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THE DYNAMICS OF CHANGES OF INDICATORS OF PRODUCTS OF PEROXIDE LIPID OXIDATION IN THE HOMOGENATES OF SCARRING TISSUES IN DIFFERENT TERMS OF THE POSTOPERATIVE PERIOD

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Summary: Taking into account the lack of a single dominant opinion about the mechanisms of the formation of excess collagen in the scarring skin tissues, we began the clinical observation of patients after surgical treatment for the neck cysts of the embryonic origin. The aforementioned observation was based on biochemical studies of the homogenates of the scar tissue of the neck at various stages of wound healing and methods of surgical treatment. To substantiate the nanometricity and to carry out statistically significant results, we determined the concentration of TBC-active products, the concentration of diene and triene conjugates. It should be noted that the positive clinical dynamics coincided with the results of biochemical observation and was observed in patients who were injected into the wound the PRF-clot and the drug "Biocerulin".

Key words: neck cysts, scar, biochemical studies.

The interconnection with scientific themes and plans. The work is a fragment of the scientific-research work of the Higher State

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Introduction. Notwithstanding of the type of traumatic agent that damages the integrity of the skin, it is formed the modified tissue - a scar. A large number of clinicians notes that the problem of excessive scar formation is the "Achilles heel" of modern plastic surgery. This is especially true to open areas of the human body. The regulation of this process depends on many factors: iatrogenic and general-somatic. Yatrogenic factors are caused by the depth and size of damage, the duration of the wound process, the cause of the traumatic agent. General-somatic factors include: reduced immunity, endocrinopathy, anemia of various genesis, hypo- and avitaminosis, violation of associative microflora, decreased microcirculation and local hemodynamics, etc [4-8].

Now, according to our convictions, insufficient attention is attended to the study of biochemical mechanisms of regulation of collagenosynthesis processes after planned surgical incisions of the skin [1, 2].

The aim of the study is to substantiate the changes of biochemical indices that occur in the neck skin at different stages of healing.

Materials and methods of research.

The material for the biochemical study was the homogenate of the scarred tissues and the intact skin (control group), which was obtained after surgical excision of scar tissue and skin surpluses during scheduled surgical interventions for neck cysts of embryonic origin.

The method of determination of the concentration of TBC-active products is that, malonic dialdehyde reacts with thiobarbituric acid at high temperatures in the acidic medium and forms a colored complex with a maximum absorption at 535 nm [3].

The concentration of diene conjugates (DC) was determined by the method based on the fact that hydroperoxides that extracted by heptane-isopropyl mixture have an appropriate

absorption maximum: DC at a wavelength of 232 nm.

The concentration of triene conjugates (TC) was determined by the method based on the fact that the hydroperoxides that extracted by heptane-isopropyl mixture have an appropriate absorption maximum: TC at a wavelength of 275 nm [3].

Parametric and nonparametric methods were used for statistical analysis of the data obtained from the results of our researches.

Statistical analysis by parametric method was carried out using the Student's t-criterion. We used the U-criterion of Kraskal-Wallis as a nonparametric method for determination the reliability of the research indices. Differences were considered probable at $p \leq 0.05$.

Mathematical processing of the data was carried out using the StatPlus 2009 program, Microsoft Excel.

The result of research and discussion.

The activation of peroxide lipid oxidation (PLO) is one of the starting mechanisms of stress-induced damage with injury of cellular metabolism, which is primarily due to damage of cellular and subcellular membranes. The products of the PLO include lipid hydroperoxides, diene and triene conjugates, TBC-active products. It was found that in patients who received PRF clot during surgery, the concentration of HPL after 3 months of supervision was significantly lower on 26.7%, after 6 months - on 15.6%, and after 9 months - on 7.0% for data of the third group. The concentration of HPL practically was not different for patients of the first and third groups, after 12 months of observation (Table 1).

It should be noted that the researched indicator varied during the observation period. Thus, in patients who received PRF-clot during surgery the HPL concentration was on 19.7% lower after 6 months, relative to the data of the previous observation period, respectively, after 9 and 12 months, the level of the investigated index was lower by 9.5 % and 3.4% ($p < 0.05$).

In patients who received PRF clot during surgery, the concentration of DC at 3 months of supervision was significantly lower by 24.1%, after 6 months - by 19.7%, 9 months

later - by 13.8% and 12 months - by 6.1%, in relation to data of the third group ($p < 0.05$). It should be noted that the researched indicator varied during the observation period. Thus, in patients who received PRF-clot during surgery, after 6 months the concentration of DC was by 23.8% lower relative to the data of the previous observation period, respectively, after 9 and 12 months, the level of the investigated index was lower by 13.9 % and 4.0% ($p < 0.05$). The same trend was observed regarding changes in TC concentration in the skin homogenate of patients in the first and third experimental groups at different observation periods (Table 1).

Analysis of the level of TBC-active products in the skin homogenate of patients who received PRF-clot during surgery was shown that the concentration of TBC-AP in 3 months of supervision was significantly lower by 17.8%, after 6 months - by 22.8% and 9 months later - by 5.0%, in relation to the data of the third group ($p < 0.05$). The concentration of TBC-AP was practically not different for patients of the first and third groups after 12 months of observation (Table 1). It should be mentioned that the level of the researched indicator varied during 9 months of observation. Thus, in patients who received PRF-clot during surgery, after 6 months the TBC-AP concentration was by 25.0% lower, in relation to the data of the previous observation period, respectively, after 9 months the level of the investigated index was lower by 7.4 % ($p < 0.05$) (Table 1).

It was established that in patients who received a PRF-clot during surgery and the drug "Biocerulin" at the postoperative stage, the concentration of HPL in 3 months of supervision was significantly lower by 39.0%, after 6 months - by 19.7 % and 9 months later - by 9.2%, in relation to data of the third group. In patients of the 2nd and 3rd groups the concentration of HPL practically was not different after 12 months of observation,.

It should be noted that the level of the researched indicator varied during the observation period. Thus, in patients of the second group, the concentration of HPL was by 8.6% lower ($p < 0.01$), after 6 months with relation to the data of the previous observation

period, respectively, after 9 months the level of the investigated index was lower by 6.7% ($p < 0.01$), whereas after 12 months the concentration of HPL was practically the same in the first and third groups.

In patients of the second group, who get the PRF-clot during surgery and the drug “Biocerulin” at the postoperative stage, the concentration of DC in 3 months of observation was significantly lower by 38.6%, in 6 months - by 25.3% and in 9 months - by 13.0%, in relation to data of the third group. In patients of the 2nd and 3rd groups the concentration of DC was practically not different after 12 months of observation,.

It is noteworthy that the level of the researched indicator varied during 9 months of observation. Thus, in patients who received a PRF-clot during surgery and the drug “Biocerulin” at the post-operative stage, the concentration of DC after 6 months was by 12.4% lower, with relation to the data of the previous observation period, respectively, after 9 months the level of the investigated index was lower by 6,6% ($p < 0,01$). The same trend was observed regarding changes in TC concentration in the skin homogenate of patients in the second and third groups at different observation periods (Table 2).

Table 1

Indicators of free radical lipids oxidation in the skin homogenate under condition of use of PRF-clots

Index	3 month		6 month		9 month		12 month	
	Control group	1 group	Control group	1 group	Control group	1 group	Control group	1 group
HPL, AU/kg	6,14± 0,13	4,50± 0,10*	4,26± 0,09	3,61± 0,13*	3,52± 0,07	3,27± 0,09*	3,23± 0,12	3,16± 0,07
				$p_1 < 0,01$		$p_2 < 0,01$		$p_3 < 0,05$
DC, AU/kg	4,49± 0,06	3,41± 0,03*	3,24± 0,02	2,60± 0,05*	2,60± 0,04	2,24± 0,03*	2,29± 0,02	2,15± 0,03*
				$p_1 < 0,01$		$p_2 < 0,01$		$p_3 < 0,05$
TC, AU/kg	4,56± 0,10	3,79± 0,08*	3,43± 0,04	2,68± 0,03*	2,69± 0,03	2,32± 0,07*	2,42± 0,03	2,21± 0,03*
				$p_1 < 0,01$		$p_2 < 0,01$		$p_3 < 0,05$
TBC-AP, mmol/kg	4,63± 0,07	3,81± 0,07*	3,70± 0,03	2,86± 0,03*	2,79± 0,03	2,65± 0,06*	2,64± 0,03	2,56± 0,05
				$p_1 < 0,01$		$p_2 < 0,01$		

Note:

* - the difference is reliable relative to the comparison group data within one observation period
 p_1 - indicator of reliability between experimental groups, observation period is 3 and 6 months;
 p_2 - indicator of reliability between experimental groups, observation period is 6 and 9 months;
 p_3 - is an indicator of reliability between experimental groups, the observation period is 9 and 12 months.

Analysis of the level of TBC-active products in the skin of patients in the second group showed that the concentration of TBC-AP was significantly decreased by 35.1% after 3 months of observation, after 6 months - by 27.7% and by 8.7% after 9 months with

relation to the data of the third group. In patients of the second and third groups, after 12 months of observation, the concentration of TBC-AP was practically not different. We ascertained that the level of the investigated indicator varied during the observation period. Thus, in patients who received PRF-clot during

surgery and the drug “Biocerulin” at the postoperative stage, the TBC-AP concentration after 6 months was by 10.9% lower, with relation to the data of the previous observation period, respectively, after 9 - by

3,1%, and after 12 months the level of the investigated index was practically not different from the data of the third group (Table 2).

Table 2

Indicators of free radical lipids oxidation in the skin homogenate under condition of use of PRF-clots and “Bioceruline”

Index	3 month		6 month		9 month		12 month	
	Control group	2 group	Control group	2 group	Control group	2 group	Control group	2 group
HPL, AU/kg	6,14± 0,13	3,74± 0,09	4,26± 0,09	3,42± 0,11	3,52± 0,07	3,19± 0,09	3,23± 0,12	3,14± 0,07
				p ₁ <0,01		p ₂ <0,01		
DC, AU/kg	4,49± 0,06	2,76± 0,06	3,24± 0,02	2,42± 0,03	2,60± 0,04	2,26± 0,02	2,29± 0,02	2,21± 0,02
				p ₁ <0,01		p ₂ <0,01		
TC, AU/kg	4,56± 0,10	3,21± 0,07	3,43± 0,04	2,61± 0,07	2,69± 0,03	2,39± 0,04	2,42± 0,03	2,44± 0,04
				p ₁ <0,01		p ₂ <0,01		
TBC-AP, mmol/kg	4,63± 0,07	3,00± 0,07	3,70± 0,03	2,68± 0,04	2,79± 0,03	2,54± 0,02	2,64± 0,03	2,50± 0,03
				p ₁ <0,01		p ₂ <0,05		

Note:

* - the difference is reliable relative to the comparison group data within one observation period
 p₁ -indicator of reliability between experimental groups, observation period is 3 and 6 months;
 p₂ - indicator of reliability between experimental groups, observation period is 6 and 9 months;
 p₃ – is an indicator of reliability between experimental groups, the observation period is 9 and 12 months.

The obtained data are important for the evaluation of the biochemical processes occurring in the patient's scar tissue, since the accumulation of lipid hydroperoxides indicates the active course of the initial stages of the chain of oxidation of lipids. The increase of the concentration of TBC-active products indicates a long pathological process that does not lose its severity.

Analysis of the dynamics of changes in the indices of free radical oxidation relative to the level of the intact group indicates a common trend with a gradual normalization of the indicated indices after 12 months of observation. Thus, the content of HPL in all experimental groups after 3 months was significantly higher than the intact group ((3.02 ± 0.04) AU/kg). The positive dynamics was

observed after 6 months of supervision, it was characterized by a significant decrease of the content of HPL in all experimental groups relative to data after 3 months. But the investigated index still had higher level relative to the intact group. In patients of the second and third groups the level of HPL were corresponded to the result of the intact group after 9 months and up to the end of the observation period.

The content of DC in all experimental groups was significantly higher than the intact group ((2.02 ± 0.04) AU/kg) after 3, 6, and 9 months. In patients of the second and third groups, after 12 months, the level of DC were corresponded to the data of the intact group. The same dynamics was observed relative to the changes in the concentration of TC in the

skin homogenate of the patients, in relation to the indicators of the intact group.

The content of TBC-AP in all experimental groups was significantly higher than in the intact group (2.45 ± 0.08 mmol/kg) after 3 and 6 months of supervision. The positive dynamics was observed after 9

months and before the end of the observation period. It was characterized by a significant decrease of the TBC-AP content in the first and second groups, in relation to the data after 3 and 6 months, with the level of this indicator practically corresponding to the data of the intact group.

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