EFFECTIVENESS OF NEUROAXIAL BLOCKADES DURING ABDOMINAL DELIVERY IN PREGNANT WOMEN WITH COMMUNITY-ACQUIRED PNEUMONIA AND MILD RESPIRATORY FAILURE

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Abstract. *This study evaluated anesthetic tactics for delivery in women with concomitant community-acquired pneumonia. Pregnancy contributes to the susceptibility to respiratory viral infections. During the new coronavirus pandemic, the incidence in pregnant women was higher than that in the general population. The progression of acute respiratory failure (ARF) is accompanied by a violation of ventilation-perfusion relations and preservation of blood flow in the unventilated parts of the lungs against the background of compression of the diaphragm by the pregnant uterus. The objective of this prospective study was to examine 86 pregnant women with community-acquired pneumonia and I degree ARF at the age of 21–45 years, with a gestational age of 32-41 weeks. The choice of anesthesia management method during operative delivery was based on the severity of pneumonia and the degree of respiratory failure. Depending on the above mentioned, the 1st group included patients (34) who underwent epidural anesthesia (EA) with NIAV with positive PEEP FiO2-60-100%; the 2nd subgroup (28) - EA with NIAV on the same parameters and the 3rd group (24) included Balanced EA with NIAV with similar parameters. The tested variants of neuraxial blockade (NB) had no depressive effects on external respiration or gas exchange. The use of reduced bupivacaine concentrations was not accompanied by pronounced motor blockade.*

Keywords: *acute respiratory failure (ARF), Neuraxial blockade (NB), pneumonia, Non-invasive artificial ventilation (NIAV), epidural anesthesia (EA), CPAP (Continuous Positive Airway Pressure), total peripheral vascular resistance (TPVR).*

Relevance: Despite a significant decrease in morbidity and mortality from pneumonia among the population since 1901, pneumonia in pregnant women remains one of the pressing problems that require solutions, according to the World Health Organization (WHO) [2, 5, 8, 9].

Pregnancy is a physiological condition that increases susceptibility to respiratory viral infections. Due to physiological changes in the immune and cardiovascular systems, severe respiratory viral infections occur more often in pregnant women [3, 6]. During the novel coronavirus pandemic in 2019-2021, the incidence of COVID-19 in pregnant women was higher than in the general population. Pregnant women infected with SARS-CoV-2 are at increased risk of developing severe disease. Many studies indicate adverse pregnancy outcomes in COVID-19, including high mortality rates of up to 25% among pregnant women [10, 6].

The progression of acute respiratory failure (ARF) with severe dysfunction of the respiratory system and gas exchange in pregnant women with community-acquired pneumonia has an additional negative impact on the respiratory and cardiovascular systems. The main cause of ARF in pregnant women with community-acquired pneumonia is a violation of ventilation-

perfusion ratios, preservation of blood flow in unventilated areas of the lungs due to infiltration, as well as compression of the diaphragm under the influence of the pregnant uterus.

Providing anesthetic support during abdominal and vaginal delivery in pregnant women with community-acquired pneumonia is one of the most difficult and not yet fully resolved problems in the field of modern anesthesiology and obstetrics. This problem is especially acute for women suffering from severe forms of community-acquired pneumonia with respiratory failure, as well as in situations where the course of pregnancy is complicated by circulatory disorders and accompanied by severe extragenital diseases. It is clear that such cases require an individual approach to anesthesia, the main criterion of which is to ensure the safety of the delivery process and maintain the stability of the main life support systems throughout the entire period of childbirth and immediately after it (in the postpartum period). For the successful implementation of these requirements, a preliminary assessment of the level of respiratory failure and the severity of community-acquired pneumonia is key.

Purpose of the study: Optimization of anesthetic tactics in pregnant women with community-acquired pneumonia and stage I respiratory failure during abdominal delivery.

Materials and research methods: The purpose of the upcoming study was 86 pregnant women suffering from community-acquired pneumonia and having stage I respiratory failure. The age of the study participants ranged from 21 to 45 years, and the gestational age ranged from 32 to 41 weeks. All observed patients with community-acquired pneumonia and stage I acute respiratory failure underwent abdominal delivery, both emergency and planned. The timing and methods of delivery were determined individually, taking into account the clinical condition of women, the duration of pregnancy and the condition of the fetus. All operations were carried out between 2018 and 2023 in the obstetric department of the multidisciplinary clinic of Samarkand Medical University, as well as in the regional perinatal center and city maternity complex No. 3 of Samarkand. The choice of the method of anesthesia during surgical delivery of women with community-acquired pneumonia and stage I ARF was carried out with mandatory consideration of the severity of community-acquired pneumonia and the degree of respiratory failure. Depending on the method of anesthesia, all women (n=86) suffering from community-acquired pneumonia with respiratory failure of the first degree are divided into 3 subgroups. The 1st subgroup (n=34) included women operated on using spinal anesthesia (SA) against the background of NIAV with positive PEEP FiO2-60-100%, the 2nd subgroup (n=28) included women operated on using epidural anesthesia (EA) against the background of NIAV with a positive PEEP FiO2-60-100%, the 3rd subgroup (n=24) included women operated on using balanced epidural anesthesia (BEA) against the background of NIAV with a positive PEEP FiO2-60-100%. Blood loss during abdominal delivery ranged from ≈ 350 to ≈ 800 ml. It should be noted that in order to carry out preventive preparation for surgery and select an anesthetic strategy, we strictly adhered to the National Clinical Protocol “Management and Delivery of Pregnant Women with Pneumonia” of 2021, approved by the Ministry of Health of the Republic of Uzbekistan. We were also guided by intensive care protocols in accordance with the “Temporary guidelines for the prevention, diagnosis, treatment and rehabilitation of coronavirus infection (COVID-19),” approved by the same ministry. Tactics for pregnant women with worsening signs of respiratory failure were developed individually and approved by a council of doctors.

The choice in favor of combined anesthesia with NIV with positive PEEP was made based on indicators with constant monitoring of SpO2 in the mother (SpO2 should be more than 94%)

and the condition of the fetus (CTG) in the absence of contraindications to central neuraxial block (CNB) in women. We adhered to a strict line determined by the National Clinical Protocol "Management and Delivery of Pregnant Women with Pneumonia" of 2021, approved by the Ministry of Health of the Republic of Uzbekistan, for conducting preliminary preparation for surgery and choosing anesthetic tactics. This included not only the use of drug preparation, but also taking into account the severity of pneumonia and the degree of respiratory failure in each individual case.

The anesthesia technique was carried out as follows: all women received premedication with diphenhydramine (0.2 mg/kg) and dexomethasone (8 mg), as well as prophylactic infusion of saline solutions (6-8 ml/kg). For subgroup 1 of pregnant women, local infiltration anesthesia was performed with lumbar puncture at the L2-L4 level and administration of a 0.5% hyperbaric solution of bupivacaine. The operating table assumed a Fowler position of 15-20 degrees. The operation began after the development of complete segmental sensory-motor block in 6-8 minutes. For subgroup 2, puncture-catheterization of the epidural space (ES) was performed, followed by the administration of a "test dose" of lidocaine and the main dose in the absence of a subarachnoid block. Subgroup 3 received the same procedure but with a balanced 0.375% bupivacaine solution administered through an epidural catheter. All women were given sibazon (0.2 mg/kg/hour) after fetal extraction to reduce psycho-emotional stress. If there were signs of weakening of the sensory block, a 1% lidocaine solution was administered epidurally. This choice is due to the shorter latency period and completion of the operation in most cases.

In all pregnant women with community-acquired pneumonia and stage I respiratory failure, we used sibazone (0.07-0.15 mg/kg) or dexmedetomidine with an infusion at a rate of 0.7 mcg/kg/h IV, maintaining 0.2-0 .7 mcg/kg/h IV, as a hypnotic component for adaptation to non-invasive ventilation (NIV) after umbilical cord clamping. To improve respiratory function and prevent ventilator-associated lung damage, we set the CPAP ventilation parameters on AVENTA, FAZA, and Mindray breathing devices. These parameters included a tidal volume of no more than 6 ml/kg of ideal body weight, a positive PEER from 5-10 mm water column with oxygen supply FiO2-60-100%. We followed the 1992 Berlin Definition of ARDS when setting NIV CPAP parameters and used the empirical PEEP setting method or the FiO2/PEEP table for adjustment. All pregnant women in the period before the extraction of the fetus were given a "left-uterine position" with an inclination angle of 20 degrees to prevent aortocaval compression. The infusion program included the administration of crystalloids in a volume of 8-10 ml/kg/hour, using stabizol or refortan for blood loss more than 6 ml/kg. The use of blood products (FFP, packed red blood cells) was considered only for blood loss of 10 ml/kg or more. In pregnant women of the 2nd and 3rd subgroups in the postoperative period, an epidural catheter was used for postoperative analgesia, where a 0.25% solution of bupivacaine was used in a volume of 10 ml with an interval of 6-8 hours. The effectiveness of pain relief was assessed by clinical signs, including loss of tactile sensation and the use of the P. Bromage scale to assess the depth of motor blockade. Central hemodynamics were monitored using echocardiography and a Schiller monitor. The adequacy of anesthesia was assessed by the tension index (TI), the level of total cartisol (TC) in the blood plasma and the rate of norepinephrine (NE) excretion in urine at four stages of the operation. All results were processed using statistical analysis and presented in the table.

All received materials were subjected to automatic statistical processing. For variational and statistical processing of the research results, the Statistica6.0 program was used to determine

the key variational indicators of the mean (M), error of the mean (m) and standard deviation (p). The reliability of the results obtained was determined using the Student's test. When the P value was less than 0.05, the difference between the two means was considered significant. The reliability level was at least 95%.

Results and discussion: Having characterized the clinical course of subarachnoid anesthesia (SA) using a 0.5% hyperbaric solution of bupivacaine with non-invasive ventilation (NIV) in CPAP mode with a positive PEEP of 5-10 mm water column and oxygen supply FiO2-60-100% (1st subgroup), it should be noted that the classic signs of complete segmental sensory-motor blockade formed by 8-10 minutes after subarachnoid injection of local anesthetic. However, in contrast to healthy pregnant women, the level of blockade spread exceeded the level of Th6-Th7, reaching Th4-Th5 dermatomes. This can be explained by high intra-abdominal pressure caused by the gravid uterus, shortness of breath and respiratory failure. An earlier and more pronounced decrease in blood pressure (BP) was observed, requiring vasopressor support. However, the use of minimal doses of mesaton helped to quickly stabilize arterial hypotension, and only in some cases was vasopressor support necessary throughout the operation.

Regarding the clinical course of epidural anesthesia (EA) with a 0.5% bupivacaine solution with respiratory support NIV in CPAP mode with a positive PEEP of 5-10 mm water column and oxygen supply FiO2-60-100% (2nd subgroup), it is practically not differed from the course in the 2nd subgroup. In this subgroup, blood pressure decreased more markedly by the time the surgical stage developed, requiring intraoperative vasopressor support. However, at subsequent stages of the operation, until completion, blood pressure remained stable and did not require correction. Postoperative epidural analgesia effectively provided pain relief, promoting early activation and rapid restoration of the motor-evacuation function of the gastrointestinal tract.

It is also worth highlighting the characteristics of the course of balanced anesthesia (3rd subgroup) with a 0.375% solution of bupivacaine, continuous infusion of propofol 0.3-4 mg/kg/h or dexmedetomidine with a maintenance infusion of 0.2-0.7 mcg/kg/h at preserved breathing against the background of respiratory support with NIV in CPAP mode with positive PEEP from 5-10 mm water column and oxygen supply FiO2-60-100%. Already 8-10 minutes after the epidural administration of painkillers and sedatives, a pronounced sedative effect was formed, with a narrowing of the pupil, a decrease in heart rate and RR. By this point, clinical signs of segmental sensory-motor blockade also began to form, reaching a peak at the 15th minute with a duration of the surgical stage of 1.5-2.0 hours. The administration of sedatives caused a drowsy state and indifference to the environment, but accessibility to contact remained, which made it possible to conduct functional studies. Subsequently, all patients remained active and available for contact even after expanding the scope of surgical intervention. Blood pressure remained stable and pulse decreased by 5-7 beats per minute throughout the operation. Clinical signs of hypoxia and hypercapnia were not noted. After the operation, all patients remained active and without complaints of pain for 5-6 hours. It should be noted that respiratory support with NIV in the SRAR mode continued in the postoperative period for all women (1st, 2nd and 3rd subgroups).

Information on the impact of the tested versions of central neuraxial blockade (CNB) on various parameters of hemodynamics and peripheral circulation is presented in Table 1. As the table data shows, the initial values of the parameters of central and peripheral hemodynamics in all three studied subgroups (1, 2, 3) corresponded to the hypokinetic regime blood circulation (see Table 1). There was moderate tachycardia and a decrease in cardiac output and cardiac output.

Systolic and diastolic pressure and total peripheral vascular resistance were increased, and minute diuresis was reduced, amounting to 0.54-0.59 ml per minute, which can be defined as “oliguria”. There were no intergroup differences in the studied parameters at this stage.

Before the skin incision at the level of complete segmental sensorimotor and sympathetic blockade, a statistically significant decrease in systolic and diastolic pressure was recorded in all three subgroups, more pronounced in the 1st subgroup of patients who received subarachnoid anesthesia (SA). Thus, systolic and diastolic pressure in the 1st subgroup decreased by 28.6% and 11.3%, respectively, in the 2nd subgroup by 13.5% and 9.7%, and in the 3rd only by 8.4 % and 10.4%. Heart rate at this stage of the study also decreased statistically significantly (see Table 1), and the most pronounced changes continued in the 1st subgroup of patients. The cardiac index in the 2nd and 3rd subgroups did not change relative to the initial values, while in the 1st subgroup it decreased to 2.04±0.04 l/m2/min, which was 84% of the initial values. This sharp decrease in cardiac output with a constant stroke index should be associated with a sharp decrease in heart rate caused by severe segmental sympathetic blockade. Consequently, in the restructuring of hemodynamics, a change in minute diuresis was observed, which decreased significantly in the 1st subgroup of patients, which indirectly indicates a deterioration in peripheral circulation.

Table 1

Some parameters of hemodynamics and peripheral blood circulation in the process of anesthesia and surgery in a woman with outpatient pneumonia and respiratory insufficiency of the first degree in subgroups 1, 2, 3.

Research stages	**groups**	**Parameters studied**					
		Heart rate, per minute	**ADP, mmHg**	**UI, ml/m2**	**SI, l/m2/min**	**TPVR, dyn/s×m-5**	**Minute diuresis, ml/min**
On the operating table	1	87,5±2,3	94,8±1,6	27,9±1,8	2,43±0,06	1642,2±48,1	0,59±0,03
	2	88,8±2,1	93,2±1,4	27,1±1,9	2,4±0,09	1634,6±54,3	0,57±0,02
	3	89,6±1,9	94,5±1,3	26,8±2,1	2,41±0,07	1658,2±50,8	0,54±0,02
Before the skin incision	1	72,2±1,1*Δ	70,4±1,4*Δ●	28,2±1,6	2,04±0,04*●Δ	1452,6±50,3 *	0,36±0,02*●Δ
	2	80,6±1,3*	80,6±2,1*●□	27,6±1,6	2,29±0,06●	1476,3±39,6 *	0,52±0,03●
	3	83,2±2,1*	86,6±2,1*□	27,8±1,8	2,38±0,09	1486,2±44,3 *	0,51±0,02
Traumatic stage	1	74,8±1,2*Δ	72,8±2,1*Δ●	26,4±1,1	1,97±0,02*●Δ	1555,1±48,4	0,29±0,02*□●Δ
	2	83,2±1,4*	78,2±1,8*●Δ	26,9±1,4	2,27±0,03 93,3 ●Δ	1459,5±42,3 *	0,49±0,02*●
	3	84,6±1,2*	90,1±2,2	27,3±1,6	2,36±0,04 97,9	1581,2±44,2	0,47±0,02*
	1	72,4±3,1*Δ	70,6±1,3*Δ	27,4±1,5	1,99±0,03 81,9 *●Δ	1493,4±51,6 *	0,34±0,02*●Δ

End of operation	2	80,4±1,8*	76,6±2,2*Δ	27,8±1,6	2,28±0,0995 ●	1416,7±46,3 *	0,56±0,04□●
	3	80,9±1,9*	85,7±1,8*	28,8±1,4	2,36±0,0897,9	1480,7±51,4 *	0,59±0,06□

*Note: * - statistically significant relative to (p<0.05) relative to the original values; □ – statistically significant (p<0.05) relative to the previous stage of the study; ● – statistically significant differences (p<0.05) between subgroups 1 and 2; Δ - statistically significant differences (p<0.05) in comparison with 3 subgroups*

The most traumatic stages of the operation were not accompanied by statistically significant differences in the studied hemodynamic parameters in all three studied subgroups compared to the previous stage of the study. The most significant changes were still observed in the 1st subgroup of patients who received SA. Minimal hemodynamic disturbances were recorded in subgroup 3 when using balanced epidural anesthesia (EA) with reduced concentrations of local anesthetics. Noteworthy is the further decrease in minute diuresis in the 1st subgroup of patients, which at this stage reached 0.29±0.02 ml/min (P1.2 <0.05), which indirectly indicates a further deterioration in peripheral circulation and a decrease in more less than 50% relative to the initial values before surgery. Completion of the operation in women in all studied groups was accompanied by a tendency towards normalization of the studied hemodynamic parameters. Nevertheless, the hypokinetic circulatory regime remained. In women of subgroups 2 and 3, the studied hemodynamic parameters approached the initial values before surgery, and minute diuresis increased statistically significantly (see Table 1). In women of the 1st subgroup at this stage of the study, systolic pressure was 70.6±1.3 mmHg, cardiac index – 1.99±0.03 l/m2/min, heart rate – 72.4 ±3.1 per minute, minute diuresis – 0.34±0.02 ml/min. These indicators were statistically significantly different from the values in the 3rd subgroup of patients, in whom systolic pressure, cardiac index and minute diuresis at this stage were 85.5±1.8 mmHg, 2.36±0.08 l, respectively /m2/min, 80.9±1.9 per min, and 0.59±0.06 ml/min.

Data on the impact of various variants of central neuraxial blockade (CNB) on external respiratory function, minute respiratory volume (MVR), blood gas composition and oxygen saturation (SpO2) are presented in Table 2. As can be seen from the table, there is an increase in respiratory rate to 23.9 -24.8 per minute and a decrease in tidal volume from 4.38 to 4.52 ml/kg. These changes are associated with the presence of pneumonia, respiratory failure and a gravid uterus, which inevitably leads to increased intra-abdominal pressure, elevation of the diaphragm and a decrease in the volume of the ventilated part of the uninfected lungs. At the same time, compensatory tachypnea maintained adequate minute volume of respiration in all three studied subgroups (1, 2, 3).

Let us pay attention to the combination of moderate respiratory alkalosis and metabolic alkalosis, which is typical for the third trimester of pregnancy. At the same time, pO2 and SpO2 levels were slightly below normal, amounting to 74.3-74.6 mmHg, respectively. and 92.6-92.9%. At this stage, no significant differences were found between the subgroups. Before the intervention, a decrease in respiratory rate by 8.8%-14.1% was observed, especially pronounced in patients undergoing general anesthesia, which is explained by partial blockade of the intercostal nerves. At the same time, tidal volume remained stable, and minute ventilation decreased in patients of the first subgroup by 12.8%, in the second - by 9.6%, and in the third - by 6.2%. These changes occurred against the background of respiratory support with non-invasive ventilation and

maintaining a positive end expiratory pressure of 5-10 mmH2O. with oxygen supply FiO2 60-100% throughout the entire operation. At the end of the intervention, there was a significant increase in tidal volume and minute ventilation in all three subgroups, and a trend towards an increase in pO2 and SpO2 levels was also noted.

Table 2

Some indicators of CBS, blood gas composition and SpO2 at the stages of anesthesia and surgery in women with community-acquired pneumonia with ARF I degree 1,2,3 subgroups

Parameters studied	Groups	Research stages			
		On the operating table	Before the skin incision	Traumatic stage	End of operation
BH, per minute	1	24,2±0,6	20,8±0,4 *	21,6±0,3 *	21,4±0,4 *
	2	24,8±0,5	21,6±0,4 *	22,2±0,3 *	21,6±0,3 *
	3	23,9±0,6	21,6±0,3 *	22,8±0,4	21,3±0,3 *
DO, ml/kg	1	4,52±0,21	4,56±0,22	4,42±0,21	5,12±0,24*□
	2	4,38±0,29	4,48±0,26	4,36±0,32	5,16±0,22●*□
	3	4,56±0,29	4,61±0,32	4,51±0,26	5,24±0,23*□
MOD, ml/kg*min	1	110,2±4,8	96,2±3,6 *	95,2±3,1 *	108,2±3,6 □
	2	109,6±4,2	98,7±3,2 *	96,8±3,3 *	111,8±3,4 □
	3	109,1±3,9	102,4±3,8	101,7±3,2	112,2±3,4 □
pH	1	7,33±0,014	7,32±0,011	7,32±0,012	7,34±0,011
	2	7,34±0,012	7,33±0,09	7,33±0,011	7,34±0,09
	3	7,34±0,013	7,33±0,012	7,33±0,012	7,35±0,011
pCO2, mmHg	1	29,8±0,6	32,3±0,4 *	32,6±0,3 *	32,4±0,3 *
	2	30,4±0,6	32,6±0,6 *	32,4±0,4 *	32,6±0,4 *
	3	30,2±0,5	33,1±0,4 *	32,6±0,3 *	32,2±0,4 *
pO2, mmHg	1	74,6±1,9	74,8±1,6	74,1±1,8	76,4±1,6
	2	74,5±1,6	74,6±1,6	74,9±1,9	75,8±1,6
	3	74,3±2,1	74,8±1,4	75,6±1,6	77,2±1,4
BE, mmol/l	1	-7,2±0,32	-7,8±0,34	-7,9±0,42	-7,4±0,32
	2	-7,6±0,41	-7,8±0,44	-7,6±0,34	-7,2±0,28
	3	-7,4±0,34	-7,6±0,32	-7,6±0,34	-7,2±0,28
SpO2, %	1	92,9±1,3	92,6±1,1	93,2±0,9	93,8±1,2
	2	92,8±1,2	92,4±1,4	93,8±1,1	94,2±1,3
	3	92,6±1,4	92,4±1,2	93,6±0,9	94,6±1,2

Note: ** - significance of differences ($p<0.05$) in comparison with the original values; □ – significance of differences ($p<0.05$) in comparison with the previous stage of the study; Δ - significance of differences in comparison with the 3rd subgroup; ● – significance of differences ($p<0.05$) between the 1st and 2nd studied subgroups.*

Interesting data are the results concerning the influence of various types of central nervous blockade (CNB) on the autonomic system. The initial indicators of the tension index and the

concentration of cartisol in the blood plasma characterized pronounced activation of the sympathetic part of the autonomic nervous system in all women studied. However, before the operation, against the background of complete segmental blockade, the tension index in patients of the first subgroup significantly decreased, indicating a significant decrease in the sympathetic influence and the degree of tension on the regulatory systems of the heart rhythm. It should be noted that the concentration of cartisol increased by 52.8%, which is explained by the adequate response of the sympathoadrenal system to changes in hemodynamics and a decrease in sympathetic influence. While in subgroups 2 and 3, only a decrease in the tension index was observed, and the concentration of cartisol increased by 40.2% and 44.3%, respectively.

Table 3.

Some indicators of the autonomic system at the stages of anesthesia and surgery in women with community-acquired pneumonia with ARF I degree 1,2,3 subgroups

Parameters studied	**Groups**	**Research stages**			
		On the operating table	**Before the skin incision**	**Traumatic stage**	**End of operation**
SI, conventional units	1	236,4±20,3	174,6±10,4 *Δ	312,8±16,3 *□Δ	328,4±19,4 *
	2	228,6±20,8	209,3±16,9	341,4±18,2 *□Δ	336,1±17,2 *
	3	235,9±23,6	218,4±18,3	392,4±19,6 *□	346,4±19,8 *
TC, nnomol/l	1	467,8±42,3	714,8±38,2*	801,4±36,4 *	788,3±34,5 *
	2	481,4±38,6	675,3±40,1 *	786,9±39,2 *	746,4±36,2 *
	3	489,2±40,3	706,2±32,4 *	816,4±36,4 *□	768,3±33,7 *
NE, nnomol/l (urine)	1	8,2±1,2			11,8±1,1 *
	2	8,7±0,9			12,1±1,3 *
	3	8,3±0,9			12,4±1,3 *

*Note: * - statistically significant differences (p<0.05) relative to the initial values; □ – statistically significant differences (p<0.05) relative to the previous stage of the study; Δ - statistically significant differences (p<0.05) relative to subgroup 3; ● – statistically significant differences (p<0.05) between the 1st and 2nd subgroups.*

At the most traumatic stages of the operation, the level of stress index (SI) in all three studied subgroups increased significantly compared to the initial preoperative values and the previous stage of the study, amounting to 312.8 ± 16.3 conventional units, 341.4 ± 18.2, respectively conventional units and 392.4±19.6 conventional units. It should be noted that within all study groups, the studied parameters remained within the “stress norm”, which emphasizes the adequacy of the pain relief provided. Upon completion of the operation, moderate activity of cardiac rhythm regulatory systems was noted. The level of SI in patients in all three subgroups significantly exceeded their initial absolute values by 42.5%, 47% and 46.8%, respectively. The concentration of cartisol in the blood plasma at this stage of the study decreased moderately, but

no statistically significant differences were observed compared to the previous stage of the study (see Table 3). All of the above indicates a moderate activation of the sympathoadrenal system in response to surgical trauma and hypoxia.

Conclusions: Based on the research data, the following can be concluded:

1. The use of spinal anesthesia (SA) in women with community-acquired pneumonia and stage I ARF is accompanied by significant hemodynamic disturbances, which makes the use of this method of central nerve block impractical in this group of patients. This is associated with the risk of developing severe hemodynamic disorders and possible disruption of the compensatory functions of the cardiovascular system.

2. The studied variants of central nerve blockade do not have a significant depressive effect on the function of external respiration and gas exchange. It is important to note that when spinal anesthesia is used, a more pronounced segmental motor block is observed with partial blockade of the intercostal nerves (Th12-Th5). While the use of reduced concentrations of bupivacaine does not lead to such a pronounced motor block, which is explained by the normalization of the function of external respiration and gas exchange due to surgical intervention, restoration of the physiological relationships of internal organs, as well as respiratory support using non-invasive ventilation in CPAP mode with positive PEEP and oxygen supply FiO2 60-100%.

3. Despite the high antinociceptive effectiveness of the studied options for central nerve blockade, the safest is considered to be the use of balanced epidural anesthesia with low concentrations of bupivacaine (0.375%) in combination with a continuous infusion of propofol (0.3–4 mg/kg/h) or dexmedetomidine with a level infusion of 0.7 mcg/kg/h IV, maintaining 0.2-0.7 mcg/kg/h while breathing is maintained. This method ensures minimal negative impact on the main life support systems.

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