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CLINICAL ANALYSIS OF CONSERVATIVE METHODS OF GONARTHROSIS TREATMENT

Abstract. Chronic joint diseases are an urgent problem of modern humanity. Lifestyle, aging of the population, peculiarities of work, nutrition, etc. - all these factors in one way or another affect the development of osteoarthritis, which in turn can lead to disability and expensive surgical interventions. Therefore, the purpose of the study was to study the effectiveness of different methods of treatment of patients with gonarthrosis at the outpatient stage and to identify the difference in clinical results. To achieve the goal, a retrospective analysis of the data of 89 patients who received various types of conservative treatment, based on the KOOS scale, at least six months after the last cycle of treatment, was used. The data were compared on the basis of non-parametric estimation according to the Kruskal-Wallis method and multiple comparison of p-values. As a result, 2 excellent treatment results were obtained with the use of hyaluronic acid intra-articularly and 1 excellent result with a combination of methods; good result in 47 respondents, satisfactory in 28 and unsatisfactory in 11 patients. A statistically significant difference between the observed groups in favor of the use of hyaluronic acid is observed in most blocks of questions of the questionnaire in comparison with the group of purely medical treatment ($p < 0.005$ for pain, $p = 0.02$ for symptoms, $p = 0.0006$ for daily function, $p = 0.015$ for active activity and $p = 0.005$ for quality of life), compared to the physiotherapy treatment group ($p = 0.03$ for pain, $p = 0.011$ for active and sports activities). No statistical difference was found for the combination of methods in comparison with isolated approaches. According to the conducted research, the use



of injection therapy with hyaluronic acid drugs is an effective means of controlling and alleviating the symptoms of gonarthrosis. The use of drug therapy in the form of non-steroidal anti-inflammatory drugs and glucosamine sulfate has a similar effect to the use of physiotherapy with non-steroidal anti-inflammatory drugs.

Keywords: gonarthrosis, hyaluronic acid, nonsteroidal anti-inflammatory drugs, physiotherapeutic treatment.

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КЛІНІЧНИЙ АНАЛІЗ КОНСЕРВАТИВНИХ МЕТОДІВ ЛІКУВАННЯ ГОНАРТРОЗУ

Анотація. Хронічні захворювання суглобів є актуальною проблемою сучасного людства. Спосіб життя, старіння населення, особливості роботи, харчування тощо – усі ці фактори тим чи іншим чином впливають на розвиток остеоартрозу, що в свою чергу може призводити до інвалідизації та вартісних оперативних втручань. Тому метою дослідження було вивчити ефективність різних методів лікування пацієнтів на гонартроз на амбулаторному етапі та виявити різницю у клінічних результатах. Для досягнення поставленої мети застосовано ретроспективний аналіз даних 89 пацієнтів, що отримували різні типи консервативного лікування, на основі шкали KOOS мінімально через півроку після останнього циклу лікування. Дані порівняно на основі непараметричної оцінки згідно методу Крускала-Уолліса та множинного порівняння р-значень. В результаті отримано 2 відмінних результати лікування при застосуванні гіалуронової кислоти внутрішньосуглобово та 1 відмінний результат при комбінації методів; добрий результат у 47 респондентів, задовільний – у 28 та незадовільний у 11 пацієнтів. Статистично значима різниця між спостережуваними групами на користь використання гіалуронової кислоти спостерігається по більшості блоках питань опитувальника у порівнянні з групою чисто медикаментозного лікування ($p < 0,005$ для болю, $p = 0,02$ для симптомів, $p = 0,0006$ для повсякденної функції, $p = 0,015$ для активної діяльності та $p = 0,005$ для якості життя), у порівнянні з групою фізіотерапевтичного лікування ($p = 0,03$ для болю, $p = 0,011$ для активної



і спортивної діяльності). Статистичної різниці для комбінації методів у порівнянні з ізольованими підходами не виявлено. Згідно проведеного дослідження, використання ін'єкційної терапії препаратами гіалуронової кислоти є ефективним засобом контролю та полегшенню симптомів гонартрозу. Застосування медикаментозної терапії у вигляді нестероїдних протизапальних засобів та глюкозаміну сульфату має аналогічний ефект із застосуванням фізіотерапії із нестероїдних протизапальних засобів.

Ключові слова: гонартроз, гіалуронова кислота, нестероїдні протизапальні засоби, фізіотерапевтичне лікування.

Statement of the problem. Osteoarthritis is one of the most common chronic diseases of the joints, characterized by a local inflammatory process and structural changes of all joint elements, accompanied by pain syndrome and gradual loss of function with a sharp deterioration in the quality of life [1]. Osteoarthritis of the hip and knee joints cause frequent disability, which is particularly correlated with the general increase in life expectancy in some populations, as well as the increase in the proportion of people who are overweight.

During the last decades, several approaches to the treatment and control of osteoarthritis have been developed, the recommendations are applied based on an in-depth analysis of all studies with the formation of clear stepwise approaches in the treatment of patients (ESCEO, OARSI) [2, 3]. Patient education, encouraging weight loss, and physical therapy are the cornerstones of chronic treatment. General recommendations usually include non-pharmacological care, pharmacological treatment and surgical interventions.

Persistence of symptoms in patients with osteoarthritis and often inevitable progression with the involvement of joint endoprosthesis prompts the search and development of local injection methods of exposure and the use of biological therapy, a combination of existing methods with an individual treatment plan for each patient.

Connection of the publication with planned scientific research works. The article is a fragment of a research topic of the Department of Traumatology and Orthopedics of the National Pirogov Memorial Medical University, Vinnytsya "Improvement of methods of diagnosis, treatment and rehabilitation of patients with injuries and diseases of the musculoskeletal system" state registration number 0123U102765.

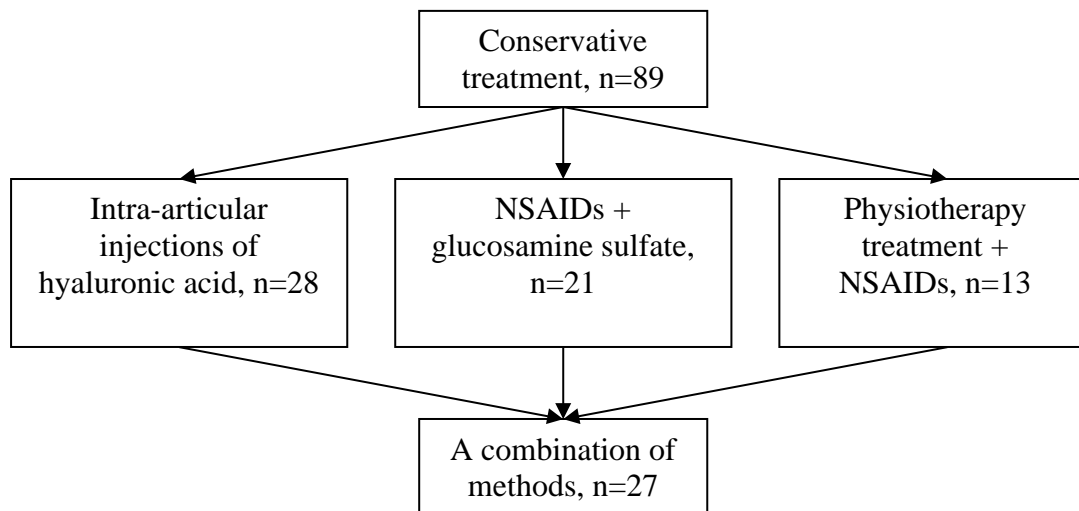
The purpose of the article – to study the effectiveness of different methods of treatment of patients with gonarthrosis at the outpatient stage and to identify the difference in clinical results.

Research objects and methods. An evaluation of conservative methods of treatment of patients with 2-3 stage gonarthrosis, who sought medical help on an outpatient basis during 2016-2021, was carried out. Treatment of patients was



carried out on the basis of existing standards and included medication and physiotherapeutic effects. A total of 120 people were selected for the study, of which 89 respondents answered the questionnaire. The survey itself was conducted no earlier than six months after the prescribed cycle of treatment.

Conditional distribution of all patients was carried out due to a stepwise approach to the treatment of joint syndrome after a clinical examination, as well as an X-ray examination. Therefore, due to the fundamental difference between some treatment methods, we divided the subjects into separate subgroups who received intra-articular injections of hyaluronic acid, a cycle of nonsteroidal anti-inflammatory drugs (NSAIDs) in combination with glucosamine sulfate per os, individual rehabilitation treatment in the form of courses physiotherapy and taking NSAIDs. We immediately note that the basic recommendations (training, weight control, exercises) were applied in all cases, and therefore are not highlighted separately.



Hyaluronic acid was used as a single injection at a dosage of 60 mg/3 ml. Nonsteroidal anti-inflammatory drugs included the appointment of minimal doses of meloxicam (7.5 mg) daily for 2 weeks and concomitant use of crystallized glucosamine sulfate also daily for at least 2 months.

There were standard physiotherapeutic methods of exposure involving short courses of shock wave therapy with breaks of 5-7 days, iontophoresis with hydrocortisone and magnetic laser therapy on the joints in cycles of 10 days.

The clinical consequences of the proposed treatment were assessed using the standardized Knee Injury and Osteoarthritis Outcome Score. The questionnaire itself consists of five blocks of questions (or subscales) corresponding to pain, symptoms, knee function during routine activities and during sports or active recreation, as well as general quality of life. For convenience and a visual assessment of the effects of treatment, we grouped the actual score distribution into qualitative cohorts:



- - excellent - more than 90 points;
- - good - from 70 to 89 points;
- - satisfactory - from 50 to 69 points;
- - unsatisfactory - less than 50 points.

Statistical evaluation of the obtained results was carried out using the Kruskal-Wallis rank method with multiple comparison of p-values.

Presentation of the main material.

Research results and their discussion. Якісний розподіл анкетних даних усіх респондентів відображений у наступній таблиці 1.

Table 1.

Indicators of qualitative distribution of questionnaire data of respondents.

Subgroup of patients	Overall result			
	Excellent	Good	Satisfactory	Unsatisfactory
Hyaluronic acid	2 (7,14%)	20 (71,43%)	6 (21,43%)	- (0%)
NSAIDs + glucosamine sulfate	- (0%)	7 (33,33%)	12 (57,15%)	2 (9,52%)
Physiotherapy treatment + NSAIDs	- (0%)	5 (38,46%)	6 (46,15%)	2 (15,39%)
A combination of methods	1 (3,7%)	15 (55,56%)	4 (14,81%)	7 (25,93%)

In 12 patients, during the following period, the clinical picture worsened, the disease progressed, which required the involvement of operative methods of treatment.

According to the conducted questionnaire, after the introduction of the hyaluronic acid preparation, the KOOS pain scale indicators are observed at the level of 76.82 ± 8.46 ; symptom indicators – 76.75 ± 8.94 , function indicators during everyday life – 79.11 ± 8.41 , function indicators during sports and active recreation – 68.14 ± 8.31 , quality of life groups – 76.32 ± 6.755 .

In patients who received a standardized course of medication in the form of meloxicam and glucosamine sulfate, pain scores were 62.52 ± 9.21 , symptoms – 64.095 ± 10.08 , functions during everyday life – 66.81 ± 7.66 , functions under time for sports and active recreation – 56.81 ± 12.28 , quality of life – 64.86 ± 11.56 .

The distribution of questionnaire scores in subjects who received a course of physiotherapy treatment in combination with NSAIDs was: for pain – 64.38 ± 12.61 , symptoms – 66.38 ± 10.78 , functions in daily activities – $71.08 \pm 10,58$, functions during sports and active recreation – 56.61 ± 8.96 , quality of life – 68.0 ± 11.88 .

As expected, the widest distribution of data according to each block is observed in patients for whom all treatment methods were sequentially combined. The revealed indicators of pain in the range of 67.22 ± 16.97 , symptoms – 68.33 ± 16.83 , functions and daily activities – 71.22 ± 15.84 , functions during sports and active recreation – 59.74 ± 15.17 , quality of life – 67.7 ± 15.59 .



An in-depth statistical analysis of the group distribution of data revealed a statistically significant difference between the pain indicators of the KOOS scale: in the group of subjects who received only injections of hyaluronic acid when compared with the group of NSAIDs in combination with glucosamine sulfate ($p < 0.005$), when compared with the group of physiotherapy treatment and NSAIDs ($p = 0.03$).

From the side of the KOOS symptom scale, a statistically significant difference in treatment results is evident only in the hyaluronic acid group when compared with the purely medical treatment group ($p = 0.002$), the use of other treatment methods has no significant statistical difference. A similar result was obtained for indicators of function during daily activities ($p = 0.0006$).

A statistically better treatment result on the scale of function during active recreation and sports is also observed in the group treated with hyaluronic acid ($p = 0.015$ and $p = 0.011$ for the drug and physiotherapy groups, respectively).

Quantitative distribution in the block of quality of life also revealed higher indicators in the group of applied hyaluronic acid only in comparison with medical treatment ($p = 0.005$).

Interestingly, none of the comparisons showed a difference between the outcomes of treating patients with NSAIDs with glucosamine sulfate and physical therapy with NSAIDs. Also, it should be noted that in none of the cases was a statistically significant difference observed for patients who received a combination of methods in comparison with the above-mentioned methods alone. The wide spread of questionnaire data in patients who received consecutively all means of treatment indicates the persistence of symptoms, and therefore, probably the progression of the disease. As a separate important fact, it is worth noting the largest number of unsatisfactory results of conservative treatment precisely in patients who received step by step all available medical means. Of course, we cannot fully retrospectively assess the compliance of all patients, as well as the subjective reassessment of their own condition, which led to the involvement of surgical approaches.

All methods that were used at the time of the study and are used at the moment are fully included in the modern paradigm of conservative treatment of gonarthrosis. According to the 2019 ESCEO guidelines, the initial principles of treatment are patient education, regular physical activity, and reduction of excess body weight. These positions are unconditional and are explained to all patients with an established diagnosis.

Non-pharmacological treatment, in the form of various means of physiotherapeutic influence, a professional rehabilitation program is especially indicated in the presence of one or another deformity (varus/valgus, femoro-patellar changes).

Initial drug therapy includes the appointment of glucosamine sulfate or chondroitin sulfate with symptomatic use of paracetamol in short courses. With



persistence of symptoms, the main means of control are NSAIDs (selective and non-selective), intermittent courses or as needed.

If symptom control is not sufficient, the use of injections of hyaluronic acid or long-acting glucocorticoids is recommended (especially in the case of an active inflammatory process with the presence of synovitis).

In our study, the best treatment result is observed with the isolated use of intra-articular injections of hyaluronic acid, as well as with a combination of methods. The feasibility of using hyaluronic acid has been repeatedly proven in studies and meta-analyses [4, 5, 6, 7], although the difference between the use of substances with different molecular weights [8, 9] is present. Only 8.5% of the subjects have a local side effect in the form of pain and swelling [10], which pass independently and are controlled by physical means.

In our review, the use of drug treatment and the use of physical therapy in their results practically do not differ. Initial therapy with so-called slow-acting drugs remains a subject of dispute and is excluded, for example, from the OARSI recommendations. Although certain studies show a statistically significant result, many authors emphasize the use of only crystallized glucosamine sulfate or chondroitin sulfate for a long time for the expected result [11, 12, 13, 14].

The use of auxiliary physical means, as well as individual rehabilitation methods, have a very individual and variable effect. Nevertheless, physiotherapeutic methods have an analgesic effect and are usually included in basic disease control measures [15, 16, 17].

Conclusions. The use of hyaluronic acid remains one of the best means for a long-term clinical effect in the presence of gonarthrosis. Identified differences in compensation of the main symptoms during physical activity contribute to the restoration of human function to the greatest extent.

Consecutive use of various treatment methods, as a result of an inferior primary effect, proves the effectiveness of escalation therapy of the chronic articular process.

The use of isolated courses of drug therapy with chondroprotectors and nonsteroidal anti-inflammatory drugs has a similar effect to the use of physiotherapeutic treatment and anti-inflammatory drugs, which allows for a flexible approach to the treatment of a specific patient.

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