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Treatment Results Of Sinusitis And Post-Surgical Reactions Of Nasal Polyps

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Abstract

Background. Despite the fact that nasal polyps were described in Egyptian medical literature more than 4,000 years ago, cases of their occurrence are not rare, and the pathogenesis of their origin is not clear. Despite the most successful medical manipulations and operations on the paranasal sinuses, physicians and sinusitis specialists often encounter patients with re-occurring nasal polyps or with postoperative early recurrence.

The study object. Analysis of the effects of sinusitis and recurrent nasal polyps in the long term (24 months).

Participants. We studied 92 patients with sinusitis with recurrent nasal polyps. The examination and therapy were carried out at the National Otorhinolaryngological Hospital, Hanoi, Vietnam.

Results. We evaluated the long-term outcome of the polyposis rhinosinusitis treatment. A positive dynamic was observed after 12 months after surgery. The number of patients with a loss of smell had decreased from 38% to 25.3%. However, after one year many patients with a runny nose of 17.2% and nasal congestion of 10.2% appeared. It is a predictor of polyp formation in the future. It was confirmed in the long term. Recurrence of polyposis formation was observed in 1/10th of the operated patients.

Conclusions. Despite few complaints, 82.8% of patients had a favourable outcome after surgery, whereas an unfavourable outcome was registered in only 9.2% of patients.

Keywords: otolaryngology, sinusitis, nasal polyps, post-surgical conditions, post-surgical recurrences

Introduction

Despite the significant advances in modern medicine, polyposis rhinosinusitis (PRS) is a chronic rhinosinusitis with polyps. It is a common pathology prone to a progressive and often relapsing

course not only in adults, but also in children. Although the pathology in children is quite rare [1, 2, 13]. It should be noted that nasal polyps have been described since Egyptian medical literature (more than 4,000 years ago). PRS is not a new problem, it is multicomponent and affects about 4% of the world's population. In addition, 40% of people have a predisposition to its development. Mostly, the disease occurs in the age group over 30, with a prevalence in patients aged 50-60. Men are more susceptible to such disease [1, 6, 7, 24, 29].

There are local forms of polyposis such as nasal solitary polyps, anthrochanal polyps (polyps coming from cysts of the paranasal sinuses), polyposis of a single paranasal sinus (polyposis sinusitis), and diffuse forms characterized by lesions of the mucosa of all paranasal sinuses [19, 26]. Local forms of polyposis occur due to anatomical anomalies of the nasal structure, leading to breathing disorders (curvature of the septum, anomalies of the ostiomeatal complex, anatomical formations of the middle nasal passage). In such a case, the air jet with micro-organisms and various particles striking a certain area of the mucous membrane causing its local irritation. Swelling occurs. If the swelling develops at the natural orifices of the paranasal sinuses, the self-cleansing processes are disturbed and favourable conditions for the reproduction of micro-organisms are created, which is manifested by the development of an inflammatory process. Single polyps can occur in the presence of certain etiological conditions in the paranasal sinuses themselves, for example, additional openings in the maxillary sinuses as well as cysts. Thus, anthroanal polyps occur, growing out of a cyst of the paranasal sinuses and spreading towards the exit of the nasal cavity (into the choana).

A chronic purulent inflammation of the mucosa of the paranasal sinuses is an independent mechanism of polyp formation. In such a case, polyposis is a secondary process in the affected sinus [9].

Diffuse forms of polyposis rhinosinusitis are a systemic pathology associated with changes in immune reactivity. The development of a diffuse process can be promoted by fungal infection [6, 11].

Polyposis develops gradually. It often occurs against a background of frequent acute respiratory infections, recurrent sinusitis (inflammation of the paranasal sinuses). Nasal breathing becomes difficult, sometimes on one side, causing patients to use vasoconstrictor drops, which are ineffective. Nasal congestion increases, the sense of smell decreases and there is poor nasal discharge. In such case, the mechanism of polyps is caused by hypertrophy of the nasal mucosa and the paranasal sinuses [27, 34].

Hypertrophy of the mucosa occurs as a protective reaction in chronic inflammation caused by infectious or allergic processes. It should be noted that the nasal mucosa is continuously renewed and the nasal cavity and paranasal sinuses are constantly exposed to external influences that often have a damaging and wounding effect. High cell division activity of the mucous membrane may cause

the development of neoplasms, which may malignise (become malignant) if left untreated and if there are provoking factors. Consequently, polyp formation is not a spontaneous process, but a response of the mucosa to chronic irritation [24, 34].

Risk factors for the formation of polyps

- Allergic reactions and respiratory tract diseases**.** There are few data in the literature on the relationship between allergy and PRS in children. Despite the proven positive correlation between bronchial asthma and PRS, the mechanism of influence of asthma on the formation of nasal polyps remains unclear [2, 8, 11, 22]. Impaired arachidonic acid metabolism (aspirin intolerance) is the most important causative factor in the development of PRS in adults. The presence of such condition is common for people over 40 years old, and, in addition to the aggressive growth of nasal polyps, is usually accompanied by the presence of non-atopic bronchial asthma. For example, the proportion of patients with abnormal arachidonic acid metabolism is 36-44% of patients with PRS [2, 22].

- Mucoviscidosis (cystic fibrosis). There is evidence of an extremely high prevalence of nasal polyps in children suffering from a mixed or respiratory form of cystic fibrosis (84.6%) [2]. Also, about 37% of adult patients with mucoviscidosis have nasal polyps [2, 23].

- Viral and bacterial inflammatory processes**.** Infections caused by bacteria are a frequent complication of viral infections of the ENT organs. It is due to congestion of the secretion, as well as tissue oxygen starvation [10]. In some cases, secondary bacterial infection joins the inflammation: Streptococcus spp., Pneumococcus spp., Haemophilus influenzae, Moraxella catarrhalis, or Staphylococcus spp. An apical abscess of the maxillary teeth is often the cause of inflammation when the inflammation spreads to the surrounding soft tissue [11].

- Mycosis inflammation**.** The role of fungi of the Alternaria genus as an etiological factor in PRS is still controversial. The onset of symptoms of fungal sinusitis is often the result of long-term use of antibiotics [28]. Antibacterialsmedications induce changes in the microflora of the biofilm in humans. It should be noted that microscopic fungi are insensitive to most antimicrobials used in bacterial infections [21]. Inflammations provoked by fungi of the Aspergillus, Sporothrix, Mucor, Pseudallescheria genus may have a chronic course and are more likely to affect elderly and immunosuppressed patients [8].

Aspergillosis and candidiasis can manifest as polyposis in the nasal cavity, causing mucosal hypertrophy. Treatment of such pathology often requires surgical intervention and the use of amphotericin B, as well as voriconazole, with echinocandin (depending on the etiology of the disease) [21, 30].

- Curvature of the nasal septum.

Smoking, alcohol abuse**.** Smoking is a form of substance abuse. When a cigarette is puffed, the temperature at the end of the cigarette reaches 60 degrees and higher. Under these thermal conditions, tobacco and tissue paper are smoked, producing about 200 harmful substances, including carbon monoxide, soot, benzopyrene, formic acid, hydrocyanic acid, arsenic, ammonia, hydrogen sulphide, acetylene, resins, formaldehyde and radioactive elements. Passing through the respiratory tract, tobacco smoke causes irritation, inflammation of the mucous membranes of the pharynx, nasopharynx, trachea, bronchi and lung alveoli.

Alcohol is a specific poison that has a depressing effect on the central nervous system. Ethanol, after entering the body, immediately penetrates into the bloodstream, affecting all internal organs. Alcohol impairs blood saturation and also provokes hypertrophy of oral and nasal mucosa epithelium, and impaired mucus drainage may not only cause chronic inflammatory processes in nasal cavities, but also predictor of polyp formation in nasal cavities [10, 20, 26, 35].

- Heredity. Polyposis is often a characteristic disease in a family history. Accordingly, nasal mucosal reactions develop to chronic external irritation in the presence of a genetic predisposition [6, 7].

Moreover, polyposis is a chronic and progressive disease. Once formed, the polyp begins to grow slowly, and after a certain period of time the bunches of polyps lead to difficulty in nasal breathing and impaired sense of smell. Patients with nasal polyposis complain of nasal breathing disorders that have been developed gradually and are persistent. Very often there is a profuse, clear, frothy nasal discharge. Polyps can start growing from anywhere on the mucosa, but they most often originate from the cells of the lamina. Polyps are a consequence of chronic irritation of the nasal mucosa, or an allergic process or infection. Polyps can be removed dozens of times, but until we find the reason that caused their growth, the process will be endless [4, 26, 32].

- Harmful influence of the environment. Sinusitis can occur due to regular inhalation of toxic and chemical compounds (e.g. during work in a harmful industry) [3].

- Concomitant diseases. The risk group for chronic sinusitis includes individuals with vasomotor rhinitis. Their nasal mucosa is severely swollen, causing recurrent inflammation [3,30].

Treatment of PRS

The complexity and incomplete study of the etiology and pathogenesis of PRS make the problem of treatment of this pathology still unresolved [18, 23, 26, 35]. There is no doubt that the treatment of chronic rhinosinusitis with polyps (excluding large solitary polyps) should start with medication therapy [5, 15, 25, 37]. In both adults and children, surgery should be used only when conservative treatment is ineffective [2, 17, 33]. However, modern intranasal surgery, such as the

use of endoscopes and soft tissue shavers, makes it possible to remove polyps and pathological contents from all affected paranasal sinuses, following the principles of minimal invasiveness.

Despite all the modern advances in rhinosurgery, the issue of polyposis recurrence remains unresolved. It is one of the reasons why conservative treatment is primary and mandatory preoperative medication preparation with postoperative treatment is generally accepted [1, 2]. In diffuse forms of polyposis rhinosinusitis, treatment is mainly conservative. Hormonal corticosteroid therapy is fundamental, which can be local, systemic, or represent different combinations of these two methods [2].

Polyposis is treated according to the following algorithm:

1. Diagnosis (culture for bacterial and fungal microflora, allergodiagnosis, computer tomography of the sinuses).
2. Surgical treatment.
3. Antiretroviral therapy, depending on the results of allergy diagnosis and bacteriological tests.

Each of the three treatment phases is equally important. It is possible to perform surgery brilliantly and remove all polyps, but if the reason that caused them is not eliminated, there will be a recurrence [6, 18, 24].

Local recurrences after correctly performed surgery are rare. The aim of surgery is the removal of nasal polyps, correction of intranasal structures with enlargement of natural openings of the paranasal sinuses, to ensure better penetration of local hormonal medications into the affected sinuses. Moreover, according to many foreign specialists, maximum removal of all polyps does not prolong the asymptomatic period of polyposis and does not improve the quality of the patient's life.

If conservative treatment is ineffective, surgical intervention (maxillary sinus surgery, ethmoidotomy or sphenotomy) may be necessary to improve the ventilation of the sinus and improve the drainage of mucopurulent discharges. Epithelial masses and hypertrophic mucosa may be removed. Such interventions are usually performed intranasally using an endoscope.In chronic frontiers, according to indications, it is possible to use the osteoplasty method or endoscopic opening of the sinus.

More and more often, computerised interventions are used during surgeries to identify the location of the lesion and to prevent damage to adjacent structures (e.g. eye and brain). Nasal obstruction, which contributes to poor drainage, may also require surgical intervention [3, 17, 18, 33].

The aim of our research was to investigate the effects of sinusitis treatment and the postsurgical reactions of nasal polyps in patients.

Research materials and methods

A prospective study was conducted in which each case was described for a period of two years after surgery. The study was conducted at the National Otorhinolaryngology Hospital in Hanoi, Vietnam.

Age and gender composition of patient groups

The study included 92 patients diagnosed with polyposis rhinosinusitis. The study group consisted of patients of both sexes with ages ranging from 15 to 55 years and older.

This group of patients with detected nasal polyps was divided into three groups according to the age criterion:

- from 15 to 35 years old;
- from 35 to 54 years old;
- patients who are older than 55 years old (Table 1).

Table 1. Age distribution of the group of patients diagnosed with polyposis rhinosinusitis (N = 92)

Age, years	**15-34**	**35-54**	**≥55**	**Total**
Number of patients	33	30	29	92
Ratio, in (%)	35.9	32.6	31.5	100.0

The group of patients with PRS differed in terms of gender. The male to female ratio is shown in Figure 1.

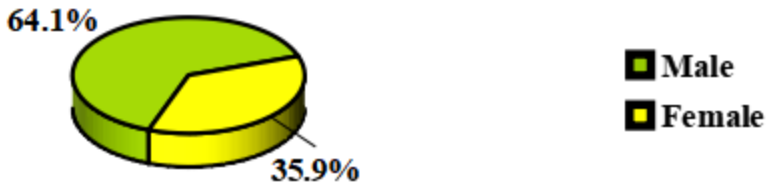

Figure 1. Distribution of the patient sample by gender

Inclusion criteria for the study:

1. Diagnosed polypoid rhinosinusitis.
2. Age is over 15 years of age.
3. Agreement to non-personalised processing of pathology outcome data.

Exclusion criteria:

1. Refusal to participate in the experiment.

2. The presence of concomitant chronic pathologies that may affect the course of the disease and treatment outcome (diabetes, immunodeficiency).

We dynamically evaluated 92 patients treated for polyposis rhinosinusitis who underwent surgery at the National Otorhinolaryngological Hospital, Hanoi, Vietnam.

About 90 patients were followed up for a year after paranasal sinus polypotomy. We also examined the health status of 28 patients 24 months after nasal polypotomy.

Results and their discussion

In the case of local polyposis, surgical treatment is the priority. The modern surgical treatment methods for such pathology are functional endoscopic surgical interventions. Under the control of optical systems, only the polyposis-altered mucosa is completely removed. The anatomical preconditions for the occurrence and recurrence of the disease are simultaneously eliminated (correction of the nasal septum, expansion of natural arrows of the paranasal sinuses, elimination of additional openings) [3,17,30,33,37].

At the first stage of observation, we assessed the patient's condition when he was discharged from the hospital.

Presence of functional symptoms in patients after surgery (nasal polypotomy) when they are discharged from hospital

In this group of patients a number of the following parameters were assessed when they were discharged from hospital:

- nasal congestion,
- presence of a runny nose,
- nasal congestion, complaints of decreased (loss) of smell,
- soreness and weakness.

Less than a third of PRS patients complained of a lack of sense of smell and one patient felt unwell and weak when they were discharged (Table 2).

Table 2. Assessment of functional condition of patients at discharge. (N=92)

Functional systems	Number of patients	Ratio, %
Nasal congestion	0	0.0
Runny nose	0	0.0

Decrease, loss of smell	35	38.0
Soreness and weakness	1	1.1

Presence of organic symptoms in patients after surgery (perinasal sinus polypotomy) when leaving the hospital

In this group of patients, a number of the following parameters were assessed when they were discharged from hospital:

- the presence of congestion in the paranasal sinuses,
- mucosal thickening,
- presence of polyps and sticky mucus in the nasal passages,
- phenomenon of occlusion of the paranasal sinuses (Table 3).

Table 3. Assessment of patients' organic status at discharge. (N=92)

Organic symptoms	Number of patients	Ratio, %
Congestion	72	78.3
Mucosal thickening	29	31.5
Polyps	0	0.0
Sticky mucus	0	0.0
Clogged paranasal sinuses	0	0.0

Thus, congestion was found in the majority of patients in this group, and a third of the discharged patients had thickening of the mucosa of the perinasal sinuses.

Assessment of patients' condition in 12 months after surgery

After 12 months in the group of patients who underwent a polypotomy of the nasal cavity, we estimated similar indicators as when they were discharged from the hospital, such as: nasal congestion, the presence of a runny nose, complaints of reduced (loss) of smell, soreness and weakness. The presentation of some functional symptoms after discharge gradually decreased (Table 4). An assessment of the functional state of patients in 12 months after surgery is shown in Table 4.

Table 4. Assessment of functional patients' condition in 12 months after polypotomy (N=87)

Functional symptoms	Number of patients	Ratio, %
Nasal congestion	9	10.3

Runny nose	15	17.2
Reduced, loss of smell	22	25.3
Soreness, weakness	5	5.7

The results of the observation show that the loss of smell at discharge was 38%, and in 12 months after surgery only 25.3%. One year later, however, there were many patients with a runny nose of 17.2% and nasal congestion of 10.2%. Severe soreness and weakness in patients also tended to increase slightly one year after treatment (from 1.1% to 5.7%).

In the group of patients who underwent perinasal polypotomies in the hospital, in 12 months after treatment, similar indicators were assessed, respectively: the presence of congestion in the paranasal sinuses, thickening of the mucosa, presence of polyps and sticky mucus in the nasal passages, the phenomenon of nasal sinus congestion (Table 5).

Table 5. Assessment of organic symptoms in 12 months after paranasal sinus polypotomy (N=92)

Organic symptoms	**Number of patients**	**Ratio, %**
Congestion	15	17.2
Thickening of the mucosa	11	12.6
Polyps	10	11.5
Sticky mucus	11	12.6
Clogged paranasal sinuses	8	9.2

The results show that organic symptoms gradually decreased by the end of one year after surgery. Patients' complaints of congestion decreased in 4.5 times; mucosal thickening was 2.5 times less frequent in 12 months after surgery. However, the formation of sticky mucus and clogged paranasal sinuses were observed in every tenth patient. And, approximately 1/10 of patients reappeared polyps in 12 months after surgery (11.5%).

The literary data indicate that determining the cause of polyps is an archival task. Polyps are often the result of chronic irritation of the nasal mucosa, an allergic or infectious process. If the irritant returns, the polyps will sooner or later begin to grow again. This process can continue indefinitely [4, 32, 26].

One irritant that is rather difficult to eradicate is an allergic irritant. For example, different data indicate that the prevalence of allergy in a group of patients with PRS is between 10% to 64%. Studies of the inverse relationship that is the incidence of PRS in a group of patients with allergic rhinitis also have a wide range of values, from 0.5 to 25.6% [2, 16, 27].

Assessment of the long-term general condition of patients after surgery

Despite few complaints during the first year after nasal polypotomy, the success rate of patients after surgery gradually increased (observation in dynamics of 3-6-12 months). After 12 months, the success rate was 82.8%. But after 24 months, there was a significant decrease in positive outcomes, but the sample of patients after 2 years had also decreased by a factor of almost four times, so that the remaining patients had a favourable post-sergical healing rate (Table 6).

Table 6. Evaluation of patient outcomes after polypotomy in follow-up dynamics within 24 months after surgery

Time after treatment	**Result of treatment**							
	Favourable		**Satisfactory**		**Unfavourable**		**Total number of patients**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
After 3 months (N=92) (1)	49	53.3	36	39.1	7	7.6	92	100.0
After 6 months (N=90) (2)	71	78.9	10	11.1	9	10.0	90	100.0
After 12 months (N=87) (3)	72	82.8	7	8.1	8	9.2	87	100.0
After 24 months (N=28) (4)	21	75.0	3	10.7	4	14.3	28	100.0
P	P(1:2)=0.003 P(1:3)=0.001 P(1:4)=0.09		P(1:2)=0.09 P(1:3)=0.11 P(1:4)=0.32		P(1:2)=0.86 P(1:3)=0.91 P(1:4)=0.72			

Long-term analysis showed that an unfavourable outcome after PRS treatment was recorded in 9.2% of patients one year later(there were no significant changes in this indicator during the year). Thus, after 24 months after surgery in almost four times smaller sample compared to one year, there was no significant decrease of favorable outcome; there was a tendency for increased incidence of adverse outcomes. Particular attention should be paid to the evacuation of mucus secretions after surgery, which becomes viscous with PRS and therefore its evacuation is more difficult. Nasal obstruction, which contributes to poor drainage, may also require surgery [3,30,33,37].

The complexity and incomplete study of the etiology and pathogenesis of PRS make it an urgent problem to investigate. The development of effective treatment and post-surgical

rehabilitation methods for such pathology is an important task whose solution will not only facilitate the work of practitioners, but also improve the quality of patients' life suffering from PRS [18,23,26,35].

Conclusions

1. The manifestation of functional symptoms one year after polypotomy was gradually changed. Loss of smell, which was 38% at discharge, was observed in only 25.3% in 12 months after surgery. However, one year later there were many patients with a runny nose of 17.2% and nasal congestion of 10.2%. Severe soreness and weakness in patients also tended to increase slightly by the end of the year after surgery.

2. The manifestation of organic symptoms was gradually reduced by the end of the year after surgery. Complaints of congestion decreased in patients in 4.5 times; mucosal thickening was 2.5 times less frequent in 12 months after surgery. However, polyps reappeared in about a tenth of patients in 12 months after polypotomy, and the formation of sticky mucus and blocked sinuses were also observed in every tenth patient.

3. Despite few complaints, a favourable outcome after surgery was recorded in 12 months after surgery in 82.8% of patients, whereas an unfavourable outcome after one year was recorded only in 9.2% of patients. In 24 months after surgery, in an almost fourfold sample, compared to a year ago, the favorable outcome of treatment did not significantly decrease, there was a tendency to increase the incidence of adverse effects.

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