Platelet-rich plasma improves esthetic postoperative outcomes of maxillofacial surgical procedures

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Summary

Background: Postoperative facial scars after plastic and reconstructive surgery are visible results that can seriously affect the quality of life of recovering patients. Currently, platelet-rich plasma (PRP) is widely used in medicine to improve tissue regeneration. **Purpose:** To analyze the esthetic outcomes of using PRP in the late postoperative period of maxillofacial surgical interventions. **Material and methods:** A total of 100 patients aged 18–60 years who were undergoing plastic and reconstructive surgery in the maxillofacial region were included in this study. The patients were randomly divided in two groups. Fifty patients in the treatment group received PRP injections at the time of surgery. Patients in the control group did not receive any injections. PRP was injected intradermally after suturing the wound. Evaluation of treatment outcomes was carried out by planimetry, the Image J programme during 1 month after surgery and by the Patient and Observer Scar Assessment Scale 30 and 90 days after the surgical procedure. The Dermatological Quality of Life Index was used to assess the negative impact of treatment outcomes on various aspects of the patient's life. **Results:** The change of scar width was twice less pronounced in the treatment group. The patients in the treatment group were more satisfied with the results of the treatment and had a higher quality of life. The treatment group exhibited less scaring at all time points than the control group 3 months after surgery. **Conclusions:** The use of PRP had a pronounced beneficial therapeutic effect in influencing the esthetic outcomes of surgical interventions.

Key words

platelet-rich plasma – scars – quality of life – plastic surgery – outcome measurement

Introduction

Platelet-rich plasma (PRP) is the fraction of plasma containing higher concentrations of platelets compared to whole blood [1]. The platelets are rich in growth factors which boosts healing and repair process [2]. Growth factors contained in PRP – platelet-derived growth factor (PDGF), transforming growth factor β (TGF-β), vascular endothelial growth factor (VEGF or PDAF), insulin-like growth factor (IGF) and epidermal growth factor (EGF) – activate cells migration, stimulate fibroblasts, osteoblasts, endothelial cells and keratinocytes proliferation, enhance the production of collagen and fibronectin, increase vascular permeability and stimulate angiogenesis [3].

PRP is widely applied in different clinical applications to promote healing of damaged tissues. Most of the studies described in the literature are devoted to the use of PRP in traumatology and sports medicine (repairing of acute muscle, tendon, ligament, nerve and cartilage injury and relieve pain in tendonitis, arthritis, ligament sprains and tear) [4–7], gynecology (use of PRP in vulvar lesions, genital prolapse and genital fistulas, in gynesthetics treatment) [8,9], surgery (healing of acute and chronic wounds, burns, defects) [10,11], neuro-surgery (treatment of disc tissue pathology, spinal cord injury) [12,13], ophthalmology (treatment of symptomatic dry eye, corneal ulcers and ocular burns) [14,15], dentistry and oral surgery (healing after tooth extraction, treatment of periodontitis, use in implantology) [16,17]. PRP is used in dermatology for purposes including the treatment of ulcers, scars, and alopecia [18].

Thus, the clinical use of PRP is treatment of soft tissue injuries, burns and hard to heal wounds. Also, PRP might be applied to initiate repair of bone lesion in case of reduced osteoblasts proliferation or delayed chondrogenesis [19].

According to the results of conducted studies [1–19] of the use of PRP in surgery and other specialties of medicine, the application of autologous platelet-rich plasma is indicated for the induction of normal wound healing, for promoting the healing of hard to heal or non-healing wounds, ulcers and burns.

Due to the widespread use of PRP in esthetic medicine, plastic surgery and dermatology, it is reasonable to believe that the use of PRP is also indicated for improving the results of surgical treatment.

After plastic and reconstructive surgery, postoperative facial scars have a substantial impact on the quality of life through psychological distress and depression, which affects patients' working capacity and social adaptation [20,21].

Platelet-rich plasma (PRP) releases numerous growth factors that may be invaluable in treatment [22,23]. The effects of growth factors may be beneficial as a therapy for wounds with delayed healing [24,25]. Complications in the early postoperative period, such as suppuration of the wound, divergence of sutures and delayed healing of patients with co-morbid conditions often lead to adverse outcomes with scarring in the late post-operative period. Previous studies have assessed the efficiency of PRP in wound healing [26,27] although few of them provide an assessment of the influence on the skin or shed light on patient satisfaction. To evaluate esthetic outcomes, there is a tendency for physicians to use questionnaires [28–30]. In some studies, outcomes are presented with the use of pictures but without objective analysis of quantitative data, or samples are presented too indistinctly to be verifiable and trustworthy. The aim of this study was to evaluate surgical outcomes and esthetic effects in patients after plastic and reconstructive surgery in the maxillofacial area.

Wound healing studies have demonstrated that scars usually develop 6–8 weeks following re-epithelization,

and that a period of 6–18 months is required for scar maturation [31,32]. Healing and remodeling are largely complete by 8–12 months [33], and the evaluation of the scars might be delayed until 1-year post-surgery [34]. Therefore, to draw an appropriate conclusion, observation time is critical.

Study hypothesis: esthetic outcomes and the quality of life are better in patients whose surgical incision was injected with PRP.

Material and methods
Patients
One hundred hospital patients aged 18–60 years (City Hospital 5, Almaty, Kazakhstan) who were undergoing plastic and reconstructive surgery in the maxillofacial region and were considered to be at high risk for scaring were included in this randomized controlled trial. Patients were randomly allocated into two groups. Fifty patients (26 males and 24 females aged 43 ± 6 (21–60) years) in the treatment group received PRP injections at the time of surgery, whereas 50 patients (27 females and 23 males aged 41 ± 5 (19–60) years) in the control group did not receive any injections. The patients underwent the following soft tissue procedures (Tab. 1).

All enrolled patients signed informed consent forms to be eligible for research

purposes. This randomized controlled trial was based on the revised CONSORT statement [35]. The study is pre-registered in clinical trials registry.

The inclusion criteria were for patients undergoing plastic and reconstructive operation in the maxillofacial area with high risk for scaring. Exclusion criteria were used for patients with platelet dysfunction syndrome, haemodynamic instability, local infection at the site of the procedure, systemic use of corticosteroids within 2 weeks, recent fever, and cancer. To identify patients considered to be at high risk for scaring, we used regression analysis of the results of clinical and laboratory research methods. By the stepwise logistic regression, we identified factors that significantly increase the risk for scaring after surgical procedures (Tab. 2). All factors were obtained during the study of archival material of medical cases of the patients (with and without excessive scaring) who had plastic and reconstructive procedures.

The resulting logistic regression equation for predicting the risk for scaring in the postoperative period is the following:

$$P = \frac{1}{1 + e^{-d}}$$

where d is the value of the discriminant function: d= 2.033 + 1.531× hypertension, ischemic heart disease + 1.051×

Tab. 1. Distribution of patients with postoperative wounds of soft tissues of the maxillofacial region after reconstructive plastic and esthetic operations (N = 100) depending on the type of the operation performed.

	Control group (N = 50)		Treatment group (N = 50)	
	number of patients	%	number of patients	%
flap surgery	30	60	31	62
scar revision surgery	12	24	13	26
secondary cheilorhinoplasty	6	12	4	8
facelift	1	2	1	2
lipofilling	1	2	1	2
total	50	100	50	100

diabetes + 0.239 × the volume of the operation + 0.878 × multiplicity of previous operations − 0.129 × excess of subcutaneous fat − 0,045 × age − 0.021× blood coagulability − 0.018 × gender − 0.014 × the absolute number of platelets in the blood.

If the P-value is < 0.5, then it can be assumed that the "event" (the development for scaring) will not occur; otherwise, an increased risk for scaring is assumed.

To assess the effectiveness of the method for predicting the development of high risk for scaring, the receiver operating characteristic (ROC) analysis was performed with the construction of a ROC curve. The value of the area under the ROC-curve was 0.98 (95% confidence interval), which indicates the informativeness of the proposed forecasting method based on logistic regression (Graph 1).

PRP preparation and method of injection

All patients in the treatment group received PRP during their surgical operations to improve the healing of postoperative soft tissue wounds in the maxillofacial area. Vacuum tubes (9–27 mL) were used for venous blood sampling. On average, one tube of 9 mL was required for wounds < 10 cm in length, two tubes for 10–20 cm wounds, and three tubes for large wounds (> 20 cm). The tubes filled with venous blood were centrifuged for 5 minutes at 3,000 rpm. Thereafter, two fractions of blood samples were visible in the tubes: an erythrocyte-leukocyte clot, and a layer of plasma enhanced with platelets. The lower third of the plasma layer contained 600,000 platelets, the middle of the layer 200,000 platelets, and the top of the layer 50,000 platelets per 1 μL. A syringe was used to take the lower third of the plasma layer, which was injected intradermally, 0.5 cm from the edge of the wound after suturing. Injections of autologous plasma (0.1–0.2 mL)

Tab. 2. Coefficients of the discriminant function of factors contributing to the development of scaring in patients after plastic and reconstructive surgery.

No.	Factors contributing to the development of scaring	Discriminant function coefficients
1	hypertension, ischemic heart disease	1.531
2	diabetes	1.051
3	multiplicity of previous operations (at the same area)	0.878
4	volume of the operation (duration of the operation > 2 hours, the length of the incision > 10 cm)	0.252
5	excess of subcutaneous fat	−0.129
6	age (> 35 years)	−0.045
7	blood coagulability	−0.021
8	gender (women)	0.018
9	absolute number of platelets in the blood	−0.014
10	constant (a)	2.033
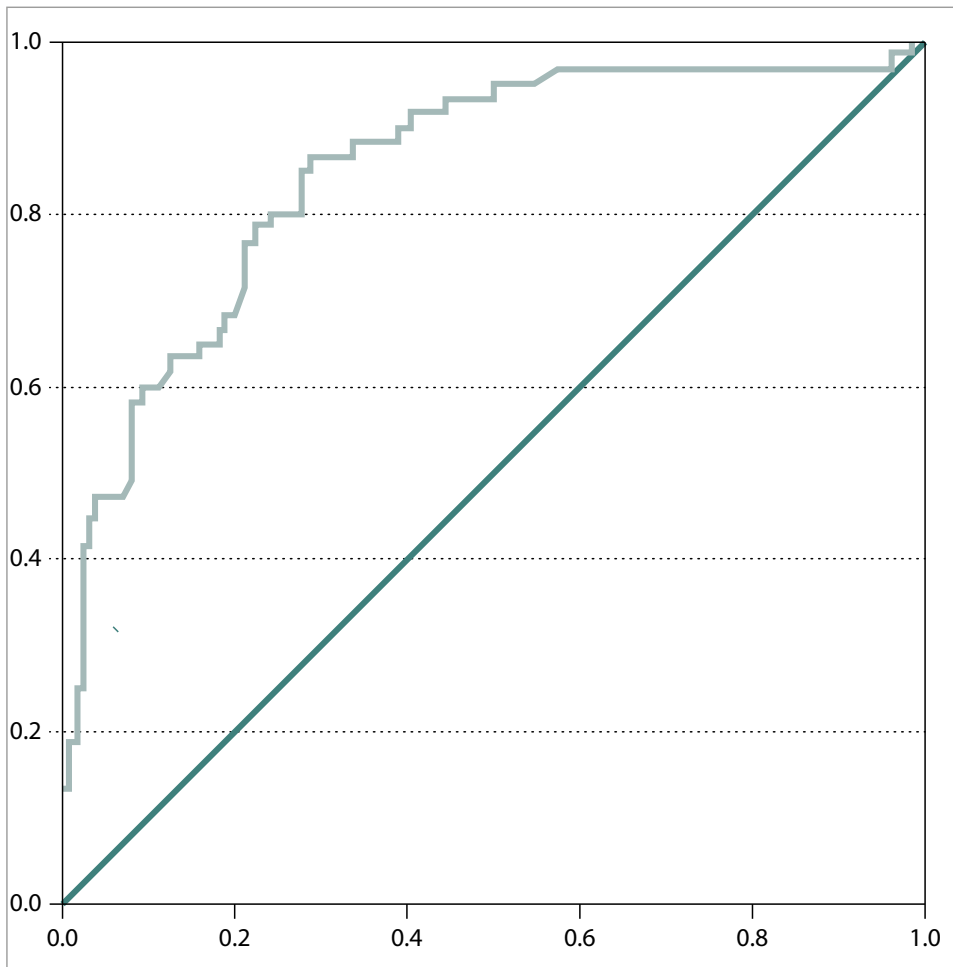
Graph 1. Receiver operating characteristic curve.

were performed with a syringe using a 30G needle. The distance between injections was 1.5–2 cm. The remaining plasma was applied to a sterile gauze and put over the postoperative wound.

The treatment of patients in the control group was identical to that of patients in the treatment group in the postoperative period and included the following: daily dressings with antiseptic solutions, antibacterial therapy and administration of analgesics.

Evaluation methods

All patients in the treatment and control groups underwent planimetry to determine the width of postoperative scars 1, 3, 5, 7, 10, 30 and 90 days after surgery using a micrometer and Image J program. To record the width of wounds, photographs were taken using a Nikon camera (D5100, 50 mm lens).

The assessment of postoperative scars was carried out after 30 and 90 days by conducting a questionnaire that used the Patient and Observer Scar Assessment Scale (POSAS) with all patients and doctors. The POSAS questionnaire has 6 indicators using a 1–10 scoring scale, with 1 being normal skin and 10 being the least normal skin possible.

The Dermatological Quality of Life Index (DQLI) was used to determine and assess the negative impact of the results of treatment on various aspects of patients' lives 30 and 90 days after surgery. DQLI has 10 questions, with up to 3 points for each question, thus allowing a minimum of 0 points and a maximum of 30 points. A higher score indicates the postoperative scars had a greater negative impact on the patient's quality of life.

The results of histological and ultrasound examination, determination of interleukins in the postoperative wound were published earlier. This study is aimed only at assessing the esthetic component of the results of the use of PRP.

Statistical analysis

The statistical analysis was performed using the SPSS software package (IBM Corp., Released 2012, IBM SPSS Statistics for Windows, Version 21.0, Armonk, NY). The distribution of the parameters was tested using the Kolmogorov–

Fig. 1. Appearance of scars in patients of the control group on day 10 after surgery.

Fig. 2. Appearance of scars in patients of the control group on day 30 after surgery.

Smirnov method. The variables between two groups were compared by the Mann–Whitney U test as the resultant distribution of parameters in two groups was not normal. The statistical data were presented as the mean with the standard error (SE) and the median with 25–75% limits. The difference of parameters with P value < 0.05 was set as statistically significant. The statistical analysis is performed in consultation with a certified biostatistician from the Department of Biostatistics (S. D. Asfendiyarov KazNMU, Almaty)

Results
Scars planimetry

Fifty patients in the treatment group and 50 patients in the control group underwent planimetry using a micrometer to determine the width and expansion of postoperative scars. There were no statistically significant differences in the width of postoperative wounds in the first day after the operation.

The median of postoperative wounds width in the control group was 2.0 mm (P_{25} = 1.0; P_{75} = 3.0) which is greater

Fig. 3. Appearance of scars in patients of the treatment group on day 10 after surgery.

Fig. 4. Appearance of scars in patients of the treatment group on day 30 after surgery.

than the median width in the treatment group 1.0 mm ($P_{25} = 1.0$; $P_{75} = 1.5$) on 3.5 days after surgery ($P < 0.05$). On the 7th day after surgical procedure, the median widths of postoperative wounds were 2.0 mm ($P_{25} = 1.0$; $P_{75} = 3.0$) and 1,0 mm ($P_{25} = 1.0$; $P_{75} = 2.0$) in the control and treatment groups, respectively ($P < 0.05$).

The most noticeable changes were on the 10th and 30th days after operation. The scars of the patients in the control group (Fig. 1, 2) were distinguishable from the normal surrounding skin on the 10th and 30th days after operation as opposed to the treatment group patients (Fig. 3, 4), who received PRP injections. So, on the 10th day after surgery, the median scar widths were

1.0 mm ($P_{25} = 1.0$; $P_{75} = 2.5$) and 2.0 mm ($P_{25} = 1.0$; $P_{75} = 3.0$) in the treatment and control groups, respectively ($P < 0.05$). On the 30th day, this indicator was 3.0 mm ($P_{25} = 2.0$; $P_{75} = 4.0$) in the control group, which is greater than the median value of the treatment group – 1.5 mm ($P_{25} = 1.0$; $P_{75} = 3.5$) (Graph 2).

Using the Image J program, we measured the width of the scars in pixels on the 10th and 30th days. The median widths of the postoperative scar were 57.6 pixels ($P_{25} = 44.0$; $P_{75} = 92.7$) and 62.8 pixels ($P_{25} = 46.7$; $P_{75} = 120.1$) in the treatment and control groups on 10th day after surgery, respectively ($P < 0.05$). One month after the surgical procedure, the postoperative scar width in patients of the treatment group was

Me = 80.1 pixels ($P_{25} = 47.0$; $P_{75} = 113.4$) which is less than the median of the scar width in patients of the control group Me = 99.3 pixels ($P_{25} = 71.1$; $P_{75} = 130.4$), $P < 0.05$ (Graph 3).

Evaluation of scars

POSAS observer scale

We used the POSAS questionnaire 30 and 90 days after surgery to evaluate the quality of postoperative scars. The POSAS questionnaire (observer part) includes six indicators (vascularity, pigmentation, thickness, relief, pliability, surface area) which were assessed by physicians using a 1–10 scoring scale.

Thirty days after surgery, the mean score value of all six indicators of the scale was 5.8 ± 0.14 in the control group, which was about $2.3\times$ greater than the treatment group mean. The mean value in the treatment group was 2.5 ± 0.14 ($P < 0.05$). Ninety days after surgery, the mean score value of the control group was 3.7 ± 0.23 and the mean value in the treatment group was 1.6 ± 0.07 ($P < 0.05$) (Tab. 3).

POSAS patient scale

The POSAS questionnaire (patient part) included six questions which were assessed by patients using a 1–10 scoring scale.

Thirty days after surgery, the mean patient POSAS score of the control group was 5.0 ± 0.75, which was about 1.9 times greater than the treatment group mean. The mean value in the treatment group was 2.7 ± 0.35 ($P < 0.05$).
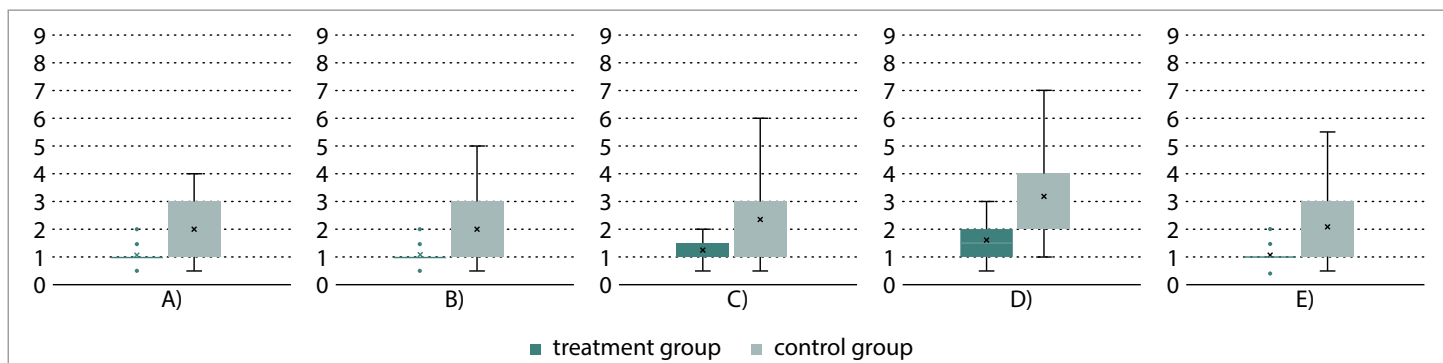
Graph 2. The expansion of postoperative scars (mm) at: A) 3 days; B) 5 days; C) 7 days; D) 10 days; E) 30 days after surgery.
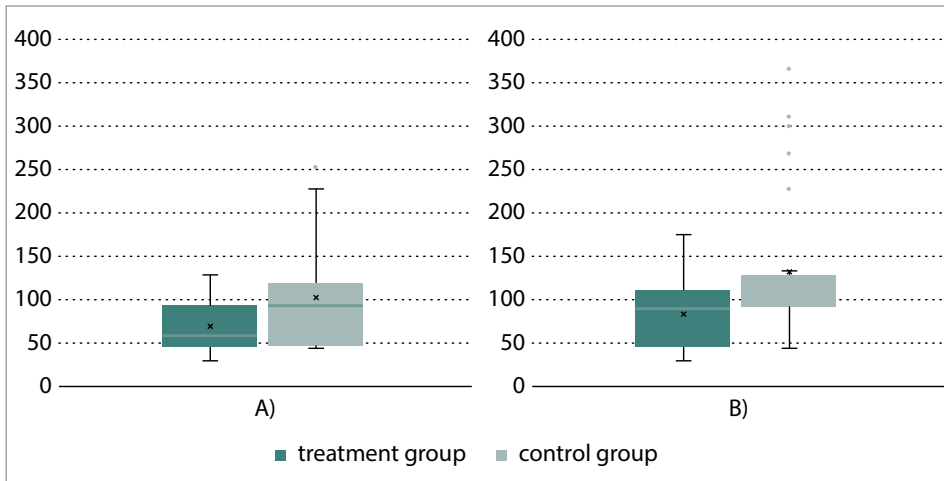
Graph 3. The expansion of postoperative scars (pixels) at: A) 10 and B) 30 days after surgery.

Ninety days after surgery, the mean score value of the control group was 2.7 ± 0.48, which was about 1.8 times more than the treatment group mean. The mean value in the treatment group was 1.5 ± 0.14 (P < 0.05). The differences between the mean values in the two groups are displayed in Tab. 4.

Results of the DQLI
Thirty days after surgical procedures, the mean score value in the control group was 12.7 ± 6.7, which was ap- prox. 4 times more than in the treatment group, i.e. 3.1 ± 4.25 (P < 0.05). According to the interpretation of DQLI in the control group, the postoperative out- comes of maxillofacial surgical proce- dures had a strong negative impact on the patients' lives, while in the treatment group, these outcomes had a slight negative impact. Ninety days after sur- gery, the mean values of scores were 4.3 ± 2.91 and 1.7 ± 1.82 points in the control and treatment groups, respec- tively (P < 0.05). According to the in-

terpretation in the control group, the treatment results had a slightly nega- tive effect, while in the treatment group, they did not have a negative effect. The differences between the mean values of DQLI on the 30th and 90th days after sur- gery in the two groups are displayed in Graph 4.

Discussion
The main results of the study are the 2-fold reduction of the scar width on the 90th day after surgery and higher patient satisfaction obtained from questionnaires.

There is a number of studies offering different speed and time of centrifuga- tion to obtain PRP. The methods of prep- aration of PRP are different in many ways [36–39], which explains the lack of stand- ardized methods of obtainment and ap- plication of PRP. The therapeutic effect of PRP could be achieved by increas- ing the concentration of platelets twice [40]. We were guided by the method of Akhmerov et al [41] in choosing the time and speed of rotation to PRP (specifically 5 min at a speed of 3,000 rpm). Regard- ing the choice of the frequency of in-

Tab. 3. The mean observer POSAS scores in the control ad treatment groups 30 and 90 days after surgical procedures.

N	Indicators	30 days after surgery					90 days after surgery				
		control group N = 50		treatment group N = 50		P-value	control group N = 50		treatment group N = 50		P-value
		mean ± SE	median (P$_{25}$–P$_{75}$)	mean ± SE	median (P$_{25}$–P$_{75}$)		mean ± SE	median (P$_{25}$–P$_{75}$)	mean ± SE	median (P$_{25}$–P$_{75}$)	
1.	vascularity	5.6 ± 0.14	7.0 (6.0–7.0)	2.2 ± 0.14	2.0 (1.75–3.0)	P < 0.05	3.0 ± 0.14	3.0 (2.0–4.0)	1.6 ± 0.18	1.0 (1.0–2.0)	P < 0.05
2.	pigmentation	6.4 ± 0.16	7.0 (6.0–7.0)	3.1 ± 0.1	3.0 (2.0–4.0)	P < 0.05	3.8 ± 0.12	4.0 (3.0–4.0)	1.8 ± 0.13	2.0 (1.0–2.0)	P < 0.05
3.	thickness	5.8 ± 0.16	7.0 (6.0–7.25)	2.2 ± 0.14	2.0 (1.75–3.0)	P < 0.05	4.6 ± 0.15	5.0 (4.0–5.0)	1.7 ± 0.18	2.0 (1.0–2.0)	P < 0.05
4.	relief	6.0 ± 0.16	6.5 (6.0–7.0)	2.3 ± 0.13	2.0 (2.0–3.0)	P < 0.05	3.2 ± 0.19	4.0 (3.0–4.0)	1.7 ± 0.16	2.0 (1.0–2.0)	P < 0.05
5.	pliability	6.1 ± 0.16	6.0 (5.75–7.0)	2.5 ± 0.13	2.0 (1.0–2.0)	P < 0.05	4.0 ± 0.16	4.0 (3.0–5.0)	1.6 ± 0.17	2.0 (1.0–2.0)	P < 0.05
6.	surface area	5.4 ± 0.16	6.0 (5.75–7.0)	2.6 ± 0.11	1.5 (1.0–2.0)	P < 0.05	3.6 ± 0.17	4.0 (3.0–5.0)	1.3 ± 0.14	1.0 (1.0–2.0)	P < 0.05

POSAS – patient and observer scar assessment scale

Tab. 4. The mean patient POSAS scores in the control and treatment groups 30 and 90 days after surgical procedures.

N	Indicators	30 days after surgery					90 days after surgery				
		control group N = 50		treatment group N = 50		P-value	control group N = 50		treatment group N = 50		P-value
		mean ± SE	median (P$_{25}$–P$_{75}$)	mean ± SE	median (P$_{25}$–P$_{75}$)		mean ± SE	median (P$_{25}$–P$_{75}$)	mean ± SE	median (P$_{25}$–P$_{75}$)	
1.	Has the scar been painful the past few weeks?	2.9 ± 0.13	3.0 (2.0–3.25)	1.4 ± 0.07	1.0 (1.0–2.0)	P < 0.05	1.1 ± 0.05	1.0 (1.0–1.0)	1.0 ± 0.02	1.0 (1.0–1.0)	P < 0.05
2.	Has the scar been itching the past few weeks?	2.5 ± 0.27	3.0 (2.0–4.0)	1.9 ± 0.18	2.0 (1.0–2.0)	P < 0.05	1.3 ± 0.07	1.0 (1.0–2.0)	1.3 ± 0.07	1.0 (1.0–2.0)	P < 0.05
3.	Is the scar color different from the color of your normal skin at present?	6.6 ± 0.23	5.0 (3.0–8.0)	3.3 ± 0.14	2.0 (2.0–3.0)	P < 0.05	3.2 ± 0.14	3.0 (2.0–4.0)	1.9 ± 0.14	2.0 (2.0–3.0)	P < 0.05
4.	Is the stiffness of the scar different from your normal skin at present?	6.0 ± 0.27	6.0 (2.0–8.25)	2.9 ± 0.21	1.0 (1.0–2.25)	P < 0.05	3.2 ± 1.33	3.0 (2.0–4.0)	1.7 ± 0.14	1.0 (1.0–2.25)	P < 0.05
5.	Is the thickness of the scar different from your normal skin at present?	6.6 ± 0.21	6.0 (2.0–7.75)	3.5 ± 0.25	2.0 (1.0–3.25)	P < 0.05	3.7 ± 1.43	4.0 (3.0–5.0)	1.8 ± 0.15	2.0 (1.0–3.25)	P < 0.05
6.	Is the scar more irregular than your normal skin at present?	5.7 ± 0.31	5.0 (2.0–6.0)	3.4 ± 0.23	2.0 (1.0–2.25)	P < 0.05	3.7 ± 1.51	4.0 (2.75–5.0)	1.7 ± 0.12	2.0 (1.0–2.25)	P < 0.05

POSAS – patient and observer scar assessment scale

jection of PRP several studies reported about multiplicity of PRP application [43–45] or injection [46] during or after surgery.

We used a single plasma injection, since we believe that a single plasma injection as a stimulator of regeneration is sufficient to start the process of normal wound healing. A single PRP injection has also been suggested in the studies of Eichler et al [47].

Considering the anatomical features of blood supply and innervation on
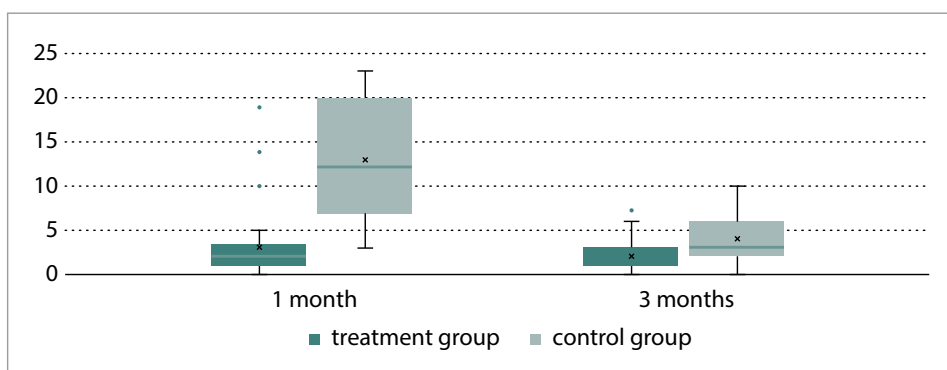
Graph 4. The mean values of the dermatological quality of life index in patients of the control and the treatment groups at 1 and 3 months after surgical procedures.

the face and neck, we propose to inject PRP leaving 0.5 cm from the edge of the wound. We were guided by the regulation of the Republic of Kazakhstan (No. 666, November, 2009) on the procurement and processing of blood components, choosing the amount of blood taken from the patient. According to the recommendations of Akhmerov et al [41], in the treatment of various diseases (in such fields of medicine as surgery, traumatology, gynecology), it is necessary to inject 3–9 mL of PRP, depending on the clinical case. A total of 9 mL of blood was required to obtain 3 mL of PRP. In current study, one tube of 9 mL was required for wounds < 10 cm in length (3 mL of PRP), two tubes for 10–20 cm wounds (6 mL of PRP), and three tubes for wounds > 20 cm (9 mL of PRP).

The goal of PRP is to minimize wound complications and attain better esthetic outcomes. Previous studies have shown the efficiency of PRP in different wound healing processes, but few have provided an assessment of the influence of PRP on skin quality or assessed patient satisfaction with treatment results.

Several studies have evaluated the potential of platelet rich plasma to treat scar tissues. Willemsen et al reported that platelet rich plasma reduced recovery time and improved esthetic outcomes in facial rejuvenation [48]. They observed when the patients could return to work or restart their social activities after surgery. The authors conducted questionnaires about the appearance of 82 patients' faces after 4 weeks. They used three questions with a scale 1–10 and surveyed only surgeons. Although they used a different scale than the one used in our study, the results were similar: both studies found that scarring was less pronounced in the treatment group relative to the control group. Our study also surveyed patients. We consider this a strength of our study because a surgeon's perspective alone may not be objective, and because the patient perspective on their scarring is ultimately the most important in relation to patients' quality of life.

Many studies evaluate the use of PRP in combination with other treatment methods. These studies have had very similar designs, often being presented in a couple of groups, where researchers compare results of treatment methods, one of which includes the use of PRP. Majani et al write about the treatment of patients with traumatic scars [49]. In this study which used a small sample size, and the Manchester Scar Scale, it was found that PRP was associated with better treatment results.

It was our aim to find studies not limited to only facial surgeries or dermatology, where authors describe the esthetic results after surgeries. The most extensive study in our search was made by Balbo et al, where a five-year analysis of the results of 115 patients with the amputations or wounds of fingers treated with platelet gel was presented [50]. The difference of this study from the study conducted at our hospital is the application of the platelet rich gel, not the injection of PRP directly into the soft tissues as it was done in our case. Balbo et al reported that the recovery of soft tissues of all patients ranged from 80 to 100% (median time 3 weeks) and the esthetic results were satisfactory in nearly all cases that were shown in numerous photos after surgeries. According to the article, patients who have undergone surgeries were satisfied with the results of the treatment afterwards, but these claims were not supported by objective quantitative data.

None of the studies found in the literature were directly comparable to our study in terms of design or methodology. However, all studies found similar results. A strength of our study was that we measured outcomes from different perspectives (both that of the patient and the surgeon) and triangulated results from different methods of measurement. We feel that this makes our study more objective than those conducted previously.

Conclusion

The current study demonstrates two findings: the first was that the use of PRP improves postoperative wound healing and results in better esthetic outcomes in the postoperative period; the second finding was that the patient satisfaction with the results and quality of life was higher in the treatment group where PRP was used.

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