

Use and impact of a comprehensive program of physical therapy in the treatment of patients with deforming coxarthrosis of 2–3 degrees

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Purpose: to study the effectiveness of physical therapy in the complex treatment of patients with deforming coxarthrosis of 2–3 degrees.

Material & Methods: a comparative analysis of the use of traditional basic drug therapy and complex drug and physical therapy for 2 months in 30 patients (main and control group) with coxarthrosis of 2–3 degrees, functional insufficiency (FI) of 2 degrees using goniometry, visual analogue pain scale (VAS), Leiken index.

Results: results of the analysis of goniometry indices, VAS and Leiken indices showed with statistical certainty the advantage of using physical therapy in the complex rehabilitation treatment of patients with coxarthrosis of 2–3 degrees, which was expressed in improving the dynamic function of the hip joint.

Conclusion: a program of physical therapy for patients with coxarthrosis of grade 2–3 was developed and put into practice, including a set of ideomotor exercises, post-isometric muscle relaxation, gymnastic exercises with projectiles and objects, movement coordination exercises, breathing exercises with gravitational weights, exercises on block simulators and an exercise bike, as well as self-study at home.

Keywords: coxarthrosis, physical therapy, post-isometric relaxation of muscles, pain syndrome, VAS and Leiken scales.

Introduction

The number of patients with orthopedic pathology is increasing every year and has a negative impact on the health of the population. Among the diseases of the musculoskeletal system, osteoarthritis is the most common pathology of the joints (V. A. Koryak, V. A. Sorokovikova, V. V. Svistunov, T. V. Sharova, 2013). Osteoarthritis is characterized by chronic inflammation and involvement of all components of the joint in the pathological process (A. D. Woolf, J. Ervin, L. March, 2012). According to averaged estimates, the prevalence of osteoarthritis among the population of most developed countries of the world ranges from 8–12% (W. Y. Kwok, V. Kloppenburg, F. R. Rosendaal et al., 2011). In Ukraine, in 2015, the incidence of osteoarthritis was 431 per 100 thousand population, the prevalence was 2995 per 100 thousand (about 3%) (O. B. Yaremenko, A. M. Mykytenko, 2016).

Coxarthrosis – arthrosis of the hip joints – occupy 2nd place after lesion of the knee joints in terms of frequency of occurrence and 1st place in terms of temporary disability and persistent disability (V. A. Koryak, V. A. Sorokovikova, V. V. Svistunov, T. V. Sharov, 2013). Coxarthrosis is characterized by progressive damage to the articular cartilage and subchondral bone associated with inflammation, osteophyte formation and joint deformity. Primary osteoarthritis, which develops in healthy cartilage under the influence of various factors, and secondary, characterized by the destruction of already previously modified cartilage, are distinguished. One or both hip joints may be affected. At the age of 50 years, the disease occurs mainly in men. With increasing age, osteoarthritis affects mainly women. The increase in the frequency of the

disease is due to an increase in the number of obese people, poor physical condition due to physical inactivity, progressive aging of the population.

Research into the causes of osteoarthritis is carried out for a long time. However, there is still no consensus about the nature of this disease. The majority of scientists agree that it has a complex multifactorial origin: metabolic disorders, hereditary causes, harmful habits and working conditions, changes in the biomechanics of joints of various genesis (E. F. Turovskaya, L. I. Alekseeva, E. G. Filatova, 2014).

Most often in clinical practice, the classification of arthrosis by Kellgren-Lawrence on the basis of radiographic evidence (P. G. Conagan, D. J. Hunter, J. F. Maillefert et al., 2011):

Stage 0 – signs of arthrosis are not visualized;

Stage 1 – minor marginal osteophytes are determined without changing the height of the joint space;

Stage 2 – significant marginal osteophytes are determined without changing the height of the joint space;

Stage 3 – significant marginal osteophytes are determined with a moderate decrease in the height of the joint space;

Stage 4 – significant marginal osteophytes, subchondral sclerosis, significant narrowing of the height of the joint space are determined.

It is also advisable to determine the functional insufficiency

(FI) of the joints (T. E. McAlindon, R. R. Bannuru, M. C. Sullivan et al., 2014).

1st degree (moderate) – a small limitation of the range of motion in the joints (the amplitude of movements in the hip joints is reduced by 30–20° from the volume of movements in a healthy hip joint);

2nd degree (expressed) – significant limitation of range of motion (range of motion in the hip joint does not exceed 50°; subluxation of joints with severe deformation due to periarticular scarring, as well as muscle atrophy, a significant stiffness throughout the day);

3rd degree (pronounced) – significant difficulty in walking (the patient can take several steps around the room) or the patient cannot get out of bed due to pain and deformities in the hip and knee joints (range of motion does not exceed 15° or is completely absent); almost impossible self service.

The main clinical manifestation of coxarthrosis is pain, the nature, intensity, duration and location of which depend on the severity of changes in the joint. Then FI joins. First of all, internal rotation and abduction are limited – flexion-adduction contracture is formed, lameness occurs (N. A. Shostak, 2012).

Treatment of coxarthrosis can be conservative and operative. The choice of treatment depends on the severity of clinical manifestations. The goal of conservative treatment is to stabilize the process, improve the patient's well-being. Conservative treatment consists of pharmacological and non-drug methods. Drug therapy consists of non-steroidal anti-inflammatory drugs, muscle relaxants, vascular drugs, chondroprotectors (L. Fernandes, K. B. Hagen, J. W. Bijlsma et al. (2013). Non-drug therapy includes therapeutic exercise and joint unloading - wearing shoes with a well-cushioned sole, the use of additional support when walking, orthotics (S. V. Kolesnikov, E. S. Kolesnikova, 2012).

The main efforts of doctors should be aimed at preserving the biomechanics and the function of the affected joint (V. V. Povozornyuk, 2009, "Vrednovskie readings", 2013). This can help physical therapy, without the use of which it is difficult to achieve a real improvement in the condition of patients. Because of the pain, many people reduce physical activity and this aggravates the process, as muscular atrophy joins, blood circulation worsens.

Purpose: to study the effectiveness of physical therapy in the complex treatment of patients with deforming coxarthrosis of grade 2–3, FI grade 2.

Objectives of the study: 1. To analyze the etiology, pathogenesis, clinical characteristics and current approaches to restorative conservative treatment of patients with coxarthrosis of 2–3 degrees. 2. Develop a program of physical therapy with its subsequent application and evaluation of its effectiveness.

Material and Methods of the research

The study included 30 people with deforming coxarthrosis of grade 2–3, FI grade 2, aged 40 to 65 years (mean age 55±5,2 years), who were treated at the medical health center "Fortis"

(clinical base HSAPC). Among the surveyed were 19 women (63.3%, average age 52,7±2,4 years) and 11 men (36,7% average age 57,1±1,5 years). With deforming coxarthrosis grade 2, FI grade 2 was 7 people (23,3%), with grade 3 coxarthrosis, FI grade 2 – 23 people (76,7%). The disease was bilateral in 8 people (26,6%), unilateral in 22 (73,4%) people. FI of the hip joints of grade 2 was in 24 people (80%), grade 3 – in 6 people (20%).

Criteria for inclusion of patients in the survey:

- patients aged 40 to 65 years;
- patients moving independently (use of aids for support is possible: cane, crutches, etc.);
- verified radiographic coxarthrosis of grade 2–3;
- functional disorders of the hip joints 2 degrees;
- the absence of severe somatic diseases;
- absence of injuries (fractures, dislocations) of different localization;
- absence of ankylosis of other joints;
- absence of severe spinal pathology;
- absence of pronounced pain syndrome (less than 6 cm according to VAS).

Exclusion criteria from the survey:

- acute infectious diseases;
- pronounced pain syndrome (from 6 cm according to VAS);
- ankylosis of the joints;
- pronounced impairment of the lower extremity support ability;
- the presence of fresh injuries of the limbs, spine, skull.

According to the criteria for inclusion in the examination, patients were divided into two groups: 20 patients of the main group (MG) in addition to the course of drug therapy, underwent a program of physical therapy. The control group (CG) consisted of 10 patients who received only drug therapy.

The clinical efficacy of physical therapy was determined according to the results of the pain syndrome assessment by VAS, the Leiken index and the study of the amplitude of movements in the joints.

VAS pain serves as a general assessment of the intensity of pain by the patient and is a horizontal scale with marks from 0 to 10 cm, the beginning of which corresponds to the absence of pain, and the end – the most pronounced pain. The patient independently notes on the scale the degree of pain.

The Leiken index for coxarthrosis reflects the severity of the disease and is a questionnaire in the form of a table. The Leiken index is calculated based on the sum of points obtained when answering groups of questions focused on the assessment of pain and discomfort, according to the maximum distance traveled without pain and the presence of difficulties in everyday life.

The amount of movement in the joints was measured using a goniometer by the "zero-passing" method of V. O. Marx.

The obtained data were processed statistically, the methods of descriptive statistics were used: mean (M) and standard deviation (SD). Comparison between groups was performed using a T-test for independent samples and a T-test for

paired samples.

The program of physical therapy developed and applied in the study was designed for 8 weeks (classes were held 2 times a week, the duration of classes was 60 min±15 minutes) and included therapeutic exercises in the form of:

- gymnastic exercises (including with projectiles and objects) – active, passive, active-passive, exercises for the coordination of movements, breathing, exercises with a gravitational burden;

- exercises on block simulators, stationary bike. The average number of repetitions of exercises was 15 times in 2 sets. Since coxarthrosis especially suffers from internal rotation and abduction in the hip joint, exercises that help restore these movements were performed at the beginning and end of the session. Excluded exercises with axial load on the hip joint;

- ideomotor exercises, postisometric muscle relaxation.

MG patients were carried out at home, developed a program of gymnastic exercises, which was performed daily (duration 45±10 minutes).

Drug therapy (for patients of both groups) included non-steroidal anti-inflammatory drugs (oxicam – rheumatic, meloxicam, Celebrex) for 14 days; vascular therapy; muscle relaxants; chondroprotectors.

In accordance with the requirements of bioethics (the Helsinki Declaration), all patients signed an informational consent to participate in the study.

Results of the research

The initial condition of the patients in both groups did not differ in intensity of pain syndrome and the degree of FI (Table 1).

The use of physical therapy in the complex treatment of patients with coxarthrosis contributed to the reduction of pain in patients in the MG and CG by 35–40% for VAS and a decrease in the Leiken index by 20–25% in both CG and CG, which can be explained by the use of the same drug therapy (Table 2).

After the study, a repeated analysis of the motor function of the lower limb in the hip joint was carried out (Table 3).

Table 1
Pain and functional parameters in patients with coxarthrosis of grade 2–3, FI grade 2 before treatment

No.	Indicators	MG (n=20)	CG (n=10)
		Before treatment	After treatment
1.	VAS, cm	5,2±0,8	5,6±0,4
2.	Leiken index, score	6,8±1,2	6,4±0,8
3.	Range of motion (degrees):		
	– flexion-extension;	65±15/0/5±3	65±10/0/5±4
	– lead-cast;	20±7/0/10±5	22±6/0/10±6
	– internal-external rotation.	10±5/0/20±7	10±6/0/21±6

There is a statistically significant increase in the range of motion in the hip joint in all planes in patients with MG. The best results on the restoration of movements in the hip joint were observed in patients of the MG:

- in the sagittal plane, due to an increase in flexion by 19,5%;
- in the frontal plane, by increasing the lead by 10%;
- rotational movements (internal rotation increased by 38%, external rotation – by 39%).

In patients from CG, the range of motion in the hip joints did not change statistically significantly.

Conclusions / Discussion

A program of physical therapy for patients with coxarthrosis of grade 2–3 was developed and put into practice, including a set of ideomotor exercises, post-isometric relaxation of muscles, gymnastic exercises with shells and objects, exercises for motor coordination, breathing exercises with gravitational weights, exercises for block simulators and exercise bike and self-study at home.

Analysis of goniometry indices, VAS and Leiken indices demonstrated the advantage of using physical therapy in the complex rehabilitation treatment of patients with coxarthrosis of grade 2–3, which was expressed in improving the dynamic function of the hip joint.

Prospects for further research in this direction imply consideration of issues related to the use of modern techniques of hardware mechanotherapy as an integral part of the physical therapy of patients with coxarthrosis.

Table 2
Dynamics of indicators of VAS and Leiken index before and after the study

Parameter	Groups	MG (n=20)	CG (n=10)	Statistical significance of differences between groups (T-test for independent samples)	
		M±SD	M±SD		
VAS, cm	Before treatment	5,3±0,5	5,8±0,3	t=-3,499; p=0,002	
	After treatment	3,1±0,6	4,1±0,4	t=-4,419; p=0,001	
	Statistical significance of the difference between the observation periods (T-test for paired samples)	M±SD	2,1±0,6	1,8±0,4	
		T	t=15,075	t=13,809	
	p	p=0,001	p=0,001		
Leiken index, score	Before treatment	6,8±1,3	5,9±0,6	t=5,389; p=0,001	
	After treatment	4,9±0,5	5,3±0,3	t=-2,463; p=0,020	
	Statistical significance of the difference between the observation periods (T-test for paired samples)	M±SD	2,2±0,8	0,6±0,8	
		T	t=12,623	t=2,442	
	p	p=0,001	p=0,037		

Table 3
Comparative table of movement parameters in the hip joint before and after rehabilitation treatment (independent sample test)

Parameter	Groups	Before treatment			After treatment		
		MG	CG	T-test (independent samples)	MG	CG	T-test (independent samples)
Flexion / extension	Flexion	65±10	65±9	t=-0,076; p=0,940	78±7	71±6	t=2,839; p=0,008
	Extension	6±2	5±2	t=1,142; p=0,263	8±3	8±2	t=0,899; p=0,376
	Range of motion	71±10	70±9	t=0,129; p=0,899	87±7	79±7	t=2,914; p=0,007
Leading / adduction	Leading	18±7	20±4	t=-0,575; p=0,570	30±6	23±3	t=4,273; p=0,001
	Adduction	10±3	10±4	t=-0,073; p=0,942	15±2	13±4	t=1,750; p=0,091
	Range of motion	28±8	30±6	t=-0,498; p=0,622	45±6	36±6	t=3,739; p=0,001
Rotation	Internal	9±2	10±5	t=-0,568; p=0,574	17±4	13±2	t=3,344; p=0,002
	External	20±7	20±4	t=-0,248; p=0,806	28±3	22±2	t=5,112; p=0,001
	Range of motion	29±7	30±6	t=-0,440; p=0,663	45±6	35±2	t=6,604; p=0,001

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