humidity during the experiment increased from $53\pm4\%$ to $66\pm6\%$, fogging of the walls was not noted. Concentration of gas and experimental conditions completely conform to the requirements stated in the edition of WHO [11] and the MH of the Russian Federation №267 from 19.06.2003. Control rats were of similar age experimental groups which 6 individuals in each group were also 4 hours in the air-locked inoculation camera in the same condations, as experieced, but in lack of sour gas were controled.

Bone marrow from the femurs was taken by means of the method developed by Yu.M. Zaharov, I.Yu.Melnikov and A.G.Rassohin [6]. Calculation of quantitative indicators characterizing a condition of an erythropoiesis in the EO was made by the method L.V. Vorgova Yu.M. Zaharov on the basis of the obtained data of the number of EO in the bone marrow of animals and their distribution by maturity classes. [6]

The quantitative data obtained in the course of the study, analyzed by methods of variation statistics and determine the significance of differences on Ulkokson-Mann-Whitney test. When carrying out statistical processing used OpenOffice Calc utility of free software OpenOffice (Ver. 3.0), running under Windows XP Home Edition (OEM X12-53766 certificate) operating system.

RESULTS OF A RESEARCH

When analyzing the results of an experimental research with a protective action "etoksidol" desire of age dynamics of content of all types of EO approach the level of the age norm is noteworthy that can be viewed as a relative normalization of erythropoiesis as a result of the process of improving its conditions. However, the severity of this process for various types of EO varies. In particular, EO maturity class can show a very significant and statistically highly significant increase in their number in response to the combined effects of pollutants and the tread in an immature age. In the following, an adult, a sharp drop in the number of islets of this species occurs under the tread that their number becomes scarce distinguishable from the age norm, ie, It is on the verge of statistical significance of differences.

In senile period of ontogenesis action tread leads to practical normalization of the structure and the amount of EO1, as the difference in their number and age control becomes statistically insignificant. As seen in Figure 1, the dynamics of the number of EO1 is almost completely determined by the involutive processes in the background of a slight effect of sulfur pollutants from the mature to old age in the conditions of the tread impact.

Age dynamics of the number of EO2 is similar in general terms to the same parameter EO1 under the combined effects of pollutants and the tread. However, the effectiveness of the protective action is not as strongly dependent on the age, as in the previous case. It revealed that the protector reduces the amount of EO2 almost the exact same amount as a result of increased toxic effects, regardless of age. At the same time difference to the control remains reliable for all ages in the number using EO2 tread.

Deformed picnotic central macrophage determined statistically significantly less in comparison with the impact of sulfur-containing pollutants, namely $21\pm8\%$ of the cases (P <0,05), while they themselves erythroblastic islands have a symmetrical structure. Age dynamics of content EO3 under the action of tread is very interesting. The desire to increase sharply reduced under the influence of this type of pollutant the number of the erythroblastic islands in the bone marrow is clearly expressed in an immature age. Content EO3 is virtually identical age control on the mature stage of ontogenesis.



Fig. 1. EO 3^{rd} class maturity rat elderly. Central macrophage is one large vacuole (arrow). Painting neutral red. \times 90

Further, in old age, there is a slight, but statistically significant excess of the amount EO3 over the age control, indicating, perhaps, the activation of the transformation in EO2 EO3 use as tread compounds and stimulation of erythropoiesis. Erythroblastic islands of this type under the tread actions look more organized compared to the experience without it. In the central macrophages pycnosis less pronounced. Vacuolation retained, however, in most cases, instead of multiple small observed 1–2 big vacuole. The protective effect on the content of erythroblastic islands in involution in terms of exogenous intoxication immature age is quite small.

This is confirmed by the lack of a statistically significant difference in the magnitude of this parameter in the case of the tread and without it. But in the mature period of ontogenesis the use of the tread gives a very noticeable effect, manifested in a high fidelity increasing number of EO in involution by 15% compared to only effect gas.

In old age the protective effect decreases, and does not ensure compliance with the age norm amounts erythroblastic islands in involution, although still statistically significant, because the number of EO of this type is significantly superior to the same amount without tread. Structurally EO in involution in the application of the tread differ slightly from similar, but only exposed to pollutants, as, indeed, and the last of the intact. In a small number of cases (9±3%) present picnotic central macrophages. At the same time, the number of central vacuolated macrophages, particularly those with large vacuoles statistically significant (P <0.05) reduced to 42 ± 8% as compared with the experiment without the protector.

Using the tread under the impact of pollutants it is accompanied by the desire to remodel the dynamics EO content closer to the age norm. It turns out quite confident in immature and mature age of the experimental animals, as evidenced by highly significant difference (P < 0.01) between the respective values.

In old age the tread less effective, since the difference between the amount of EO is reconstructed with the use of the tread and dramatically reduced without him, but still remained statistically significant (P <0.05). This fact indicates a significant slowing of the formation of this type of EO at this age, despite the use of the tread. Morphological studies show one of the mechanisms of this phenomenon. Since the total number of EO reconstructed in this case about 37% are composed of more than one of the macrophage and, frequently, 3–5 (fig. 2), the latter apparently insufficient to produce the required amounts of EO type. Vacuolization central macrophages retained similar to that observed in the experiment, only the influence of the sulfur-containing pollutants. More fully characterize the process of erythropoiesis by using the tread and its difference from a similar process in the conditions of exposure to sulfur pollutants only allow functional parameters are calculated based on the number of different types of EO.

The general tendency of the age dynamics of functional parameters using erythropoiesis tread, with rare exception, is the desire to return to the age norm.



Fig. 2. Remodel EO rats adulthood with several central vacuolated macrophages (arrow). Neutral red

Especially clear desire to return to normal with the help of the tread, despite the effect of the sulfurcontaining gaseous pollutants, expressed in immature and mature stages of ontogeny of experimental animals. However, in old age is not so clear. These facts show a slight positive effect on the inhibited protective effects of intoxication intensity of involvement of dividing cells in the erythroid differentiation of macrophages and re participation in erythropoiesis. Despite the use of the tread, erythropoiesis continues to experience the negative impact of sulfur-containing gaseous pollutants, which is reflected in the decrease in the number of dividing cells of erythroid family, entered into differentiation. So, in response to the toxic effects of increasing the number of proliferating EO (EO1, EO2, EOrek) and drops EO, in which there is the maturation of red blood cells (EO3, EOinv). These processes are most intense in the immature age, their severity diminishes in adulthood and in old dies. The greatest environmental sensitivity erythrone system has in immature age, it is relatively stable in the mature and exhibits imbalance of self-regulation processes in the senile. This, in particular, is confirmed by the lack of effectiveness of protective effects.

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MATHEMATICAL & GRAPHICS SIMULATION FOR INDIVIDUAL SHAPE OF MAXILLARY DENTAL ARCH

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ABSTRACT — The item contains a method for mathematical simulation of dental arch, where the diameter of the front segment is determined by the ratio of the length of the arch limited by the chord corresponding to the arch width between the canines, to the angle limited by the radii coming from the chord edges. At the same time, the central angle value was taken as the double arc-tangent of the ratio between the dental-arch double depth and its width between the canines. On the continued diameter of the circumference a location was identified that corresponded to the value of the dental arch depth. A line was drawn perpendicular to it, which had on its both sides lengths equal to half-width of the dental arch between the second molars. A line was drawn connecting the spots that corresponded to the position of the canines and the vestibular distal odontomeres (cusps) on the second molars. The arches were outlined to locate the position of the grinder teeth.

KEYWORDS — howley arch, mathematical simulation of dental arches, geometric graphic reproduction of dental arches.

INTRODUCTION

At present, there have been a variety of methods proposed for examining the maxillofacial area, which can be employed for diagnosing anomalies and deformations as well as selecting the right treatment [1, 5, 15, 23, 25, 32]. Of particular importance are the methods for forecasting the shape of dental arches in order to select the parameters of



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metal arches and the prescription of brackets to offer patients treatment employing the edgewise technique [7, 8, 12, 13, 22, 28, 31].

Constructing a dental arch based on the geometric & graphic method has been the focus of attention for many decades now [3, 4, 14].

The proposed graphic reproduction of the dental arch following the Howley-Herber-Herbst method has already become part of educational and special literature, and is part and parcel in diagnostics of occlusion anomalies [26].

Recently, clinicians have noticed certain errors in the structure arrangements, which led to a discrepancy between the true parameters of the dental arch and its graphic construction. It has been noted that the sum of the medial-distal dimensions of the three anterior teeth (medial and lateral incisors, and the canine on one of the sides of the arch) cannot be used simultaneously as the circle diameter and the length of the sector bounded by a chord equal to the radius. Given this, some corrections have been made making it possible to offer a more accurate mark for the position of the canines on the dental arch. However, these observations were good for dental arches where the width between the canines was twice that of the anterior section of the dental arch [3].

Mention should be also made of experts who believe that even in case of equal dimensions of the teeth, the shape of the anterior dental arch may be different [2, 6]. In this connection, it was proposed to employ two interdependent values, such as the width and the depth of the anterior part of the dental arch bounded by the permanent canines [4].

A method of constructing an arch has been developed, where the value of the difference between the width and depth of the dental arch to the level of the canines' location was accepted as the diameter [10]. This study, however, was carried out involving humans with physiological occlusion of the permanent teeth.

In case of abnormal occlusion, torsiversions, protrusion or retrusion of medial incisors, determining the depth of the dental arch remains quite a challenge and questionable in view of setting the diagnosis. Besides, even on case of physiological occlusion, there is still a great variety of the shape and size of dental arches [9, 17, 20]. There have been shown the dimensions of dental arches and the interrelation between the linear parameters [16, 27, 30]. There is also a description offered for the features of incomplete dental arches caused by lack of one of the premolars on each side of the arch [21].

In view of the above-said, it has been concluded that a graphic development of a dental arch employing the Howley-Herber-Herbst method requires some refinement. This statement is based on the opinion expressed by researchers who have proposed various options for the shape and size of dental arches, taking into account the gnathic (meso-, brachy- and dolichognathy) and dental (normo-, macro- and microdontia) types [11, 18, 19, 24, 29].

Aim of study:

improved methods for design as well as development of a mathematical & graphic reproduction of dental arches allowing determining the shape and size of the dental arch irrespective of the gnathic and dental types.

MATERIALS AND METHODS

43 persons in their mature age with a full set of permanent teeth and physiological occlusion had a comparative analysis done on their true shape of the dental arches with a geometric & graphic reproduction relying on mathematical simulation.

The radius for the circumference to serve location for the six front teeth, was done through the commonly accepted geometric method for calculating the diameter based on the length and the height of the sector bounded by the chord (Fig. 1).



Fig. 1. Determining the diameter through the length of the chord (X) and the height of the segment (H). Center angle (a)

Following the method in question, the diameter (D) is to be calculated by the ratio of the curve length (L) to the center angle (α) :

$$D = \frac{L}{\alpha}$$

The center angle is formed by the radii bounding the chord and was calculated subject to the formula:

$$\alpha = 2 \cdot \operatorname{arctg} \frac{2H}{X}$$

H — the height of the segment, X — the length of the chord.

The length of the curve bounded by the chord was calculated as the product of the chord length and the relation of the center angle to its sinus:

$$L = X \cdot \frac{\alpha}{\sin \alpha}$$

To calculate the diameter of a circumference when building the dental arch, the chord length (X)corresponded the inter-canine gap. The segment height (H) determined the depth of dental arch front part and was calculated as the leg of a rightangled triangle shaped by the frontal-canine (canine) diagonal and the half-width of the dental arch between the canines (fig. 2).



Fig. 2. Dental arch benchmarks for graphic imaging of dental arch anterior section

A chart was developed based on the benchmarks proposed as well as the method for mathematical simulation of a circumference to locate the anterior teeth.

RESULTS AND DISCUSSION

In view of the specific features for building a circumference based on the chord length and the segment height, we developed a way to set up an individual shape of the dental arch.

To determine the diameter of the circumference to host the front teeth, two relatively stable values were used, namely the width of the dental arch between the canines and the frontal-canine diagonal. The major measuring points were located on the tearing cusps of the canine teeth. The inter-incisal point was located on the vestibular side between the medial incisors in the occlusal norm. The diameter and the radius of the circle were calculated, which was done in order to construct a circle whose upper spot was used as a starting point to two segments deviating both sides, each of these equal to the frontal-canine diagonal. The continuation of the diameter of the circle was used to detect the position of the point corresponding to the depth of the dental arch. Perpendicular to it, a line was produced, on both sides of which segments were drawn, each equal to half-width of the dental arch between the second molars (Fig. 3).



Fig. 3. Developing an individual shape for the dental arch in view of the mathematical simulation of the circumference to host the anterior teeth and locating the major linear parameters

A straight line connected the points corresponding to the position of the canines and the distal vestibular odontomeres (tubercles) on the second molars.

From the middle of diagonals, perpendiculars were produced on both sides of the circumference. The resulting line then was marked with segments equal to the sum of the dental arch width and depth (Fig. 4).

On both sides curves were produced with a radius equal to the distance from the obtained points to the points where the canines and/or the second molars were located (Fig. 5).

The shape of the curve thus obtained was then compared to the true curve on the cast model of the jaw.

CONCLUSIONS

The above-mentioned shows that the proposed production of a dental arch matches fully the shape and the size of the dental arches irrespective of their gnathic and dental type.



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EXPERIENCE OF TREATMENT OF DIAPHYSEAL FOREARM FRACTURES IN CHILDREN BY ELASTIC INTRAMEDULLARY NAILING

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ABSTRACT — The article describes our experience of treatment of 51 children between the ages of 9 years 11 months 17 d 4 months with diaphyseal fractures of the forearm bones with titanium elastic intramedullary rods (TEN). The method was 10.1% of the total number of children treated with this pathology in the period from 2010 to 2016. Were formulated the indications, described technique and evaluated the results of treatment. This review will be interesting for traumatologists and orthopedics and rehabilitation specialists to determine the tactics of this group of patients.

KEYWORDS — Pediatric traumatology, pediatric surgery, fractures of the forearm, intramedullary osteosynthesis.



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INTRODUCTION

Forearm fractures are one of the most common injuries encountered in emergency pediatric traumatology. On average, according to the literature, diaphyseal localization is from 17 to 20% of fractures of this segment. Closed reposition with cast immobilization remains the "golden standard" for the treatment of fractures in children (4), but existing problems in achieving a satisfactory position of the fragments, the instability of the correction achieved determine the need for stabilizing osteosynthesis. This group of fractures is characterized by instability of bone fragments that are difficult for closed reposition and are characterized by a high risk of second-





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ary displacement of fragments with the use of only external fixation. Unresolved displacement of fragments, contraction of interosseous space, instability of bone fragments can cause slow consolidation with the possible formation of nonunion fractures, or false joints, with subsequent disruption of limb function. (16). Diaphyseal localization of the fracture is a risk factor for delayed consolidation, because of the reduced intensity of bloodstream in this zone.

The use of osteosynthesis prevents secondary displacement. The results of treatment in the long-term catamnesis, including the functional result, according to the literature available to us, have not been covered. (9). The choice of the

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optimal treatment option is determined not only by fracture characteristics, such as localization, type of displacement, but also by the age of the patient.

The universal fixation method has not been determined until now. (8). For a long time, the common method of choice of the surgical treatment in pediatric traumatology was open reduction with fixation of reconstructive plates or external fixation device, but recently these methods are inferior to a closed reposition with intramedullary fixation. (9).

One of the actual methods of treatment of the adolescent group of patients with diaphyseal fractures of the forearm bones is the functionally stable elastic intramedullary osteosynthesis with titanium elastic nails (TEN).

Indications for surgical treatment are diaphyseal fractures with displacement, when conservative treatment is impossible (1, 3, 12). We also identified the criteria for instability of fractures, such as: 1) The type of displacement of fragments — oblique, transversebeveled, helical-shaped fractures; 2) Fractures of both forearm bones at different levels; 3) Localization of the fracture line in the area of muscle attachment, affecting the position of fragments; 4) Repeated repositions ("chafing" of fragments); 5) comminuted fractures, characterized by the absence of a transverse contact surface of the fragments. Advantages of this method of treatment are small operative access without exposure of the fracture zone, no need for additional immobilization during the entire period of consolidation of the fracture, and, as a consequence, early activation and rehabilitation of the patient.

MATERIALS AND METHODS

In the department of traumatology and orthopedics of Filatov's Children Hospital from 2010 to 2016 were treated 2128 children with fractures of the forearm bones of different localization who underwent surgical treatment (Table 1). The age of the patients was from 1 year 2 months to 17 years 11 months. 1218 children were with fractures of the distal forearm bones (553 of them girls, 665 boys), which accounted for 57% of the total number of children with fractures of the forearm bones. Osteosynthesis in this group was performed by 177 patients (14%). With the diaphyseal fractures of the forearm bones were treated 504(23%)children (of them 222 girls, 282 boys). 209 (41%) children were treated with intramedullary osteosynthesis, 51(24.4%) of them with functionally stable elastic intramedullary osteosynthesis in the age range from 9 years 11 months to 17 years 4 months. 158 patients (75.5%) treated with K-wirefixation at the age of 3 years 1 month to 17 years 2 months. It is useful to note that there is no direct gender dependence on the

incidence of trauma. The relation of boys and girls is about 1:1.

Three of patients (0.5%) were treated with open reposition and osteosynthesis with plates because of interposition of soft tissues, ocular fractures. All children have received surgical treatment in 1–2 days from the time of injury.

REPOSITION METHOD USING TITANIUM ELASTIC BARS (TEN)

A titanium elastic nail is a special fixation system that, due to its elastic properties and implant shape, allows achieving an anatomical and functional result that is less traumatic for the patient. To carry out the operation, a specialized set of tools is needed (fig. 1). General anesthesia. The position of the patient is on the back with the laying of the injured limb on the table. To reduce the inhalation of the patient load and increase the degree of intraoperative anesthesia performed peripheral brachial plexus block under control neyromiostimulyatora combined with ultrasound. Echographic imaging increases the effect of blockade due to the relative visualization of the position of the needle and the neurovascular bunch, which allows not only to avoid complications (damage to the structures of the brachial plexus, the introduction of an anesthetic into the vessel), but also to increase the effect of the blockadethereby enhancing and prolonging the analgesic effect in the postoperative period. Installing locks produced with periodic radioscopic control. We selected osteosynthesis rods 2.0/2.5 mm depending on the width of the medullary canal. A cutaneous incision length of 1.5–3.0 cm is performed longitudinally in the distal part of the radial and ulnar bones by 1-1.5cm proximal to the growth zone, which is determined by radioscopic marking along the back side surface. When accessing, it is necessary to remember the anatomy of the vessels and nerves of this area (the radial artery and vein, the radial nerve), as well as the tendons and muscles (the retainer of the extensor tendons of the fingers, the tendon of the long and short muscles that remove one finger of the hand) to preserve the integrity of which delicately bred soft tissue. After exposing the surface of the bone with an acute awl at an angle of 45° to the plane of the bone in the proximal direction, we form holes for the titanium rods into the radial and ulnar bone. Before fixing the locks we produced individual modeling of the nail, which depends of the level of fracture for creation of adequate intraosseous tension in its zone. At the time of the rod along the medullary canal through the fracture line, the presence of a technological bend can be used to correct the position of the fragments. After reaching a satisfactory position of the fragments, we perform a

Table 1. Characteristics of patients (N=2128)

			2010	2011	2012	2013	2014	2015	2016
	One hone	8	49	27	31	69	78	75	69
	UIE DUIE	Ŷ	23	25	30	32	78	71	71
	Path hanas	8	18	16	27	42	60	55	49
Distal forearm	DOTHIDOHES	Ŷ	9	14	23	48	54	37	38
	Total	8	67	43	58	111	138	130	118
	IULdi	9	32	39	53	80	132	108	109
	1218	Σ	99	82	111	191	270	238	227
	One hone	8	5	6	10	17	17	21	33
		Ŷ	6	7	9	11	14	18	23
D' I I I	Poth honor	3	8	10	18	20	24	48	45
Diaphyseal forearm	DOTHIDDILES	Ŷ	11	7	15	19	19	28	35
	Total	3	13	16	28	37	41	69	78
		Ŷ	17	14	24	30	33	46	58
	504	Σ	30	30	52	67	74	115	136
	Monteggia injure	8	4	3	5	7	8	9	13
		Ŷ	5	4	4	5	7	5	7
	Galleazzi injure	3	1	0	1	0	2	1	0
		Ŷ	0	0	0	1	0	0	0
D I	Proces injure	3	2	3	3	4	3	3	4
forearm	Diecca injuie	Ŷ	1	3	2	5	2	1	1
	Fracture of the olecranon	3	8	4	5	7	13	10	9
		Ŷ	4	3	5	3	10	9	7
	Fracture of the neck of the radius	8	5	5	6	15	22	27	17
		Ŷ	6	4	7	10	21	15	17
	406	Σ	38	29	39	57	88	80	75
TOTAL		2128							



gradual installation of rods with a turn of the ends of the rods "to each other" to create the maximum intraosseous tension in the fracture zone, and also to expand the interosseous space (fig. 2). In case the turn of the rod goes to the detriment of reposition, we chose the most correct position of the nail. Throughout the reposition, it is necessary to control not only the axial, but also the rotational displacement visually and radiologically (fig. 3). Next, the control performed X-ray, which allows us to control the position of the rod not only in the zone of fracture, but also all over the bones of the forearm. In case of violation it is necessary to determine the cause and eliminate it. After biting, the free end of the rods (about 1 cm) "fits" on the surface of the bone.

POSTOPERATIVE MANAGEMENT

In the early postoperative period are applied bandages of the "kerchief" type for fixation within 10-14 days. The control radiograph should be performed with the capture of two adjacent joints in order to control the possible migration of the implants, the position of the fragments, and an estimate of the possible residual rotational displacement (fig. 4, 5). The main advantage of functional stable intramedullary osteosynthesis is the possibility of early activation of the injured limb.

On the stages of treatment carried out X-ray, if the child has risk factors for fracture consolidation violation carried ultrasound. In case of slow repair our speed prescribed conservative therapy and physiotherapy. In general, postoperative management of patients with diaphyseal fractures of the forearm bones is not difficult.

It should be noted that against the background of the lack of additional fixation of the limb in children with functional elastic osteosynthesis, the rehabilitation

Fig. 1. Set of tools



Fig. 2. Position intramedullary nails scheme

process was carried out in a continuous mode and the child fully utilized the injured limb in normal mode. With 5 days of post-operative patients were allowed to flexion and extension at the elbow, with 10–14 days — flexion and extension at the wrist joint, and from 3–4 weeks after the operation was being developed rotational motions after the formation of primary bone regenerate. Against this background, there were no contracture of the wrist and elbow joints, and there was also a satisfactory volume of rotational movements.

CONSOLIDATION WITH INTRAME-DULLARY OSTEO-SYNTHESIS OF DIAPHYSEAL-FRACTURES OF THE FOREARM BONES

Patients of the older age group with diaphyseal fractures are in risk for developing delayed consolidation, because diaphyseal section is less blood-flowing compared to the metaepiphyseal zone of the forearm bones. Primarily, radiography is performed to



Fig. 3. Layout tuberosity of the radius for evaluating the rotational displacement (by M.Rizzo)



Fig. 4 Patient A., 16 y.o. X-ray of the forearm bones – comminuted diaphyseal oblique-transverse spiral both-bone fracture

Fig.5. The same patient. Control X-ray

determine the state of the regenerate in the fracture zone. In case of inconsistency in the timing of the appearance of the primary bone callus in the pictures, an ultrasound (ultrasound) was ancillary. In our work, the timing of ultrasound with dopplerography to children after the installation of titanium elastic rods was as follows: 5-7, 14-17, 28-30 postoperative day. We evaluated the condition of the fracture zone, the position of the bone fragments and the diastase between them, the echostructure of the interosseous membrane, but the main information component was the intensity of the blood flow in the fracture zone, which allows us to predict the process of osteoregeneration and to give a structural assessment of bone callus based on neovascular activity of this region.In the case of a violation of the rate of reparative osteogenesis, conservative therapy is immediately prescribed.

RESULTS

Thus, in the period from 2010 to 2016, 504 children with diaphyseal fractures of the forearm bones were treated. The ratio of the use of osteosynthesis in fractures of the forearm bones and closed reposition is presented in Table 2. It should be noted that the younger the child, the less the probability of using osteosynthesis due to the possibilities of bone reconstruction. During this period, 295 patients were treated with closed one-stage reposition, which was 58.5% of the total number of patients with this type of injury. With the use of intramedullary osteosynthesis, 209 children were treated, which amounted to 41.4%. In 158 cases intramedullar fixation with spokes (75.5%) was applied, in 51 — functionally stable elastic osteosynthesis (24.4%). The age interval of intramedullary osteosynthesis as a whole was from 2 years 1 month to 17 years 5 months. In this case, the use of functionally stable intramedullary osteosynthesis corresponded to the older age group — from 9 years 11 months to 17 years 4 months, which is directly related to the width of the bone marrow canal, as well as the activity of the growth zones of the distal epiphyses of the radial and ulnar bones at the age of up to 8 years — with the installation of a long-standing fixation it is possible to expect its immersion deeper into the bone marrow channel due to the active growth of the child and, as a result, technical difficulties in removing it.

However, despite the more mature age, we encountered technical difficulties in removing the locks due to the too short free end of the rod left when biting after installation.

As noted above, additional immobilization during osteosynthesis by TEN is not required. We made corrections for the expressed painful syndrome and in 4 cases applied gypsum immobilization up to 10 postoperative days.

The complications revealed by us during the follow-up are presented in Table 3.

In 2 children with functionally stable intramedullary osteosynthesis (0.39%) and in 4 patients (0.25%) with intramedullary osteosynthesis, echographic data revealed delayed consolidation. These were children of the older age group, boys with fractures in the diaphysis of both forearm bones. In the process of dynamic observation, conservative therapy (Osteogenone, calcium preparations, Pentoxifylline), physiotherapeutic treatment (electromagnetic stimulation) and therapeutic physical training. Consolidation in both patients with osteosynthesis with spokes and TEN occurred within 9 weeks, and organotypic restructuring of the osseous canal in a period of up to 6 months.

In 2 children was noted deformity of the implant at the time of 2 and 3 weeks after the operation against the background of a violation of the rehabilitation regimen — they provided an axial load on the injured limb. In one case, the child was removed rod, rheosteosynthesis with spokes and immobilization with the cast. Osteosynthesis with K-wireswas performed because of instability of bone fragments and weak intensity of bone regenerate in the fracture zone. Consolidation was observed at week 6 from the moment of repeated intervention. In the second case, the patient was also removed the rods, but against the background of a satisfactory position of fragments and a wealthy regenerate, cast was applied for 3.5 weeks, after which fracture consolidation was observed. In one case, the child was determined to violate the rotational movements throughout the entire period of wearing the rods, however, after their removal, the volume of movements is complete. In another case, a patient has a restriction of rotational movements (supination) after 1 month after removal of the implants, probably against the background of adhesion to the residual displacement.

CONCLUSION

The functionally stable intramedullary osteosynthesis, in our opinion, corresponds to these requirements — cosmeticity, lack of additional immobilization, early functional result. For a traumatologist, such important conditions as the speed of repositioning, the convenience of the rehabilitation period, and, most importantly, early activation, that allows to avoid contractures of joints and muscle hypotrophy. Osteosynthesis with TEN is shown in the older age group - from 10 to 17 years due to the possibility of delayed consolidation and, consequently, the necessary prolonged stable fixation of the damaged segment. Patient don't need to refuse to usual everyday loads, which is important not only functionally, but also psychologically. Ultrasound evaluation of the bone regenerate state allows to determine at an early stage the slowing of the bone fragments repair rate and to prescribe conservative treatment of patients in a timely manner, which leads to the fusion of fractures in terms of 6 to 9 weeks. When determining the indications, the correct implementation of surgery and an individual approach to rehabilitation, this method is the best alternative to other surgical methods.

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	Distal forearm		Diaphyseal forearm		Proximal forearm		
	Closed reduction	Osteosinthesis	Closed reduction	Osteosinthesis	Closed reduction	Osteosinthesis	
2010	86	13	20	10	28	10	
2011	69	13	17	13	20	9	
2012	100	11	31	21	28	11	
2013	167	24	49	18	43	14	
2014	205	65	51	23	70	18	
2015	188	50	62	53	65	15	
2016	206	21	102	34	65	10	
Total	1021 (83,3%)	197 (16%)	332 (65,8%)	172 (34,1%)	319 (78%)	87 (21,4%)	

Tab. 2. The ratio of the use of osteosynthesis in the treatment of fractures of the bones of the forearm (2010–2016)

Tab. 3. Complications of the method of elastic intramedullary osteosynthesis. Explanations in the text

	Number of patients	% of total number of treated patients (N=51)
Delayed consolidation	2	0,39
Deformation of the implant	2	0,39
Perforation of the skin	1	0,19
Post-traumatic neuropathy	4	0,78
Rotational contracture while wearing implants	1	0,19
Rotational contracture after removal of rods	1	0,19
Seroma region of the free end of the rod	1	0,19
Total	12	2,32

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MODERN ASPECTS OF REHABILITATION OF PATIENTS WITH DISTURBANCE IN POSTURAL BALANCE

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INTRODUCTION

Among all kinds of vascular disease the acute impairment of cerebral circulation (AICC) still remains as a one of most serious medical and social issue. In majority of patients suffered from AICC (81,2%) there are movement and coordination problems leading to disability, reducing the quality of life [1, 2]. Lokomotor disorders in post AICC patients sufficiently increase the risk of falls while standing and walking. In the acute stage of the stroke falls are observed in 14% of patients, during rehabilitation among 73%, in 8% of this amount with fractures [2, 3, 4].

Therefore in the treatment of post-stroke patients a great attention is paid to rehabilitation programs aimed at correction of movement stereotypes, restoring of static and dynamic balance.



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Aim:

to evaluate the efficacy of a system to restore static and dynamic balance in patients with disturbance in postural balance after AICC.

MATERIALS AND METHODS

45 patients aged from 36 to 73 years old with disturbance in postural balance after AICC in the pool of middle cerebral artery on the second stage of medical rehabilitation entered the study. Gender of the respondents was distributed as 24(53,3%) men and 21(46,7%) women. Illness duration was from 5,5 to 11 months. 24 patients with disturbance in postural balance after AICC comprised the main group and 21 patients — the group of comparison.
The patients of both groups could be well correlated on gender, age, the seriousness of the main illness, the neurological manifestation, motor and coordination disorders.

All the patients involved in the study underwent: symptomatic drug therapy, physiotherapy (magnet therapy, paraffin therapy, massage of the spastic limbs and reflection zones, coordination physical therapy, cycling biomechanics for upper and lower limbs). Additionally the patients of the main group received a rehabilitation course with the use of system «Balance tutor». General time of rehabilitation in the main and the control group was the same.

In the course of the study functional scales estimating static and dynamic balance, walking function, fall risks (Berg Balance Scale, Dynamic Gait Index, Tinetti Scale) were applied to assess the efficacy of the methods. An examination was carried on before and after the course.

Data processing was performed with Statistica 10,0 and Microsoft Excel 2007.

RESULTS

Berg Balance Scale was used to asess the balance and independent walking ability (without support or assistance). After the treatment the performance on the Berg Balance Scale $r = 44,63\pm0,5$ what is statistically different from the performance before treatment $r = 37,04 \pm 0,4$ (p<0,05). In the control group there was a tendency to improvement of the balance as an increase from $r = 36,8\pm0,5$ before the rehabilitation up to $r = 40,7 \pm 0,5$ after the rehabilitation. Before the rehabilitation course 19 (79,2%) patients were in the group «walking with support» 5 (20,8%) could walk independently; in the control group 17 (80,9%) patients walked with support. After the correction of locomotor functions only 2(8,3%) patients of the main group needed a support while walking, 17 (70,9%) shifted from the group «walking with support» to the group of independent walking; in the control group 10(47,6%)patients пациентам required support while walking.

Walking function and risk of falls while walking was assessed with the help of Dynamic Gait Index. Before the treatment 100 % of the patients from both group referred to a group of high risk of fall. In the main group of patients the result after the course of rehabilitation was $r=21,09\pm0,25$, which has a statistical significance (p<0,05) compared to the result before the rehabilitation $r=14,9\pm0,23$. In the control group a positive dynamic was reported however without a statistical significance: before the rehabilitation course performance of Dynamic Gait Index was $r=14\pm0,3$, after — 17,5±0,42. After the treatment with the above mentioned medical technology only in 3(12,5%) patients of the main group a high risk of fall kept unchanged. All re other patients (21 people, 87,5%) shifted from group of high risk of fall to the group of a low risk of fall while walking. At the same time in the control group only 10 (47,6%) patients after rehabilitation showed a low risk of fall while walking.

Functional Tinetti Scale enabled to assess success in performance of concrete motor tasks (both static and dynamic) as well as a degree of the postural disorders.

Comparing the results in the main group an evident improvement in steadiness and the gait on Tinetti Scale was reported with evident increase in the length of a step, more stable walking, lesser deviation from the line, which shows a positive effect on dyna-mic indicators of the balance (p<0,05). Before beginning of the rehabilitation the performance of gait and steadiness were as follows: $11,6\pm0,21$ and $15,8\pm0,27$; in the control group $-11,4\pm0,2$ and $15,5\pm0,25$ which corresponded to a moderate manifestation of gait and steadiness disorders in both groups. By the end of the rehabilitation course a positive result was observed in both groups with more distinct dynamic in the main group: the performance of gait was assessed with $14,9\pm0,23$, steadiness $-21,3\pm0,35$, which corresponded to a light degree of disorder according to the assessment criteria. In the patients of the control group after the rehabilitation the gait and steadiness improved but remained in the degree corresponding to moderate disorders of gait and steadiness and came to $12\pm0,25 \times 17,5 \pm0,29$.

CONCLUSION

Thus, due to the conducted study the efficacy of application of the system for restoration of static and dynamic balance «Balance tutor» was proved, which confirms the the feasibility of its inclusion in a complex rehabilitation of AICC patients with disturbance in postural balance.

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PATHOGENETIC ASPECTS OF THE FLOW OF BURN INJURY IN CHILDREN

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ABSTRACT — The article discusses the changes occurring in a child's body in the acute phase of burn injuries, which affect a number of organ systems including the gastrointestinal tract. An important role in the pathogenesis of burn disease belongs to a disorder of the gastrointestinal tract with the syndrome of bacterial translocation, which requires a search for rational methods of treatment and prevention. There is still a possibility of constant learning and improving of approaches to the treatment of purulent-septic complications, which are the main causes of mortality in the stage of acute burn toxemia.

KEYWORDS — children, burn injury, purulent-septic complications

Burn injury occupies one of the leading places among the injuries in peacetime. According to the WHO and UN Children's Fund (UNICEF), mortality in children takes 3rd place (1). In Russia 200000 patients with burn injury are hospitalized annually, 40% of whom are children. Mortality from burn injuries reaches from 0.4% to 1.4% in different age groups. The main causes of mortality in the stage of acute burn toxemia are purulent-septic complications in combination with endogenous intoxication of metabolic and microbial origin, they account for 25–30% of cases of mortality in burns. The risk of early sepsis (4–5 days after injury) increased to 75–90% with deep burns over 10–15% of the body surface area. Due to anatomical and physiological characteristics, the younger the child, those with relatively smaller area of the lesions developing burn shock. So the critical values for the children of the first year are 5%, from age 1 to 5 years -10%, 6–15 years 20% of body surface (1, 2).

Changes occurring in the body during the acute period of burn disease, affect many organ systems including the gastrointestinal tract. Gastrointestinal blood circulation gets an average of 15–20% of total cardiac output, the bulk of which receives the small intestine. In critical states the centralization of blood flow occurs to ensure the functioning of the organs with a constant high metabolic rate of the brain, heart and lungs. The gastrointestinal tract is experiencing ischemia, to which the most sensitive stomach and small intestine that has been proven in animal experiments. Ischemia is exacerbated by the release into the bloodstream of a large number of vasopressor substances — epinephrine, angiotensin, vasopressin, which operate on a duodenum gut and skinny due to the prevalence in their structure of α -receptors (3, 6).

Rapidly progressive disturbance of microcirculation in the form of primary change to the spasm of blood vessels in congestive hyperemia due to the expansion of precapillary sphincters and preservation of the high tone post-capillary venules lead to damage of the mucous membrane, extending from the submucosa to the intestinal lumen. The development of hypoxia leads to an increase in the permeability of cellular and lysosomal membranes for enzymes. Activated proteolytic enzymes (pepsin, trypsin) and lysosomal hydrolases (acid phosphatase, β -glucuronidase) destroy the mucous membrane, the resistance of which is reduced due to circulatory disorders, oppression of synthesis and destruction of mucin, which is compounded by the pathogenic action of proteolytic enzymes of bacteria (6).

Normal intestinal microflora performs a nonspecific protective function in the organism (antagonist, enzymatic, vitaminoterapiya, stimulation of the immunological reactivity of the organism, partly the organization and maturation of the reticuloendothelial system), but with the development of pathological conditions in which changes in composition and properties, develops goiter. Reduces the total number of typical E. coli, an increasing number of putrefactive, pyogenic, spore and other pathogens (6, 7).

It has been experimentally proven changes in the composition of microbiocenosis of large intestine in burn injury in children: only 10% of patients qualitative and quantitative composition of microbiota was normal in 1-3 days after injury. In other cases, on the background of quantitative changes in the intestinal microflora occurred and its significant qualitative change. In half of the cases the species composition of the microflora were consistent with 2–3 degrees of dysbiosis. As a result of damage of the intestinal mucosa, increasing its permeability, changes in the number and pathogenicity of bacteria contained in the lumen of the gastrointestinal tract, the conditions for the penetration of bacteria, their metabolic products and other toxic substances through the mucous barrier of the intestinal wall into the systemic circulation (bacterial translocation) (4, 5, 7).

Describes the cases of insolvency of the intestinal barrier under the influ-ence of massive bacterial invasion (stress factor in the form of high dose of staph introduced subcutaneously, a massive breakthrough of fecal streptococcus from the intestine to the lymph nodes, blood and internal organs. In animal experiments established that the barrier function of the small intestine is damaged after 5 minutes after receiving the burn injury, reaching a maximum after 4 hours and remains high for a long time. Noted that the violation of the barrier function of the intestinal mucosa with the development of dysbiosis in burn injury may lead to hematogenous and lymphatic spread of intestinal microflora in the body, the development of sensitization to conditionally pathogenic microorganisms of the intestine, further leading to autoimmune reactions (2). As the elimination of burn shock and restore microcirculatory blood flow in the systemic circulation receives a great number of toxic products from lesions undergoing ischemia during shock.

The bulk of the toxic products formed by exposure on the cells and the destruction of the high molecular compounds, various reactive oxygen species (nitric oxide, hypochlorite, peroxyl radical, etc.) produced by neutrophilic granulocytes and macrophages as a manifestation of the nonspecific response of the body in response to injury. Many researchers call this phenomenon the "oxygen metabolic burst of leucocytes", others – "respiratory explosion". Under the influence of cytokines neutrophil leukocytes is a "respiratory burst", consisting in a sharp 10–15 times amplification of oxidative processes with the formation of nitric oxide, which have a cytotoxic effect (4).

In severe and persistent inflammatory process in the body is excessive accumulation of biologically active substances. As a result of their actions long flowing hyperactivity gives way to hyporeactivity and then areactivity, which is accompanied by increasing privatedata development in severe cases, multiple organ failure (6). The disposal of toxic substances (products of tissue decay, medium molecular peptide and other toxic substances) occurs in different ways: 1) secretion through the kidneys, gastrointestinal tract, skin; 2) deactivation in the liver; 3) mononuclear-macrophage system of the lungs. However, it should be noted that the greater depth and area of the burn, the sooner you can come decompensation protective means of the body, leading to accumulation of toxic substances in the body in high concentrations, causing disruption of their properties and functions, with the development of multiple organ failure (4, 5).

According to the literature of burn trauma in children occupies a leading position among all injuries in peacetime that require constant learning and improving treatment approaches. Along with microcirculatory disorders, the action of cytokines, proteolytic enzymes and toxins, an important role in the pathogenesis of burn disease belongs to violations of the gastrointestinal tract with the syndrome of bacterial translocation, which requires a search for rational methods of treatment and prevention.

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PERSPECTIVE OF HYGIENIC ASSESSMENT OF THE STATE OF HEALTH AND CONDITIONS OF EDUCATION OF STUDENTS OF COSSACK SCHOOLS

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ABSTRACT — The younger generation determines the future of the country and the nation. That is why the health of children and youth has always been and remains a fundamental problem of any state. Currently, there is a persistent tendency to reduce the health level of children and adolescents. In addition, there is a sharp decline in physical activity in the conditions of technological progress, growth and encouragement of the enthusiasm of the children's population by computer and information technologies. Solving of these problems requires joint efforts of medicine and the education system. In the modern world, the Cadet education system attracts a lot of interest, especially the Cossack education system, which has just begun its revival after the collapse of the Soviet Union. The Cossack cadet corps initially prepared not only healthy and strong warriors, but also highly educated political figures. Given the scarcity of such personnel, Russia has embarked on the path of reviving the Cossack Cadet system of education. The regime of the day, the physical load, moral education of the Cadets undoubtedly affect the state of health, the level of physical preparedness of the pupils. However, at this stage of the formation of the Cadet education system there is no single system of education, justified programs of physical activity of students. Therefore, the interest of medicine in such institutions is quite understandable.

KEYWORDS — children's health, physical development, physical activity, cadets, schoolchildren, Cossack cadet corps, Cossacks.

Unflagging interest in the past of our country is one of the features of the spiritual life of modern Russia. The hope for the return of power and the great future of our Motherland is inspired by the desire of Russians to revive the network of cadet educational institutions on the basis of a generalization of past experience in this sphere. The problem of the upbring-



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ing and education of a highly educated personality of a civil servant has risen to the state for a long time.

The government is striving to create an education system that would ultimately lead to the formation of a national elite that has been the foundation and support of the state since the time of Peter the Great. Cadet Corps were attempts to create such a system, borrowed from Western Europe in the XVIII century. The result of the activities of these buildings were graduates who could continue their careers in the capital's cadet corps for military training or in universities for obtaining higher civic education [1, 5]. Such educational institutions had as their goal the education in the students of certain qualities of military and political orientation for further public service. They were not just highly educated people, but civil servants loyal to their cause. Purposefulness, elitism, spiritual and moral education, the early definition of the profession, as well as continuity with traditions and unshakable loyalty to the Motherland were the distinguishing features of the cadet education of that time. As a result, at that time, Russia was on the way to becoming the layer of society that should be at the core of any state, highly developed both intellectually and morally.

A special role for the Cossacks in Russia can not be overlooked. Cossacks have always been an integral part of Russian society. Even in the period of persecution, they remained true to their traditions, their way of life, their country. Cossack army was a permanent pioneer in protecting the borders of Russia. From the time of Peter the Great to the next years, the Cossacks consistently performed three main state tasks: they occupied new, previously deserted lands, served as guides to Russian colonization and Russian influence, constituted an important part of the armed forces of the state and carried out service on an equal footing with regular troops. Cossacks belonged to the military estate and took an active part in all the wars of the Russian Empire during the XVIII–XX centuries. To train the officer corps of Cossack troops, Cossack Junker schools were created, which trained officers to serve in small detachments, separated from the main forces. Increased attention was paid to the development of initiative and physical education of students [2].

In the cadet educational institutions of the pre-Soviet period, a system of spiritual and moral education was developed, which was understood as a purposeful, organized process of influencing the pupil and creating certain conditions for the formation and development of positive spiritual, moral qualities, oriented to the existing ideals and values, the formation of moral spirit, spiritually moral consciousness, behavior and, in general, moral culture [5].

Interest in the history of the Cadet Corps, as well as in the entire education system in imperial Russia, declined noticeably during the Soviet period, from the first days after the Great October Revolution, which subsequently led to the destruction of the entire education system. The entire legendary experience was unclaimed, accumulated in the Cossack movement for the entire preceding period, for political and ideological reasons. The main reason was that in czarist Russia the Cadet education was class and anti-popular. In the report of the General Directorate of Educational Institutions for 1917–1920 categorically denied any continuity between the old military educational institutions, it was argued that in them "the landlord and merchant sons learned to oppress the masses of the people." In 1918 the cadet corps was abolished on the territory controlled by the Bolsheviks; Several corps operated in exile. But, despite all the persecutions of the new government, the students of the cadet corps remained faithful to their country, following the moral and ethical principles inherent in them even during the training.

Only toward the end of the 1980s, Russia began to return to the Cadet system of education. On November 14, 1989, the Declaration of the Supreme Soviet of the USSR enshrined the right of the Russian Cossacks to rehabilitation [3].

Only toward the end of the 1980s, Russia began to return to the Cadet system of education. On November 14, 1989, the Declaration of the Supreme Soviet of the USSR enshrined the right of the Russian Cossacks to rehabilitate [3]. For the Russian society, which is in a state of socioeconomic crisis, it becomes necessary to change the education system, change political, socio-economic landmarks, and the social order of life in general [4]. The main source of formation of the administrative resource of Russia should be the national system for the training of civil servants, consisting of Suvorov and Nakhimov schools, as well as Cadet Corps of the Ministry of Education [1, 7].

Active development of ways to solve the problems that have arisen at the moment is being carried out. The implementation of all the above tasks should be carried out from childhood. Undoubtedly, it is necessary to take into account the health and physical development of children and adolescents. According to the Law of the Russian Federation "On Education", the health of students is a fundamental principle of state policy in the field of education [6]. Therefore, one of the main activities of educational institutions is the development and implementation of activities aimed at preserving and strengthening the health of the younger generation. However, now both in Russia and in foreign countries there is a persistent tendency to reduce the health of the younger generation. In addition to the deviation in the physical development of students, there is an increase in the incidence of chronic diseases: digestive organs, musculoskeletal system, visual analyzer, nervous system [8, 15, 16].

It is necessary to attribute, in the first place, the imperfection of educational programs, including insufficient control over the health of students towards the reasons for the current situation, which undoubtedly will further reduce the level of preparedness of the staff. As a result, over 40% of young people who are younger than the draft age do not meet the requirements set by the army service, including the passing of minimum standards of physical training. Undoubtedly, the defense capability of the country and the fighting efficiency of troops are largely due to the quality of the health of the pre-conscripts.

In modern conditions in Russia, the interest in preserving and strengthening the health of the children's population as a factor that determines the labor, intellectual and defense potential of the country in the future becomes evident not only for the medical community, but also for the authorities [10, 11]. Therefore, at this stage, educational institutions of a new type deserve close attention, since they act as the main factor of impact on the health and physical development of children. The revival of the traditional Cossack government service for Russia is seen as one of the elements of the emergence of a new Russian reality [1]. President Dmitry Medvedev, on July 3, 2008, adopted a new "Concept of the state policy of the Russian Federation in relation to the Russian Cossacks", whose goal is to develop the state policy of the Russian Federation to revive the Russian Cossacks.

The opening of new Cossack schools, cadet corps testifies to active work in this direction. The number of Cossack cadet corps in Russia is now more than fifty, while the leaders in the development of Cossack education are the Krasnodar and the Rostov Regions. In Astrakhan, the Cossack Corps has been functioning since August 2014 [14]. The educational programs of the Cossack educational institutions are based on military-applied orientation. Along with the traditional tasks of strengthening and preserving health, physical working capacity, Cadet schools form skills: possession of weapons, riding skills, possession of hand-to-hand combat, education of personal qualities. Early professional orientation will contribute to the training of highly qualified and educated cadres of the top level.

However, with the opening of the cadet corps, there is a need to evaluate their educational and educational process, since subjects that are not included in traditional educational programs are introduced into the daily schedule and schedule [12]. Important factors of the risk of children's health in educational institutions of a new type are the basis for the formation of a chronic stress state [12], which contributes to the development of neurotic states, functional abnormalities and chronic diseases in them (G.G. Onischenko et al., 2004). Therefore, innovative educational institutions and educational programs, which declare their effectiveness in the educational plan and in improving health, are of particular interest to hygienists [13].

Cadet schools and corps occupy a special place among such institutions, as they revive the traditions of specialized educational organizations for boys (M.I. Stepanova et al., 2008). Education of children and adolescents of the same sex creates certain psychohygienic and medical-psychological problems that were are not mentioned in the investigation on the cadets (A.G. Kundelekov (2003), I.V. Asvits (2007), M.I. Stepanova et al. (2006-2007), E.A. Zhilina (2006-2007), E.Z. Godina et al. (2008). The evaluation of the separate (by gender) education of boys in the conditions of the Cadet Corps is an interesting hygienic problem, important for the scientific justification of health-saving technologies and types of institutions, it concerns those children and adolescents on whom the solution of the demographic problem depends, the formation of labor reserves and the defense potential of the country.

Analysis of the practice of spiritual and moral education in military schools shows that in modern conditions there is no single conceptual approach to understanding its essence and content, there is an imbalance of social ideals and values. The consequences of this are distorted representations of cadets of Suvorov, Nakhimov schools, cadets about such values as goodness, honor, conscience, generosity, mercy, justice, citizenship, patriotism, etc. [6].

On the basis of the foregoing, it is planned to carry out research work on studying the influence of the Cossack Cadet Corps training system on the state of health and physical development of pupils on the example of the State Autonomous General Education Institution of the Astrakhan Region "Cossack Cadet Corps named after Ataman I.A. Biryukov".

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THROMBOSIS OF LEFT FEMORAL VEIN IN NEWBORNS AS A CAUSE FOR DEVELOPMENT OF ACQUIRED CLUBFOOT: CASE FROM PRACTICE

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Equino-varus position of foot in children after birth is manifestation of congenital clubfoot. Congenital clubfoot — complex malformation shin, ankle joint and foot, where violation bookmark and bone -muscle apparatus has occurred. In Filatovskaya Children Hospital (Greatest Hospital in Russia) in 2007 at the Center of outpatient orthopedics 573 children aged from 5 days of life to 7 years with congenital one-or bilateral clubfoot underwent treatment. In all cases malformation lower limbs with broken bookmark ankle joint in period intrauterine development had place. From past through branch patients with congenital clubfoot, one child deserved more attention.

As known from anamnesis, the child was born from the third pregnancy, flowed with constant threat of interrupts, 2 premature birth way cesarean section on 31 week of gestation with weight 1100 g (antenatal death 1 fetus in 28 week). Viable girl was born with assessment on scale Apgar 2/5 points. Motion in all joints in full volume, foot and brush formed correctly. After birth status child heavy, due to the respiratory violations on background prematurity and morphofunctional immaturity. The baby was transferred into a maternity hall on artificial ventilation light and delivered in resuscitation. With first hours life expressed violation of microcirculation in areas of lower limbs was noted. Cyanosis in areas of right thigh and shin was solved on 2 day of life. In areas bottom hall trunk and left bottom extremity in areas thigh and shin violations quashed to 3 days of life, in areas 1 toe left foot hemodynamics violations saved to 23 days with



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subsequent gradual resolution on background therapy. In blood test there were signs of disseminated intravascular winding down. On data dopplerography vessels of lower limbs thrombosis left femoral vein was identified, therapy of low molecular heparin was conducted.

On the third day of life clinical-laboratory signs of thrombosis of left branch portal vein, absence signs functional activity platelets were identified. On 6 day of life on data dopplerography vessels abdominal cavity revealed thrombosis left branch portal vein. Child was consulted by a microsurgeon and recommended continue conservative therapy heparin, control vessels in dynamics.

On 5th day of life in clinical picture equino-varus position of left foot begins to prevail bringing front division. Notes hypotrophy of muscles shin left. Repeatedly was consulted by a neurologist, which confirmed peripheral paresis peroneal nerve left as a result of outcome venous thrombosis left bottom extremity. Girl received daily procedure massage and physiotherapy physical education, Vitamin therapy with positive dynamics.

On 8th day of life the condition deteriorated, appeared signs rise infectious toxicosis and paresis bowel. On results clinical inspection and instrumental methods research, revealed flow necrotizing enterocolitis with perforation hollow organ (iliac gut). On 9th day of life operation — laparotomy was performed, audit abdominal cavity with overlay of ileostoma and drainage of abdominal cavity. Postoperative period flew relatively smoothly.

Aged 6 month of life girl was made relaparotomy and imposition adapted ileo-ileoanastomosis. Postoperative period leaked smoothly. In flow 6 month of life left foot was in equino-varus position. Conducted courses conservative treatment without persistent effect.

At admission child in branch outpatient orthopedics, drawn attention position left foot. Not knowing anamnesis life this child, completely competent may was would think about congenital clubfoot. But child was born with correctly formed feet!

With a medical examination equinus left foot is persistent, palpatory significant tension left Achilles tendon, small hypotrophy shin (circle right and left thigh — 21 cm, right and left shin in up third — 14 cm, in with medium third right 14 cm, left — 13,5 cm, in lower third right 11 cm, left — 10,5 cm). Child with diagnosis «acquired clubfoot» was launched treatment foot on methodology Ponceti. During 5 weeks ream withdrawn in correct position gradual plaster bandages. On achieving correction front and average divisions left foot, patient was performed percutaneous achillotomy left with fixation of the left lower limb in a high gypsum boot. Through 4 week were dressed up brace Mitchell.

In present time girl 1,5 years old. Foot is in right position, slightly difficult pronation left foot, but this not prevents great and steadily walk. Within 1,5 years the girl is permanently supervised by neurologist, hematologist and orthopedist. She receives medical and rehab therapy in connection with residual phenomena neuropathy peroneus with expressed positive dynamics.

So, unique technique treatment of congenital clubfoot, developed by Ignacio Ponceti, may be successfully used for elimination of secondary equinovarus foot deformity in children.

SOME QUESTIONS OF PATHOGENETIC JUSTIFICATION OF APPLICATION OF TRACTION THERAPY AT THE LUMBAR OSTEOCHONDROSIS

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Prospect Lenina 40, Barnaul, 656038, Altai region, Russia E-mail: aaoley@mail.ru The first mention of the treatment of spinal injury diseases with the help of traction therapy is found among the ancient peoples of the Mediterranean, India and Europe. Initially, as a pulling load used containers, in which a drop by drop of water came. This provided an excellent adaptation of the patient to an increasing load, allowing for a precise dose loading. For many centuries after Hippocrates spinal distension was accomplished either by rough mechanisms that did not







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allow the adjustment of the tensile force, or manually by a physician with helpers, and sometimes with the help of draft animals. The apparent ineffectiveness of many of the barbaric treatment methods used at that time forced them to abandon them. Long stretches of the spine were also forgotten. We remembered about it only in the last century, when the concept of the compression nature of the appearance of many back pains was first put forward.

Our goal: to determine the main therapeutic effects of the application of traction therapy. The traction table Anatomotor (Hill Laboratories, USA) was used. The study involved 896 patients with neurological manifestations of lumbar osteochondrosis at the age of 32 to 64 years. When all patients were addressed, neuroimaging (MRI or CT), ultrasound examination of the lumbar spine for the detection of herniated lumbar intervertebral discs was performed. In the clinical picture, the pain syndrome predominated in various degrees of severity, as well as motor and sensory disorders at the level of the lower limbs.

As a result of the treatment, the majority of patients (812 - 90.1%) achieved a stable positive result

(confirmed with further dynamic studies). 52 patients (5.8%) subjectively did not notice improvement, while the results of control studies indicated a decrease in the severity of hernias protrusion. In other patients, the positive effect was less, or the effect of the treatment lasted less time, and additional courses of treatment were required. The positive effect of traction: when it is carried out, the posterior longitudinal ligament of the spine is pulled, pressing on the disc or nucleus pulposus that is displaced backwards, eliminating the subluxations of the arcuate joints and reducing the muscle contractures in the affected vertebral motor segment of the spinal column. In addition, with the extension, the regression of clinical manifestations of vertebral and extravertebral syndromes of spine osteochondrosis caused by the compression-mechanical factor is noted, temporary elimination or decrease in the degree of expression of pseudo-spondylolisthesis was noted.

Thus, the use of this method of conservative treatment makes it possible to provide effective treatment for patients with neurological manifestations of lumbar osteochondrosis and to ensure the appearance of a persistent clinical effect. The number of sessions of traction therapy is not regulated and is strictly individual for each patient. The focus for the termination of the procedure is the disappearance of spontaneous pain in the of lumbar osteochondrosis in a state of rest and pain in the palpation of paravertebral structures in the zone of the affected PDS. To achieve a pronounced clinical effect, usually 5–7 sessions are enough. In the order of carrying out procedures, traction therapy is always put on the last place for the possibility of a protective motor regime and the greatest rest after it. After the end or during (starting with the $4-5^{th}$ procedure), the patient undergoes a course of stimulating therapy of paravertebral muscles: needle therapy, point and classical (tonic) massage, currents of Bernard In the stimulating regime (6–8 sessions). Simultaneously, the patient develops exercise therapy to create a muscle corset.

CONSERVATIVE TREATMENT OF THE GONARTHROSIS (ARTHROSIS OF THE KNEE) WITH THE PRESENCE OF BAKER'S CYST

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Prospect Lenina 40, Barnaul, 656038, Altai region, Russia E-mail: aaoley@mail.ru Baker cysts usually occur in almost any form of pathology of the knee joint. More often - with arthritis, for example, rheumatoid arthritis, or damage to the cartilage, especially the medial meniscus. Baker's cysts arise between the sinews of the medial head of the gastrocnemius muscle and the semiembranous muscles. They are located behind the medial femoral condyle. Most Baker cysts support this direct communication with the synovial cavity of the knee. With the aim of conservative treatment of patients with post-traumatic gonarthrosis and the presence of Baker's cyst, we apply complex conservative treatment with sonographic control of the results of treatment (in some cases, with an intermediate control). Gonarthrosis is the leader in the incidence of the disease among articular arthrosis. There are different ways to treat gonarthrosis. We managed to develop a new modification of the method of treatment of gonarthrosis. In carrying out this method, a subcutaneous administration of the ozone–oxygen mixture and subsequent electrical stimulation of the site of introduction of the ozone-oxygen mixture with an electric current of 50 Hz, a current of up to 7–10 mA, an impulse duration of 0.3 ms and a drug interstitial electrophoresis of the drug Caripain, duration of the procedure 12–15 minutes daily, for a course of treatment of 12–15 procedures. The application of this method leads to a reduction and arrest of pain syndrome in patients with knee osteoarthritis, a decrease in the inflammatory reaction of the knee structures, restoration of the knee joint function. 397 patients were treated. The stable clinical effect of this method, obtained in the treatment of patients with osteoarthritis of the knee joint, makes it possible to recommend this method for a wide clinical application.

To assess the presence and severity of pathology at the knee joint level, a comprehensive diagnostic approach, including X-ray and ultrasound, is actively used in the sanatorium. In a number of cases, to clarify the nature of the pathological process, patients were referred for study to medical and preventive medical institutions in Barnaul for CT or magnetic resonance imaging of the knee joint. To control the results of treatment, the method of ultrasound diagnostics of the pathology of the knee joint

After the completion of the course of treatment, patients noted that the pains significantly decreased or completely passed. In the ultrasound examination of the knee joints, a subculture bag of the gastrocnemius muscle (Baker's cyst) was determined. Typical sonographic signs: the presence of an anechoic neck (canal) of the podsuchozhal bag (between the medial head of the gastrocnemius muscle and the tendon of the semimembranous muscle), an anechogenic bag. Localization: the medial edge of the popliteal fossa (more often), the middle part of the popliteal fossa. In 39 patients (23.8%) Baker's bilateral cyst was determined, in 125 patients — one-sided, in 78 patients (62.4%) — left-sided, in 47 patients (37,6%) — rightsided. Cyst volume from 0.7 ml to 21.3 ml. Aspiration of cysts was not performed. As a result of complex conservative treatment, when performing a control

study, a decrease in the volume of cysts was noted in 143 patients (87.2%). In 21 patients, the volume of cysts did not change objectively. Our control studies were performed 7–16 days after the start of therapy. In a number of cases (29 patients — 17.6%), as a result of the control studies, the disappearance of cysts was noted. The initial volume of cysts in these cases was from 0.7 to 5.1 mL.

Thus, conservative complex treatment with the use of interstitial electrostimulation and subcutaneous administration of the ozone-oxygen mixture can successfully be used to treat posttraumatic gonarthrosis with the presence of Baker's cyst. The method of ultrasound diagnosis can objectively assess the presence of a cyst, accurately determine the amount of content, provide the possibility of establishing a dynamic control of the results of treatment.