WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 4, Issue 11, November, 2023

USE OF LOW INTENSITY LASER THERAPY IN GERIATRIC PRACTICE OF ANESTHESIOLOGY AND RESUSCITATION

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Abstract
Recently, for an elderly person, as a rule, a prerequisite for maintaining the possibility of an active existence requires the permanent intake of a variety of medications that can ensure the normal functioning of the body and the prevention of possible disorders. In this regard, problems of drug safety in geriatric practice, of course, arise especially acutely than in other departments of medicine.

Keywords: (ILBI-NILI), Sysmex CA-560, NLA.

Purpose of the study:
To improve the results of pharmacological (hypo- and antihypertensive) correction and prevention of hypertension and coagulological changes in elderly and senile people at the stages of surgical treatment by conducting sessions of non-pharmacological therapy - LLLT-ILBI, which allows to reduce the drug load and increase the drug safety of patients in geriatric practice.

Materials and methods:
The work is based on examination and treatment data of 70 patients (70.83% women and 29.16% men) of elderly and senile age: 54–85 years (average age 71.5 ± 4.2 years). Patients (48.6% of whom were aged 55–70 years, and 28.5% were aged 71–85 years) suffered from various general surgical pathologies (hemorrhoids, varicose veins of the lower extremities, cholecystitis, etc.) against the background of other age-related diseases (general atherosclerosis, ischemic heart disease, coronary cardiosclerosis, PICS, etc. In some patients, at all stages of preparation and treatment, indicators of peripheral hemodynamics were examined, the level of nitrates and nitrites and coagulology parameters were assessed.Anesthetic protection after traditional premedication was carried out using the method of classical ELA - endotracheal OA (insufflation of a gas narcotic mixture of N2: O2 (4:2), mechanical ventilation (Drager "Fabius") with bolus IV administration of fentanyl. In the control group (n = 40), traditional preoperative pharmacotherapy, anesthetic protection (PAP) and

postoperative management were carried out, if necessary. appropriate pharmacocorrection of existing changes.In the main group (n = 30), preoperative preparation, anesthetic protection (AP) during surgery and postoperative treatment were supplemented with NILTVLOK sessions. In the main group (n = 30, a coagulogram study was carried out in 20 patients), along with the above complex drug therapy, sessions of intravenous laser blood irradiation (ILBI-LLI) were performed in the postoperative period. For anticoagulant therapy, unfractionated heparin was used in all patients, the mechanism of action of which is primarily associated with the effect on plasma coagulation factors and restoration of the patient's own anticoagulant potential of the blood. The Sysmex CA-560 device (Japan) was used to perform the research. Blood sampling (on an empty stomach) from all patients of both groups was carried out once in a volume of 5 ml in the preoperative period, on the 1st, 3rd, 5th day of the postoperative period.

Results and its discussion:

In the control (I) group of patients, correction of blood pressure and prevention of changes in hypertension were carried out by prescribing modern pharmacological drugs of antihyper- and hypotensive groups: ACE inhibitors (Capoten, Enap), β-blockers (anaprillin, atenolol), calcium channel blockers (Corinfar) and other drugs . In the main (P) group of patients, traditional pharmacotherapy at all stages (preparation for surgery, during surgery and in the postoperative period) was potentiated with NILTVLOCK sessions. According to our data, as a result of using a combined method of prevention and correction of hemodynamics, it turned out that in patients of the main group, SBP and heart rate were more stable and were less susceptible to unexpected deviations than during traditional pharmacotherapy for hypertension. In 3 patients (5.33%) of group I (control), despite preoperative pharmacological prevention of hypertension, hypertension occurred on the morning of the operation against the background of psychoemotional distress (BP 1650/105–210/120 mm Hg), due to why the operation was cancelled. We did not observe such facts in the main group of patients. Assessing the results obtained as a whole, it should be noted that in patients of the main group, against the background of combined, potentiated therapy in the preoperative period, more stable control of the level of SBP and heart rate was ensured. Before treatment, 1.9% of observed patients in the main group had SBP values within the range of 170–180 mmHg. Art., in 28.6% – 150–160 mm Hg. Art., in 34.3% – 165–170 mm Hg. Art., and DBP in 28.6% was 90–95 mm Hg. Art., in 22.9% – within 96–100 mm Hg. Art. The therapy significantly changed the overall picture; the SBP level decreased. As a rule, we did not record cases of

hypertension with a SBP level of 170–180 mmHg. Art., and in 25% of those observed in this group, SBP values corresponded to levels of 150–160 mm Hg. Art. Against the background of combined non-pharmacologically potentiated therapy, patients in the main group also noted positive dynamics in heart rate. We noted a similar trend during a comparative analysis of the results in the postoperative period. Traditional premedication in patients of both groups, as a rule, provided a sufficient level of sedation on the day of surgery. Analyzing the dynamics of blood pressure and heart rate at various stages of surgery, it should be noted that the developed combined method of potentiating traditional therapy with LLLT-ILBI sessions in geriatric patients made it possible to reliably maintain an acceptable level of blood pressure in them at the stage of preparation for surgery, during surgery and in the postoperative period . After induction of anesthesia and the tracheal intubation stage, the SBP level was 140 ± 3.8 mm Hg. Art., and at the most traumatic stages of the operation, SBP was 138.7 ± 2.7 mm Hg. Art. In the control group, after tracheal intubation, the SBP level in patients averaged 150.4 ± 3.5 mm Hg. Art., heart rate – 95.6 ± 4.2 beats/min. Analysis of changes in peripheral hemodynamic parameters in patients of this group indicates that during the traumatic stages of the intervention, the level of SBP increased to an average of 154.3 ± 2.7 mm Hg. Art., and the heart rate remained virtually unchanged, averaging 97.2 ± 2.3 beats/min. By the time the operation was completed, we noted an increase in SBP to 162.4 ± 1.8 mmHg. Art., and heart rate - up to 97.2 ± 2.3 beats/min. From the presented data it follows that the trends in hemodynamic shifts (SBP and heart rate) with two methods of anesthetic protection were characterized by unidirectionality, however, in patients of the control group I, a higher level of values of all recorded indicators noted in the outcome (against the background of pharmacological correction) remained almost throughout the entire period. operating period. Thus, the results obtained indicate greater stability of SBP and heart rate in patients of the main group both in the pre- and surgical periods, and during the postoperative management of patients. Conducting LLLT-ILBI sessions in addition to classical measures of anesthetic protection in elderly and senile patients contributed to a greater extent to the stabilization of the system for monitoring peripheral hemodynamic parameters, which was also confirmed when studying the state of autonomic homeostasis. The results of the study and assessment of the state of autonomic homeostasis (AH) indicate that the indicators of AH before surgery in patients of the studied age category of both examined groups differed almost minimally, which we explain by the adequacy of patient preparation. A comparative analysis of changes in heart rate at the 2nd stage of the operation revealed a smoothing of the existing minor differences that occurred at the 1st stage of the operation. In the

patients of the main group, we observed signs of stabilization of the activity of the sympathetic-adrenal component of the ANS. The AMO indicator in patients of the control group at the 3rd and 4th stages increased in comparison with the initial data by 25.3 and 14.4%, respectively, and in patients of the main group it increased by 0.18% by the 3rd stage and decreased by the time the operation was completed by 10.2%. The variation range (ΛX) in patients in the control group decreased relative to the initial value by 40.2 and 27.7%, while in patients of the main group it gradually increased by 34.8 and 45.9%. The dynamics of the Sd indicator were characterized in the control group by a decrease of 41.6 and 30.1%, while in the main group of patients we observed a decrease in its values by 7.2% and an increase by 13.4%, respectively. A decrease in AMO and an increase in the absolute values of ΛX and Sd indicators indicated a decrease in the tone of the sympatheticoadrenal system. The most stable and informative indicator is the tension index (TI), although it should be noted that the differences in the absolute values of the TI index in specific patients, due to constitutional characteristics and differences in the initial state of VH on the eve of surgery, varied significantly in our observations. To level out the initial differences and provide the necessary conditions for a comparative analysis of GV, regardless of its initial level, a technique was used to calculate relative changes in the IG during the studies. According to the data we obtained, it turned out that at the 3rd and 4th stages of the operation, in patients of the control group, the CI was 1041.75 ± 178.7 and 758.14 ± 145.8, while in the representatives of the main group it was 650, respectively. .74 ± 90.2 and 505.25 ± 107.8. The detected decrease in IH in patients of the main group at the traumatic stage of the operation and at the end of it, from our point of view, indicates the manifestation of greater stability of the IH than in patients of group I. In percentage terms, the maximum changes in this indicator in patients in the control group reached 165.8% during the intervention, in the main group - 57.9%, and by the end of the operation - 121.8 and 44.3%, respectively. Summarizing the data obtained, we can conclude that potentiation with LLLT-ILBI sessions in patients in the main group was accompanied by a significant decrease in the activity of the body's sympathoadrenal system, more demonstrably than in the control group, manifested by stabilization of autonomic balance. This was most clearly manifested in a decrease in FI at the traumatic moment of the operation, which, from our point of view, provided more reliable control of the stability of hemodynamic parameters. We associate the effect of ensuring the stability of hemodynamic parameters and autonomic homeostasis that we noted with the known literature data on the multifaceted role of nitric oxide in the body. Analysis of data in both groups indicates that with initially similar levels of nitrates and nitrites, which indirectly reflect the

level of NO in the blood serum of patients of the main and control groups and their changes in the process of applied methods of preoperative therapy, anesthetic protection and postoperative management, differed significantly . Conducting LLLT-ILBI sessions before surgery in patients of group II (main) led to an increase in nitrate levels by 14.5%, and nitrites by 129%. Immediately before surgery, baseline nitrate and nitrite levels were consistent with preoperative baseline levels. These sessions against the background of NLA were also accompanied by an increase in the content of nitrates and nitrites in the blood serum. During the operation, when LLLT-ILBI sessions were performed several times, the increased NO content was maintained throughout the entire intervention period, which ensured reliable prevention of the possible development of arterial hypertension. The trend of increased content of nitrates and nitrites persisted throughout the entire period of the operation: nitrates – 23.3–26.7%, and nitrites – 110.1–115.5%. In contrast to what was indicated in patients of group I (control) only after induction into anesthesia we recorded a slight increase in the level of nitrates (1.3%), and subsequently, during all periods of observation, a downward trend remained (compared to the initial level) within 3.6–5.9%. The dynamics of nitrite levels in patients in the control group also manifested themselves in a decrease: within the range of 8.6–22.9%. Thus, the detected increase in the level of nitric oxide (NO) in the examined elderly patients in the main group indirectly explains the achievement of better results in this group and confirms the available literature data on the effect of nitric oxide, which is also manifested by vasodilation and, accordingly, a decrease in blood pressure. Initially, 27.5% of geriatric patients in the control group and 28.5% in the main group were characterized by a state of normocoagulation, the remaining 71.5–72.9 had signs of moderate hypercoagulation. At all stages of treatment, we did not observe significant, statistically significant changes in the studied parameters in patients. We associate the tendency to hypercoagulation in most patients in the early postoperative period during treatment with the identified hyperactivation of the plasma hemostasis unit. Patients in the control group showed a significant decrease in aPTT at all stages of the postoperative period. The aPTT index initially, corresponding in the preoperative period to values within the range of 28.70 ± 1.06 s, on the 1st day after surgery, against the background of pharmacotherapy, was 26.91 ± 0.95 s. Changes in aPTT by the 3rd day after surgery relative to the initial preoperative data were –10.24%, and by the 5th day, demonstrating a tendency to return to the outcome, they nevertheless remained below the initial values by 5.22%. In the same group, we noted a decrease in prothrombin time (PTT), which also indicated the presence of signs of hypercoagulation. Initially, in the preoperative period, PTT was 9.92 ± 0.73. In

general, according to the indicator under consideration, changes relative to the initial preoperative data by the 3rd day after surgery amounted to -3.52%, and due to a slight increase in the future by the 5th day of observation and nursing of patients relative to the initial level, the difference was -1. 5% . Regarding the INR estimates, it should be noted that relative to the initial data, the INR significantly decreased by the 1st and 5th days of postoperative observation and treatment. Changes in INR relative to the initial values of the indicator by the 3rd day after surgery were –7%, and by the 5th day, with a gradual increase in the indicator, we found a difference corresponding to –3%. The tendency to develop subtle signs of hypercoagulability may be related to endothelial dysfunction due to surgical distress. It cannot be excluded that the above endothelial dysfunction is manifested by a decrease in the antithrombogenic activity of the endothelium of the vascular wall. Summarizing the results obtained in patients of the control group, we can conclude that against the background of traditional perioperative therapy and pharmacological measures to prevent thrombosis and thromboembolism, we identified, although moderate, changes in the coagulogram, demonstrating a certain tendency to hypercoagulation, which poses a potentially significant threat to the elderly and old age. We observed a slightly different picture in patients of the main group. In this group, we noted an increase in APTT time at all stages of the postoperative period. With the initial preoperative APTT values equal to 29.72 ± 0.81 s, on the 1st day after surgery this indicator was 30.20 ± 1.18 s (changes relative to the previous indicator were therefore +1.6 %). PTT showed an increase, indicating a tendency toward hypocoagulation. Initially before surgery, the average PTT for the group was 11.30 ± 1.37 s. In general, changes in PTT by the 3rd day after surgery relative to the outcome values were thus +8.90%, and by the 5th day, respectively, +11.50%. The initial (preoperative) INR values corresponded to 0.97 ± 0.14 arb. units Changes in indicators by the 3rd day of the postoperative period relative to the initial data amounted to +13.40%, and by the 5th day, respectively, +15.50%. The results of studies in geriatric patients of the main group demonstrate the positive contribution of LLLT-ILBI sessions, the effects of which against the background of traditional therapy were manifested in ensuring a more stable tendency for shifts in hemocoagulation parameters at all studied stages of the perioperative periods towards normo- or moderate hypocoagulation. This method of potentiating traditional therapy is more capable of counteracting the development of complications in the postoperative period due to the existing risks of thromboembolism in the age category of surgical patients under consideration. According to existing ideas, it is in the microcirculation zone that the close connection between coagulation processes and the rheological properties of blood is manifested

to the maximum extent. In a situation where the non-pharmacological method of LLLT-ILBI, which has a polyvalent effect on the body and, in particular, improves microcirculation and helps maintain the coagulological properties of blood in the vector of normo- and hypocoagulation, demonstrates the effect of potentiating the pharmacological prevention of the development of thrombosis and thromboembolism. Assessing the traditional scheme used to prepare geriatric patients for surgery and their further postoperative treatment, as well as the method we developed for potentiating the traditional scheme with LLLT-ILBI sessions, it is impossible not to point out that the achieved more pronounced effects of controlling blood pressure levels, correcting shifts in hemorheology and the possibility of reducing the pharmacological load on the operated patient is difficult to overestimate for geriatric practice. Everyone recognizes the fact that age-related changes in organs and systems, caused by the process of natural aging, affect the adaptive capabilities of the body as a whole and the interaction of drugs with each other. This makes it necessary to use the generally accepted dosages of medications, especially narcotic and tranquilizing drugs and their combinations, with particular caution in elderly and senile people. In a comparative study of the consumption of the main means of maintaining OA (fentanyl for NLA) in mg/kg body weight h in both groups, it was revealed that patients in the main group on average required significantly less fentanyl, i.e. the potentiating effect of LLLT-ILBI contributed to a decrease in consumption narcotic analgesic fentanyl by 20–25%. We associate the obtained results with the known literature data on the analgesic effect of LLLT, described by a number of researchers who used laser therapy (including the ILBI method) in various fields of clinical medicine. Thus, the method we have developed for potentiating modern pharmacotherapy with LLLT-ILBI sessions significantly improves the results of traditional pharmacocorrection, helping to prevent changes in blood pressure, normalizing and optimizing coagulation parameters during the preparation of patients for surgery, during the period of surgery and general anesthesia, and ensures adequate postoperative management elderly and senile patients.

Conclusion:

Thus, the method we have developed for potentiating modern pharmacotherapy with LLLT-ILBI sessions significantly improves the results of traditional pharmacocorrection, helping to prevent changes in blood pressure, normalizing and optimizing coagulation parameters during the preparation of patients for surgery, during the period of surgery and general anesthesia, and ensures adequate postoperative management elderly and senile patients.

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