

Estimation of the Effectiveness of the Laserotherapy Method in Patients with Chronic Rhinosinusitis after Endoscopic Surgery

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Abstract Rhinosinusitis is an inflammation of the mucous membrane of the nose and the paranasal sinuses, almost always occurs with stagnation and a violation of aeration of the paranasal sinuses. The data on the clinical and therapeutic aspects of this problem are presented. A study of the effectiveness of low-intensity laser radiation in 22 patients aged 18 to 40 years with a diagnosis of rhinosinusitis. Observations on the dynamics of clinical manifestations of the early recovery period showed that, with the exception of cases of saprophytic staphylococcus, the concentration of existing other pathological microflora was significantly reduced by 2-2.3 times, compared with intraoperative samples. In addition, some features of low-intensity laser therapy are described, and the reduction of the content of pathogenic punches on the mucosa and the regeneration of nasal cavity tissue are studied.

Keywords Endoscopy, Rhinosinusitis, Low-intensity laser therapy, Ostiomeatal complex, Bacterial microflora

1. Introduction

Rhinosinusitis is an inflammation of the nasal mucosa and paranasal sinuses, almost always caused by stagnation of secretions and impaired aeration of the paranasal sinuses (SNP). Inflammation of the paranasal sinuses is one of the most common pathologies of the ENT organs. In the last decade, the incidence of rhinosinusitis has increased almost 3 times. According to epidemiological studies, 15% of the adult population and 5% of children suffer from inflammatory diseases of the paranasal sinuses. The frequency of chronic inflammatory diseases of the paranasal sinuses remains at a high level and so far has not tended to decrease. Moreover, in recent years, there has been an annual increase in the incidence of 1.5-2.0% [5].

In recent years, the development of laser science and industry has become a strategic challenge for the world's leading countries. Currently, laser technologies work in all areas of medicine without exception: both in the field of basic research and in clinical practice. The concept of laser medicine was formed. At the same time, the development of laser medicine goes along three main branches: laser surgery, laser therapy and laser diagnostics [6].

Surgical treatment of rhinosinusitis does not exclude postoperative complications, for example, such as exacerbation of sinusitis associated with the addition of a

secondary infection or with activation due to surgical trauma growing on the mucous membranes of the nasal cavity and sinuses of the bacterial microflora. One of the ways to prevent complications in the postoperative period is the use of antibiotics, which often leads to the development of body sensitization, resistance pathogenic microflora, changes in the ciliated epithelium and their loss of functions [1,2,3]. In this regard, the search for new means of combating such manifestations of the pathological process and the development of effective methods of managing patients in the postoperative period, without prescribing antibacterial drugs, is relevant and expedient. The method, which has a pronounced anti-inflammatory, immunostimulating effect, has a beneficial effect on the processes of regeneration of the mucous membranes and helps to reduce postoperative reactive phenomena, in addition, has no side effects, is the method of low-intensity laser therapy [4,7].

The aim of this work is to study the effect of low-intensity laser radiation and its effectiveness in the treatment of patients with chronic rhinosinusitis after endoscopic operations.

2. Patients and Methods

The study was carried out in the ENT departments of the 1st clinic of SamMI and the Regional Multidisciplinary Children's Clinical Medical Center of the Samarkand region. 22 patients with an initial diagnosis of rhinosinusitis underwent:

- general clinical examination,
- endorinoscopy,
- clinical and microscopic changes examined the contents of the affected paranasal sinuses,
- computed tomography of the paranasal sinuses before and 1 year after surgery.

A pathohistological study of the material obtained during surgery from the affected sinuses was examined at the Department of Pathological Anatomy of the Samarkand State Medical Institute.

3. Results and Its Discussion

It was found that the symptomatology of the pathological process was manifested by complaints of recurrent headache - 11 patients (50.0%), difficulty in nasal breathing - 15 patients (70.5%), mucous discharge from the nose - 19 patients (86.3%), in one (5.0%) patient the disease was asymptomatic.

An objective examination of the ENT organs revealed changes corresponding to the manifestations of chronic catarrhal in one patient (4.5%) or vasomotor rhinitis in two patients (9.0%). Damage to the sinuses was accompanied by the following pathology: curvature of the nasal septum (spines, ridges, subluxation of the quadrangular cartilage) - in 14 patients 63.6% of patients, in three patients 13.6% of patients revealed pathological changes in the ostiomeatal complex (hypertrophy of the anterior end of the middle turbinate, S-shaped change in the middle turbinate, hypertrophy or pneumatization of the uncinate process, hypertrophy of the ethmoid bulla cells).

On CT of the nose and ARF, darkening of the paranasal sinuses was observed in three patients (13.6%) - ethmoid labyrinth cells in two patients (9.0%), rarely in the frontal sinuses, as well as changes such as a bulla in the middle turbinate in one patient (4.5%). The fluid level was visualized in one patient (4.5%), sometimes parietal opacities in 9 patients (40.9%). In a small percentage of cases, four patients (18.1%) had adenoid vegetations. Various types of curvature of the nasal septum were often identified in 6 patients (27.2%).

The results obtained clearly fit into the CT picture of the lesion of the paranasal sinuses, as a result of which the patients included in the study group, according to the results of computed tomography, were diagnosed before the operation: Chronic rhinosinusitis. All patients underwent surgical treatment depending on the location and severity of the pathological process in the paranasal sinuses.

Having carried out a bacteriological study in groups of patients intraoperatively, we revealed in them the presence of pathogenic and opportunistic microflora on the mucous membranes of the maxillary sinuses. At the same time, 17.01% of all examined patients were found to have associations of microbial pathogens. The most common

associations were *Staphylococcus aureus* (28.57%) and *Staphylococcus epidermidis* (14.2%).

The presence in most tissue samples removed during surgical treatment of microbial pathogens that contribute to the development of inflammation in the sinuses, aggravating the course of the postoperative period, such as *Haemophilus influenzae*, *pneumococcus*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *E.coli*, etc., raised the question of the search a method that would allow to influence the resulting microflora at the operational and postoperative stages, to avoid suppuration of the operated tissues in the postoperative period, to accelerate the repair processes, to restore the normal functions of the operated sinus as soon as possible. For this purpose, we used the method of low-intensity laser radiation in the patients we treated. We used this method in the postoperative period (3, 4, 5, 6 days).

Evaluation of the effectiveness of the impact was carried out on the basis of the following data:

Evaluated microbiological data. The lavage fluid from the maxillary sinuses for bacteriological examination was taken on the 7th day after the operation. Microbiological analysis of the lavage fluid of patients treated using this technique showed that after the operation we did not find microbial pathogens, with the exception of some cases of saprophytic *staphylococcus* (in the group of patients with pathohistological diagnosis, a true cyst and fibro-edematous polyp), the concentration of which was significantly reduced by 2–2.5 times compared to intraoperative samples. The results obtained confirmed the presence of the bactericidal effect of low-intensity laser radiation, which ultimately contributed to the activation of the repair processes of the operated tissues.

The dynamics of clinical manifestations of the early recovery period was assessed. Analysis of the manifestations of the postoperative period showed that the use of low-intensity laser radiation has a positive effect on the dynamics of clinical manifestations of the recovery period - symptoms such as headaches, tissue edema in the operation area and in the nasal cavity, paresthesias and tenderness of soft tissues in the area of operation disappeared faster. nasal breathing was restored.

Based on the concept of the unity of the mucous membranes, we limited ourselves to the study of the mucous membrane of the nasal cavity, in view of the fact that in our patients suffering from chronic rhinosinusitis. At the same time, in patients (intranasal interventions) who received low-intensity laser radiation, the decrease in the content on the mucous membranes was significantly lower (32.2%) compared with the group of patients who did not use this method (40.8%). We see a similar picture when analyzing the data obtained in the groups in which endoscopic operations were performed. The decrease in the content in the study group occurred by 28.8%, in contrast to the patients in the control group - 71.2%.

4. Conclusions

1. When analyzing the data of histopathological study, the diagnosis of chronic rhinosinusitis corresponded to the clinical diagnosis only in 58.8% of cases. In the remaining patients, pathohistological examination revealed such changes as fibro-edematous polyp or fibro-edematous polyp with cyst formation.
2. Microbiological examination of tissue samples removed during the operation made it possible to determine the presence of pathogenic and opportunistic microflora in the affected sinus.
3. Application of the method of low-intensity laser radiation (postoperative period) in the examined patients contributed to the improvement of the repair processes of the operated sinus.

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