

ANNOTATION

on PhD thesis of Menchisheva Yuliya entitled "The use of PRP-therapy for optimizing postoperative soft tissues wound healing in the maxillofacial region" presented as an application for the PhD degree on the specialty 6D110100 – «Medicine»

The relevance of research

According to the statistics published by the Republic center of Health development, an average 47,438 operations on the skin and subcutaneous fat are performed annually in Kazakhstan. Reconstructive, plastic and aesthetic operations in the maxillofacial region are widespread (Vissarionov V.A., 2002; Adamyan R.T., 2004; Belousov A.E., 2004). According to various studies under review (Vozdvizhensky I.S., 2003; Oganesyanyan A.R., 2004), complications after reconstructive operations range from 8 to 32%.

The formation of an “ideal” scar after surgical treatment becomes the problem that has particular importance (Anikin Y.V., 2004; Belousov A.E., 2004). The quality of the postoperative scar depends on many factors: the general condition of the body, the nature of the disease, the experience of the surgeon, the type of suture material, etc. (Belchenko V.A., 2001; Kasymov A.I., 2004; Amanullaev R.A., 2005). Since facial scars affect the psycho-emotional state of patients and their professional activities, the development of methods which optimizing the healing process of postoperative soft tissue wounds of the maxillofacial region, reducing the number of complications and improving the appearance of scars remains a challenging clinical problem.

PRP-therapy is the name of a method based on the use of autologous platelet-rich plasma (Platelet Rich Plasma – PRP) for the treatment of various diseases, including wounds of various etiologies. PRP contains cytokines, growth factors, chemokines and fibrin obtained from the patient’s blood, which provide the molecular and cellular induction of the normal healing process (Akhmerov R.R., 2011; Prosyannikova N.V., 2014). According to published data, the use of autologous platelet-rich plasma leads to significantly faster wound epithelization in comparison with traditional treatment methods (Gassling V.L., 2009; Saluja H., 2011). PRP-therapy is widely used in various fields of medicine: in general surgery, traumatology, gynecology, dermatology, ophthalmology, dentistry and maxillofacial surgery. According to various studies under review, the use of PRP is a cost-effective treatment method, which decreases complications and treatment costs, positively affects the quality of life of patients (Villela D.L., 2010; Yang K.C., 2012).

There are a number of studies in the Republic of Kazakhstan showing the success of using of the platelet-rich plasma in the following fields: dental implantology and gerontostomatology, periodontology, maxillofacial surgery (as a stimulator of bone regeneration in the surgical treatment of bone defects, jaw fractures, filling cavities after the removal of cysts and wisdom teeth). Botabaev B. (2010) used the platelet-rich plasma in combination with autologous bone material

during dental implantation to stimulate reparative regeneration of bone wounds in the postoperative period during rehabilitation of elderly and senile patients with different types of adentia. The work of B. Umbaev (2015) devoted to the development and study of the wound healing properties of new wound dressings based on amniotic membrane and autologous platelets rich plasma.

According to the literature, the use of PRP-therapy accelerates the onset of complete epithelialization (Hom D., 2007), helps to prevent complications (Khalafi R. et al., 2008), helps to reduce pain and shorten rehabilitation time (Spyridakis M. et al., 2009), reduces scarring (Yoo J. et al., 2008). At the same time, controlled researches which devoted to studying regeneration of soft tissues after reconstructive, plastic and aesthetic operations in the maxillofacial region, especially of patients with high risk of complications in the early postoperative period due to concomitant diseases, as well as studies representing long-term results of surgical treatment and patient's satisfaction with their facial appearance, in our opinion, are still not sufficient.

According to published data the methods of PRP preparation are differ greatly in recommended multiplicity, speed and time of centrifugation, which explains the lack of standardized methods of preparation and use of autologous platelet-rich plasma (Pietrzak W.S., 2005; Reese R.J., 2010).

The purpose of the research is to analyze the efficiency of the use of PRP in the improvement of postoperative soft tissues wound healing in the maxillofacial region.

Object of study: patients from the department of craniomaxillofacial and reconstructive surgery №1 of the City Hospital №5 of Almaty aged 18 to 60 years undergoing plastic and reconstructive surgeries on soft tissues in the maxillofacial area from May 2017 to May 2018 were enrolled. All patients selected using mathematical modeling – discriminant analysis and the logistic regression, predicted an increased risk of complications in the early postoperative period. Patients were divided into 2 groups: 50% of the patients were the main group, 50% of the patients were the comparison group

Subject of research: the process of healing of postoperative wounds on soft tissues in the maxillofacial region after the use of autologous platelet-rich plasma.

The research objectives are:

1. Conducting the retrospective analysis of cases of postoperative complications after reconstructive, plastic and aesthetic operations at the Department of craniomaxillofacial and reconstructive surgery №1 of the city clinical hospital №5 of Almaty.

2. Elaboration of the equation formula which allows to predict possible complications in the postoperative period in patients who are undergoing reconstructive, plastic and aesthetic operations by using discriminant analysis of risk factors and logistic regression.

3. Study and analyze of the impact of PRP-therapy on the healing of postoperative soft tissue wounds of the maxillofacial region by using modern diagnostic methods: measuring the width of scars in dynamics using the ImageJ

program, cytological and enzyme-linked immunosorbent analysis, ultrasound examination.

4. Determination of the quality of life and patient satisfaction with treatment results after PRP therapy.

Scientific novelty

1. The most significant factors affecting the postoperative soft tissue wounds healing in the maxillofacial region were identified as a result of the retrospective analysis of postoperative complications after reconstructive, plastic and aesthetic operations at the Department of craniomaxillofacial and reconstructive surgery №1 of the city clinical hospital №5.

2. The equation formula has been developed to predict development of high risk of complications in the early postoperative period in patients who are undergoing reconstructive, plastic and aesthetic operations in the maxillofacial region as a result of providing the discriminant analysis and logistic regression.

3. The planimetry of postoperative wounds in the maxillofacial region was carried out for the first time using the ImageJ computer program in the dynamics of healing.

4. The effectiveness of the use of PRP which leads to optimization of the healing process in postoperative soft tissue wounds of the maxillofacial region was substantiated and proved according to the results of: cytological analysis which developed in optimization of all stages of wound healing; enzyme-linked immunosorbent analysis which developed in the activation of fibroblast cells in the proliferation phase; ultrasound examination that showed reduce of infiltration and lymphostasis in soft tissues around postoperative wounds.

5. The use of PRP-therapy contributed to improving the quality of life of patients after surgical treatment according to the results of determining DLQI (dermatological index of quality of life), allowed to improve the aesthetic appearance of scars according to the assessment by patients and doctors of the condition of scars in the maxillofacial region using the POSAS scale 1 and 3 months after surgery.

The practical significance of the research

1. Our equation formula for predicting the development of complications in the early postoperative period made it possible to identify patients at increased risk of postoperative complications.

2. The proposed method for optimizing the healing of postoperative wounds using PRP therapy allowed to reduce the number of complications in the early postoperative period by 1,6 times from 10% in the comparison group to 6% in the main group and to reduce the patient's hospital stay after surgery by 2,6 days: in the comparison group $9,8 \pm 0,4$ days, in the main group $7,2 \pm 0,3$ days ($p < 0,05$).

3. The diagnostic significance of computer planimetry, cytological, enzyme-linked immunosorbent assays, ultrasound studies, POSAS scores and the determination of the patient's quality of life index (DLQI) was studied, which expanded the possibilities of using them to evaluate the effectiveness of treatment.

4. As a result of conducted research the following positive influence of PRP-therapy on postoperative wounds healing in the maxillofacial region were revealed:

impact on the epithelialization time (for the patients in the main group was $12,25\pm 0,5$ days, in opposed to $16,04\pm 0,6$ days for the patients in the comparison group) according to cytological analysis; effect to activity of fibroblast cells in the proliferation phase according to enzyme immunoassay; affect the severity of edema, infiltration and lymphostasis according to ultrasound examination.

5. Due to the prevention of complications and thereby improving the quality of the postoperative scar, the use of PRP has improved the quality of life of patients.

6. The method of obtaining PRP included a single centrifugation of the blood of patients for 5 minutes with a rotation speed of 3000 rpm, was economically available, did not require the purchase of additional equipment and was easily applicable in practical health care.

The main provisions to be defended

1. The method for predicting an increased risk of postoperative complications in the early postoperative period makes it possible to figure out a group of patients requiring the use of autologous platelet-rich plasma.

2. PRP-therapy is an effective method for optimizing postoperative soft tissues wound healing in the maxillofacial region and for reducing complications in the early postoperative period, as indicated by the positive results of cytological, enzyme-linked immunosorbent assays and ultrasound examination.

3. The use of PRP-therapy for optimizing postoperative soft tissues wound healing in the maxillofacial region in patients with an increased risk of complications in the early postoperative period allows to achieve a less noticeable scar and positive aesthetic results according to the results of planimetry and assessment of postoperative scars with the POSAS scale 1 and 3 months after operation.

4. The use of PRP-therapy helps to improve the quality of life of patients according to the results of determining the dermatological index of quality of life (DLQI).

The personal contribution of the doctoral candidate: all the results presented in the dissertation and having scientific novelty were personally received by the author. The author participated as an operator or assistant in operations, the results of which were then evaluated using clinical, laboratory and instrumental research methods. The method for optimizing postoperative soft tissues wound healing in the maxillofacial region in patients with an increased risk of complications in the early postoperative period has been introduced into the practice at the Department of craniomaxillofacial and reconstructive surgery №1 in clinical hospital №5 (Implementation Act № 19-2 of 05/22/2019).

Approbation of the research

1. International scientific-practical conference "Actual issues of surgical dentistry and maxillofacial surgery", June 2-3, 2017, Issyk-Kul region, Sary-Oy, Kyrgyz Republic.

2. V-th scientific-practical conference with international participation "Priorities of pharmacy and dentistry from theory to practice", Almaty, December 14, 2016.

3. International Congress 2nd International Biomedical Congress. – Sofia, November 17 – 19, 2017, Bulgaria.

4. Scientific-practical conference of the city clinical hospital №5. Almaty, March 30, 2018.

5. I-st Eurasian Congress “Oral and maxillofacial surgery and dentistry of the XXI century” Kazan, September 27–28, 2018.

6. International conference "Fundamental research carried out by young researchers and doctoral students" Almaty, November 20–21, 2018.

7. On the second round of the competition of scientific research of young scientists of the school of dentistry. Almaty, November 29, 2018.

8. International scientific and educational conference "Multidisciplinary approaches in dentistry and maxillofacial surgery", Turkestan, April 29-30, 2019.

9. International scientific-practical conference of students, young scientists and teachers "Akanov readings: the role of PHC in achieving universal coverage of services." Almaty, April 24–25, 2019.

10. VI-th International Congress of Dentists of Kazakhstan "Education, Science and Practice of Dentistry of the XXI Century", dedicated to the 60th anniversary of the Faculty of Dentistry. Almaty, May 29–30, 2019.

11. An expanded meeting of the Department of Surgical Dentistry of NJSC "Asfendiyarov KazNMU".

12. VIII International scientific-practical conference "Priorities of pharmacy and dentistry: from theory to practice", dedicated to the memory of Professor Abdullin K.A. Almaty, November 22, 2019.

Publications

According to the results of the study 15 scientific papers were published, 6 of them in journals recommended by the Education and Science Monitoring Committee of the Ministry of Education and Science of the Republic of Kazakhstan; 1 – in the foreign journal with impact factors that indexed in Web of Sciences Core Collection (Clarivate Analytics) and Scopus; 5 – in materials of international scientific conferences, including 3 – in foreign conferences.

Structure of the doctoral thesis:

The dissertation is presented on 183 pages of a computer text, consists of an introduction, 3 chapters: a review of the literature, a description of the material and research methods, own research results; discussions; conclusions; conclusions; References from 350 sources. The work is illustrated by 64 figures and 23 tables.