Application of Plate Autoplasma in Treatment of Osteoarthrosis 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 autoplasma containing blood platelets. Methods of treatment with the use of platelet autoplasma in the treatment of osteoarthrosis 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: *autoplasma, platelets, growth factors stimulation of regeneration, osteoarthrosis*

Osteoarthritis (OA) is a chronic progressive joint disease characterized by degeneration of the 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 (synovium, ligaments). Initial radiographic signs of osteoarthritis occur in most people over 65 years of age and in about 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 ostearthrosis is the intra-articular administration of certain drugs. The most effective means for injection in osteoarthritis today are 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 integrate the molecule into the biochemical processes of the cell, and the majority of chondrocytes and chondroblasts have already been destroyed, the provision of “building material” to the cells cannot start the processes of joint restoration. In addition, hon-drop protectors require long-term use - at least 4-8 weeks and do not provide quick relief of pain syndrome [1, 2].

Among other injection techniques, it is necessary to mention corticosteroids. Corticosteroids (GCS) are good because they quickly suppress pain and inflammation in synovitis (edema and swelling) of the joint. However, long-term use of corticosteroids leads to the destruction of joint tissues and to the body's addiction to them. Another of the methods, as considered by some authors, influencing the pathogenetic links of the ongoing processes are injections of hyaluronic acid. Hyaluronic acid is a structural unit of connective, epithelial and nervous tissues.

Introduction It is part of the synovial fluid and for some time is able to replenish the lack of lubrication in the joint, but these injections are very expensive, allergic reactions are possible, long courses of injections are required, which means again the problem of injury and infection of the joint, and the effects last no more 3 months [1,2].Thus, the search for techniques and drugs that act on the

entire chain of regeneration with the fastest achievement of a therapeutic effect remains relevant to this day. In this regard, it seems relevant to study the effectiveness of intra- and periarticular tissue infiltration using platelet autoplasma (TPA) as a new and safe biological stimulant acting on the entire regeneration chain and on all tissues simultaneously bone, cartilage, ligaments , muscles.

It is known that platelets contain numerous growth factors and cytokines that promote the regeneration of damaged tissues. In alpha-granules of platelets, more than 30 growth factors have been identified that can influence the recovery processes of all joint tissues at the same time. The most important are: platelet growth factor (PDGF) - stimulates chemotaxis, mitogenesis of fibroblasts, collagen synthesis; vascular endothelial growth factor (PDEGF) - has a stimulating effect on endothelial cells; transforming growth factor (TGF-I).

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 bone extracellular matrix 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 obtaining plasma, and using specialized test tubes.The injectable form of platelet autoplasma was created in 2003 by Russian scientists - Ph.D. R.R. Akhmerov and Ph.D. R.F. Zarudiy. At the same time, the name of the technique was coined - Plasmolifting ™ and special tubes for the “Plasmolifting ™” method were developed, which allow obtaining plasma with a therapeutic platelet content.

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The production of Plasmoliftihg ™ test tubes allowed the active use of this technique in various fields of medicine: cosmetology, stomatology, gynecology, urology, sports medicine, etc.

In orthopedics and traumatology, initially the injection form of autoplasma was used to relieve pain syndrome of the greater trochanter; it was proposed to use a gel form of platelet-rich plasma mixed with Collapan in bone defects in open and closed osteosynthesis, etc. [9-14].

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

At the present stage, using the "Plasmolifting ™" methodology, new possibilities open up for doctors 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 autoplasma in patients diagnosed with deforming osteoarthritis of the knee and hip joints of I-II severity.

Methods and techniques. Under observation were 52 people aged 45 to 70 years with a diagnosis of coxarthrosis and gonarthrosis of I-II severity. Sampling by gender was carried out at random.

The diagnosis of patients with OA of the knee and hip joints was made in accordance with international recommendations. The criteria for exclusion from the study of steel III and IV

deforming OA, confirmed by X-ray; acute stage (signs of exudative synovitis of the joints); GCS injections within the previous 9 months, coagulopathy, mental illness.

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

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 "travel time of 15 meters" [1, 2]. The study of these parameters was carried out before the start of therapy and at periods of 1, 3, 6 months and 1 year after the treatment.

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

Platelet plasma injections were performed according to the following scheme: intra- and para-articular (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 once a year.

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

The results of the treatment of patients diagnosed with deforming osteoarthritis of the I and II 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 "Time to travel 15 meters »Are decreasing.

Thus, the "Pain" indicator for standard therapy before treatment was (216.6 ± 12.22) conv. units, after a month it decreased significantly and amounted to (181.34 + 8.23) conv. units After 3 months, the "Pain" indicator also decreased significantly to (160.45 + 7.43) conv. units, after 6 months to (155.76 ± 6.75) arb. units, and a year later the index grows up to (163.11 + 5.94) conv. 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) conv. units, and 1 month after treatment (178.34 ± 7.94) conventional units. Then there is a more pronounced decrease in the "Pain" indicator - for 3 months to (134.71 + 6.56) conv. units and after 6 months, respectively, - (105.49 + 5.28) conv. units and the indicator continues to decrease by the year to (70.12 ± 4.55) conv. units.

When analyzing the "Stiffness" indicator in the control group at the first registration, it was (74.26 + 9.23) conv. units, for periods after 1 month, it decreased significantly to (61.78 + 5.57) conv. units, after 2 months it decreased insignificantly to (54.9313.39) and after 6 months it also decreased insignificantly to (49.73 + 4.51) conv. units, and a year later there was an increase in the indicator to (59.3813.12) conv. units.

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

The indicator "Functional activity" in the control group was initially (734.8 ± 18.36) conv. units, then

after 1 month the indicator decreased significantly to (673.52115.83) conv. units, then there was a more pronounced decrease in this indicator for a period of 3 months (570.56 + 10.68) conv. units and insignificantly for a period of 6 months - (562.78 + 12.19) conv. units, and an increase for a period of up to a year (577.9 ± 11.37) conv. units.

In the main group of patients at the first stage of the examination, the indicator "Functional activity" was (732.8114.26) conv. units, then for 1 month it significantly decreased to (624.37112.29) conv. units, on the third to (549,17112,89) conv. units, and continued to decline by 6 months before (325.87110.51) conv. units, and a year later the indicator was (261,219,39) conv. units.

The total WOMAC index in the control group changed as follows: at the first stage it was (1025.66139.81) conv. units, for a period of 1 month, it decreases significantly to (916.64129.63) conv. units, after 3 months there is a decrease in the indicator to (785.94121.5) conv. units and up to (768.27123.45) arb. units after 6 months, and after a year, a pronounced increase to (800.39120.43) conv. units.

In the main group, this index changed as follows: at the first stage it was (1025.99134.42) conv. units, then reliably decreases after 1 month to (859.43 + 24.56) conv. units, also reliably continues to decrease for a period of 3 months - (725.77124.91) conv. units and more pronounced for a period of 6 months (463.95119.54) conv. units and up to (359.35116.26) arb. units for a period of 12 months. The indicator "Time to travel 15 meters" changed as follows: in the control group in the first period it was (43.28 + 2.43) s, after 1 month (37.4812.58) s, after 3 months - (32 , 9611.21) s, after 6 months it did not change (29.28 + 2.96) s and worsened after 1 year to (34.412.57) s.

In the group where platelet plasma injections were used, this indicator was at the first registration (44.67 + 2.43) s, after 1 month it decreased significantly to (36.9411.39) s, after 3 months it continued decrease to (24.74 + 1.49) s, after 6 months to (21.7811.96) s and a year was (18.44 + 0.89) s.

Discussion. Analyzing the data obtained, it should be noted that all indicators in the first and third months of treatment decrease in both groups, although in the group with the use of TAP the decrease in indicators is more pronounced. And after 6 months in the main group of patients, the indicators continue to decrease as intensively, and in the control group, the indicators do not change, and there is an increase in all parameters after a year.

Such dynamics of indicators indicates that TAP has a prolonged effect and is able to enhance the effect of standard therapy.

As a result, in the group of patients where platelet autoplasma was used, an improvement in the "Pain" indicator by 67.73% was noted in a year; the "Stiffness" indicator - by 63%; "Functional activity" - by 64.36%; the total WOMAC index - by 64.98% and "Time to travel 15 meters" - by 58.72%. In patients treated with traditional therapy, changes in these indicators after a year were not so pronounced.

The indicator "Pain" improved by 24.7%, respectively, "Stiffness" - by 20.04%, "Functional activity" - by 21.36%, the total WOMAC index - by 21.97% and "Time to travel 15 meters" - by 20.52%.

Conclusion. Thus, the inclusion of TAP in the complex therapy of deforming OA makes it possible to increase the effectiveness of the therapy in comparison with the standard one by an average of 42.04%, which usually gives a good therapeutic effect only during the first 3-6 months.

In addition, the obtained positive clinical dynamics in the form of a decrease in pain syndrome, an increase in the range of motion in the joint, an improvement in the musculoskeletal function of the limbs, and an extension of the remission period of the disease make it possible to recommend the

inclusion of TAP in the complex therapy of OA of large joints.

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