# OTORHINOLARYNGOLOGY, HEAD and NECK PATHOLOGY (ORLHNP)

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# Surgical Treatment of Benign Neoplasms of the Larynx

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**Introduction:**Benign laryngeal tumors include juvenile papillomas, hemangiomas, fibromas, chondromas, myxomas, and neurofibromas. Symptoms of benign laryngeal tumors include hoarseness, dyspnea, aspiration, dysphagia, otalgia (ear pain), and hemoptysis.

**Objective:** Improvement of voice, respiratory and swallowing function.

**Materials & Methods:** Surgical treatment was performed in patients with dysphonia, respiratory failure and dysphagia. Under of endotracheal anesthesia endolaryngeal removal of benign neoplasms of the larynx was performed by the Trublue laser and by the cold method. Further curation of the patients consisted in the voice rest, the inhalation therapy and the voice exercise with the voice therapist.

**Results:** Complete restoration of laryngeal function was performed.

Conclusions: The laryngologist should have an individual approach to the choice of endolaryngeal surgery. In the postoperative period, due to the sparing effect of the blue laser, rapid regeneration and re-epithelialization of the postoperative area was observed and the swallowing function was quickly restored. The use of a surgical blue laser makes it possible to remove neoplasms of the larynx with precision and with good postoperative results.

**Keywords:**hoarseness, benign laryngeal tumors, endolaryngeal surgery

**References:**Hoffman MR, Simpson CB. Principles of Phonosurgery. International Journal of Head and Neck Surgery. 2021;12(4):144-152

# Features of Routine Dental Treatment of Patients with Gnathological Complaints: Opinion Survey Among Dentists

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**Background:** in the modern world, due to the abundance of stress, including lockdown of COVID-19 pandemic, the number of patients with temporomandibular joint (TMJ) disorders is growing. Thus, in a Serbian study among medical students, it was found that the COVID-19 pandemic had a great psychological impact and caused starting and/or worsening of symptoms of bruxism (Veljko Kolak et al., 2022). TMJ disorders occur in 60-70% of the population. There are complaints of difficulties in mouth opening, clicking or crepitation in the TMJ, short-term blocking of the jaw while opening and closing (Jonathan Lomas et al., 2018). Such patients require a special approach to routine dental treatment since prolonged sitting in a chair with an open mouth can negatively affect the state of the TMJ.

**Materials and methods:** Eighty two respondents (general dentists(39) and dentists specialized in restorative dentistry and endodontics (43)) participated in a survey. The questionnaire was provided for filling out in paper form, as well as in electronic form by Google Forms, depending on the preferences and location of the respondent.

**Results:** this survey showed a high incidence of gnathological complications during therapeutic treatment, 92.68% of respondents encountered complications from the TMJ after treatment in patients. Most often, complications occurred during root canal treatment (34.2%) and work lasting more than 60 minutes (61.5%). Both similar and different features were identified in the treatment of this group of patients.

**Conclusions:** Most participants run into gnathological complications during routine dental treatment in their patients. Despite participants of survey mentioned some measures they do to avoid such complications, the unified approach to the safe dental treatment of patients with gnatological complaints has not been identified yet and requires further development.

**Keywords:** clicking in temporomandibular joint, temporomandibular disorders, gnathological complaints, a survey of dentists

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# Analysis of the Effectiveness of Surgical Lowering of the Voice: a Series of Observations

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**Introduction:** According to research, people with a low voice feel more confident (M. Stel et al., 2012, D.A. Puts et al., 2007), and a lower voice is associated with a high level of authority and status (J.T Cheng et al. ., 2016), and candidates with lower votes are more often chosen by voters (R.C. Anderson, C.A. Klofstad, 2012)

One of the reasons for the appearance of a too high voice, more often in men, may be mutational dysphonia, in which there is no decrease in the pitch of the voice in the process of growing up. This problem is most acutely felt when your gender is misidentified on the phone. Other causes may be atrophic and cicatricial changes in the vocal folds.

**Materials and methods**: Thyroplasty type III was performed according to a modified technique, 2 vertical incisions of the thyroid cartilage were made, 8-9 mm away from the midline on each side. The perichondrium covering the thyroid cartilage from the inside was separated laterally from the vertical cuts of the thyroid cartilage, and the fragments of the thyroid cartilage located laterally from the cuts were sutured to each other along the medial edge, thus covering the middle part of the thyroid cartilage from above. The mechanism of lowering the voice is similar to lowering the sound of a string by loosening its tension. The paper presents an analysis of the results of 4 surgical interventions performed from external access. The analysis of the fundamental frequency of the voice was carried out using Praat acoustic voice analysis software.

Results. In the group of patients who underwent lowering of the voice, the following results of the fundamental frequency reduction were obtained: 141.4 -> 88.2 Hz, 146.4 -> 101.1 Hz, 139.5 -> 87.8 Hz, 90 -> 67 Hz .

**Conclusion:**Thyroplasty III for lowering the voice is an effective method that can be used to change the pitch of the voice.

**Keywords:** Thyroplasty III, lowering of the voice, fundamental frequency

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# Vitality Assessment and Prefabrication of the Cns in the Treatment of Patients with Head Neck Diseases

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The patient's rehabilitability is determined by the vitality of his nervous system.
Chronic diseases of the head and neck lead to the sensitisation of local and aeneral immunity
Chronic anxiety and depression reduce the overall adaptive abilities of the body, change the functioning of the opioid system.
Prefabrication of the central nervous system, including the limbic section, improves the adaptability of patients with various chronic diseases of the head and neck area
This technique is based on the use of a new method of encephalography, impulse currents and correction of psychosomatic status with pharmaceuticals

**Keywords:** Chronic pain,ecephaligraphy, psychosomatic status, depression

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# The Prevalence of Dental Erosion in the Dental Practice of the University Polyclinic

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**Introduction:** Dental erosion is the progressive loss of dental hard tissue by acids from a non-bacterial source (Vakil N. et al., 2006). Depending on the studied population, the prevalence of erosion varies from 25 to 30% of the adult population. (Bartlett D.W. et el., 1998).

**Objective:** To evaluate prevalence of dental erosions in routine dental patients flow of university policlinic and combined the individual treatment plan and recommendations.

**Material and methods:** 30 patients (16 women and 14 men, age 16-50 years old), were examined in everyday practice at a dental clinic. Collection of general and dental anamnesis of all patients. The degree of erosion was determined by the depth of the lesion as follow: superficial lesions– loss only the top layer of the enamel, medium lesions–with involvement of all enamel until enamel-dentinal junction, deep lesions – with involvement of enamel and dentin. All patients who were diagnosed with dental erosion were given individual recommendations for the treatment and prevention of progressive lesions.

**Results:** During the examination of 30 patients, tooth erosion was detected in six patients, two of them take hormonal drugs to correct estrogen levels (superficial lesions), one patient had gastritis with high acidity (medium lesions), one patient as a result of acidic diet influence (deep lesions), one patient had Sjoegren's syndrome (deep lesions), one patient frequently consumpted carbonated drinks (medium lesions). Patients were recommended: reduce the number of sour products and drinks consumed. Use drinking straw for acidic beverages/soft drink to limit contact of fluid with teeth; home and professional remineralizing therapy by using gels; alteration of toothbrushing technique to minimize damage of hard tissues. Treatment started after the etiological factor was identified. Treatment, depending on the depth of the lesion, included direct and indirect restorations. In the case of an active stage of the erosive process, remineralizing therapy was prescribed for 1 week before treatment. In the case of stabilized erosions, the restoration could be placed preliminary remineralizing therapy.

**Conclusions:** For the successful treatment of erosions at the first stage, it is necessary to identify the cause of their development, eliminate, if possible, or reduce the degree of its negative impact. At an early stage of erosions, the patient should be informed about measures aimed at preventing the progression of lesions. Treatment of erosion in the active stage should begin with a course of remineralizing therapy, the lesion in a stabilized form can be sealed on the first visit.

**Keywords:** Prevalence of dental diseases, dental erosions, personalized dental care

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# The Opinion of Dental Students About the Potential of Regenerative Techniques in Endodontics

N.Taha

**Actuality:** Regenerative endodontics is the topic of interests for dentists and students, understanding its importance is a key factor as it will be our future in the coming decades. The awareness of our dental students now will increase the chance of its usage in the coming future.

**Purpose.** To estimate the awareness and attitude of dental students about regenerative endodontics.

**Materials and methods:** Researches carried out a survey using Google Form. Questionnaire was done to understand the knowledge of dental students about regenerative endodontics. Participants answered up to 8 questions.

**Results:** 61 students took part in this survey, from RUDN university and Sechenov university, mainly 3rd year students. About the meaning of regenerative endodontics, 81.8% thinks it's the concept of tissue engineering to restore the root canals to a healthy state, allowing continued development of root and surrounding, 18.2% thinks its growing new tooth. Fifty four percents of students consider that regenerative procedures should cost more than ordinary treatment, 45.5% answered - less. Eighty four percents answered that regenerative endodontics requires additional educational training of specialists, and 20% answered – it does not. Ninety percents think that any future regeneration techniques including dental and endodontic techniques will be more popular among population, 10% consider – it will not; 90.9% believe in regenerative techniques as specialists in the future, 9.1% - no; 100% would prefer to save own tooth using regenerative techniques rather than place the implant. If regenerative endodontics is widely known among dental students and specialists, 27.3% answered yes and 72.7% - no. All participants think that regenerative endodontics courses should be done in dental schools.

**Conclusion:** Most students knew what is the meaning of regenerative endodontics, but also thought that it requires additional education about it for both dental students and dental specialists.

**Keywords:** Regenerative endodontics

**References:**

1. google form was done to ask students and on PubMed data

# Prevalence of Traumatic Lesions of the Oral Mucosa at the Dental Appointments

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**Background:** malignancy in the oral cavity has a multifactorial etiology. One of the factors is a mechanical trauma by sharp edges of teeth, fillings, prosthesis. Identifying and elimination of traumatic factors plays a key role in prevention of malignization.

Purpose: to identify patients with traumatic lesions in the oral cavity at a daily dental appointment, eliminate the traumatic factor and control healing.

**Materials and methods:** Fifty-eight patients were examined in the study, 20 among them had oral mucosa lesions of different etiologies. Detailed patients' history and examination of the oral cavity were done for each patient. When a traumatic factor was identified, it was eliminated (sharp edges were polished, defective restorations were replaced). To accelerate healing, depending on the localization, patients were prescribed applications of keratoplastics, as well as healing adhesive films. After two weeks, patients were invited for a check-up for the control of healing.

**Results:** Among 20 patients with oral mucosa lesions, mechanical trauma was detected in 5 patients (31,25%), burns with hot food - in one patient (6,25%), recurrent aphthous stomatitis - in four patients (25%), bite trauma of tonge and buccal mucosa – in three patients (18,75%), braces trauma – in one patient (6,25%), bite trauma after treatment with anesthesia – in two cases (12,5%). After elimination of the traumatic factor, the patients were prescribed local anti-inflammatory therapy. It was revealed that when lesions are localized on the cheek and lip mucosa, the adhesive films are well fixed, last for a long time, do not cause discomfort to patients, on the contrary, they bring pain relief. When the lesions are localized on the lateral surfaces of the tongue and in the floor of the mouth, the films are poorly fixed and bring discomfort to the patient; with such localization, it is advisable to prescribe applications of fluid keratoplastics or adhesive pastes.

**Conclusions:** it is necessary to identify and eliminate traumatic factors, as well as apply the full range of therapeutic agents, namely, applications of keratoplastic preparations, adhesive pastes and films to accelerate the healing of already formed traumatic lesions.

**Keywords:** traumatic lesion, oral mucosa

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# Understanding and Addressing Mucosal Candidiasis: the Interplay of Glucose Control and Interferon Therapy

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Mucosal candidiasis, predominantly caused by Candida albicans, represents a significant global health challenge, with manifestations ranging from oral thrush to vulvovaginal candidiasis (VVC) [1]. This presentation underscores the pivotal role of glucose control in the development and management of mucosal candidiasis, with a particular focus on individuals with type 2 diabetes mellitus (T2DM) [2].

Hyperglycemia provides a conducive environment for Candida proliferation, exacerbating infection severity [3]. Sodium-glucose co-transporter 2 (SGLT2) inhibitors, such as canagliflozin, effectively manage T2DM by regulating blood glucose levels. However, they can inadvertently increase the risk of mucosal candidiasis due to glucosuria-induced Candida growth [4]. This underscores the need for comprehensive diabetes management strategies that concurrently mitigate the risk of mucosal candidiasis.

The potential of type I interferon therapy, notably interferon-alpha (IFN-α), in managing mucosal candidiasis is also explored [5]. IFN-α bolsters the host's innate immune response against Candida, providing a promising adjunct to current antifungal treatments like fluconazole [6]. Recent studies suggesting the potential of IFN-α therapy warrant further investigation to validate their efficacy and safety [7, 8].

Our upcoming research will further delve into these intersections, seeking to better understand the pathophysiology of mucosal candidiasis in T2DM and evaluate the therapeutic potential of IFN-α. This study will involve a comprehensive review of existing literature, followed by a randomized controlled trial to assess the efficacy of IFN-α therapy in managing mucosal candidiasis in T2DM patients.

The increasing prevalence of T2DM and the associated rise in mucosal candidiasis underscore the need for a multifaceted approach that integrates glucose control, immune modulation, and antifungal therapy. By broadening our understanding of the pathophysiological underpinnings of these conditions, we aim to pave the way for novel therapeutic interventions and improved patient outcomes [9].

**Keywords:**Candidiasis, interferon, sglt2 inhibitors, interferon-alpha

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# The Effect of Oral Probiotics Containing Streptococcus Salivarius K12 on Secretory Immunoglobulin a Levels in Saliva, Salivary Flow Rates, and Plaque Scores

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**Background:** The oral microbiome estimates more than 700 species [1] and is characterized by a dynamic balance between commensal and opportunistic microorganisms [2]. An imbalance of microflora underlies the majority of dental diseases, particularly dental caries. The use of supplements that restore the balance of microflora (oral biotics and probiotics) is a promising strategy for the prevention of dental diseases [3]. Probiotics have also been shown to decrease the counts of oral pathogens, particularly Streptococcus mutans and Candida albicans [4-7]. Probiotic bacteria are thought to compete with cariogenic microorganisms for adhesion sites or food substrates and influence immune mechanisms by secreting antimicrobial substances [8]. It is hypothesized that probiotics may also reduce caries risk by increasing the rates of saliva secretion [9] and, therefore, decreasing the contact time of microorganisms with the tooth surface. Moreover, researchers have found that probiotic supplementation can increase salivary levels of secretory immunoglobulin A (sIgA), which plays an important role in caries prevention [10-13], by inhibiting microbial adhesion, protecting the host against absorption of antigens from mucosal surfaces, suppressing inflammatory effects, enhancing phagocytosis, and neutralizing microbial toxins and invasive pathogens [14]. Despite a large number of studies, there is still no agreement on how probiotics affect dental health indicators. In addition, there is little data on the use of probiotics containing S. salivarius (in particular, K12 strain) for dental purposes.

**Objective:** To assess the effect of oral probiotics containing S. salivarius K12 on sIgA levels in saliva, salivary flow rates, and plaque scores.

**Materials and methods:** This double-blind, randomized, placebo-controlled study enrolled patients who met the inclusion criteria. They were randomly divided into the probiotic and placebo groups. The inclusion criteria were permanent dentition, presence of more than 20 teeth, and absence of systemic and chronic diseases. The exclusion criteria were more than 5 cavities requiring treatment, refusal to sign informed consent, taking supplements or lozenges containing probiotics or prebiotics 3 weeks before the study, taking antibiotics (within 1 month before the study), orthodontic and prosthetic treatment, allergy to the components of the drugs used in the study, use of other hygiene products, immunostimulants, antibacterials, probiotics, or prebiotics during the study, refusal to take a given medication, and failure to attend check-ups. Allocation concealment was carried out using containers numbered by a "third party" (a person not involved in the study). Probiotic/placebo lozenges in unlabeled bottles were placed in containers. Neither study subjects nor researchers were aware of the type of lozenges used. All participants took probiotics/placebos for 4 weeks, 1 lozenge per day. The intervention was followed by a two-week

washout period, during which the prescribed lozenges were not taken. Unstimulated salivation rates, salivary sIgA levels, and Turesky modified Quigley-Hein Plaque Index (TQHPI) and Papillary – Marginal Attachment index (PMA) indices were assessed at all study timepoints. Data were presented as means and standard deviations with 95% confidence intervals, medians and 25 and 75 percentiles, and percentages depending on the type of variables. The normality and sphericity of distribution of continuous variables were assessed with Shapiro–Wilk and Levene's tests, respectively. If the assumptions of normality and sphericity were met, repeated measures mixed ANOVA was performed followed by the post hoc Tukey's test with adjustment for multiple comparisons. If the aforementioned assumptions were not met, the differences between the groups were assessed using the Mann–Witney U-test and the differences within the groups at different study timepoints were assessed with Friedman test with post hoc comparisons. The same non-parametric tests were used for the analyses of categorical and ordinal variables. Fisher's exact test was used to access the frequencies of categorical variables in the groups.

**Results:** The study sample included 31 volunteers (27 females and 3 males) aged 20–24 years (mean: 21.2 ± 0.8 years). They were randomly divided into two groups: placebo (14 females and 2 males) and probiotic (14 females and 1 male). Thirty patients completed the entire study protocol. There were no significant differences between the groups in age, gender distribution, DMFT, and the decay component of DMFT values. We found no increase in salivary sIgA levels and salivary flow rates in the probiotic group compared with placebo ($p = 0.853$ and 0.792, respectively). The baseline and outcome salivary sIgA concentrations (mg/L) were 226 ± 130 and 200 ± 113 (probiotic) and 205 ± 92 and 191 ± 97 (placebo). The salivary flow rates (mL/min) were 0.47 ± 0.20 (probiotic) and 0.48 ± 0.18 (placebo) at baseline and 0.55 ± 0.25 (probiotic) and 0.53 ± 0.17 (placebo) at outcome. A significant decrease in plaque accumulation was observed in the probiotic group at 4 and 6 weeks ($p = 0.024$). The median TQHPI scores were 2.8 [2.5; 3.1] and 2.9 [2.7; 3.1] at baseline and 2.5 [2.2; 2.9] and 2.9 [2.8; 3.2] at outcome in the probiotic and placebo groups, respectively. A strong negative correlation was found between salivation rates and sIgA levels ($r = -0.62$, $p = 0.0002$). A moderate positive correlation was detected between the number of decayed teeth and TQHPI values ($r = 0.57$, $p = 0.001$). No significant correlation was observed between the number of the decay components of DMFT and sIgA levels ($r = 0.17$, $p = 0.379$). Three participants from the probiotic group and four participants from the placebo group had PMA index scores greater than 0 at baseline. In the probiotic group, values tended to decrease at the outcome and washout follow-ups, although these changes did not reach the level of statistical significance ($p = 0.061$).

Conclusion: The probiotic containing S. salivarius K12 did not affect salivation rates and salivary sIgA levels but exhibited a positive effect on oral hygiene levels.

**Keywords:**Probiotics; Streptococcus salivarius K12; dental biofilm; salivary secretory immunoglobulins A; unstimulated salivary flow rates

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# Acoustic Triangles of Vowels as a Way to Diagnose the Quality of Auditory Prosthetics

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**Abstract:** for an objective assessment of the acoustic features of vowels in the speech of people with long-term hearing impairments (LHI), a new method for converting acoustic triangles of vowel sounds (ATV) was developed.

**Patients and methods**: Acoustic analysis of the recording of the long pronouncing of individual Russian cardinal vowels /a/, /i/, /u/ was carried out in 10 women and 10 men with LHI. For each participant of the study, the first two formants of each vowel were measured and their values were logarithmed (logF1, logF2). ATV were transformed into right-angled triangles, the vertices of the sound /u/ which have been moved to the origin, and the legs are aligned with the coordinate axes. The long pronunciation of individual Russian cardinal vowels /a/, /i/ and /u/ was recorded and analyzed acoustically in 10 women and 10 men with LHI. For each participant of the study, the first two formants of each vowel were measured, their values were logarithmic (logF1, logF2), the ATV began to represent right triangles, the vertex of the sound /u/ were moved to the origin, the cathets were aligned with the coordinate axes.

**Results:** In control (healthy study participants) ATV was almost symmetrical, identical and had maximum dimensions, whereas in patients with LHI, the triangle tended to narrow and stretch along one axis. It probably depends not only on the degree of hearing loss, but also on the duration of hearing replacement.

**Conclusion:** The study showed that the new method of normalization of ATV makes it possible to divide people with LHI into at least three groups: In the first group, the vowel triangle extends along the logF1 axis, in the second group - along the logF2 axis, and in the third group, ATV is symmetrical. The reasons for such differences in ATV require further study.

# Formation of Dark Neurons in the Hippocampus in Rats After Sensory Deprivation of the Olfactory Analyzer.

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**Relevance.** Surgical interventions in the craniofascial region are a strong stress factor due to the special sensitivity, especially in the nasal septum. In this regard, the topical issue remains the quality of anesthesiological aids.

**Objective:** to study the formation of dark neurons in the hippocampus in rats after sensory deprivation of the olfactory analyzer.

**Materials and methods:** the study was conducted on 80 mature male rats. Premedication with phenozepam solution was performed in experimental groups 1 and 2. Group 1: 30 rats, local infiltration anesthesia with 2% lidocaine solution; group 2: 30 rats, local infiltration anesthesia with 2% articaine and epinephrine solution (0.5 mg/ 100 ml), postoperative analgesia with diclofenac sodium solution for 6 days after surgery. Groups 3 and 4 were controls and included 10 animals each. In groups 1-3, pre-trepanation fixation of the brain was carried out, in group 4, no such fixation was carried out and artifact TN were counted. The number of dark neurons in the hippocampus was studied on sections of the brain stained with hematoxylin-eosin on days 2, 6 and 14 after surgery.

**Results:** Comparing the results between the experimental groups, it was obvious that on the 2nd day after surgery, the amount of TN in CA2 was significantly higher in group 1 ($p<0.05$), and in CA3 and DG - in group 2, the amount of TN was significantly higher ($p<0.05$), in CA1 no differences were observed between groups 1 and 2 ($p<0.05$). However, when analyzing the number of TN in dynamics by groups, a significant decrease in the number of TN in CA1 was noted in both experimental groups by day 14; in the 2nd group on the 6th and 14th days there were significantly fewer of them ($p<0.05$), compared with the second day after surgery.

In CA2, on the 6th and 14th days after surgery, TN prevailed in group 1 ($p<0.05$), whereas in group 2 their number significantly decreased compared to the previous period and compared to group 1 ($p<0.05$), and in 1The 6th group experienced a sharp increase in their number on the 6th day, but on the 14th day there were fewer of them even compared to the 2nd day after surgery ($p<0.05$).

In CA3, a similar pattern was observed in group 1 animals as in CA2, namely, an increase in the number of TN on day 6 and a sharp drop on day 14 ($p<0.05$). In the 2nd group in CA3, the number of TN decreased with each period ($p<0.05$), compared with the previous days of observation.

In DG on the 6th postoperative day, according to the quantitative ratio of TN, there was an increase in their number in the 1st group, compared with the 2nd group and compared with the 2nd day of slaughter ($p<0.05$). On the 14th day, their number in the 1st group significantly decreased compared to the 6th and 2nd days ($p<0.05$). In animals of the 2nd group, negative dynamics of the amount of TN was observed in the dentate gyrus on the 14th day ($p<0.05$).

**Conclusion:** quantitative changes in TN in different areas of the hippocampus may indicate the severity of surgical stress with different anesthetic aids during the simulation of septoplasty.

**Keywords:** dark neurons, septoplasty, surgical stress, hippocampus, dentate gyrus.

# Photobiomodulating Therapy in Early Rehabilitation of Patients after Septoplasty

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**Objective:** to study the effect of photobiomodulating therapy on the development of stress reactions in patients in the early postoperative period after septoplasty.

**Materials and methods:** The study was conducted in the otorhinolaryngology clinic of the department of otorhinolaryngology of the Medical Institute of the Peoples' Friendship University of Russia at the clinical base in City Clinical Hospital No. 67 named after L.A. Vorokhobova. A randomized, prospective clinical trial was conducted to evaluate stress reactions and ways to minimize them in patients after septoplasty using photobiomodulatory therapy. During the period from 2020 to 2022. The study involved 124 patients with a deviated nasal septum who underwent septoplasty. The study included men without concomitant somatic pathology aged 18 to 46 years.

**Results:** In the present study, we used the sum of precisely these frequency ranges, since 20-minute ECG recordings did not allow us to estimate the ultra-low-frequency range of HRV, which can only be analyzed with a 24-hour ECG recording. A decrease in the overall power of HRV indicates less tension in the functional systems of the body in the groups in which patients were treated with FBMT, including after removal of tampons, i.e. within 3 days after septoplasty. The very low-frequency component on the day of surgery did not differ significantly between the study groups of patients. 24 and 48 hours after surgery, according to the Mann-Whitney test, VLF in patients of group 1 was significantly lower than in patients of the other groups ($p<0.001$). In the dynamics within the groups, the picture of changes was as follows. According to the Mann-Whitney test, the very low-frequency component of heart rate variability in group 1 decreased significantly ($p<0.05$) one day after septoplasty compared to the day of surgery, and after another 48 hours it increased significantly compared to the previous one. period of HRV assessment ($p<0.001$). VLF in group 2, compared with the day of septoplasty, increased significantly on subsequent days ($p<0.001$). Moreover, at the 48-hour postoperative period his assessment was significantly higher compared to the 24-hour period ($p<0.001$). Patients of the third group had a significantly significant increase in the very low-frequency component of HRV in the subsequent postoperative days of observation (24 hours ($p<0.001$) and 48 hours ($p<0.01$)). It is known that the PNS is responsible for anabolism and, under conditions of stress and damage, its activity decreases sharply compared to the SNS. This may explain the higher power of the low-frequency range of HRV in patients with long-term photobiomodulatory therapy.

**Conclusion**: A scheme for the use of photobiomodulatory therapy in patients after septoplasty in the early postoperative period has been developed. In conditions of anterior nasal tamponade, during two postoperative days it is necessary to use the lateral cartilage and greater cartilage of the nasal wing on both sides for 2 minutes. infrared pulsed laser radiation with a wavelength of 0.890 microns and a power of 10 W, after removing the anterior tampons from the nasal cavity, it

is necessary to use intranasally a continuous, modulated operating mode in the red optical range, with a wavelength of 0.63 microns and a radiation power of 8 mW 23. Shown that the use of photobiomodulating therapy in patients after septoplasty during the first two days helps reduce the intensity of acute postoperative pain syndrome. Photobiomodulation, reducing the intensity of acute inflammatory reactions, reduces the severity of the development of stress reactions, reduces the activity of the sympathetic nervous system, which is manifested by a decrease in its relative power, compared with the share of the power of the parasympathetic nervous system 24 and 48 hours after septoplasty. Analysis of the frequency spectrum of HRV after septoplasty showed that in patients with a minimum number of FBMT sessions, there is an increase in LF power, a decrease in VHF, and an increase in LF/HF values, which indicates sympathicotonia.

**Keywords:** photobiomodulating therapy, stress, septoplasty, pain syndrome, rehabilitation

# Strategy of Analgesic Therapy During Sinus Lifting and Dental Implantation

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**Objective:** Secondary adentia contributes to the atrophic processes of the lateral parts of the upper jaw. Due to the fact that the bone tissue of the upper jaw is predominantly spongy with large intertrabecular spaces, it is more sensitive to chewing loads than the bone tissue of the lower jaw (Sirak S.V. et al., 2013). The loss of teeth leads to pneumatization of the maxillary sinuses and a decrease in bone volume, which makes the prognosis of the success of dental implantation in the upper jaw unfavorable (Kulakov A.A., Abdullaev F.M., 2002).

Any surgical intervention in the maxillofacial region leads to the development of stress reactions (Kastyro I.V. et al., 2012; Nikitin A.A., Chukumov R.M., 2013; Gegenava B.B. et al., 2019). Previously, it was shown that surgical interventions in the nasal cavity lead to acute pain syndrome, changes in heart rate variability (Kastyro I.V., 2012; Kalmykov I.K. et al., 2021). In addition, experimental studies have been conducted showing that modeling of septoplasty in biological objects, in addition to vegetative imbalance, leads to morphofunctional changes in neurons of the pyramidal layer of the hippocampus, changes in behavioral reactions, the occurrence of inflammatory reactions, etc.

The aim of the study is to determine the most adequate schemes of anesthetic aid in patients during sinus lifting with simultaneous dental implantation by minimizing stress factors.

**The clinical part. Research design. Before** surgical manipulation, electrodes were applied to the patient to record an ECG, then oral fluid was taken by chewing special tampons by the patient for subsequent evaluation of cortisol in it.

Sinus lifting was performed with simultaneous dental implantation. Deproteinized spongy pig bone – xenogenic pig bone material Ovis XENO-P (DENTIS, Korea) was used as an osteoplastic material. Titanium dental implants (Alpha Bio, Israel) were used as an implant. After the end of the surgical manipulation, saliva was re-taken by the specified method and the electrodes were removed.

Patients were randomly assigned to 3 groups who were orally prescribed nonsteroidal anti-inflammatory drugs of various classes: etherocoxib, nimesulide, ketorol.

**Evaluation of cortisol in oral fluid.** A triple intake of oral fluid was carried out. Patients were asked to chew a special tampon for 3-4 minutes. A comparison group was formed, which consisted of 25 healthy men and women aged 20 to 37 years. Oral fluid intake in the comparison group was carried out in the period from 10:00 to 16:00 hours. The collected material was subjected to electrochemiluminescent immunoassay.

HRV was evaluated based on the analysis of electrocardiogram records. The ECG was performed using the Varikard hardware and software complex. The following ECG intervals were evaluated: before the start of the oral cavity examination, 20 ±4 min.; from the moment of anesthesia to the end before the start of surgery, 76 ±14 min.; from the end of surgery to the end of the second oral fluid intake, 16± 4.5 min. A day later, patients were invited for a second examination to assess the condition of the implant, pain syndrome intensity assessments and ECG recordings.

**Statistical data processing.** The data were processed in Microsoft Excel, MATLAB, STATISTICA 12.6, JASP 0.14.0.0 software. When comparing the data of the group before and after the operation, the Wilcoxon criterion was applied when the sample distribution was uneven, and the Student's criterion was used in the case of its uniform distribution. When comparing these groups with each other, the Mann–Whitney criterion is used. For each comparison, its own significance level was determined ($p< 0.001$ to 0.05).

**Results:** An hour and three hours after surgery, the patients of group 3 had the most severe pain syndrome, compared with patients of the other groups ($p<0.001$). After 6 hours, the pain intensity in group 2 patients was significantly lower than in group 3 patients ($p<0.05$), but higher than in group 1 patients ($p<0.01$).

A day after the end of the operation, group 1 patients practically did not have pain syndrome, and the pain in group 2 patients was lower than in group 3 patients ($p<0.001$). At this time, patients from group 2 had pain intensity significantly higher than in group 1 ($p<0.01$). After 48 hours, patients of the 1st and 2nd groups had no pain, and patients of the 3rd group noted mild pain, the indicators of which were higher than in the first two groups ($p<0.01$).

According to the facial pain scale, pronounced pain syndrome was noted only in the third group during the first 3 hours .

**Results:** Changes in heart rate variability. Dynamics of changes in the ultra-low frequency component of HRV. 20 minutes after the end of the surgical intervention in group 3, ULF significantly decreased ($p<0.001$) and remained the same for the next day. In the first group, ULF significantly increased compared to the moment of surgical intervention ($p<0.01$), and after a day there were no changes. In the second group, this indicator had no dynamics throughout. 120 minutes after the start of ECG monitoring, ULF was significantly lower in patients of group 3, compared with patients of groups 1 and 2, between whom no differences were found at this time. After a day in the 2nd group, ULF was significantly lower than in the first group, and higher than in the 3rd group ($p<0.01$), and in the third group – lower than in the first ($p<0.001$).

Dynamics of changes in the very low-frequency component of HRV. VLF was higher in patients of the first group, compared with patients of the 2nd and 3rd ($p<0.001$) groups. Patients of the 3rd group had at the specified time the indicators of a very low-frequency component significantly lower than in patients of the 2nd group ($p<0.05$).A day after surgery in group 2, the values of this indicator were significantly higher than in group 3 ($p<0.001$), but lower than in group 1 ($p<0.01$).

Changes in heart rate variability. Dynamics of changes in the low-frequency component of HRV. The values of the low-frequency component had fewer differences than the HRV indicators described above. So, before, on time and immediately after the closed sinus lift with simultaneous implantation, there were no statistically significant differences either between the estimated terms or between the groups. But it should be noted that after the end of surgical manipulations in the

second group, LF was significantly lower than in the 1st group ($p<0.05$), and higher than in the 3rd group ($p<0.01$). A day after the operation, LF significantly increased in all groups ($p<0.01$), but in group 3 it was significantly lower than in the other groups ($p<0.001$).

Dynamics of changes in the vagosympathetic index. An intergroup comparison showed that no differences were detected before and during the operation. After surgery, the LF/HF ratio in group 2 was significantly lower than in the first group ($p<0.01$) and higher than in group 3 ($p<0.001$), which had this indicator significantly lower than patients in group 1 ($p<0.001$).

Changes in the concentration of cortisol in the oral fluid. Compared with the group of healthy people, the concentration of cortisol did not significantly differ in patients of all three groups before surgery. 20 minutes after surgery, the amount of cortisol in the 1st group of patients was significantly higher than in the comparison group ($p<0.01$). Patients who took nimesulide and ketorol also had higher cortisol values than healthy people ($p<0.001$). A day after surgery, the comparison group and patients from the ethericoxib group did not differ significantly, but in groups 2 ($p<0.05$) and 3 ($p<0.001$), its concentration was significantly higher. Cortisol concentration 20 minutes after surgery in group 2 was significantly higher than in group 1, but lower than in group 3 ($p<0.01$). In the ethericoxib group, its concentration was significantly lower than in the ketorol group ($p<0.001$). A day after the end of closed sinus lifting with simultaneous implantation, the highest level of cortisol was recorded in patients of group 3, compared with patients of the other groups ($p<0.001$). At the same time, the 1st and 2nd groups did not differ significantly from each other.

**Conclusions:** As a result of the analysis of the intensity of postoperative pain syndrome, assessment of heart rate variability and cortisol concentration in the oral fluid, it was found that the use of selective COX-2 blockers from the coxib group, compared with non-selective cyclooxygenase blockers and mainly COX-2 blockers, reduces the intensity of stress reactions, leads to less secretion of cortisol by the salivary glands during it improves the postoperative course of patients during the first three days who underwent sinus lifting with simultaneous dental implantation.

The use of nonsteroidal anti-inflammatory drugs during sinus lifting with simultaneous dental implantation in patients in the perioperative period from the class of non-selective COX-2 blockers and from the class of predominant COX–2 blockers leads to greater secretion of cortisol by the salivary glands during the day ( 20 minutes after surgery - 23.67±1.29 nmol/L and 27.43 ±1.34 nmol/l, respectively) after surgery, compared with selective COX-2 blockers (18.04± 1.73 nmol/L).

The diagnosis of pain syndrome after sinus lifting with simultaneous dental implantation using a digital rating scale and a facial pain scale can be accurate only with pronounced pain intensity (above 31.09 ± 2.82 mm in CRH).

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# Criteria of Stress Reactions in Septoplasty Simulation: Heart Rate Varlability Parameters.

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**Objective:** to evaluate the effect of septoplasty on physiological and morphological reactions in the body of experimental animals(1-6).

**Materials and methods:** Septoplasty was performed by scarification with a zigzag sharp probe of the mucosa of the suprachondral layer under general anesthesia. HRV was performed before and after septoplasty for 6 postoperative days for 10 - 15 minutes (Biopac apparatus) To compare the data, we apply the criterion Wilcoxon: this criterion showed that the VLF power after the operation increased on the 2nd day, on the 4th- 6th day there was a decrease; the LF index is increased by the 3rd day and decreases by the 6th day; the HF indicator has been lower since the 2nd day and increases by 4 and 6 after the operating day.

**Results:** The simulation of septoplasty in small rodents provokes the appearance of stress reactions, anxiety(2), sensory deprivation of the olfactory analyzer was obtained from the side effects, which can cause a change in the hypocampus(1,2,6).

**Conclusion**: The growth of activated SNS on the 4th day after septoplasty shows the formation of an anxious state against the background of surgical stress of sensory deprivation.

**Keywords:** heart rate variability, stress, septoplasty.

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# The Effect of Dental Gel With Astaxanthin on The Proliferation of Mesenchymal Stromal Cells

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**Introduction:** As part of this work, we have produced four samples of an antioxidant gel containing natural astaxanthin. Astaxanthin, which is part of the dental gel, by its chemical structure belongs to the class of carotenoids and is a natural antioxidant present in various amounts in living organisms.

The first gel sample we made consisted of natural astaxanthin. An additional substance of the second sample of the preventive gel was interferon. Interferon α has the ability to stimulate the phagocytic activity of macrophages, as well as the cytotoxic activity of T cells and NK cells.The third sample of dental gel contained polyprenol. Polyprenols are precursors of the most important transport lipid of all living organisms, dolichol. Polyprenols interact perfectly with antioxidants, increasing the efficiency of their work. The fourth sample of dental gel consisted of natural astaxanthin and scallop extract.

**The purpose of the study:**To evaluate the effect of antioxidant gels on the survival and proliferation of mesenchymal stromal cells (MSCs) of the human umbilical cord.

**Materials and methods:** Antioxidant gel with astaxanthin, astaxanthin with interferon, astaxanthin with polyprenols and astaxanthin with scallop were examined for viability of mesenchymal stromal cells (MTT test). The induction of apoptosis was evaluated by the propidium-iodide test (PI-test) and 7AAD-test.

**Results:** All samples of dental gels showed no cytotoxicity. The antioxidant gel with interferon and polyprenol has a proliferative effect on MSCs compared to control samples, which confirms its potential wound-healing effect.

**Conclusions:** Astaxanthin with interferon in concentrations of 32.5 mcg/ml, 16.25 mcg/ml, 8.12 mcg/ml, 2.03mcg/ml and 1.01 mcg/ml has a proliferative effect on MSCs compared with control samples (concentration 0 mcg/ml).

At a concentration of 1.01 micrograms/ml, astaxanthin with polyprenol showed significantly higher MSCs viability compared to a gel containing only astaxanthin.

According to the PI test and the 7AAD test, the percentage of apoptotic cells after 24 hours of incubation of MSCs with the studied drugs at a concentration of 1.01 mcg/ml did not differ between the samples, which may indicate the absence of apoptosis-inducing effect of drugs on MSCs.

# Heart Rate Variability in the Simulation of Sinus Lifting and Dental Implantation in Rats

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**Relevance of the study:**

Secondary adentia contributes to the atrophic processes of the lateral parts of the upper jaw. Due to the fact that the bone tissue of the upper jaw is predominantly spongy with large intertrabecular spaces, it is more sensitive to chewing loads than the bone tissue of the lower jaw. The loss of teeth leads to pneumatization of the maxillary sinuses and a decrease in bone volume, which makes the prognosis of the success of dental implantation in the upper jaw unfavorable (16).

Any surgical intervention in the maxillofacial region leads to the development of stress reactions (12, 13, 14). It was previously shown that surgical interventions in the nasal cavity lead to acute pain syndrome, changes in heart rate variability (11, 12). In addition, experimental studies have been conducted showing that modeling of septoplasty in biological objects, in addition to vegetative imbalance, leads to morphofunctional changes in neurons of the pyramidal layer of the hippocampus, changes in behavioral reactions, the occurrence of inflammatory reactions, etc.

**The aim of the study** was to study the aspects of physiological reactions during the simulation of sinus lifting and dental implantation on biological models and to determine the most adequate schemes of anesthetic aid in patients during sinus lifting with simultaneous dental implantation by minimizing stress factors.

**Materials and methods. Design of the study of the experimental part.** When carrying out models of surgical interventions in the maxillofacial region for 10 minutes, all rats were intraperitoneally injected with a solution of zoletil at a dosage of 15 mg / kg to provide general anesthesia. 3 days before the operation, 3 metal half-rings with rounded tips were installed for everyone for subsequent fixation of the electrodes. Three days after that, a control ECG was performed on a Biopac M30-B research polygraph (California, USA) for 15 minutes, after which surgical interventions were performed on the same day.

**Materials and methods. The experimental part**. In the first group, septoplasty (n=10) was simulated by the standard method by zigzag scarification of the nasal mucosa. This surgical intervention was included in the study to compare stress reactions after it was performed with those after modeling operations on the alveolar process of the upper jaw. In the second group (n=10), dental implantation with a titanium implant was performed after the hole was formed using boron. In the third group (n=10), only a hole was made in the alveolar process of the upper jaw without subsequent manipulations. This group was a comparison group for groups with dental surgical interventions. In the fourth group, 10 rats underwent sinus lifting with bone chips

with simultaneous implantation of a titanium implant, and in the fifth group (n=10), with the help of a microboron through a pre–formed hole in the alveolar process of the upper jaw, a maxillary sinus was performed with damage to the mucous membrane of the ipsilateral paranasal sinus.

**Materials and methods: The experimental part. Heart rate variability.** A spectral analysis of HRV was performed in rats before surgery and on 1-6 days after modeling surgical interventions in the maxillofacial region based on 15-minute ECG recordings, from which non-artifact ECG fragments were isolated, analyzed in the Biopack student lab 4.1 program. The average length of the treated ECG segments was 62±28 s. HRV analysis was carried out according to R.M. Baevsky (Baevsky R.M. et al., 2002). The total power (ms2) of HRV was estimated. The effect of humoral and suprasegmental levels of HRV regulation was assessed by analyzing very low–frequency (VLF, ms2), and the state of the PNS and SNS - by using the high-frequency component of the heart rate (HF, ms2) and the low-frequency component of the heart rate (LF, ms2), respectively, as a percentage of each frequency index of their sum, also The LF/HF ratio (vagosympathetic index) was evaluated.The control data were the results of HRV analysis obtained during testing of rats before surgery.

**Statistical data processing.** The data obtained were analyzed using Microsoft Excel, MATLAB, STATISTICA 12.6, JASP 0.14.0.0 software.

**The results of the experiment:** According to the Mann-Whitney criterion, a day after surgery in rats, LF in group 2 was significantly higher ($p<0.001$) compared to the other groups. Compared to group 1, LF was higher in group 3 ($p<0.05$). On day 2, the groups in descending order by LF were arranged as follows: 4th, 2nd, 5th, 1st ($p<0.001$) and 3rd, compared to the first group ($p<0.01$). On the third day after the operations, the highest low-frequency component was detected again in group 4, compared with the rest ($p<0.01$), between which no significant differences were detected. After 4 days, LF in group 3 was comparable to group 4, but significantly higher than in groups 1, 2 and 5 ($p<0.001$), between which no differences were found again. LF in the 1st group on the 5th day after surgery was significantly lower, compared with the 3rd ($p<0.001$) and 4th ($p<0.01$) groups. After 6 days, YES was significantly lower in group 1, compared with other groups ($p<0.001$) .

After 24 hours, according to the Mann-Whitney criterion, it turned out that the HF index was significantly lower in group 3, compared with group 2 ($p<0.05$) and group 4 ($p<0.001$). After another day, the 1st and 3rd groups did not differ from each other, but had a high-frequency component lower than in the 2nd ($p<0.05$), 4th and 5th groups ($p<0.001$). On the third day, groups 1 and 3 also had no significant differences between each other, but their HF was significantly lower compared to the other groups ($p<0.001$). HF was significantly higher in group 2 than in groups 4 and 5 ($p<0.001$). On the 4th day, the trend persisted with one difference, which was that the 2nd, 4th and 5th groups did not differ from each other and their HF was the highest among the experimental groups ($p<0.001$). After 6 days, the highest HF was observed in animals of the 5th group, compared with the rest ($p<0.001$). In group 1, HF was significantly higher than in group 3 ($p<0.001$), but lower than in group 4 ($p<0.01$). In group 3, HF was also significantly lower than in Group 4 ($p<0.001$).

The Mann-Whitney criterion showed that VLF was the highest in groups 2 and 4 a day after the iterations. In the rats of the latter, it was significantly higher than in the rats of the 2nd group ($p<0.05$). In group 5, compared with groups 2 and 4, VLF was significantly lower, but significantly

higher than in groups 1 and 3 (p<0.001). On the second day, the differences between the 2nd and 4th groups remained the same. However, the VLF in the remaining groups was significantly lower than in the 4th group (p<0.001). Three days after surgery, group 4 rats had a significantly higher VLF than the rats of the other groups (p<0.001). VLF in the 1st group was significantly higher than in the 2nd (p<0.01), 3rd and 5th (p<0.05) groups. On day 4, the highest VLF was recorded in group 4, and in group 3 it was significantly higher than in group 2 (p<0.05). After another day, the 1st and 2nd groups did not differ from each other, but had significantly lower VLF values than in the 3rd and 4th groups (p<0.05), which also did not differ from each other. On day 6, there were no differences between the groups.

The highest OM, according to the Mann-Whitney criterion, a day after surgery was in rats of the 2nd and 3rd groups, less – in the 2nd group (p<0.001), and compared with the latter, even lower – in the 1st and 3rd groups (p<0.001). However, OM was significantly higher in group 1 than in group 3 (p<0.05). On the 2nd day in the 2nd group OM was significantly lower than in the 4th and 5th groups (p<0.01), but higher than in the 1st and 3rd groups (p<0.001). After three days, there were practically no changes, compared to 2 days. OM in the first group was significantly higher than in the 3rd group (p<0.01), and the 4th and 5th groups differed from the 2nd group at p<0.05. On the 4th day after surgery, the rats of the 4th group maintained a significantly high total HRV power compared to the other groups (p<0.001).

On the fifth postoperative day, it was revealed that in the 4th group this indicator was significantly higher than in the 3rd and 5th groups (p<0.05), in which it was also higher, but in comparison with the 1st and 2nd groups (p<0.05). After 6 days, the highest OM was observed in the 5th group, compared with the rest (p<0.001).

According to the Mann-Whitney criterion, a day after operations, the highest LF/HF was observed in animals of the 4th group, compared with the rest (p<0.001), and the lowest – in rats of the 5th group, compared with the 2nd, 3rd and 4th groups (p<0.01). On the third day, the highest values were detected already in the 1st and 3rd groups, compared with the rest, and the lowest - in the 2nd and 5th (p<0.001). On the fourth postoperative day, the highest average vagosympathetic index was observed in group 3, in comparison with the other groups (p<0.001). The same was observed on the fifth and sixth days, but in the first and second groups LF/HF was significantly higher than in the 4th and 5th groups (p<0.001).

**Conclusions:** In the experiment, it was found that the most stressful are the modeling of implantation into the alveolar process of the upper jaw, modeling of sinus lifting and modeling of sinus lifting complicated by maxillary sinus, compared with modeling of septoplasty and modeling of an artificial well in the upper jaw. It was found that modeling of implantation into the alveolar process, modeling of sinus lifting and modeling of sinus lifting complicated by maxillosis in biological objects cause the greatest activity of the sympathetic department of the autonomic nervous system (an increase in the power of the low-frequency component on the 2nd postoperative day to 30.83±7.7 ms2 and 14.39 2.39 ms2, respectively), a longer period tension regulation of homeostasis up to 6 days after surgery) and centralization of nervous regulation of cardiac activity, compared with other models of surgical interventions in the maxillofacial region.

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# Changes in Heart Rate Variability after Breathing and Physical Exercises

V.A.Samsonov

**Introduction.** It is impossible to imagine all the variety of effects for our body obtained from physical exercise. But as well as physical, breathing exercises have a significant positive effect on the body. Their use is justified and proven in many areas of medical activity.

**Aim.** Our goal in the study was to study and compare the effects of respiratory and physical exercises on the cardiovascular system by determining the parameters of heart rate variability. It has long been a well-known fact that the body is able to adapt to changing environmental factors, whether it is cycling or solving an arithmetic problem.

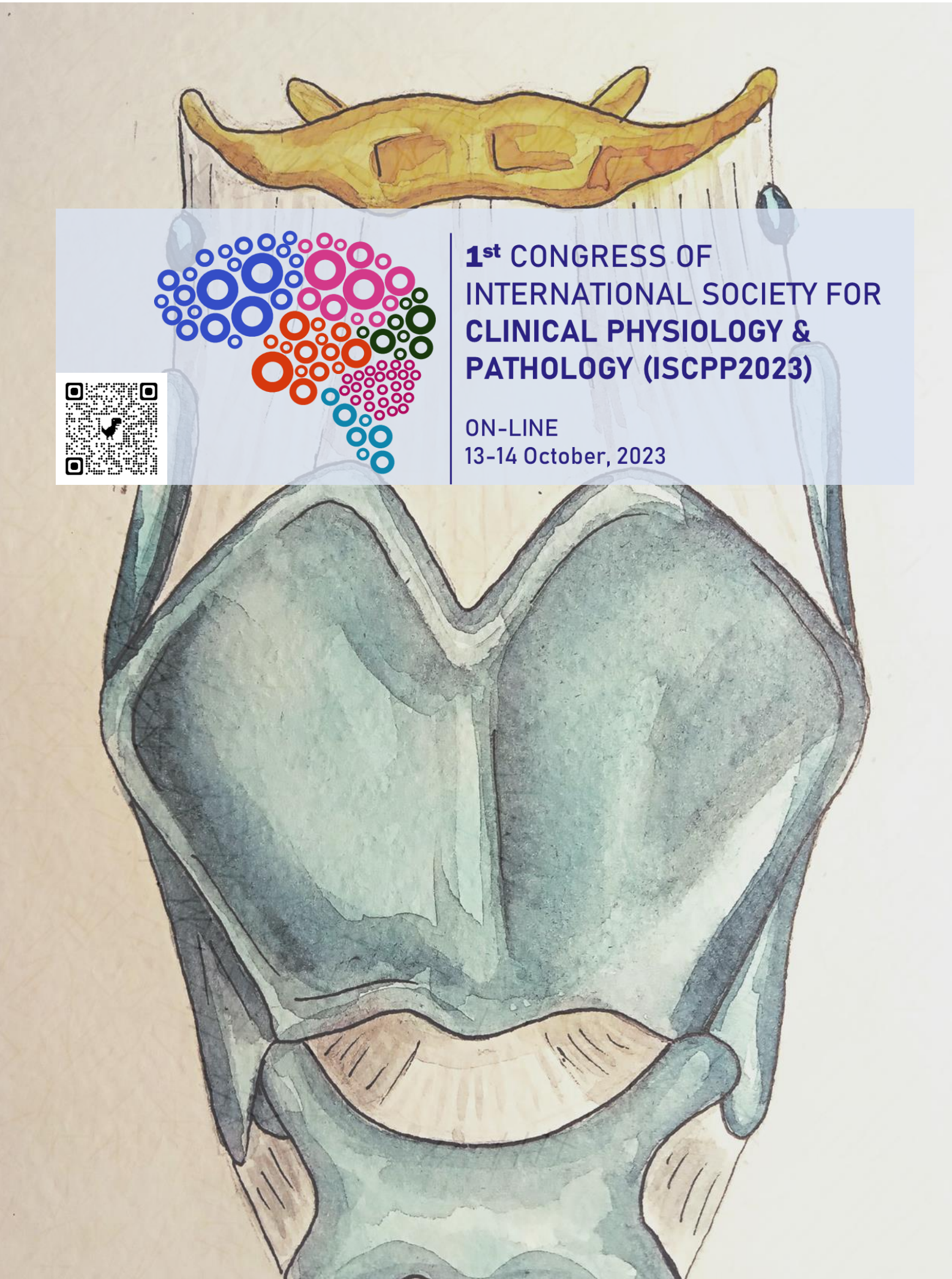
As the main method for the study, we chose the recording of 3-minute ECGs, which were performed after squatting by one group and loud pronunciation of /s/ by the other. The parameters rMSSD, LF, HF, LF/HF were extracted from the ECG and subjected to statistical analysis.

We examined 28 women and 26 men aged 19-20 years, who were randomly divided into 2 groups. The exclusion criteria were the presence of a history of cardiovascular, respiratory and cerebrovascular pathology, taking any medications on a regular basis, as well as the use of caffeine and alcohol at least 12 hours before the study. In women, the study was conducted on the 10th day before the start of the menstrual cycle

**Results.** As a result, it was found that the sequence of exercises did not affect HRV indicators. There were also no significant differences between men and women. The study identified 2 types of vascular reactions based on rMSSD.

**Conclusion.** In one group of participants, rMSSD decreased during exercise and increased after breathing exercises. The opposite effect was found in the other group.

**Content**



# 1st CONGRESS OF INTERNATIONAL SOCIETY FOR CLINICAL PHYSIOLOGY & PATHOLOGY (ISCPP2023)

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