

# Role of Hemostatic Agents in Simultaneous Surgical Interventions in the Nasal Cavity

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**Abstract:** Modern medical advances allow us to expand a range of combined surgical interventions. The literature to this day does not cover issues regarding the implementation of typical options for combined operations with deformities of the nasal septum, structures of the lateral wall of the cavity, nose, pathological processes in the hole of the paranasal sinuses; with perforated odontogenic maxillary sinusitis; racemose, sprains of the paranasal sinuses, combined with damage to the orbit. Since during combined operations the mucous membrane in various parts of the nasal cavity is injured to one degree or another, the problem of prevention and treatment of postoperative traumatic rhinitis is extremely important.

**Keywords:** simultaneous operations, diseases of the nasal cavity, hemostatic agents, paranasal sinuses.

## I. INTRODUCTION

The interdependent pathological conditions of the nose and paranasal sinuses, requiring surgical methods of treatment, prevail in practical otorhinolaryngology. One of the main reasons for this is anatomical deviations from the norm, which are either constitutionally determined, or appeared during the development of the facial skull in a particular individual, or formed as a result of traumatic injuries or diseases [1,4]. The development of highly informative research methods, the improvement of surgical techniques, the creation of effective antibacterial and biologically active drugs, advances in the field of anesthesiology and intensive care have provided new opportunities for the use of surgical methods of treatment in otorhinolaryngology and allowed to expand the range of simultaneous or simultaneous operations when several pathological conditions of the nose and PNS [2,3]. **The purpose of this publication** is to study the role of simultaneous surgical interventions in the nasal cavity and paranasal sinuses using hemostatic agents in patients with diseases of the nose and paranasal sinuses. Simultaneous operations ("simultaneous" in English - simultaneous) are complex operations aimed at simultaneous surgical correction of two or more diseases of various organs in one or more anatomical areas [1].

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Simultaneous surgery is especially necessary if there is a pathogenetic relationship between the two surgical diseases. Without simultaneous surgical correction of concomitant pathology in the postoperative period, an exacerbation of the disease is possible.

It is also necessary to note the economic effect when performing simultaneous surgical correction compared with the performance of separate operations, the bed-day is reduced by 2 times or more, the costs are reduced: examination, expenses for pre- and postoperative therapy, for anesthetic drugs [5,8]. The development of new medical technology allows doctors to perform simultaneous operations in the upper respiratory tract. Combined operations on ENT organs are performed quite often, however, this problem in the ENT practice remains poorly understood and insufficiently covered [6]. Purely simultaneous operations in rhinology are the few works of domestic authors [11]. It is important to emphasize that despite the possibilities of modern conservative therapy, the number of simultaneous surgical interventions for diseases of the nose, intranasal structures and paranasal sinuses does not decrease [7,9,12]. Modern medical advances allow us to expand the range of simultaneous operations. Simultaneous operations (combined, simultaneous) make it possible to immediately eliminate several pathological conditions of the nose and paranasal sinuses (PNSs). Tactically, it is necessary to answer three basic questions:

- to carry out the operation on all interested structures simultaneously or according to stages divided in time;
- what is the sequence of surgical benefits in relation to various structures;
- which method of analgesia will be adequate to the degree of surgical trauma [12].

The benefits of simultaneous surgery are many. Simultaneous operations relieve patients from repeated hospitalizations, anesthetic risk and associated emotional trauma, patients are in a state of temporary disability for a shorter time, postoperative factors that are unpleasant for patients are eliminated, and the total economic costs of treatment are reduced [9]. In addition, the implementation of surgical treatment in several stages is not always possible and justified for a number of objective socio-economic reasons for disagreement or non-appearance of patients for repeated operations, lack of necessary equipment, etc. [7].

A simultaneous surgical intervention aimed at restoring the aesthetic, respiratory functions of the nose and the rehabilitation of the paranasal sinuses does not lead to complications and makes it possible to obtain a reliably positive long-term result of surgical correction in 89.9% of cases [4].



The disadvantages of simultaneous operations include: the inclusion of several anatomical formations in the operating area; increase in the duration of surgery; the need for additional operational access; increased intraoperative blood loss; significant risk of postoperative bleeding; more pronounced reactive tissue changes in the area of operation; the risk of developing postoperative atrophic processes in the nose [6].

**Indications** for simultaneous operations on the structures of the nose and PNS: curvature of the nasal septum with persistent difficulty in nasal breathing, in combination with chronic diseases of the nasal cavity and PNS or severe deformation of the external nose.

### II. CONTRAINDICATIONS:

- acute or exacerbation of chronic inflammatory diseases of any etiology and localization;
- diseases of the cardiovascular, respiratory, genitourinary systems with the phenomena of cardiovascular, respiratory and renal failure;
- endocrine diseases with decompensation of functions;
- diseases of the gastrointestinal tract with gross malnutrition and liver failure;
- malignant neoplasms in the late stages;
- diseases of the blood and blood-forming organs, accompanied by an increase in the permeability of the vascular wall and a violation of the blood coagulation system.

The listed indications and contraindications are not absolute. In each specific case, the expected positive effect is predicted, which the planned operation will provide, as well as the possibility of preventing its undesirable consequences. Also taken into account the psychological attitude "and the wishes of the patients [10].

When determining the sequence of operations, it is advisable to adhere to some general principles, which are determined not only by the anatomical and physiological changes, but also by the wishes of the patient, as well as by the capabilities of this medical institution and the professional training of surgeons [11].

The multiplicity of surgical interventions (simultaneous or repeated) depends on the indications and contraindications indicated below [12].

In the work of some authors believe that (2006), when examining 280 sick children with appropriate pathology, the following sequence of surgical treatment sequence algorithm was developed: septoplasty - correction of the middle turbinates - endoscopic surgery on the paranasal sinuses - tonsillectomy - endoscopic adenotomy-rhinoplasty - correction of the lower nasal concha. Accordingly, the necessary amount of surgical intervention for each patient is selected, but the order of their implementation is preserved [5].

The pronounced curvature of the nasal septum is one of the most common local factors combined with the pathology of PNSs. Difficulty in nasal breathing leads to a change in mucociliary clearance and creates the prerequisites for the occurrence of inflammation in the PNS. In this regard, there is a need for sanitation of the focus of chronic infection and anatomical correction of intranasal structures [12].

In case of damage to the mucous membrane of the nasal cavity, rough manipulations, surgical interventions,

tamponade, exposure to mechanical, thermal, chemical or physical irritants, traumatic rhinitis develops [8].

For the prevention of complications, treatment in the postoperative period is important. The most difficult for the patient are the first - second day after surgery, while tampons are in the nasal cavity or sinus. Naturally, simultaneous operations entail significant pain in the patient directly in the intervention area and headaches. In addition, reactive tissue edema and fever aggravate suffering [3,6].

Analgesics often do not solve the problem of the first days of the postoperative period. The situation changes significantly after the use of non-steroidal anti-inflammatory drugs, especially the latest generation (based on ketoprofen), arthrostyle. Having an equally pronounced anti-inflammatory, antipyretic and analgesic effect, these drugs, used as injections or rectal suppositories, improve the patient's well-being, significantly reduce the severity of reactive manifestations in the operation area [2].

Since the removal of tampons some authors believe that recommended the introduction (for 30-40 minutes) of cotton wicks with ointment of the following composition: ephedrine hydrochloride 0.6; diphenhydramine 0.2; sodium bicarbonate 2.0; novocaine 0.6; anestezin 0.2; thiamine bromide 0.1; 30% solution of tocopherol acetate 1.0; menthol 0.1; lanolin 10; 0; petroleum jelly 10.0. This ointment, thanks to its simple components, has anti-inflammatory, vasoconstrictive, analgesic, mucolytic effects, promotes regenerative processes.

In some patients, after simultaneous operations, more pronounced and prolonged reactive phenomena were noted, especially with a combination of interventions in the nose and PNS; part had intra- and postoperative blood loss; more often there were reversible and persistent atrophy of the mucous membrane; there were several cases of the development of purulent process in the operated sinuses [10].

It is believed that when choosing an antibiotic for the prevention of postoperative infections, it is advisable to give priority to cephalosporins, which have a fairly good spectrum of antimicrobial activity and high efficiency [4,9].

The use of ceftriaxone for perioperative prophylaxis after "clean" rhinosurgical interventions significantly facilitates the postoperative period, reduces the severity of reactive phenomena in the nasal cavity, reduces the number of complications, length of hospital stay, disability and the need for antibiotic postoperative prescription [5,7].

The combination of topical application of a 0.01% solution of miramistin with the appointment of antibiotics is an effective comprehensive method for the prevention of postoperative infectious complications after planned operations in the nasal cavity [3].

The negative effects of simultaneous operations required not only correction of the algorithm of surgical interventions and the most sparing attitude to the structures of the nose and PNSs, but also to the formation of a medical complex that would prevent or significantly reduce these effects.

It includes non-steroidal anti-inflammatory drugs, modern local and general mucolytics, drugs that accelerate the regeneration of the mucous membrane.

Gentle removal of tampons from the nose and PNSs, early (2-3 days after surgery) washing of PNSs and removal of mucous-bloody crusts from the nose complement this complex. In order to prevent purulent inflammation in the combination of chronic sinusitis with curvature of the nasal septum, a course of antibiotic therapy is used for 7-10 days, starting 1-2 days before surgery. All this gives positive results. In the future, the functional results and the proportion of postoperative complications practically do not differ from those in multi-stage operations [7].

Thus, simultaneous operations with a combined pathology of the structures of the nose and PNSs make it possible to obtain sanitizing and functional effects at an earlier date than with multi-stage interventions. The rational choice of anesthesia and management of patients in the postoperative period prevents the possible negative effects of simultaneous operations. All this prompts preference for simultaneous operations in the treatment of combined pathology of the nose and PNS [2].

Thus, the analysis of literature data on combined (simultaneous) endonasal operations shows that many unresolved issues remain in this problem. Pointing to the need for simultaneous correction of deformation of the nasal septum and structures of the lateral wall of the nose, the work does not analyze the questions of which combined operations are performed on the lateral wall depending on the type of deformation of the septum, what is their volume and what is the sequence. There is also no information on simultaneous operations with perforated odontogenic maxillary sinusitis, what is the algorithm for their implementation. Until today, with this pathology, which is located on the border of two specialties (maxillofacial surgery and otorhinolaryngology), in the vast majority of cases, an organ-destructive operation on the maxillary sinus is performed without analyzing the state of the structures of the ostiomeatal complex (OMC) and the nasal septum.

The question of combined operations during endonasal surgical interventions during cystic distention of the paranasal sinuses, which are among rare but difficult diseases, often leading to damage to the orbit, anterior cranial fossa, is not covered. The lack of work on combined operations for cystic stretching of PNSs is largely due to the fact that to date, the vast majority of surgeons in the surgical treatment of this disease use a traumatic extranasal approach.

An important and far from unresolved problem when performing combined operations is the prevention and treatment of postoperative traumatic rhinitis. Some authors believe that in uncomplicated cases it is inappropriate to use parenteral administration of potent antibiotics that have an inhibitory effect on the immune system [6]. It is necessary to develop and improve methods of local prolonged antibacterial exposure to the microflora of the mucous membrane of the nasal cavity in the postoperative period [8].

During the operation, each surgeon should have a clear idea of the anatomy of the organ being operated on and its relationship with other surrounding organs. This is especially important when performing simultaneous operations, when the operating surgeon in the process of eliminating the pathological process, it becomes necessary to work on various anatomical structures, each of which carries a certain functional load.

The study of the anatomical and functional features of organ systems and their individual parts is necessary in order to choose the right method for restoring function in case of their disease. Therefore, the task of the surgeon, based on knowledge of the anatomy and its functional significance, using modern medical technology, to ensure the most rational and safe execution of operations, as well as to maintain or restore the functions of the affected organ. The nasal septum, the structures of the lateral wall of the nasal cavity play a key role in the functional and clinical terms; anastomosis of the paranasal sinuses. It is on these anatomical formations that the surgeon has to; perform a complex of surgical interventions in order to eliminate the pathological process in the nasal cavity, PNS, and organs surrounding them.

Based on the foregoing, we can conclude that many factors are important in. Therefore, it is necessary to take into account all etiopathogenetic factors, taking into account the individual approach to predicting and treating remission of chronic kidney disease.

Most researchers focus on the variety of mechanical methods of stopping nosebleeds, while at the same time, when providing assistance to such patients, it is necessary to take into account the pathogenetic mechanisms of the development of this pathology [3]. Under normal conditions, with damage to the vascular wall, the tissue activator profibrinolysin enters the bloodstream, which ensures the localization of the blood coagulation process at the site of damage to the vascular wall. At the same time, fibrinolysis inhibitors entering the bloodstream prevent the spread of this process to the entire vascular bed. When plugging the nasal cavity due to mechanical compression and the inevitable damage to more vessels, vascular hypercoagulation factors are realized [2], while the gauze structure acts as an artificial matrix of a blood clot. This leads to disruption of the natural mechanisms of hemostasis due to both a greater release of proteolytic enzymes from the formed elements of the clot promoting its lysis and activation of fibrinolysis due to a gradual decrease in the concentration of fibrinolysis inhibitors at the site of damaged tissue [1,3]. Relapses of bleeding are often associated precisely with these types of disorders of the hemostatic system [2].

From the foregoing it follows that with nosebleeds, it is advisable to use local hemostatic agents that induce adhesion and aggregation of plasma platelets, as well as activating blood coagulation factors in their physiological sequence [7,11]. In this regard, in the treatment of nosebleeds, local hemostatic agents — based on collagen, alginic acids, cellulose derivatives, metal-based products, fibrin adhesives, and others [6] are worthy of attention.

In clinical practice, hydrogel films based on polyvinylpyrrolidone are used. A feature of hydrogels is an increase in their volume by 300% while maintaining the rigidity of the material upon contact with a liquid medium [5,8], i.e. hemostasis is achieved by mechanical compression of bleeding vessels in the nasal cavity and is identical in principle to tamponade.



In this case, the material sorbes the decay products of the formed elements of the blood clot, preventing the activation of local fibrinolysis and the development of reactive edema of the nasal cavity [5,8]. Alginate films and merocele act in a similar way, increasing by 2-3 times upon contact with water and being structured into a gel state, which allows them to mechanically compress bleeding vessels [12]. Some authors did not find significant differences in the time of stopping nosebleeds in groups of patients using Merocele and pneumotampon, while patients noted a subjectively more pronounced discomfort when using Merocele [10]. Aerosols based on methacrylic acid - Statizol and Tsimesol - are widely used in the clinic. When sprayed in the nasal cavity, these substances form an elastic adhesive film on the mucosa, however, such a film is retained for no more than a day [9]. There are few experimental works on the use of cyanoacrylate compositions in patients with nosebleeds, during the application of which hemostasis was achieved within 150 seconds [5]. Some authors point to the high effectiveness of the QuickClot hemostatic agent for stopping nosebleeds [3]. According to some authors, the use of a hemostatic collagen sponge to stop nosebleeds is effective, but limited due to the low fixing ability to the source of bleeding. At the same time, the authors noted the high effectiveness of the tachocomb preparation, which allows for 1 minute to achieve a stable hemostatic effect in case of recurrent nosebleeds from the Kisselbach zone in 20 patients [4]. Some authors report the successful use of zhelfoam in cases of low intensity anterior nosebleeds. According to some authors, the surzhitsel remedy was effective in 8 patients with bleeding from the posterior parts of the nasal cavity, and according to some authors, the tool showed high efficacy in nosebleeds associated with coagulopathy in children [2]. According to studies, when applying fibrin glue, it was possible to stop nosebleeds in 2 minutes 30 seconds, while the tool was effective in both front and rear nose bleeds. Compared with chemical and electrocoagulation methods, as well as with nasal tamponade, such advantages as more reliable hemostasis, the absence of recurrence of bleeding, pain, inflammatory and atrophic changes in the nasal mucosa (including long-term after manipulation) were noted. Also, the use of fibrin glues is effective for nosebleeds against the background of hereditary telangiectasia and coagulopathies [6,8]. The use of floseal fibrin glue for persistent nosebleeds allowed to reduce the number of bleeding relapses compared with gauze tamponade from 40% to 14%, relieving patients of the need for occlusion of the great vessels, and also proved effective in surgical interventions in the cavity [11].

### III. CONCLUSION

Thus, despite the variety of techniques for stopping nosebleeds (cryotherapy, chemical cauterization, drug exposure, the use of pneumotampons, etc.), most of them are used less often than gauze tamponade due to their lower effectiveness and complications. Obviously, tubeless methods for stopping nosebleeds seem more physiological [12,13]. Many modern techniques (endoscopic mono- and bipolar coagulation, endovascular x-ray occlusion of the great vessels) are also not without their drawbacks, so the search for reliable and safe hemostasis for nosebleeds continues to be an urgent problem of otorhinolaryngology [10,14,15].

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