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The use of platelet-rich plasma in the treatment of patients with chronic dorsalgia

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Abstract. ***Background.*** *The purpose of the study is to assess the clinical effectiveness of using platelet-rich plasma for functional recovery in patients with chronic back pain.* ***Materials and methods.*** *The research was carried out in the clinical units of the Ukrainian Research Institute of Transport Medicine and Petro Mohyla Black Sea National University in 2020–2023. Sixty patients with chronic dorsalgia were examined.* ***Results.*** *During the entire course of treatment, patients who received local platelet-rich plasma therapy did not experience any adverse reactions or intolerance, did not require adjustment or change of treatment regimen. After 2 weeks of therapy, compared to the initial level, a significant decrease in the severity of the pain syndrome according to the visual analog scale was found, by 2.1 ± 0.2 points in the main group and by 1.5 ± 0.3 points in the control group ($p < 0.05$).* ***Conclusions.*** *After the treatment, the functional capabilities of patients in the main group improved significantly — Neck Disability Index decreased from 51.9 ± 2.2 % to 34.5 ± 1.3 % in the main group and from 53.3 ± 2.4 % to 45.8 ± 2.4 % in the controls, and Oswestry Disability Index — from 68.8 ± 2.3 % to 49.6 ± 1.8 % and from 66.7 ± 2.6 % to 55.8 ± 1.6 % ($p < 0.05$), respectively.*

Keywords: *chronic back pain; neck pain; platelet-rich plasma therapy; treatment; effectiveness*

Introduction

Vertebroneurological diseases are one of the most important medical and social problems in the world [11]. An increase in the frequency of back pain in economically developed countries is impressive. Damage to the peripheral nervous system caused by dystrophic-degenerative changes in the spine has become one of the most frequent causes of permanent disability; therefore, the medical and social significance of vertebral diseases is extremely high [4]. The monetary costs of treating back pain are three times higher than the costs of treating cancer patients, with 28 % of the population aged 20–69 suffering from recurrent back pain and 84 % experiencing a relatively long episode of back pain at least once in their lifetime [4, 13]. The prevalence of vertebroneurological pathology has a tendency to increase, especially with regard to cases of dorsalgia at a young age, frequent complications of the process, and an increase in the number of days of incapacity for work due to the exacerbation of the disease [13].

Modern methods of treatment aimed at functional recovery in patients with spine pathology include both conservative and operative methods. More than 97 % of patients are currently treated conservatively and only about 3 % require surgical interventions [4, 11, 13]. The frequency of postoperative pain syndrome among operated patients is 25–30 %, and 7–8 % of them, unfortunately, require repeated surgery [3]. Among the conservative treatments for chronic dorsalgia, there are well-known methods that involve local administration of drugs, as well as non-drug efferent therapy, which affects the entire body as a whole [5, 7]. Recently, the administration of platelet-rich plasma (PRP), both paravertebrally and intradiscally, has become popular [8, 9, 15].

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The purpose of the study is to assess the clinical effectiveness of platelet-rich plasma for functional recovery in patients with chronic back pain.

Materials and methods

The research was carried out in the clinical units of the Ukrainian Research Institute of Transport Medicine and Petro Mohyla Black Sea National University in 2020–2023. Sixty patients with chronic dorsalgia were examined. The severity of the pain syndrome and functional changes were assessed in all cases [12]. All patients underwent a general neurological examination. Degenerative-dystrophic changes were visualized using magnetic resonance imaging (Siemens Magnetom Avanto 1.5T), computed tomography (Siemens Somatom, Germany). Two groups were formed: the main one (n = 30), where treatment using PRP was applied, and the controls (n = 30), where therapy included nonsteroidal anti-inflammatory drugs, pregabalin, or gabapentin. Patients in both groups attended kinesiotherapy sessions throughout the follow-up period.

The average age of the controls was 36.4 ± 1.2 years. There were 17 (56.7 %) women and 13 (43.3 %) men in the group. The average age of patients in the main group was 37.2 ± 1.3 years. They underwent repeated paravertebral injections of PRP with an interval of 7–10 days between procedures. In terms of gender composition, the main group was similar to the control group (16 women (53.3 %), 14 men (46.7 %), $p > 0.05$).

A visual analog scale (VAS) was used to quantify pain [1]. Functional changes were assessed using the Neck Disability Index (NDI) (predominant cervical spine injury) and the Oswestry Disability Index (ODI) (predominant lumbosacral injury) [6, 10].

All studies were conducted in accordance with modern bioethical requirements [2]. Each patient signed an informed consent to participate in the study. All measures are taken to ensure patient anonymity. Statistical processing was carried out by methods of variance analysis using Statistica 14.0 software (TIBCO, USA) [14].

Results

All patients had persistent pain lasting at least 90 days. Positive tension symptoms were noted in 57 (95.0 %) of cases. The range of active movements in the neck and lower back was reduced in all patients. Magnetic resonance imaging and computed tomography scans revealed a decrease in the size of the vertebral bodies, a decrease in the height of the intervertebral spaces, signs of spondyloarthritis, scoliosis, intervertebral hernias, and circular protrusions.

Predominant lesions of the cervical spine were detected in 23.3 % of patients of the main group and 20.0 % of the controls, of the lumbar spine — in 26.7 % of patients in each group, combined lesions of the cervical and lumbar regions — in 50.0 and 53.3 % of cases, respectively.

The initial level of severity of the pain syndrome according to VAS in patients before admission was within the range of 6.3 ± 0.4 points and 6.1 ± 0.8 points in the main and control groups of patients ($p > 0.05$).

Depending on the age, the duration of the chronic process, the level of immobilization, a decrease in the volume of active movements in the cervical and lumbar spine, the duration of treatment for each specific patient was individual. The average duration of treatment of individuals who received local injection of PRP until pain relief was 3 to 5 days, until the onset of stable remission — 9–11 days.

During the entire course of treatment, patients who received local PRP therapy did not experience any adverse reactions or intolerance, did not require an adjustment or a change in treatment regimen. After 2 weeks of therapy, compared to the initial level, a significant decrease in the severity of the pain syndrome according to the VAS scale was found: by 2.1 ± 0.2 points in the main group and by 1.5 ± 0.3 points in the controls ($p < 0.05$).

Positive dynamics on the NDI and ODI was observed in both clinical groups, however, changes in the recovery of function were more pronounced in patients who underwent PRP therapy (Table 1). Thus, the initial level of NDI in the main group was 51.9 ± 2.2 %, in the control group — 53.3 ± 2.4 %. For ODI, these figures were 68.8 ± 2.3 % and 66.7 ± 2.6 %, respectively ($p > 0.05$).

After the treatment, the functional capabilities of patients in the main group improved significantly — NDI decreased to 34.5 ± 1.3 % in the main group and to 45.8 ± 2.4 % in the controls, and ODI — to 49.6 ± 1.8 % and 55.8 ± 1.6 % ($p < 0.05$), respectively.

Discussion

The use of PRP in degenerative-dystrophic changes of the spine has become more widespread in recent years. With chronic dorsalgia, there is an active inflammatory process in the intervertebral disc. At the same time, the involvement of chondrocytes in the nucleus pulposus and fibroblasts in the fibrous ring leads to pronounced degeneration of the disc. The possibility of slowing down degeneration and reducing the altering effects of chronic inflammation due to the use of orthobiological drugs, which includes PRP, is being discussed [8, 9, 15]. However, the introduction of platelet-rich plasma directly into the disc requires ultrasound or X-ray guidance and is technically difficult. In our study, paravertebral injection was used, which showed a sufficient effectiveness to eliminate the manifestations of dorsalgia.

Table 1. Dynamics according to the NDI and ODI, %

Indices	Main group (n = 30)		Control group (n = 30)	
	Before treatment	After treatment	Before treatment	After treatment
NDI	51.9 ± 2.2	34.5 ± 1.3	53.3 ± 2.4	45.8 ± 2.4
ODI	68.8 ± 2.3	49.6 ± 1.8	66.7 ± 2.6	55.8 ± 1.6

A recently published systematic literature review analyzed more than 40 publications on the use of PRP for the treatment of chronic low back pain [9]. The introduction of PRP directly into the intervertebral disc, into the joints, and epidurally is considered. PRP therapy has demonstrated better clinical results compared to corticosteroids, ozone therapy, antibiotics, and local anesthetics [8, 9].

The debate regarding the optimal concentration of platelets and other formed elements of the blood in a concentrated plasma centrifuge remains relevant. In our opinion, the use of ultraconcentrated PRP rich in leukocytes has no advantages over traditional methods of PRP therapy [9, 13].

Technically simple paravertebral injection of PRP allows to reduce back muscle atrophy, which often occurs against the background of chronic degenerative changes of the spine. This improves the stabilization of the vertebral-motor segments and has a significant preventive effect.

Conclusions

1. During the entire course of treatment, patients who received local PRP therapy did not experience any adverse reactions or intolerance, did not require adjustment or a change in treatment regimen.

2. After 2 weeks of therapy, compared to the initial level, a significant decrease in the severity of the pain syndrome according to VAS was found: by 2.1 ± 0.2 points in the main group and by 1.5 ± 0.3 points in the controls ($p < 0.05$).

3. After the treatment, the functional capabilities of patients in the main group improved significantly — NDI decreased from 51.9 ± 2.2 % to 34.5 ± 1.3 % in the main group and from 53.3 ± 2.4 % to 45.8 ± 2.4 % in the control group, and ODI — from 68.8 ± 2.3 % to 49.6 ± 1.8 % and from 66.7 ± 2.6 % to 55.8 ± 1.6 % ($p < 0.05$), respectively.

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Використання збагаченої тромбоцитами плазми в лікуванні хворих на хронічну дорсалгію

Резюме. ***Актуальність.*** Метою дослідження було оцінити клінічну ефективність використання збагаченої тромбоцитами плазми (PRP) щодо функціонального відновлення в пацієнтів із хронічним болем у спині. ***Матеріали та методи.*** Дослідження проводились у клінічних підрозділах Українського науково-дослідного інституту медицини транспорту та Чорноморського національного університету імені Петра Могили в 2020–2023 роках. Обстежено 60 хворих на хронічну дорсалгію. ***Результати.*** Протягом усього курсу лікування в пацієнтів, які отримували місцеву PRP-терапію, не спостерігалося побічних реакцій та непереносимості, вони не потребували коригування або зміни схеми лікування. Через 2 тижні лікування порівняно з початковим рівнем виявлено вірогідне зменшення вираженості больового синдрому за візуальною аналоговою шкалою на 2,1 ± 0,2 бала в основній групі й на 1,5 ± 0,3 бала в контрольній ($p < 0,05$). ***Висновки.*** Після проведеної терапії значно покращилися функціональні можливості пацієнтів основної групи: індекс обмеження життєдіяльності через біль у шиї знизився з 51,9 ± 2,2 % до 34,5 ± 1,3 % в основній групі та з 53,3 ± 2,4 до 45,8 ± 2,4 % у контрольній, а індекс інвалідизації Освестрі — відповідно з 68,8 ± 2,3 % до 49,6 ± 1,8 % та з 66,7 ± 2,6 % до 55,8 ± 1,6 % ($p < 0,05$).

Ключові слова: хронічний біль у спині; біль у шиї; PRP-терапія; лікування; ефективність