

The Use of Platelet Autoplasm in the Treatment of Osteoarthritis and Its Clinical Effectiveness

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Abstract

Proposed injection treatment osteoarthroses based Plasmolifting method stimulate the regeneration of tissues with the use of autoplasm containing blood platelets. Methods of treatment with the use of platelet autoplasm in the treatment of osteoarthritis of this technology is easy to use, does not require sophisticated equipment can take the pain, improve joint mobility, to promote processes of restoration of cartilage, bone and soft tissue of the joint, to prolong the period of remission of the disease.

Keywords: *autoplasm, platelets, growth factors stimulation of regeneration, osteoarthritis*

Introduction

Osteoarthritis (OA) is a chronic progressive joint disease characterized by degeneration of articular cartilage with subsequent changes in the subchondral bone and the development of marginal osteophytes, which leads to loss of cartilage and concomitant damage to other components of the joint (synovial membrane, ligaments). The initial radiographic signs of osteoarthritis occur in most people over 65 years of age and in approximately 80% of people over 75 years of age. Although the development of OA does not affect the life prognosis, the disease is one of the main causes of premature disability and disability, as well as chronic pain syndrome, which reduces the quality of life of elderly and senile people [1,2].

At the present stage, one of the main methods of treating osteoarthritis is intra-articular administration of certain medications.

The most effective means for injecting osteoarthritis are currently considered chondroprotectors — a complex of glucosamine and chondroitin sulfates, which provides joint cells (chondrocytes and chondroblasts) with the ability to synthesize proteoglycans from ready-made molecules. However, due to the fact that the composition of the drug is foreign to the body, which makes it difficult to embed the molecule into the biochemical processes of the cell, and most chondrocytes and chondroblasts are already destroyed, providing the cells with "building material" cannot start the processes of joint recovery. In addition, chondroprotectors require long-term administration — at least 4-8 weeks and do not provide rapid relief of pain syndrome [1, 2].

Among other injectable methods, it is necessary to mention corticosteroids. Corticosteroids (GCS) are good because they quickly suppress pain and inflammation in synovitis (swelling and swelling) of the joint. However, long-term use of corticosteroids leads to the destruction of joint tissues and to the habituation of the body to them.

Another of the methods, as considered by some authors, which affects the pathogenetic links of the ongoing processes are injections of hyaluronic acid. Hyaluronic acid is a structural unit of connective, epithelial and nervous tissues. It is part of the synovial fluid and for some time is able to make up for the missing lubricant in the joint, but these injections are very expensive, allergic reactions are possible, long courses of injections are required, which means that again the problem of injury and infection of the joint, and the effects last no more than 3 months [1,2].

Thus, the search for methods and drugs that act on the entire regeneration chain with the fastest possible achievement of a therapeutic effect remains relevant to this day.

In this regard, it seems relevant to study the effectiveness of intra - and periarticular infiltration of tissues using platelet autoplasm (TAP) as a new and safe biological stimulator acting on the entire chain of regeneration and on all tissues simultaneously bone, cartilage, ligaments, muscles.

Methods and techniques. It is known that platelets contain numerous growth factors and cytokines that promote the regeneration of damaged tissues. More than 30 growth factors were detected in platelet alpha granules that can affect the recovery processes of all joint tissues simultaneously. The most important are: platelet growth factor (PDGF) — stimulates chemotaxis, fibroblast mitogenesis, collagen synthesis; vascular endothelial growth factor (PDEGF)-has a stimulating effect on endothelial cells; transforming growth factor (TGF). The latter is a large group of proteins, some of them and morphogenic proteins modulate cell proliferation and differentiation of poorly differentiated cells into osteoblasts, increase the synthesis of the extracellular matrix of bone and inhibit its degradation and other growth factors [3-7].

It is possible to obtain high-quality plasma enriched with platelets only by observing a certain technology for producing plasma, and using specialized test tubes.

The injectable form of platelet autoplasm was created in 2003 by Russian scientists-MD R. R. Akhmerov and PhD R. F. Zarudiy. At the same time, the name of the technique was coined — Plasmolifting™ and special test tubes were developed for the "Plasmolifting™" method, which allow obtaining plasma with a therapeutic platelet content. The lower part of the test tube is filled with an adsorption gel, which during centrifugation produces adsorption of red blood cells and low-molecular-weight fatty acids. The gel does not affect the properties of the plasma and allows you to get a high-purity plasma, it stabilizes the erythrocyte-leukocyte clot well. To prevent blood clotting in the upper and middle part of the test tube, fine-dispersed sodium heparin of a high degree of purification was applied to the walls, allowed for the reverse administration of plasma in vivo [8].

The production of Plasmolifting™ test tubes allowed the active application of this technique in various fields of medicine: cosmetology, dentistry, gynecology, urology, sports medicine, etc.

In orthopedics and traumatology, initially the injectable form of autoplasm was used in the relief of pain syndrome of the large trochanter; it was proposed to use a gel form of platelet-rich plasma mixed with collapse in bone defects during open and closed osteosynthesis, etc. [9-14].

It should be noted that the authors of these studies differ in the method of preparing plasma, receiving it in some works in gel form, and in others in liquid, but calling it one concept platelet-rich plasma. They talk about obtaining autoplasm, but they do not specify the equipment, i.e. the test tubes and centrifuges used, which as a result can lead to undesirable consequences or lack of effect when injected into the patient's tissues.

At the present stage, using the "Plasmolifting™" technique, doctors are opening up new opportunities in the treatment of such a complex and long—lasting pathology as deforming osteoarthritis of I-II severity.

The aim of this study was to study the clinical efficacy of platelet autoplasm in patients diagnosed with deforming osteoarthritis of the knee and hip joints of I-II severity.

Material and methods. 52 people aged 45 to 70 years with a diagnosis of coxarthrosis and gonarthrosis of I-II severity were under observation. The selection based on gender characteristics was carried out randomly.

The diagnosis of patients with OA of the knee and hip joints is made in accordance with international

recommendations. The exclusion criteria from the study were the III and IV stages of deforming OA, confirmed radiologically; acute stage (signs of exudative synovitis of the joints); injections of GCS during the previous 9 months, coagulopathy, mental illness.

In order to study the effectiveness of the use of autotromboplasma, all patients were divided into 2 groups. The control group consisted of patients (20 people) who received basic treatment (non-steroidal anti-inflammatory drugs, physiotherapy, chondroprotectors, glucocorticoids), and the main group consisted of patients (32 people) who had platelet autoplasm injections in addition to basic treatment.

All patients before and after treatment were examined using the WOMAC index (according to the scales "Pain", "Stiffness", "Functional activity"), the normalized value of the WOMAC index and the test "time to pass 15 meters" [1, 2]. The study of these parameters was carried out before the start of therapy and at the terms of 1, 3, 6 months and 1 year after the treatment.

TAP was obtained by taking blood into specialized "PlasmoliftingTM" tubes (8 ml). The centrifugation mode was: 4000 rpm for 5 minutes, using a PE-6910 "Plasmolifting" centrifuge (Uzbekistan).

Platelet plasma injections were carried out according to the following scheme: intra and paraarticular (3.5±0.5) ml in the area of one joint with an interval of one week. The course of treatment was 3-4 procedures 1 time a year.

Statistical processing of the results included the determination of the average values of the standard deviation, the Student's t-test was calculated, the level of differences $p < 0.05$ was considered reliable.

The results of treatment of patients with a diagnosis of deforming osteoarthritis of I and II degrees of severity showed that in the first month after the start of treatment in both groups, the indicators of the assessment "Pain", "Stiffness", "Functional activity", the total WOMAC index and "Walking time of 15 meters" decrease. Thus, the indicator "Pain" with standard therapy before treatment was (216.6±12.22) units, after a month it decreased significantly and amounted to (181.34±8.23) units. After 3 months, the indicator "Pain" also decreased significantly to (160.45±7.43) units, after 6 months to (155.76±6.75) units, and a year later there is an increase in the index to (163.11±5.94) standard units relative to the indicator in 6 months.

In the main group, where the plasmolifting method was used, the "Pain" indicator before treatment was (217.23±11.82) units, and 1 month after treatment (178.34±7.94) units. Then there is a more pronounced decrease in the "Pain" indicator — at the 3rd month to (134.71±6.56) standard units and after 6 months, respectively — (105.49±5.28) standard units. and the indicator continues to decrease by the year to (70.12±4.55) standard units.

When analyzing the "Stiffness" indicator in the control group at the first registration, it was (74.26±9.23) units, at the terms after 1 month, it decreased significantly to (61.78±5.57) units, after 2 months it decreased unreliably to (54,9313,39) and after 6 months it also decreased unreliably to (49,73±4,51) units, and a year later there was an increase in the indicator to (59,3813,12) units.

Conclusion. In the main group of patients before treatment, this indicator was (75.9618.34) usl. then after 1 month there is a significant decrease in the indicator (56.72±4.33) con. units and a more pronounced decrease in the indicator at the terms of 3 months — (41.89±5.45) and 6 months — (32.59±3.75) con. units, then the indicator did not change significantly (28.0312.32) con. units.

The indicator "Functional activity" in the control group first amounted to (734.8±18.36) units, then after 1 month the indicator decreased significantly to (673.52115.83) units, then there was a more pronounced decrease in this indicator for 3 months (570.56±10.68) units, and slightly for 6 months

— (562.78+12.19) units, and an increase for up to a year (577.9±11.37) units. ed.

In the main group of patients at the first stage of the examination, the indicator "Functional activity" was (732,8114,26) units, then for 1 month it significantly decreased to (624,37112,29) units, at the third to (549,17112,89) units, and continued to decrease by 6 months (325,87110,51) units, and a year later the indicator was (261,219,39) units.

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