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# COMPARATIVE CHARACTERISTICS OF CLINICAL INDICATORS OF THE CONDITION OF SCAR TISSUE OF THE FACIAL SKIN AT DIFFERENT STAGES OF THE POSTOPERATIVE PERIOD DEPENDING ON THE CHRONOTYPE OF THE PERSON

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## ABSTRACT

**The aim:** The aim of the study was to improve preventive measures aimed at preventing the formation of pathological scarring of the skin in patients after elective surgery by intra- and postoperative use of cryopreserved placental cells.

**Materials and methods:** The research was conducted in the Department of Maxillofacial Surgery on the basis of the Municipal Enterprise «Poltava Regional Clinical Hospital. M.V. Sklifosovsky» Poltava Regional Council. A total of 60 patients took part in the study, who were hospitalized for planned surgical interventions in the department of maxillofacial surgery

**Results:** We obtained clinical data on the processes of scar formation in patients with morning and evening chronotype on the background of local intraoperative injection of cryopreserved placenta extract into the wound. We have proved that short people with an established evening chronotype need additional preventive measures, especially on the 90th and 180th days of the postoperative period.

**Conclusions:** From our study we can say with confidence that the drug "CryoCel" reduces epithelialization time, promotes optimal wound healing and leads to the formation of more aesthetic scars, which creates optimal both functional and cosmetic results.

**KEY WORDS:** chronotype, scars, cryoextract, placenta

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## INTRODUCTION

Atypical wound healing can lead to the formation of pathological scars (hypertrophic and keloid). Thus, postoperative scars in the head and neck can be not only a cosmetic problem, but also a significant psychological trauma for patients, which often leads to long-term mental health dysfunction. According to statistics, about 10% of the world's population suffers from the formation of pathological scars [1]. Analyzing our previous research, we found that the reparative processes in the wound are influenced not only by the topographic area of the wound, but also the human chronotype [2].

Chronotype – a term that was proposed to determine the individual characteristics of the organization of human circadian rhythms [3].

Thus, Belfry and the authors in their research proved that biological rhythm affects not only the mental state, but the human condition as a whole [4]. It is biological rhythms that provide a person's ability to adapt to the environment, and of particular interest is the functioning of the organism taking into account its individual characteristics in terms of organization of biorhythmic processes [5,6,7].

## THE AIM

The aim of the study was to improve preventive measures aimed at preventing the formation of pathological scarring of the skin in patients after elective surgery by intra- and postoperative use of cryopreserved placental cells.

## MATERIALS AND METHODS

The research was conducted in the Department of Maxillofacial Surgery on the basis of the Municipal Enterprise «Poltava Regional Clinical Hospital. M.V. Sklifosovsky» Poltava Regional Council. To study the materials, we conducted an analysis of patients who were hospitalized for planned surgical interventions for congenital neck cysts and tumor-like formations in maxillofacial surgery. A total of 60 patients took part in the study, who were hospitalized for planned surgical interventions in the department of maxillofacial surgery. Patients were interviewed during the hospitalization, as well as questionnaires to determine the chronotype.

We performed clinical examination and photoregistration of patients on the ninetieth day (90 days) after surgery, 180 and 360 days.

Patients were divided into 3 groups after the questionnaire:

The first group – 20 patients, the first group included patients who had improved the protocol of surgical care. We proposed the introduction of the drug “Cryocel – cryoextract of the placenta” (DP “Interdisciplinary Science Center of Cryobiology and Cryomedicine HAH, AMS and Ministry of Health of Ukraine”, Ukraine) into the wound during the intraoperative phase.

The first group was divided into 2 subgroups depending on the biorhythm of the person:

The first subgroup (1.a – patients with morning chronotype) consisted of 10 patients.

The second subgroup (1.b are patients with evening chronotype) subgroup consisted of 10 patients.

The second group consisted of 20 patients. In the second group, as in the first group during surgery, the drug “Cryocel” was injected into the wound. It was also used on the 90th and 180th days of scar formation. We performed electrophoresis with the drug mentioned above. Patients in group 2 were also divided into 2 subgroups according to circadian rhythms.

The first subgroup (2.a – with morning chronotype) consisted of 10 people.

The second subgroup (2.b – with the evening chronotype). It consisted of 10 patients.

The third group consisted of 20 patients. This is a control group. We used the standard method of preventing the formation of pathological skin scars. This group was also divided into 2 subgroups.

The first subgroup (3.a with morning chronotype) consisted of 10 people.

The second subgroup (3.b – with evening chronotype) 10 patients, respectively.

All patients, regardless of group and subgroup, were operated on in the morning.

We used the parameters to obtain results and to assess wound healing and the quality of postoperative scar formation:

P-1 – Vascularization (from 0 to 2 points);

P-2 – Pigmentation (from 0 to 2 points);

P-3 – Height of the scar (from 0 to 2 points);

P-4 – Surface (from 0 to 2 points);

P-5 – Scar density (from 0 to 2 points);

P-6 – Subjective feelings of the patient (itching) (from 0 to 2 points);

P-7 – Subjective feelings of the patient (pain) (from 0 to 2 points).

## RESULTS

We analyze seven indicators in 1a group that characterize the condition of scar tissue. Dynamics of changes in indicators (gradual decrease) P1, P2, P6, P7 have the most uniform direct decrease in indicators from the obtained digital value 0 on the 360th day after surgery. It is of interest to change the P4, P5 to the surface of the scar and the density of the scar. They have a smaller decrease curve,

especially at 90 and 180 days. This prompted us to create an additional second clinical group to directly affect the scar of the cryopreserved placenta by its active transfer by electrophoresis.

Also noteworthy is a significant decrease in P3 (scar height) by an average of 1 point from the 90th to the 360th day of postoperative intervention. This is probably true for people with a morning chronotype operated on in the morning.

Analyzing the dynamics of changes in all indicators of the first 1a group, the total average for 90 days of the postoperative period is  $5.1 \pm 0.43$ . On the 180th day it dynamically decreases to  $3.1 \pm 0.18$ , and on the 360th day it is  $1.0 \pm 0.14$ . In our opinion, this indicates a positive combination of two factors: intraoperative administration of cryoextract of preserved placenta and the structural structure of the genetic organization of patients with morning chronotype, who were operated on in the morning. This hypothesis is confirmed by the fact that the average quality indicator on the 180th day has already been reduced by 39.1% compared to the 90th day. The 360th indicator decreases by 80.4% without additional preventive measures during these observation periods.

Analyzing the digital data of indicators P1–P7 in 1b, it should be noted that 0 values on the 360th day of postoperative intervention reaches only the indicator P7 in contrast to 4 indicators in subgroup 1a. In our opinion, this indicates the inadequacy of a single intraoperative injection of the drug «Cryocel» into the wound. It should be noted the relatively small dynamics of the decrease in P1, which on the 360th day decreased by 50% compared to the 90th day in contrast to the previous group. Slightly greater dynamics of decrease was recorded in indicator P2. This figure decreases by 66.7%. Slightly greater amplitude of decrease was recorded in the indicator in P3, especially between the 90th and 360th observation days with a difference of 66.7%. Unlike the previous indicator, the P4 indicator decreases by 14.2% between the 90th and 180th days. Then it decreases significantly by 57.1% on the 360th day compared to the 90th.

Slightly similar dynamics of decrease is shown by indicators P5, P6 on the 180th day relative to the 90th. On the 360th day, the P6 indicator significantly decreases by 83.3% compared to the P5 indicator, which has a significant decrease in this observation period of 38.5%. Such a variety of clinical manifestations and cirrhotic values of indicators indicates the unconditional influence of cryopreserved placenta extract on the condition of scar tissue. Its clinical manifestations are diverse and manifest themselves in the form of instability of the dynamics of some clinical indicators.

This indicates the need for additional topical therapy on the 90th and 180th day in patients with detected evening chronotype, who underwent surgery in the morning.

We obtained clinical data on the processes of scar formation in patients with morning and evening chronotype on the background of local intraoperative injection of cryopreserved placenta extract into the wound. We have proved



that short people with an established evening chronotype need additional preventive measures, especially on the 90th and 180th days of the postoperative period.

Analyzing the dynamics of P1–P7 in subgroup 2a, we obtained the best dynamics of normotrophic scar formation among all studied groups.

We found that the indicators P1, P2 and P7 their average value is 0 on the 180th day of postoperative intervention, and the average data of P6 on the 360th day. Also noteworthy are the lowest figures for the 90th day and their sharp decline in the 180th and especially in the 360th in indicators P3, P4, and P5. It should also be noted that the average overall rate is the lowest in all study groups ( $0.5 \pm 0.15$ ) on the 90th day. Analyzing the dynamics of individual indicators, it should be noted a decrease of almost 50% in P3 on the 180th day compared to the 90th, and 90% between the 90th and 360th days.

The digital data of the P4 indicator decreased the slowest, decreasing by 25% on the 180th day, and by 66.7% between the 180th and 360th days. Indicators P5 and P7 also have a rapid decline, especially between the 180th and 360th day. This indicates a positive effect of electrophoresis with the drug «Cryocel», which was performed on the 90th and 180th days.

The dynamics of the P6 indicator changed significantly, the digital indicator of which decreased by 28.6% on the 180th day according to the previous observation period, and on the 360th day it reached zero values, which once again proves the need for preventive action in the near and near future. The late postoperative period is evidenced by the dynamics of the average quality indicator, which decreased by 86.8% on the 360th day compared to the 90th day.

Analysis of digital data of the average score of indicators P1–P7 in group 2b. It should be noted that the average score of P7 reaches zero values on the 180th day, and 360 similar values reach P2. It should be noted a rather low average score in indicators P1 and P2 on the 180th day, and indicators P1 and P6 on the 360th day of the postoperative period. This indicates the formation of a normotrophic scar in most cases, but with additional preventive measures that must be carried out in groups of patients with a pronounced evening chronotype.

This is confirmed by the comparative characteristics of the digital data of indicators in groups 1b and 2b, especially on the 180th and 360th days of the postoperative period. The need for preventive action on the 180th day is evidenced by the dynamics of the overall average score of all indicators in group 2b, which on the 90th and 180th day almost did not change and was equal to  $0.60 \pm 0.14$  and  $0.60 \pm 0.17$ , and after additional electrophoresis on the 180th day probably decreased and on the 360th day reached  $0.2 \pm 0.1$ .

We performed a digital analysis of P1–P7 in group 3a. It should be noted that none of them reaches zero on the 180th or 360th day. This is conclusive evidence of the effectiveness of the author's method, especially in the 2nd clinical group, regarding the combined use of cryopre-

served placenta extract in the form of injections and electrophoresis. A positive point is the relatively low average score of P1 and P7 on the 90th day. But on the 180th and 360th days only the P7 indicator underwent an optimal decrease in contrast to the P1 indicator.

Also, the need for additional preventive action in the protocol of surgical care is evidenced by the overall average value of all seven indicators, which on the 90th day was  $1.10 \pm 0.18$ , and on the 360th decreased to only  $0.40 \pm 0.12$ , which correlates with data from other researchers.

We made remarks after analyzing 3b digital data indicators P1–P7. As in the previous subgroup, none of the indicators reached zero at the end of the observation period. The figures for all seven indicators for the 360th day are probably higher than those in Group 3a, which must be taken into account at the planning stage of surgery.

The overall mean value of all indicators probably correlates and coincides with the indicators of group 3a at all stages of observation. which, in our opinion, is due to an increase in digital data indicators that characterize clinical signs and a decrease in indicators that characterize the subjective feelings of patients.

## DISCUSSION

Carrying out a comparative characterization of changes in clinical indicators at different stages of scar formation, it should be noted that a person's biorhythm affects not only the mental state, but also the reparative functions during wound healing.

Chronotype plays an important role in everyone's life, it is circadian rhythms that allow organisms to adjust their physiology and behavior.

So Belfry and the authors believe that the human chronotype affects mental illness. In their research, they describe that patients with the evening type of chronotype have increased aggression and personality disorder, which may occur due to reduced sleep time [4, 6].

We found that the time of surgery and the patient's chronotype affect the postoperative period and the wound healing process. Operations performed in accordance with the maximum activity of the patient reduce the time of repair in the wound, which in turn accelerates hemostasis and restores microcirculation in postoperative tissues [7, 8].

Given the data of previous studies [2, 5, 7], we can say that the use of placental cryoextract in the intraoperative and postoperative stage of prevention not only leads to better both functional and aesthetic results, but also significantly improves the quality of life of patients in early and late postoperative periods.

## CONCLUSIONS

The following data were obtained by comparing the digital indicators of the three clinical groups and the obtained results of preventive measures. The best aesthetic result was observed in group 2a, in this group the combined use of the drug «Cryocel» was used in the intraoperative stage by

injection and in the postoperative stage by electrophoresis on the 90th and 180th day. We have statistically confirmed that this technique is well suited for patients with evening chronotype type. For patients with a morning-type chronotype who underwent surgery in the first half of the day, using Cryocel by electrophoresis on day 180 is the method of choice. Thus, from the data obtained, it should be noted that a single intraoperative administration of the drug is not enough to form an optimal postoperative scar, especially for patients with evening chronotype, operated in the morning. Our clear digital differences in the clinical parameters of scar tissue in the control group indicate the need for intra- and postoperative prevention of pathological scarring of the skin of cryopreserved placenta extract.

Therefore, from our study we can say with confidence that the drug «Cryocel» reduces the time of epithelialization, promotes optimal wound healing and leads to the formation of more aesthetic scars, which creates optimal both functional and cosmetic results.

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## Conflict of interest:

*The Authors declare no conflict of interest.*

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