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CLINICAL ARTICLES

MODERN METHODS OF DIAGNOSTICS AND TREATMENT OF CHRONIC MAXILLARY SINUSITIS

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Abstract

The objective of the present study was to compare the efficacy of traditional and endoscopic surgical treatments for maxillary sinusit.

Materials and methods: The present study is based on a comparison of the results of the radical maxillary sinusotomy and endoscopic endonasal approach sanation in 206 patients with sinusitis. The patients were divided into 2 comparable groups. The diagnosis was established on the basis of complaints, endoscopy of the nasal cavity and CT scan of the paranasal sinuses.

We have developed a scale for assessing clinical effectiveness of surgery the criteria of which were:

1) intraoperative and postoperative complications;
2) relapse diseases. Clinical efficacy was defined as "unsatisfactory" in the event of a relapse of the disease, the presence of complications in the early postoperative period. "Satisfactory" - if available complications and with an increase in the length of stay patients in the hospital by 6-30%, "good" – in absence of complications, recurrence of the disease and reducing the length of the patient's stay in hospital.

Results: Clinical efficacy in the 1nd group was higher in 62.4% - "good", in 23% - "satisfactory" and in 14.6% - "unsatisfactory" clinical efficacy. Clinical efficacy in the 2nd group was higher in 82.3% - "good", in 14,2% - "satisfactory" and in 4.5% - "unsatisfactory" clinical efficacy.

Conclusion: Endoscopic sinus surgery at allows to reduce complications in comparison with radical maxillary sinusotomy. The endoscopic sinus surgery technique is characterized by low trauma and the physiological principle of influencing the sinus, allows for constant visual control both during the intervention and in the postoperative period, and reduces the time of inpatient treatment compared to radical maxillary sinusectomy.

Keywords: *radical maxillary sinusotomy, endoscopic endonasal sinus surgery, maxillary sinusit*

Introduction

The main sources of infection of the maxillary sinuses are periapical foci of inflammation, odontogenic cysts, foreign bodies, perforations of the sinus floor. Approximately 30% of cases of unilateral sinusitis may have a dental cause which usually leads to cases of recalcitrant sinusitis, often associated with serious complications.[1-3]

Dental materials used in endododntic therapy extrusion of into the maxillary sinus has also a high risk of producing sinusist.[4] Moreover, along with the bacterial microflora, mycotic infection plays a significant role in the development of inflammatory processes.[5]

In recent years, due to the rapid development of implantology, the number of patients with sinusitis after dental implantation and sinus lift has increased.[6] Sinusitis of rhinogenic, rather than odontogenic origin, originates from nasal inflammation followed by anterior ethmoid disease and secondary obstruction of the ostiomeatal unit.

The search for more gentle methods of surgical treatment of diseases of the nasal cavity and paranasal sinuses was aimed at the possibility of minimizing surgical trauma and maintaining the normal anatomy of the intranasal structures. Despite significant advances in diagnosis and treatment of chronic maxillary sinusitis.

In clinical practice, for the sanitation of maxillary sinuses, radical maxillary sinusotomy developed more than a century ago by the Caldwell-Luc method or its modification is still widely used.[7,8] This does not take into account pathological changes in the intranasal structures and mucous membrane, the state of the natural opening, i.e., the state of the anatomical formations that determine the functional activity of the mucociliary apparatus.

Meanwhile, over the past two decades, not only in otorhinolaryngology, but also in the practice of maxillofacial surgery, endoscopic technologies have been actively introduced.[9]

Endoscopic sinus surgery is one of the most used operations, which is performed mainly in the treatment of chronic inflammation of the paranasal sinuses, tumors of the paranasal sinuses, trauma to the anterior part of the base of the skull, damage to the eyeball associated with trauma, and compression of the optic nerve.[10]

Endoscopic sinus surgery (FESS-Functional Endoscopic Sinus Surgery) is by far the most optimal method of surgical treatment of chronic sinusitis. The performance of such operations requires not only a good knowledge of the endoscopic anatomy of intranasal structures, but also the ability to bimanually perform endoscopic manipulations.[10-12]

The following operations are carried out under endoscopic control:

- Ethmoidotomy - opening the cells of the ethmoidal labyrinth
- Sinusectomy - opening of the maxillary sinus
- Opening of the sphenoid sinus
- Revision of the fronto-nasal pocket
- Infundibulotomy
- Removal of a foreign body from the maxillary sinus
- Removal of a cyst-like formation from the maxillary sinus
- Removal of inflamed tissue/polyps
- Enlargement of the drainage channels that connect the sinuses to the nose
- Correction of anatomical problems such as "concha bullosa" (concha bullosa, bullous deformity of the middle turbinate), multiple openings of the excretory channels of the paranasal sinuses (accessory ostium) and abnormal areas of contact with the mucous membrane

Of great importance in the development of diseases of the paranasal sinuses are pathological changes in the region of the middle nasal passage, where their fistulas open.

The goal of surgical treatment for chronic maxillary sinusitis is to create an adequate communication between the sinus and the nasal cavity. Thus, the ventilation and drainage of the sinus is restored.

Through the expanded natural fistula, all pathological contents from the sinus can be removed - purulent discharge, foreign body, cyst, mucocele, polyps. When removing foreign bodies and cysts from the maxillary sinuses located in the region of the sinus floor, the approach through the lower nasal passage is often used. Visual control allows you to preserve unchanged structures as much as possible.

For the treatment of sinusitis, it is necessary to restore the ventilation of the frontal sinus through the natural

fronto-nasal canal. With regard to the ethmoid and sphenoid sinuses, the same principle is used: if necessary, the maximum number of affected cells of the ethmoid labyrinth is opened, but not necessarily all. The preservation of not only normal, but also pathologically altered mucosa is one of the concepts of endoscopic sinus surgery. Restoring normal sinus ventilation has been shown to promote mucosal regeneration. It is also necessary to take into account the fact that the development of chronic sinusitis may be associated with pathological changes in the nasal cavity: curvature of the nasal septum, hypertrophy of the middle or lower turbinate. In this regard, in order to achieve a good effect during operations on the paranasal sinuses, the nasal septum is corrected, the inferior turbinates are destroyed, and the middle turbinate is partially resected.

Using the ESS method allows not only to restore normal nasal breathing, but also to preserve the anatomy of the nasal cavity and paranasal sinuses as much as possible. Such operations are easily tolerated by patients and do not require a long stay in the hospital. After the intervention, the recovery period takes about a week.

Postoperative care of the nasal cavity is also important - the removal of clots and crusts, the appointment of anti-inflammatory, anti-edematous and antibacterial therapy. This prevents adhesions and promotes better healing.

Unsatisfactory results of treatment are primarily due to the lack of a unified approach to the treatment of this disease. Most surgeons believe that the necessary volume surgery is a wide opening the affected sinus. This method is traumatic, not physiological, and the frequency of development complications, including recurrent sinusitis, anesthesia of the upper lip, gums and teeth, neuralgia trigeminal nerve, cicatricial deformity of tissues infraorbital region and even osteomyelitis of the upper jaw and zygomatic bone, reaches 80%.

The resulting extensive bone defect in the anterior wall of the sinus, the formation of an unnatural messages with the lower nasal passage in the absence attention to the state of the natural fistula, frequent trauma to the nasolacrimal canal and infraorbital nerve — the main disadvantages of the classical Caldwell-Luc operation.

Broad prospects opened up with the advent of rhinological endoscopic techniques in clinical practice. Optics with 0° viewing angles, 30° and 70° made it possible to inspect all departments maxillary sinus, restore the patency of its natural anastomosis, remove polyps and cysts without resorting to to the opening of the sinus through the anterior wall, which opens up fundamentally new possibilities in the surgical treatment of sinusitis.[13,15]

The study of the effectiveness of this new method was the goal of this study.

The purpose of the study is to conduct a comparative assessment of traditional and endoscopic surgical treatments for maxillary sinusitis.

Material and methods

The study included 206 patients divided into 2 comparable groups. The diagnosis was established on the basis of complaints, endoscopy of the nasal cavity and CT of the paranasal sinuses.

At the first stage, CT of the paranasal sinuses was performed in axial and frontal projections with tomograph step 0.5 mm.

In 102 patients 1 groups according to CT the following results were obtained: in 23 patients in the cavity of the maxillary sinus, an accumulation of heterogeneous liquid content was detected, in 19 patients cysts in the cavity of the maxillary sinus, in 38 patients uneven parietal thickening of the mucosa membranes, in 18 patients filling material associated with the mycelium of the fungus, which was confirmed morphologically, in 4 patients fragments in the maxillary sinus (figures 1, 2, 3, 4, 5).

In 104 patients 2 groups according to CT the following results were obtained: in 24 patients in the cavity of the maxillary sinus, an accumulation of heterogeneous liquid content was detected, in 13 patient's cysts in the cavity of the maxillary sinus, in 43 - uneven parietal thickening of the mucosa membranes, in 16 - filling material associated with the mycelium of the fungus, which was confirmed morphologically, in 8 – fragments in the maxillary sinus.

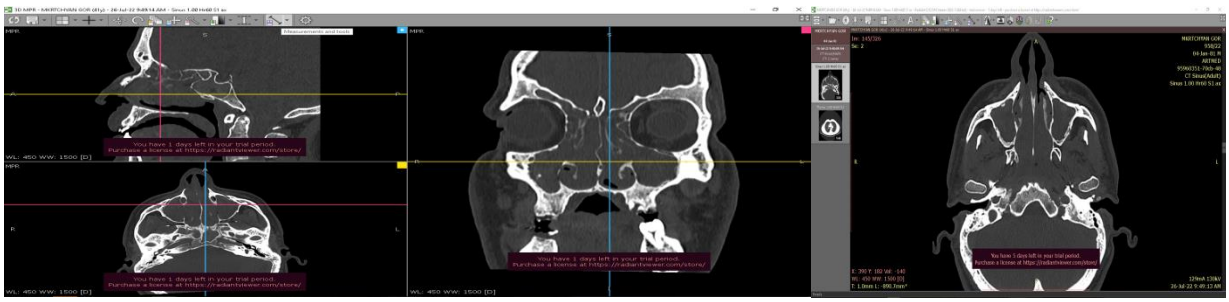

Figure 1. CT shows a liquid in the maxillary sinus

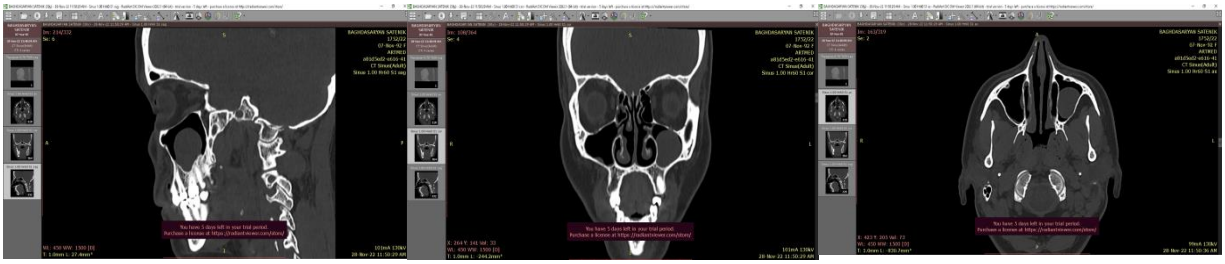

Figure 2. CT shows cysts in the cavity of the maxillary sinus

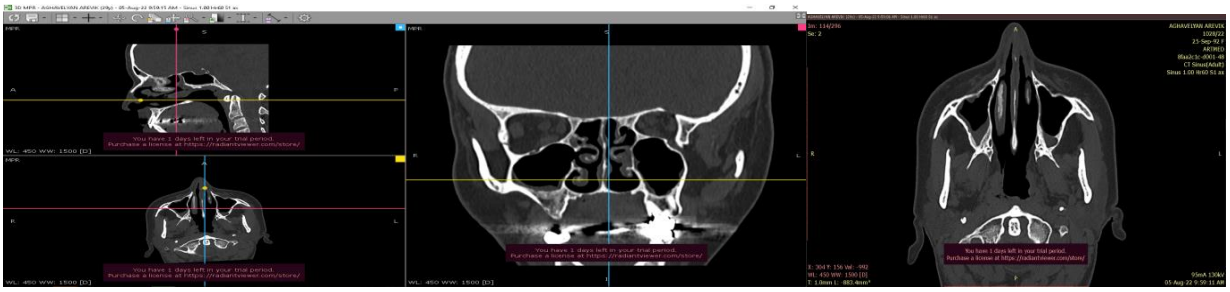

Figure 3. CT shows uneven parietal thickening of the mucosa membranes sinus

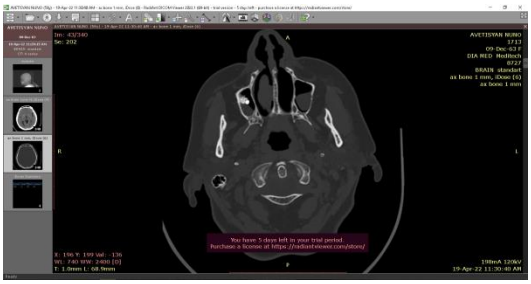

Figure 4. CT shows filling material associated with the mycelium of the fungus of the mucosa membranes sinus

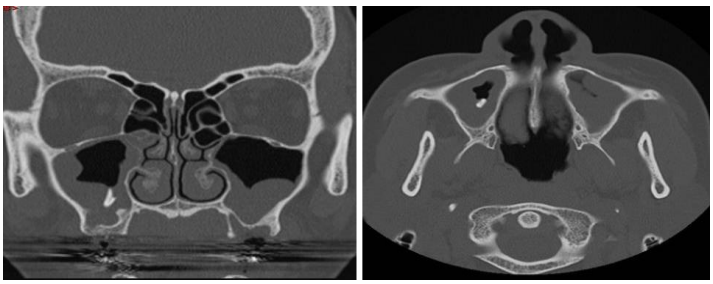

Figure 5. CT shows tooth root in the maxillary sinus

The size and shape of foreign bodies from filling materials were different, from small areas to significant ones, up to 1.7 cm in diameter. Foreign bodies were located in 28.2% patients in the region of the sinus floor at the root apex of the causative tooth, in 71.8% in the sinus cavity.

Located in the maxillary sinus, the filling material has tendency to migrate, blocking the natural anastomosis, which often leads to an exacerbation of the inflammatory process. In radiodiagnosis, it is important to determine the localization filling material, assess the state of the odontogenic source of infection adjacent to the sinus.

102 patients1 groups underwent traditional radical maxillary sinusectomy according to the Caldwell-Luc method.

104 patients 2 groups underwent endoscopic sanitation with using equipment from Karl Storz, consisting of rigid 4-mm endoscopes with a viewing angle of 0°, 30° and 70°, video equipment and special tools.

Intervention began with an endoscopic revision of the natural opening of the maxillary sinus in the middle nasal passage. For of this, under the control of a 0° endoscope, gentle traction of the middle turbinate in medial direction, and then resection of the uncinate process, opened and removed the walls ethmoid bulla and visualized the natural sinus fistula, the latter was expanded backwards and downwards, after which endoscopes of 30° and 70° were examined sinus lumen. Pathological contents of the sinus removed with a suction tip, polyps, foreign body - with antral forceps (figure 6).

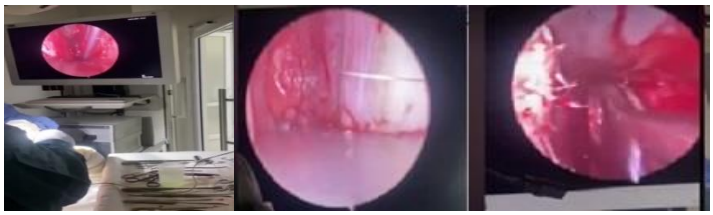

Figure 6. Endoscopic sanitation with using equipment from Karl Storz

It should be noted, that in all cases we managed to remove by endonasal access foreign bodies located in the lumen of the sinus - pieces of filling material and turundas.

Operations were performed under the endotracheal anesthesia. Antibacterial therapy was performed in the postoperative period. The average length of stay of patients in the hospital was 7±2 days.

We have developed a scale for assessing clinical effectiveness of surgery the criteria of which were:

1) the length of stay of patients in the hospital;
2) intraoperative and postoperative complications;
3) relapse diseases.

Clinical efficacy was defined as "unsatisfactory" in the event of a relapse of the disease, the presence of complications in the early postoperative period and increased length of stay of patients in the hospital than 30%. "Satisfactory" - if available complications and with an increase in the length of stay patients in the hospital by 6-30%, "good" – in absence of complications, recurrence of the disease and reducing the length of the patient's stay in hospital.

Results

The following postoperative complications in patients 1 groups were noted: recurrence – in 4 patients; postoperative hematoma of the soft tissues of the face – in 7, temporary disturbance of sensitivity on the operated side – in 6, in 8 cases, synechia was observed in the nasal cavity.

The following postoperative complications in patients 2 groups were noted: recurrence in 2 patients; postoperative hematoma of the soft tissues of the face – in 3, temporary disturbance of sensitivity on the operated side – in 2, in 3 cases, synechia was observed in the nasal cavity.

Clinical efficacy in the 1st group was higher in 62.4% - "good", in 23% - "satisfactory" and in 14.6% - "unsatisfactory" clinical efficacy.

Clinical efficacy in the 2nd group was higher in 82.3% - "good", in 13,2% - "satisfactory" and in 4.5% - "unsatisfactory" clinical efficacy.

Discussion

Chronic inflammation of the paranasal sinuses and nasal cavity, which is estimated to occur in more than 15% of adults and is known as chronic rhinosinusitis, is one of the main causes of pain in the face, paranasal sinuses, back of the eye, ear or forehead.[16] The treatments for these types of chronic inflammations

are varied and mainly include multidrug therapy (MLT) with corticosteroid steroid hormones, antibacterial agents, phenylpropanolamine (PPA), mucoactive agents, and nasal irrigation with saline. In situations where these therapies are ineffective, functional endoscopic sinus surgery (FESS) may be suggested to improve symptoms associated with the disease.[17]

Clinical observations show that otorhinolaryngologists often underestimate association of maxillary sinusitis with the disease teeth, and the odontogenic process is often considered as rhinogenic. As a result, he meets much more often than diagnosed. Availability foreign bodies, often filling material, roots and fragments of teeth that migrated into the cavity sinus after endodontic treatment.[18,19]

Second the reason is the pneumatic type of structure maxillary sinus (MS), occurring in about 40% of people, when the roots of the upper teeth the jaws are separated from the lumen of the sinus by a very thin bone wall or only mucous membrane.[20,21]

Over the past two decades, the surgical management of rhinosinusitis has entirely changed due to technical advances in endoscopic systems and the recognition of the importance of mucociliary flow and ventilation through the anatomical ostia for normal sinus function. Functional endoscopic sinus surgery (FESS) is a set of minimally invasive techniques in which sinus air cells and ostia are opened under direct visualisation. The goals of functional endoscopic sinus surgery (FESS) in the treatment of sinusitis are to enlarge sinus ostia, restore adequate aeration of sinuses, improve mucociliary transport, and provide a better route for topical therapies.[22]

Endoscopic endonasal maxillary sinusectomy allows you to perform revision of the maxillary sinus with minimal trauma, which creates conditions for a smoother course of the postoperative period, reduces length of stay of patients in the hospital. Satisfaction of patients after endoscopic endonasal maxillary sinusectomy is higher than in patients after radical surgery on the maxillary sinus according to Caldwell-Luc.[23,24]

The risks of sinus surgery have been the subject of controversy for years. Several large series have reported very low complication rates endoscopic sinus surgery, suggesting that this procedure can be performed safely.[25,27] Currently well established for the treatment of chronic rhinosinusitis, which is not amenable to medical treatment. However, there is an apparent lack of good scientific evidence of the comparative effectiveness of this intervention.

Endoscopic studies and observations have shown that the most common cause of paranasal sinus infections is rhinogenic in nature, spreading from the nose to the sinuses. A common focus of infection in sinusitis is stenotic areas of the anterior ethmoid bone, with infection recurring in the larger sinuses. Thus, the anterior part of the ethmoid bone, especially its infundibulum, is a key site for infection or treatment, and the maxillary as well as the frontal sinuses are completely dependent on the pathophysiological conditions in this area. Histological examination shows that massive changes in the nasal glands are the cause of persistent thickening of the mucous membrane. Retention cysts, highly viscous mucus, extravasation of mucus, and metaplastic changes in the epithelium complete the vicious cycle of ostium-meatus occlusion.

In the literature there are several studies on that address surgical method of choice for recurrent or chronic sinusitis.[28,29]

The current philosophy is to choose a surgical technique that is as conservative as possible and as radical as possible, depending on the individual case. The surgical method of choice for recurrent or chronic sinusitis is the radical Caldwell-Luc technique (maxillary sinus).

Endoscopic sinus surgery (ESS) is a modern method used to treat inflammatory diseases of the paranasal sinuses surgically. The complication rate associated with endoscopic sinus surgery is low, and improvements in surgical technology and experience can reduce its side effects.[30-32]

The idea behind ESS may seem simple, but the anatomical variability and the wide range and severity of diseases treated in each ESS remain challenges for the surgeon in every case. Preoperative sinus surgery planning is an important step to obtain optimal results and prevent all possible complications.

We present the technological advances that have enabled endoscopic intranasal techniques to expand and successfully treat other pathologies. The boundaries of ESS are constantly expanding with the development of technology.

ESS readings have surpassed the area of rhinosinusitis so far.

206 hundred cases of chronic/recurrent sinusitis were examined endoscopically using 0° (4 mm) rigid endoscopes in combination with conventional x-ray and computed tomography to reveal the exact nature of the pathology, which was sometimes not possible with conventional examination. Once the cause was established, functional endoscopic sinus surgery (FESS) was performed to treat and relieve symptoms. The Messerklinger technique was used with good results and minimal surgical trauma. Complications with possible treatment and long-term results were discussed. The use of endoscopic sinus surgery can give the most appropriate positive results.

In order to achieve the most suitable surgical outcome, the surgeon must be sufficiently skilled in diagnosis and face any possible complications during the operation, as well as complex and revision problems.

Conclusions

Endoscopic sinus surgery at allows to reduce complications in comparison with radical maxillary sinusotomy. The endoscopic sinus surgery technique is characterized by low trauma and the physiological principle of influencing the sinus, allows for constant visual control both during the intervention and in the postoperative period, and reduces the time of inpatient treatment compared to radical maxillary sinusectomy.

Conflicts of Interest

The authors declare no conflict of interest.

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Institutional Review Board Statement

The study was conducted by the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee).

Informed Consent Statement

Informed consent was obtained from patient involved in the study.

Data Availability Statement

Not applicable.

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ՔՐՈՆԻԿ ՎԵՐԾՆՈՏԱՅԻՆ ՍԻՆՈՒՍԻՏԻ ԱԽՏՈՐՈՇՄԱՆ և ԲՈՒԺՄԱՆ ԺԱՄԱՆԱԿԱԿԻՑ ՄԵԹՈԴՆԵՐ

Արայիկ Ղարիբյան,[1] Սոնա Գեւորգյան, Անժելա Չախոյան,[3] Կարեն Սեւտերտաերյան [4]

[1] Առողջապահության ազգային ինստիտուտի գլխի և պարանոցի էսթետիկ և վերականգնողական վիրաբուժության ամբիոնի դոցենտ, ARTMED բժշկական վերականգնողական կենտրոնի բժշկական տնօրենի տեղակալ, Հայաստան

[2] Երևանի Մ. Հերացու անվան պետական բժշկական համալսարանի վիրաբուժական ստոմատոլոգիայի և դիմածնոտային վիրաբուժության ամբիոնի դասախոս, Հայաստան

[3] Առողջապահության ազգային ինստիտուտի գլխի և պարանոցի էսթետիկ և վերականգնողական վիրաբուժության ամբիոնի քիթ-կոկորդ-ականջաբան-օրդինատոր, Հայաստան

[4] Երևանի Մ. Հերացու անվան պետական բժշկական համալսարանի բերանի խոռոչի և դիմածնոտային վիրաբուժության ամբիոնի դասախոս, Հայաստան, Դիմածնոտային վիրաբույժ, Կենտրոնական կլինիկական Հոսպիտալ, Հայաստան

Ամփոփում

Սույն հետազոտության նպատակն էր համեմատել վերծնոտային սինուսիտի ավանդական և էնդոսկոպիկ վիրաբուժական բուժման արդյունավետությունը:

Նյութեր և մեթոդներ. Ուսումնասիրությունը հիմնված է վերծնոտային սինուսիտով 206 հիվանդների ռադիկալ սինուսոտոմիայի և էնդոսկոպիկ էնդոնազալ մոտեցմամբ սանացիայի արդյունքների համեմատության վրա: Հիվանդներին բաժանել են 2 համեմատելի խմբի. Ախտորոշումը հաստատվել է գանգատների, քթի խոռոչի էնդոսկոպիայի և պարանազային սինուսների համակարգչային տոմոգրաֆիայի հիման վրա: Մշակվել է վիրահատության կլինիկական արդյունավետության գնահատման սանդղակ, որի չափանիշներն են.

1) ներվիրահատական և հետվիրահատական բարդություններ,
2) հիվանդության կրկնություն; Կլինիկական արդյունավետությունը սահմանվել է որպես «անբավարար» հիվանդության կրկնության, վաղ հետվիրահատական շրջանում բարդությունների առկայության դեպքում: «Բավարար»՝ առկա բարդությունների դեպքում և հիվանդների հիվանդանոցում գտնվելու տևողության 6-30%-ով ավելացմամբ, «լավ»՝ բարդությունների բացակայության, հիվանդության կրկնության և հիվանդի հիվանդանոցում մնալու տեւողության կրճատման դեպքում:

Արդյունքներ. Կլինիկական արդյունավետությունը 1-ին խմբում ավելի բարձր է եղել 62.4%-ի մոտ՝ «լավ», 23%-ի մոտ՝ «բավարար» և 14.6%-ի մոտ՝ «անբավարար» կլինիկական արդյունավետությամբ: 2-րդ խմբում կլինիկական արդյունավետությունն ավելի բարձր է եղել 82.3%-ում՝ «լավ», 13,2%-ի մոտ՝ «բավարար», իսկ 4,5%-ի մոտ՝ «անբավարար» կլինիկական արդյունավետությունը:

Եզրակացություն. Սինուսների էնդոսկոպիկ վիրահատությունը թույլ է տալիս նվազեցնել բարդությունները՝ համեմատած վերծնոտային սինուսիտի ավանդական սինուսոտոմիայի հետ: Սինուսների էնդոսկոպիկ վիրահատության տեխնիկան բնութագրվում է ցածր տրավմայով և սինուսի վրա ազդելու ֆիզիոլոգիական սկզբունքով, թույլ է տալիս մշտական տեսողական հսկողություն իրականացնել ինչպես միջամտության, այնպես էլ հետվիրահատական շրջանում և կրճատում է ստացիոնար բուժման ժամանակը՝ համեմատած արմատական սինուսէկտոմիայի հետ:

СОВРЕМЕННЫЕ МЕТОДЫ ДИАГНОСТИКИ И ЛЕЧЕНИЯ ХРОНИЧЕСКОГО ЧЕЛЮСТНОГО СИНУСИТА

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Абстракт

Целью настоящего исследования было сравнение эффективности традиционного и эндоскопического хирургического лечения гайморита.

Материалы и методы: Настоящее исследование основано на сравнении результатов радикальной гайморотомии и санации эндоскопическим эндоназальным доступом у 206 больных синуситами. Больные были разделены на 2 сопоставимые группы. Диагноз установлен на основании жалоб, эндоскопии полости носа и КТ придаточных пазух носа.

Нами была разработана шкала оценки клинической эффективности оперативного вмешательства, критериями которой были:

1)интраоперационные и послеоперационные осложнения;

2) рецидив заболевания. Клиническая эффективность определялась как «неудовлетворительная» при возникновении рецидива заболевания, наличии осложнений в раннем послеоперационном периоде. «Удовлетворительно» - при наличии осложнений и увеличении сроков пребывания больных в стационаре на 6-30%, «хорошо» - при отсутствии осложнений, рецидивах заболевания и сокращении сроков пребывания больных в стационаре.

Результаты: Клиническая эффективность в 1-й группе была выше у 62,4% - «хорошая», у 23% - «удовлетворительная» и у 14,6% - «неудовлетворительная». Клиническая эффективность во 2-й группе была выше у 82,3% - «хорошая», у 13,2% - "удовлетворительная" и у 4,5% - "неудовлетворительная" клиническая эффективность.

Заключение: Эндоскопическая хирургия околоносовых пазух позволяет уменьшить количество осложнений по сравнению с радикальной верхнечелюстной пазухой. Эндоскопическая методика хирургии носовых пазух характеризуется малотравматичностью и физиологическим принципом воздействия на пазуху, позволяет осуществлять постоянный визуальный контроль как во время вмешательства, так и в послеоперационном периоде, сокращает время стационарного лечения по сравнению с радикальной гайморэктомией.