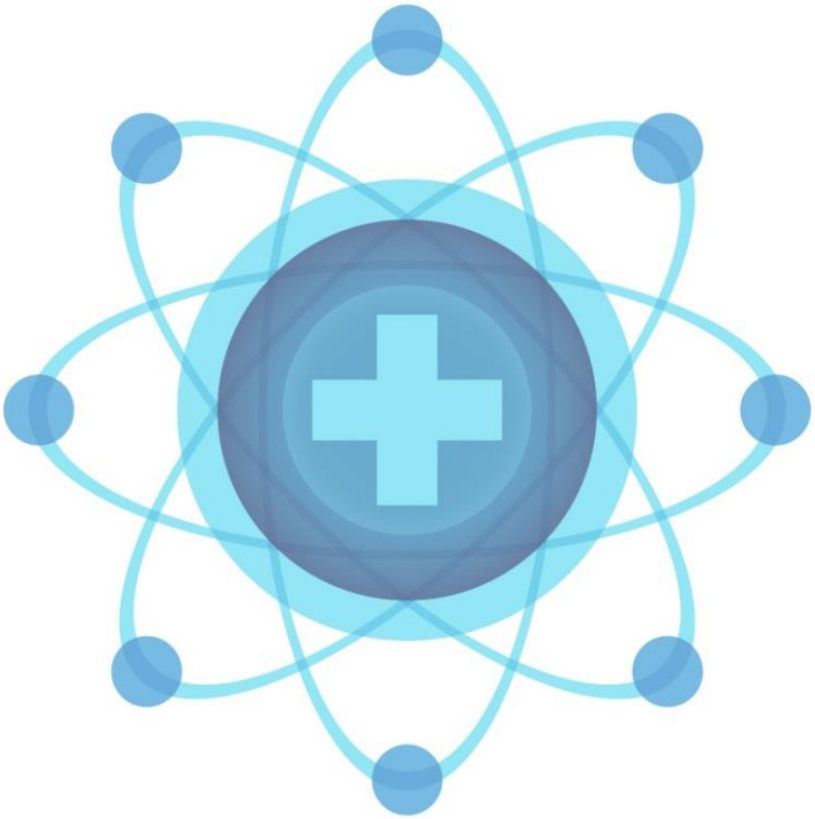

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OXYGEN VOLTAGE IN THE TISSUES OF THE OPERATING ZONE AS A CRITERION OF ADEQUACY OF ANESTHESIA IN RECONSTRUCTIVE PLASTIC SURGERY IN PATIENTS WITH POST-BURN CONTRACTURES OF THE FACE, NECK AND BREAST

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Abstract: In 56 patients with pathological narrowing of the airways due to burns, complete or partial loss of functionality of the neck, face and chest, 2 types of anesthetic methods were used: in the first group of 29 patients, local anesthesia was used in the superficial and deep neck, where the trachea was not intubated , a blockade of the cervical plexus (CSP) and a blockade of the trigeminal nerve of the mandible under ultrasound control were performed. In the second group, consisting of 27 patients, intravenous total anesthesia (TVA) was performed using percutaneous contact polarography of the Clark type to measure oxygen tension in the soft tissues of the neck ($R_{TK}O_{2)}$. It is intended to determine the effect of various anesthesia options on the microcirculation index in the soft tissues of the operated area and to assess its information content as an adequate criterion for anesthesia in reconstructive plastic surgery.

Keywords: neck**,** breast**,** operating zone, cervical plexus

Relevance. A rational approach to anesthesia in reconstructive plastic surgery (RPS) allows maintaining adequate hemodynamics, gas exchange and microcirculation in the perioperative period, which contributes to good wound healing and is of no small importance in the successful outcome of operations of this type.

Unfortunately, the existing generally accepted criteria for assessing the adequacy of anesthesia cannot always inform in a timely manner about disorders of the microcirculatory bed of blood circulation, especially in the area of surgical intervention (2,4,5).

Expanding the possibilities of perioperative control of the peripheral blood flow in the operated area in RRP can provide deeper information about the effectiveness of anesthesia during surgical interventions of this type (4, 7).

The method of continuous transcutaneous determination of oxygen tension in tissues ($_{PTC}O_2$) using a contact electrode makes it possible to obtain constant information on oxygen delivery in transplanted tissues, which is very important in the early diagnosis of possible wound complications associated with microcirculatory disorders. The possibilities of modern anesthesiology, technical and medical support, improvement of modern regional anesthesia (RA) allow to solve these problems to some extent.

The aim of our research is to study the effect of the methods of anesthesia used by us in this work on the indicators of oxygen tension in the soft tissues of the operated area with an assessment of their information content as a criterion for the adequacy of anesthesia in the elimination of contractures of the face, neck and chest.

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Material and methods

The work is based on the study of the results of anesthetic management of surgical treatment of 56 patients with post-burn defects, deformities of the soft tissues of the neck, who were treated at the Department of Reconstructive Surgery of the Andijan Province Medical Center from 2009 to 2021.

The nature of surgical interventions was as follows: combined plasty (12), flap plasty (15), cross plasty (18), free skin plasty (5). The duration of the operation was within 136+15 minutes

According to the anesthetic manual we used, the patients were divided into 2 groups: in the first (1) group - 27 patients (48.2%) used regional anesthesia (blockade of the cervical plexus and 3 branches of the trigeminal nerve). In the second (2) group of 29 patients (51.8%), RP was performed under conditions of total intravenous anesthesia with benzodiazepines, ketamine, fentanyl with myoplegiaarduane at standard age dosages. No anesthesia-related complications were noted.

The adequacy of anesthesia was controlled by clinical changes in terms of systolic (BP syst), diastolic (BP diast), mean arterial pressure (BP mean), according to measurements of heart rate (HR), pulse oximetry and thermometry.

Oxygen tension ($P_{TC}O_{2)}$ at the base of the soft tissues of the operated area was studied perioperatively by percutaneous contact polarography, performed on the TCM-2 device from Radiometer (Denmark) using a Clark-type contact sensor. The control zone of these studies was the determination of $P_{TC}O_2$ remote from the surgical intervention of the subclavian region. $P_{TC}O_2$ data were recorded at the indicated points before and after a functional test (breathing with humidified pure oxygen through a mask in a semi-open system for 5-7 minutes) before surgery in the ward, at the surgical stage of anesthesia, during the main stage of the operation - fixation of the flap , at the end of the operation when patients wake up on spontaneous breathing.

All of the above indicators were recorded on the eve of the operation (stage 1), upon reaching the surgical stage of anesthesia (stage 2), during the main stage of the operation (stage 3), and at the end of the operation (stage 4).

Research results and discussion

According to the data obtained, the indicators of blood pressure, heart rate, pulse oximetry in patients of both groups during the entire observation period were within the physiological range, which is reflected in the table below.

Table 1

Changes in the studied parameters of hemodynamics and gas exchange in patients of the surveyed groups at the main stages of reconstructive-plastic interventions on the neck

Groups	Indicators	Stages			
		one	2	3	four
BShS (n=27)	GARDEN, mm Hg	88.1±2.4	84.7±1.3	85.5±3.1	84.1±4.5
	Heart rate, beats/min	72.7±2.8	68.8±2.1	73.5±3.9	77.3±2.9* ** ***
	SpO2 , %	97.9±0.3	97.6±0.1	97.7±0.3* **	96.3±0.1* **

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TVA KF (n=29)	GARDEN, mm Hg	86.5±2.6	97.6±2.3	85.5±2.5	84.3±2.2
	Heart rate, beats/min	72.9±1.8	80.7±2.9	85.3±3.7* $^{0\,00}$	84.0±3.5*
	SpO2%	96.9± $^{0.300}$	98.2±0.2* ^{00}	98.0±0.3* ^{00}	96.9±4.4** ***

Notes: * - p<0.05 compared to stage 1,
** - p <0.05 compared to stage 2,
*** - p <0.05 compared with stage 3,
^{00} - p < compared to BShS

Therefore, focusing on the standard, generally accepted methods for monitoring the adequacy of anesthesia, there were no obvious signs of ineffective protection of the patient from intraoperative factors of influence.

The reaction of local tissues from which the flap was formed, depending on the applied anesthesia, was different (Table 2).

table 2

Indicators of changes in oxygen tension in the tissues ($P_{TC}O_2$ mm Hg) of the flap in the patients of the examined groups at the main stages of reconstructive-plastic interventions on the neck (M ± m)

Groups	Research Zones	Stages							
		Before surgery		Surgical stage		Flap fixation		End of operation	
		one	2	one	2	one	2	one	2
I	Control	126.1± 4.2	295.6± 37.4	123.3± 4.0	247.9± 41.0	115.4± 4.5*	231.1± 26.4	112.13. 0* **	244.8±27 .8
	Main			82.8±1. 7	286.6± 9.4	78.2±2. 3	274.9± 7.8	71.9±2. 5	257.1±6. 3
II	Control	121.0± 3.8		116.7± 4.6		105.1± $^{2.6\Delta}$		101.2± $^{4.3\Delta}$	
	Main			$^{73.8}$ ±2.0o		65.1± $^{4.4o}$		61.6±3. $^{o\Delta}$	

Note: * - p <0.05 significance relative to stage 1 of the study
** - p <0.05 significance relative to the 2nd stage of the study
Δ - p <0.05 significance between groups of control zones
o - p <0.05 reliability between groups of the main study areas

Parameters of $_{PTC}O_2$ at the beginning of the operation in flaps in patients of group 1 were 2.3% lower than in the control zone and 57.8% after performing a functional test.

In patients who received TVA (Group 2), $P_{TC}O_2$ at the base of the flaps was lower than in the control zone at the 2nd stage of the study by 36.8%. In the phase of flap fixation and at the end of the operation in patients of group 1, $_{RTC}O_2$ in the main zone was lower than in the control zone by 32.3% and 35.9%, respectively.

As for the 2nd group of patients, at these 3rd and 4th stages, the difference in $P_{TC}O_2$ between the main and control zones was 38.1% and 39.2%, respectively.

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The difference in $P_{TC}O_2$ between the control values in the groups at stages 2, 3 and 4 was 5.4%, 9.0% and 9.8%, respectively, and in the main zones at the same stages of the study it was 10.9%, 16.8%, 14.4%, respectively, indicating about the best degree of gas exchange in the soft tissues of the operated area (flaps) in patients of the 1st group operated under BSS conditions.

The data we found show that when performing RPO - transplantation of flaps after the elimination of post- burn contracture on the neck, the delivery of oxygen to the area of surgical manipulations worsens. The degree of these disorders depends on the method of anesthesia used. According to the data obtained by us, BSS allowed to maintain more satisfactory values of $P_{TC}O_2$ at the base of transplanted flaps than TBA with ketamine and fentanyl. The data obtained had an impact on the results of the RPO, which is reflected in Table 3

Table 3

Flap-related complications

Groups	Number of complications (%)			
	flap necrosis	Suppuration of the wound	Subflap hematoma	Graft lysis
one	1.6	-	4.1	-
2	4.9	2.1	4.5	1.1

The presented data clearly indicate the least % of complications in the implementation of RP on the neck under regional anesthesia (RAS), which we associated with better blood supply in the flaps after regional anesthesia.

The results obtained by us according to the data of thermometry of the flaps at the stages of surgical intervention are quite consistent with those changes in oxygen tension in the tissues of the flap ($P_{TC}O_2$) in the patients we examined.

Summing up our study in this section, it can be clearly noted that monitoring of oxygen tension in the tissues of the flap ($P_{TC}O_2$) can serve as a fairly informative method for monitoring the state of microcirculation, which, of course, affects the engraftment of the flaps.

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