ASSESSMENT OF MOMETASONE FUROATE EFFECTIVENESS FOR PREVENTION OF INFLAMMATORY COMPLICATIONS AFTER SINUS LIFT SURGERY

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ABSTRACT — This article focuses on the functional changes in nasal breathing that occur after the sinus lift surgery, registered by anterior active rhinomanometry. Also, the authors of the study evaluated the effect of mometasone furoate on the postoperative period.

KEYWORDS — maxillary sinus, sinus lift surgery, nasal septa, mometasone furoate, anterior active rhinomanometry

INTRODUCTION

The use of implant-supported dental dentures is currently the standard in the functional and cosmetic rehabilitation of patients with missing teeth [1–7]. However, in many patients, implant placement is not possible without prior reconstructive surgery aimed at restoring bone volume in the alveolar process of the maxilla. To solve this problem, the most common osteoplastic surgery performed in the distal upper jaw is the sinus lift [13]. The lack of medical history, diagnosis of the pathology of the maxillary sinus and the structures of the osteomeatal complex at the preoperative stage is one of the main reasons for the development of the chronic inflammatory process after reconstructive interventions performed by the oral surgeon [14, 16, 17].

It was established that morphological changes in inflammation of the mucous membrane of the maxillary sinus are chronic. It is known that morphological changes due to inflammation of the mucous membrane of the maxillary sinus are chronic. The results of histological studies of features posttraumatic processes in the mucosa of the maxillary sinus in an experiment on animals have shown that a fracture of bone wall causes the development of alternative, exudative inflammation of the sinus mucous membrane, which is expressed in the formation of edema immediately after the injury, followed by its increase up to the seventh day. In the more remote periods, 4 weeks after injury, mucous membranes of the post-traumatic process with signs of metaplasia of the multi-row epithelium predominate with a stratified squamous cell and hyperfunction of the glandulas of the sinus [9–11].

In addition, the development of postoperative edema of the mucous membrane may contribute to the inhibition of the functions of mucociliary clearance and block the natural fistula of the maxillary sinus with the middle nasal passage [15]. Topical steroid drugs have proven themselves in the treatment of acute sinusitis, and in the prevention of the development of inflammatory complications and relapses after surgical interventions on the upper respiratory tract. The pronounced anti-inflammatory and anti-exudative effects of this group of drugs are an important condition for maintaining the functional integrity of the osteometal complex structures in the postoperative period [8, 12].

Aim

The aim of the study was to study the functional changes in nasal breathing in the postoperative period after sinus lift surgery and the impact of mometasone furoate.

MATERIAL AND METHODS

In the period from 2016 to 2019, 60 patients with partial and complete absence of teeth in the distal parts of the upper jaw were diagnosed and treated. Patients planned to manufacture implant supported dentures. Due to the insufficient vertical size of the bone tissue of the alveolar process in these areas and its low density, the patients were planned to undergo the sinus lift surgery using the lateral wall window method.

All patients underwent cone-beam computed tomography on the Vatech apparatus (South Korea) preoperatively, consultation of an ENT doctor. Based on preoperative diagnosis, abnormalities of the structures of the nasal cavity and osteomeatal complex on

the side corresponding to the planned operation were revealed in 30 patients. These included the curvature of the nasal septum (27 patients, 90%), pathology of the middle turbinate (14 patients, 46.7%), hypertrophy of the hooked process (5 patients, 16.7%), hypertrophy of the ethmoid vesicle (6 patients, 20%), Haller cells (1 patient, 3.3%), thickening of the nasal mucosa (19 patients, 63.3%) (Fig. 1).

Fig. 1. *Cone-beam computed tomography of a patient with severe deviation of the nasal septum to the left*

These patients formed a group I where a mometasone furoate (Nasonex) was added to the course of standard medical therapy prescribed after surgery by the ENT doctor to prevent possible obstruction of the natural fistula as a result of mucosal edema and the development of further complications. The dosage was 200 mcg per day (2 inhalations in each half of the nose 1 time per day). The drug was started 3 days before the operation to achieve a cumulative effect in the mucous membrane of the nasal cavity and maxillary sinus, and lasted until the 30th day postoperatively. Patients in the control group II (30 people) had no abnormalities in the anatomy, and they received standard therapy, including antibacterial drugs (Augmentin 875 mg — 1 tabular 1 hour before surgery, then 1 tab 2 times a day for 7 days), selective nonsteroidal anti-inflammatory drugs as painkillers (Nimesil — 1 pack with pain), antihistamines to reduce the effects of postoperative inflammatory reactions of traumatic origin (Erius — 1 tabl once a day for 3 days), nasal decongestants (Tizin Xylo — 1 inhalation 2 times a day for 7 days).

For the determining the functional integrity of the structures of the nasal cavity and evaluating the effectiveness of mometasone furoate, all patients underwent anterior active rhinomanometry using the ATMOS Rhino 300 apparatus.

The device allows determining the volume of the air flow and resistance separately for the right and left half of the nose, total flow (Fl.L+R) and total resistance (ResL+R), calculated by the device automatically by the formula R=ΔP/V. Free breathing is considered when Fl.L+R is more than 700 ccm/sec and ResL+R is less than 0.29 Pa. The values of the total volume flow and the total resistance for which occur violations of nasal breathing are presented in Table 1.

Table 1. *Degree of nasal obstruction*

Degree of nasal obstruction	Fl.L+R (ccm/sec)	ResL+R (Pa)
I (slight disturbances of nasal breathing)	699–500	0,29–0,39
II (moderate nasal breathing problems)	300–499	0,4–0,49
III (severe nasal breathing disorders)	Less than 299	0,5 and more

Anterior active rhinomanometry comprehensively and objectively using numbers and graphs allows you to assess the state of nasal breathing, determine which half of the nose breathes better and how much, whether the Fl.L+R figures are at or below the norm, whether volume flow increases in the right and left halves of the nose with increasing pressure or not, how high is the nasal resistance.

The quantitative variables were described by the following statisticians: the number of patients, the arithmetic mean value (M), the standard deviation from the arithmetic mean value (∂). Qualitative variables were described by absolute and relative frequencies (percentages). Differences were considered statistically significant at an error level of $p < 0.05$. The calculation was performed on a personal computer using the Numbers application.

RESULTS

All patients underwent a sinus lift using the lateral wall window method. Repeated anterior active rhinomanometry was performed on the 3rd and 30th days of the postoperative period prior to daily usage of nasal drugs. The research results are presented in Table 2.

Table 2. *The average values of the total flow (Fl.L+R, ccm/sec) and total resistance (ResL+R, Pa) in patients of the studied groups at different stages of treatment (n=60)*

	Preoperatively		3rd day post-op		30th day post-op	
	Fl.L+R	ResL+R	Fl.L+R	ResL+R	Fl.L+R	ResL+R
Group I	605,80±52,75	0,34±0,05	571,43±89,62	0,37±0,05	597,60±69,75	0,34±0,04
Group II	755,17±32,19	0,24±0,03	669,70±89,27	0,29±0,05	731,30±56,98	0,25±0,04

DISCUSSION

Analysis of the total volume flow (ccm/ses) and total resistance (Pa) in patients who were prescribed Nasonex in the postoperative period showed that on day 3, the reduction in Fl.L+R compared to the preoperative values was 5.67%, while the ResL+R increased by 9.52% (Fig. 2).

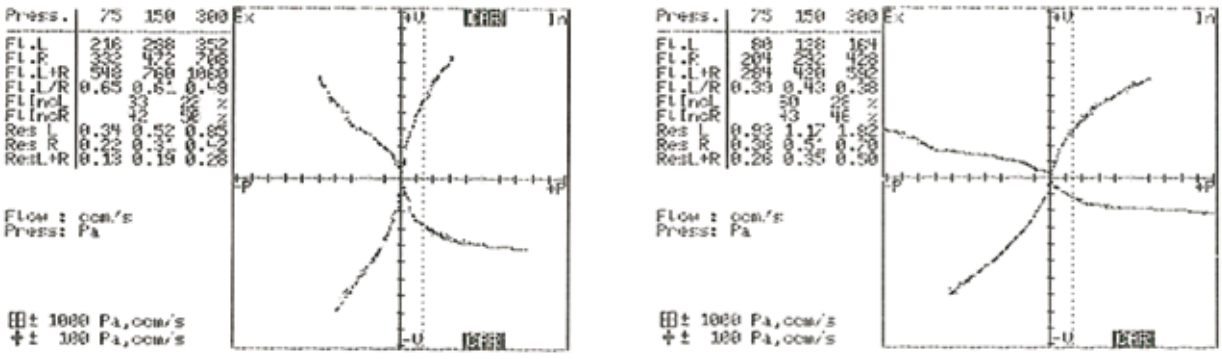

Fig. 2. *Research results of anterior active rhinomanometry*

In the group of patients who did not receive the mometasone furoate Fl.L+R, in the same period of time, decreased by 11.32%, while the ResL+R increased by 20.81%. These differences were significant ($p < 0.05$). On the 30th day of the postoperative period, the values were as follows: in group I patients, there was a decrease in Fl.L+R, compared to the preoperative, by 1.35%, an increase in ResL+R, by 1.28%; in group II, the difference in Fl.L+R was 3.16%, ResL+R — 5.73%. Graphs of changes in the values of the total volume flow and the total resistance at various stages of treatment are shown in Fig. 3.

CONCLUSION

The sinus lift surgery is associated with a large amount of injury caused by damage to the bony walls of the maxillary sinus and the separation of its mucous membrane. Edema that develops in the postoperative period can lead to obstruction of the natural fistula, especially in the presence of a concomitant pathology of the nasal cavity. The mometasone furoate, prescribed in the course of accompanying drug therapy, has a pronounced anti-exudative effect and has a positive effect on maintaining the functional integrity of the structures of the nasal cavity and osteomeatal complex. This allows to reduce the number of inflammatory complications resulting from impaired drainage and sinus aeration in the postoperative period.

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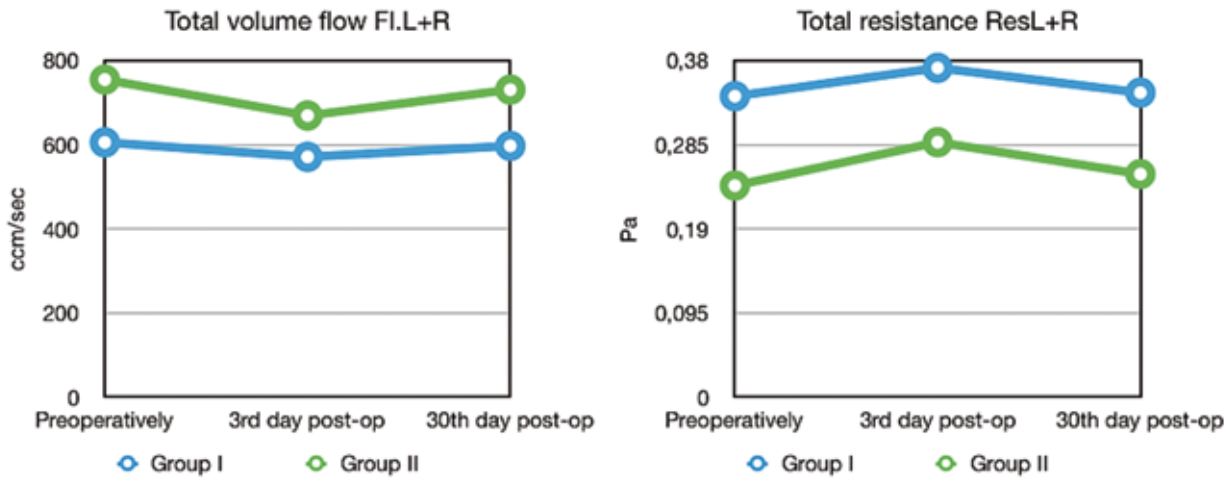

Fig. 3. *Graphs of changes in the total volume flow (ml / s) and total resistance (Pa)*

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