SLOBOZHANSKYI HERALD OF SCIENCE AND SPORT

UDK 615.825:616.711.1

ISSN (English ed. Online) 2311-6374
2018, №2(64), pp. 41-44

Modern principles of physical rehabilitation of patients with Osteochondrosis of the cervical-thoracic spine

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Presents the results of the use of physical rehabilitation program (therapy) patients with Osteochondrosis of the cervical-thoracic spine.

Purpose: *to research and develop and substantiate, evaluate the effectiveness of program for the physical rehabilitation of patients with Osteochondrosis of the cervical-thoracic spine.*

Materials & Methods: *medical-biological, instrumental, hardware, medical-pedagogical observation, evaluation of motor function, conducting trials and tests methods of mathematical statistics.*

Results: *the study posited clinico-functional examination of 57 patients with Osteochondrosis of the cervical-thoracic spine, which conducted rehabilitation using the diagnostic-therapeutic training apparatus "David".*

Conclusions: *the use of physical therapy program, which included a complex of mechanotherapy (developed on software DavidSpineConcept) and classic massage, contributed to the positive dynamics of clinical manifestations of the disease, the normalization of the State of the cardiovascular system.*

Keywords: *Osteochondrosis of the cervical-thoracic spine, physical therapy, rehabilitation, belongs to the diagnostic-therapeutic simulators "David".*

Introduction

Osteochondrosis (OC) is one of the most common degenerative-dystrophic diseases of the musculoskeletal system. It affects people of any age and profession [1; 2]. Often it occurs after work in an uncomfortable position, physical stress, hypothermia, prolonged stay in a standing or sitting position. Such a pain quickly passes after rest. However, prolonged or recurring lumbar pain is already a symptom of the disease. Osteochondrosis affects from 75% to 95% of the population of Ukraine. According to many authors, this disease manifests itself in X-ray examinations, even in 12–26% of children 10–15 years of age [3].

Disease of the OC becomes more and more important due to the continuous increase in the number of patients. He occupies one of the first places in the structure of diseases with temporary disability and disability of the population of Ukraine. So, according to the Kharkiv regional center of medical and social expertise, in the Kharkov region, for the osteochondrosis of the spine for the first time disability occurred: in 2014 – 430 people, among them in able-bodied age – 404; in 2015, 490 people, of whom 471 are of working age, and 476 in 2016, of whom 459 are of working age. The primary disability measure was 2,5 to 2,9 per 10000 population. Diagnosis and treatment of this severe form of lesion of the spine has been devoted to many scientific works of clinical, neurological and radiological orientation [4].

In the course of treatment and for the prevention of OC, lately both conservative and surgical methods of treatment are used [3]. Physical culture plays a leading role in the prevention of OC spinal cord, and therapeutic physical culture (physical therapy) is very important for the treatment of such patients. The choice of a complex of therapeutic actions is based on a differentiated approach to treatment tactics depending on the stage of the disease, the intensity of the pain syndrome, the nature and degree of neurological disorders, the causes of functional impairment. Data from recent years on the effectiveness of treatment and in the OC of the spine have shown that with the help of an integrated approach to physical rehabilitation, one can not only resist OC, but also successfully treat it [5]. Physical rehabilitation includes exercise therapy, therapeutic massage (TM), physiotherapy, hydrokinetic therapy, reflexology, manual therapy, mechanotherapy etc. [5; 6].

All of the above stipulated the urgency of developing a new comprehensive physical rehabilitation program for patients with OC of the cervicothoracic spine, which will reduce the incapacity for work, improve the overall performance of patients, will contribute to a more complete recovery of the functions of the spine.

Relationship of research with scientific programs, plans, themes. The work was carried out in accordance with the priority thematic area 76.35. "Medico-biological justification for the implementation of recovery measures and the appointment of physical rehabilitation to young people of different levels of fitness" Number of state registration – 0116U004081.

Purpose of the study: to scientifically justify, develop and evaluate the effectiveness of the physical rehabilitation program for patients with OC of the cervicothoracic spine in the recovery period.

Objectives of the study:

1. On the basis of the study of the special scientific literature, to analyze the etiology, pathogenesis, clinical characteristics, diagnosis and modern approaches to the appointment of

physical rehabilitation in OC of the cervicothoracic spine.

2. To determine the functional state of patients with OS of the cervicothoracic spine before the onset of rehabilitation effects.

3. To develop a comprehensive program of physical rehabilitation for patients with OC of the cervicothoracic spine using the complex of diagnostic and therapeutic simulators "David".

4. To evaluate the effectiveness of our comprehensive program of physical rehabilitation for patients with OS of the cervicothoracic spine based on the study of the dynamics of certain parameters of the functional state of patients.

Material and Methods of the research

Methods of research: analysis of special scientific and scientific methodological literature (theses, abstracts of dissertations, monographs, educational and methodical literature, articles in collections of scientific papers and periodicals, as well as theoretical provisions and practical recommendations that exist in the medical, pedagogical and related fields) medical and biological methods and medical and pedagogical observations (analysis of histories and outpatient maps of patients, namely: analysis of the results of the study of the function of the cervicothoracic posture onochnika) determining the power and dynamic possibilities cervical-thoracic spine muscles using complex diagnostic and treatment simulators "David" [7]; methods of mathematical statistics.

The study was conducted from November 2017 to January 2018 on the basis of Kharkiv Medical Center "Fortis".

Results of the research and their discussion

At the first stage of the study, the analysis and processing of literature sources was carried out, the etiology, pathogenesis and clinical manifestations of the disease were studied, and the available physical rehabilitation programs were examined for OS of the cervicothoracic spine. At the same stage, the author's comprehensive program of physical rehabilitation.

At the second stage, a primary examination of patients with OC of the cervicothoracic spine was carried out on the basis of Kharkiv Medical Center "Fortis". We observed 57 patients under our supervision. The age of the patients is 35–45 years. Patients were randomly assigned to a main group (MG) consisting of 29 males and a control group (CG) consisting of 28 males in accordance with the principles of bioethics. All patients were examined at the beginning and at the end of the study, were under the supervision of the center's doctors. The formulation of the clinical diagnosis was carried out in accordance with the national recommendations of the Ministry of Health of Ukraine.

All patients underwent testing on the diagnostic and therapeutic simulators "David" twice – before and after the physical therapy complex, after 3 months (Figure 1).

MG patients underwent a complex of mechanotherapy, which was compiled on the "David" software package for 6 simulators and a classic massage of the cervicothoracic spine.

Patients of CG underwent a complex of physical therapy, which included exercises of exercise therapy (static exercises, as a load – their own body weight and dumbbells or other weights that were performed while standing, sitting and lying, dynamic exercises, during which the contraction of muscles was carried out on average tempo and alternated with relaxation) and classical massage of the cervicothoracic spine.

Figure 1. Conducting diagnostic and rehabilitation activities on diagnostic and therapeutic simulators "David"

At the third stage, a second examination of the patients of the main and control groups was conducted, which allowed to analyze the dynamics of the studied parameters under the influence of rehabilitation measures and compare the results obtained in both groups of patients. Scientific conclusions and practical recommendations were made.

When re-examining patients x-cervical-thoracic spine, which was carried out in 3 months of application of means of physical rehabilitation, the general state of patients in both groups have been positive developments, namely the number of complaints of patients has decreased. Thus, the number of people complained about:

– general weakness – in the MG decreased by 39,7%, in the CG – by 28,6%;
– periodic pain in the region of the heart – in MG decreased by 41,0%, in CG – by 28%;
– periodic pain in the cervicothoracic segment of the spine – in the MG decreased by 76,0%, in the CG – by 64,3%;
– paresthesia of the upper extremities – in the exhaust gas decreased by 19,6%, in the CG – by 10,7%;
– periodic headaches – in the MG decreased by 48,3%, in the CG – by 42,0%;
– dizziness – in MG decreased by 20,0%, in CG – on 17,0%.

Comparing hemodynamic parameters in patients with MG and CG, we came to the conclusion that in a second examination the heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) in the MG patients after the author's program of physical rehabilitation were better (Table 1).

As a result of the use of complex physical rehabilitation programs for 3 months, the test parameters for the David complex significantly changed in patients of both groups (Table 2).

It is proved that out of 15 indicators – 9 patient indices in the main group of patients are much better than the parameters in the control group ($p<0,05$), which indicates the effectiveness of the rehabilitation program for patients with OS of the cervical thoracic spine using a complex of diagnostic and therapeutic simulators "David".

Table 1

Dynamics of hemodynamic parameters in patients of both groups in primary and secondary studies

Parameters	Norm	Periods of study		t	p
		Primary studies	Secondary studies		
Main group (n=29)					
HR beats·min^{-1}	60–84	89,67±0,98	73,63±0,82	12,77	<0,001
SBP, mm Hg.	100–139	140,26±2,56	134,71±1,69	5,32	<0,005
DBP, mm Hg.	60–89	82,66±1,99	73,49±0,96	4,15	<0,005
Control group (n=28)					
HR beats·min^{-1}	60–84	88,98±1,23	79,66±0,92	6,01	<0,001
SBP, mm Hg.	100–139	139,92±3, 61	136,37±2,80	1,86	<0,05
DBP, mm Hg.	60–89	82,52±2,12	76,91±1,40	2,20	<0,05

Table 2

Comparison of the results of the survey before and after the rehabilitation program on the diagnostic and therapeutic simulators "David"

Parameters	Machine number	Name of test	Test 1–2 MG in %	Result, %	Test 1–2 CG in %	Result, %	Difference between groups, %
Mobility	110	extension	+1/+26	+25	+1.5/+13	+11,5	13,5
	110	flexion	–24/–6	+18	–25/–20	+5	13
	120	rotation right	+77/+93	+16	+82/+86	+4	12
	120	rotation left	+77/+95	+18	+82/+86	+2	16
	150	tilt right	+37/+47	+10	+30/+30	0	10
	150	tilt left	+42/+50	+8	+32/+35	+3	5
Strength	110	extension	+31/+42	+11	+34/+36	+2	9
	110	flexion	+10/+43	+33	+2/+12	+10	23
	120	rotation right	+20/+32	+12	+14/+18	+4	8
	120	rotation left	+6/+21	+15	0/+12	+12	3
	150	tilt right	–10/+9	+19	–12/–9	+3	16
	150	tilt left	–7/+5	+12	–5/–2	+3	9
Strength ratio	Flexion / extension		–17/0	+17	–30/–20	+10	7
	Rotation left / right		+13/+9	–4	+15/+5	–10	6
	Right / left tilt		–3/+4	+7	–7/–8	–1	6

Conclusions

1. Based on the analysis of scientific and scientific-methodological literature, it was determined that the OC of the cervicothoracic spine is one of the most common degenerative-dystrophic diseases of the musculoskeletal system. It affects people of any age and profession. Osteochondrosis affects from 75% to 95% of the population of Ukraine. According to many authors, this disease manifests itself in X-ray examinations, even in 12–26% of children 10–15 years of age.
2. Disease of the spinal column becomes more and more important due to the continuous increase in the number of patients. He occupies one of the first places in the structure of diseases with a temporary loss of ability to work and disability of the population of Ukraine.
3. When primary testing of patients with OC of the cervicothoracic spine with the help of the complex of diagnostic and therapeutic simulators "David", significant decreases in the indexes of the movements of the cervicothoracic spine on flexure (25%), a decrease in the muscle strength with tilts to the right and left (–10%). A violation of the flexion-extension (–20%), a right-to-left tilt (–5%) was also diagnosed.
4. The use of the developed complex program of physical rehabilitation caused positive changes in the general condition of patients, which indicates an improvement in the functional state of the musculoskeletal system, cardiovascular and muscular systems.
5. We analyzed 15 indicators that were studied in patients of both groups. It is proved that out of 15 indicators – 9 patient indices in the main group of patients are much better than the parameters in the control group ($p<0,05$), which indicates the effectiveness of the rehabilitation program for patients with OC of the cervical thoracic spine using a complex of diagnostic and therapeutic simulators "David".

Prospects for further research in this area we see in the use of a set of diagnostic and therapeutic simulators "David" for the physical rehabilitation of patients with various diseases of the spine and muscles of the trunk.

Conflict of interests. The author declares that no conflict of interest.
Financing sources. This article didn't get the financial support from the state, public or commercial organization.

References

1. Yepifanov, V.A., Rolik, I.S. & Yepifanov, A.V. (2002), *Osteokhondroz pozvonochnika (diagnostika, klinika, lechenie): monografiya* [Osteochondrosis of the spine (diagnosis, clinic, treatment): monograph], Moscow. (in Russ.)
2. Lutsyk, A.A, Shmidt, I.R. & Peganova, M.A. (1998), *Grudnoy osteokhondroz: monografiya* [Thoracic osteochondrosis: monograph], Novosibirsk. (in Russ.)
3. Prodan A.I., Radchenko V.A. & Korzh N.A. (2007), *Degenerativnye zabolevaniya pozvonochnika : monografiya* [Degenerative diseases of the spine: monograph], Kharkov. (in Russ.)
4. Kornatskyi, V.M. (2001), "Diseases of the bone and muscular system: the state of the problem in Ukraine and Europe", *Ukr. med. chasopys*, No. 4, pp. 139-141. (in Ukr.)
5. Marchenko, O.K. (2012), *Osnovy fizicheskoy reabilitatsii: uchbenik* [Fundamentals of Physical Rehabilitation], Kiev. (in Russ.)
6. Peshkova, O.V., Kamen Zhenzi (2004), "Complex physical rehabilitation of patients with osteochondrosis of the spine", *Slobozans`kij naukovo-sportivnij visnik*, No. 7, pp. 168-170. (in Russ.)
7. David (2018), David Spine Solution, available at: david.fi/solution/spine-solution/.

Received: 27.02.2018.
Published: 30.04.2018.

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