

FEATURES OF PLASTIC SURGERY OF THE ANTERIOR WALL OF THE MAXILLARY SINUS

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Abstract

To date, the problem of traumatic injuries of the middle zone of the face remains extremely relevant. According to the WHO, the number of traumatic injuries is still on the rise. According to statistics, skull fractures and intracranial injuries account for 5.1% of the total number of all registered injuries according to the rates of injuries and poisonings and other accidents among the adult population in 2022. In the structure of total injuries, 1.7% is occupied by injuries of the eye and orbit. Patients with injuries of the midface require inpatient treatment in 85% of cases. Trauma to the bones of the facial skull accounts for up to 40% of the entire list of diseases in patients hospitalized for treatment in the departments of maxillofacial surgery, and accounts for almost 21% of the total number of victims with injuries in hospitals of medical institutions. Thus, the frequency of traumatism of the maxillofacial region, and in particular, the frequency of damage to the zygomatic-orbital complex, both in our country and abroad, does not decrease; on the contrary, there is an increase in the number of patients with this pathology.

Keywords: Trauma, maxillofacial region, maxillary sinus, zygomatic-orbital complex.

Introduction

The last decades have seen the widespread introduction of innovative technologies for in vivo research of various human anatomical structures supporting the apparatus [1]. At the same time, methods for visualization of the facial skeletal system and its soft skeleton have received significant developments [2-4].

In particular, modern non-invasive research methods and computer technologies make it possible to identify patterns of individual variability of the structure of the bones of the facial skull [5]. Such developments make a significant contribution to the study of various aspects of the clinical anatomy of the skull, which are applicable to the problems of dentistry, otolaryngology, ophthalmology and other areas of medicine [6].

It should be noted that the object of close attention of both anatomists and representatives of one of these clinical disciplines is the upper jaw [7].

So, on the one hand, it participates in the morphogenesis of the facial skull as a whole, on the other hand, it is an object of surgical manipulation for specialists in various fields [8].

The results of studies of the variant anatomy of the upper jaw and its structures, such as the maxillary sinus (MS) and canine fossa (CF), underlie the understanding of the laws of the structural organization of the human face [9].



The study of the variant variability of the shape, depth, topography of the canine fossa and the thickness of the anterior wall of the maxillary sinus allows personalizing the surgical approach and technique of rhinosurgical, reconstructive and plastic manipulations in this area, which is of great clinical importance in stopping the inflammatory processes of the maxillary sinus [10].

It should be noted that in the literature of recent years there are no data on the study of the patterns of age and variant variability of the shape, depth, topography of the canine fossa and the thickness of the walls of the maxillary sinus in examined individuals aged 5 to 22 years (younger age groups).

These gaps in the morphology of the facial part of the skull became the rationale for craniometric research, the results of which should be taken into account when planning surgical interventions on the maxillary sinus in children and adults. Currently, it is generally accepted in clinical practice that external surgical access is preferable for a number of maxillary sinus pathologies. The bone defect formed during perforation of the anterior wall of the maxillary sinus requires reconstructive technologies, usually with transplantation of various materials [11]. Therefore, adequate filling of the trepanation defect of the anterior wall of the maxillary sinus using allogeneic grafts was of great interest in our work. Insufficient study of the patterns of reparative regeneration of bone tissue when filling the bone defect of the anterior wall of the maxillary sinus with cartilage allograft (CAT) or demineralized bone allograft (DBT) contributed to further research in this area. There are works in the literature devoted to methods of filling bone defects of the walls of the paranasal sinuses, including demineralized bone grafting [12]. However, VCT is difficult to model in the operating room. It is also a known fact that VCT is subject to significant resorption in the bone bed, which leads to a loss of regenerate volume. Therefore, in our opinion, the most optimal is to use cartilage allograft to fill the bone defect.

MATERIAL AND METHODS

The study included 30 patients with fractures of the tibia. zygomatico-orbital complex, which was applied to the Department of Plastic Surgery, Multidisciplinary Clinic of the Tashkent Medical Academy.

To examine patients with this pathology, we use clinical (anamnesis, subjective and objective research methods), clinical and instrumental (radiography and MSCT of facial bones and SNP) and laboratory (general blood and urine tests, bacteriological) research methods.

Results and Discussion

The results of the study of the variability of the thickness of the anterior wall of the maxillary sinus, as well as the shape, depth and topography of the canine fossa depending on the age and sex of the person, which made it possible to personalize surgical access to the maxillary sinus and choose the optimal allograft to fill the bone defect in the anterior wall of the maxillary sinus. Morphological study of bone defects of the maxillary sinus in the intact state and when replenished with biotransplants, determined the conditions and indications for performing micromaxillotomy followed by bone grafting defects of its anterior wall.

Clinical studies on bone replacement defects of the anterior wall of the human maxillary sinus using VKT and CT. to confirm the presence of previously obtained experimental data laboratory animals. Taking into account the results of the experimental morphological study, the possibility of using two types of biomaterial is justified. Namely, after 45 days, the integrity and continuity



of the anterior wall of the maxillary sinus was visualized on the cone-beam computed tomography of 4 patients with the defect closed by demineralized bone allograft. The replaced bone did not regenerate. differ in structure from adjacent healthy bone tissue, but was significantly inferior to it in volume ($43 \pm 12.4\%$ of the original volume). When studying the cone-beam calculation tomography of 4 patients with the replacement of the bone defect of the anterior wall of the maxillary sinus with a cartilaginous allograft on the 45th day, the newly formed thin bone tissue covering the cartilaginous allograft in the form of a "shell" was determined visually with the help of the preserved volume of the implanted CAT ($79 \pm 4.1\%$). When performing cone-beam tomography calculation in 3 patients without replacement bone defect of the anterior wall of the maxillary sinus, on the 45th day, slight compaction of newly formed bone tissue is observed along the edge of the defect, and the regenerate is represented by dense connective tissue, more resembling cicatricial deformation. The technique of the operation is worked out on the basis of anthropometric studies. perforated hole on the anterior wall of the maxillary sinus (taking into account its thickness) in the area of projection of the canine fossa. Using a saline bur-dispenser, the bur opening is expanded according to the shape of the canine fossa and taking into account its depth. Thus, in persons under 12 years of age with a significantly greater thickness of the anterior wall of the sinus (more than 3 mm), as well as a small depth and a narrow shape of the OK is most optimal for using burs for trepanation of the maxillary sinus in childhood. Also, taking into account the thickness of the anterior wall of the upper jaw sinus and the OK parameters, the most optimal biomaterial is selected. In patients over 12 years old, with a lesion of the anterior wall, the thickness of the maxillary sinus is less than 3 mm, and in the presence of a deep and wide OC, it is possible to use both a physical burr-dispenser and a trocar.

Thus, with a thickness of the anterior wall of the maxillary sinus less than 1.5 mm and an average width of the shape and a small depth of the canine fossa, which is typical for patients over 12 years old, a demineralized bone allograft was used. An allogeneic cartilage transplant was used in patients with a thickness of the anterior wall of the maxillary sinus more than 1.5 mm and in the presence of a wide shape and a large depth of the OS. The lateral displacement of the bottom of the OC relative to the teeth of the upper jaw, as well as the presence of right-sided asymmetry of the shape, depth of the OC and the thickness of the anterior wall of the maxillary sinus were taken into account when planning surgical access to the maxillary sinus. Before the operation, systemic antibacterial and anti-inflammatory therapy was administered for several days. In addition, the nasal mucosa was irrigated with local decongestants to sanitize the maxillary sinus and restore the natural path of exudate outflow from the maxillary sinus cavity. Given the above, a clinical case is presented below that confirms the expected results of clinical trials.

Patient M., 44 years old, came to the maxillofacial surgery department complaining of headache, mainly on the right side, heaviness in the right half of the face, in the projection of the right maxillary sinus, aching pain in teeth 16, 17, occurring during chewing. In the patient's history, there was no information about previously suffered colds and injuries in this area. There are general somatic diseases - chronic pancreatitis. Hepatitis, HIV, allergic reactions to drugs are denied. Objectively: the general condition is satisfactory.

The face is symmetrical. Skin of physiological color, clean. Regional lymph nodes are not enlarged. Palpation of the projection of the exit of the II branch of the trigeminal nerve is slightly painful. Opening of the mouth is free. The bite is neutral. Percussion of the 15-17 teeth is sharply painful. There is no mobility of the teeth. Attachment of the frenulum of the upper, lower lip and



tongue. The vestibule of the oral cavity is middle. The mucous membrane of the oral cavity (palate, mucous membrane of the cheeks, lips, alveolar process) is brightly hyperemic, moist.

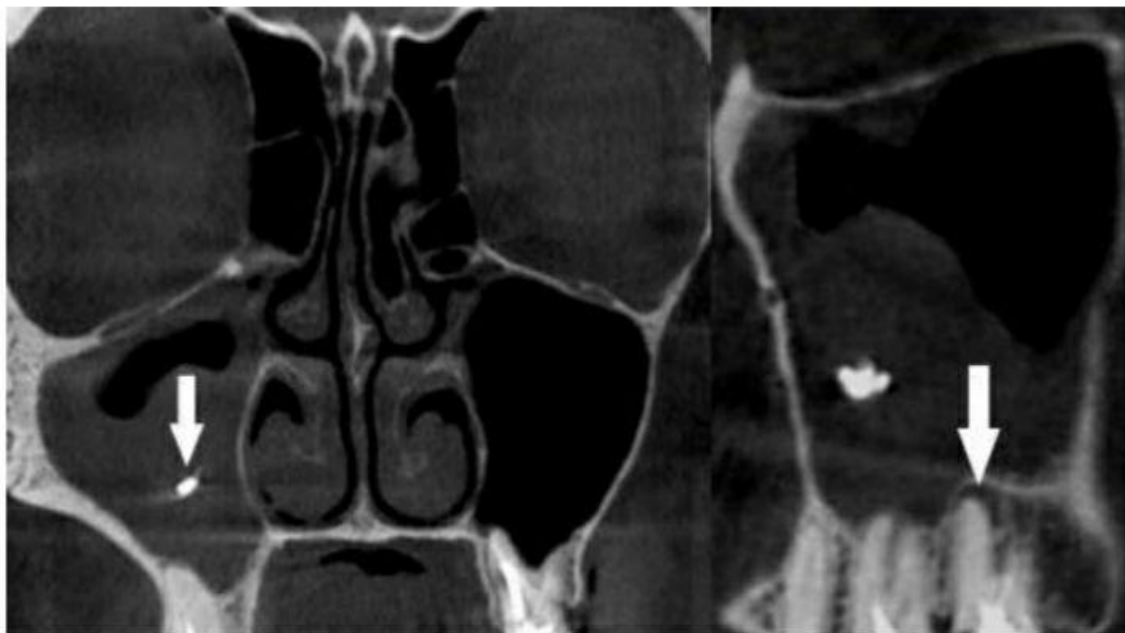


Figure 1 – Patient H., 40 years old. CBCT. Isolated lesions of the right maxillary sinus. Left coronary artery projection – the arrow indicates a hyperdense shadow in the center of the aspergilloma; on the right, sagittal projection – the arrow indicates a granuloma on the proximal buccal root of the 17th tooth.

Craniometric analysis based on CBCT data showed that the thickness of the anterior wall of the maxillary sinus is 2.5 mm, with a medium-wide (62.2%) and medium-deep (4.2 mm) OS. The topography of the bottom of the canine fossa was projected in the area of tooth 16. Under inhalation anesthesia and infiltration (s. articaini 1.5%, s. adralinini 1: 100000), the patient underwent micromaxillotomy with one-stage resection of the apex of tooth 17. In the vestibule of the mouth under the upper lip on the right in the projection of the canine fossa, the incision was made along the transitional fold. The mucous membrane of the vestibule of the mouth, together with the periosteum, was separated, the anterior wall of the maxillary sinus was skeletonized and access to the maxillary sinus was created using a physiodispenser with a bur (d = 5.5 mm). When opening the sinus, a putty-like dense mass of green-brown color was found - mycetoma. After removing the mycetoma, the bone defect of the anterior wall of the maxilla, the sinus and the alveolar process of the maxilla with a total diameter of 7 mm was closed with a cartilaginous allograft using the press-fitting method. It is important to note that the use of cartilage allograft is justified by earlier microbiological studies and is protected by a patent. A control cone-beam tomogram performed six months later (Fig. 2) showed that the paranasal sinuses were normal, the defect in the anterolateral wall of the maxillary sinus and the alveolar process of the maxilla had decreased to 5 mm as a result of partial replacement of the cartilaginous allograft with bone tissue.



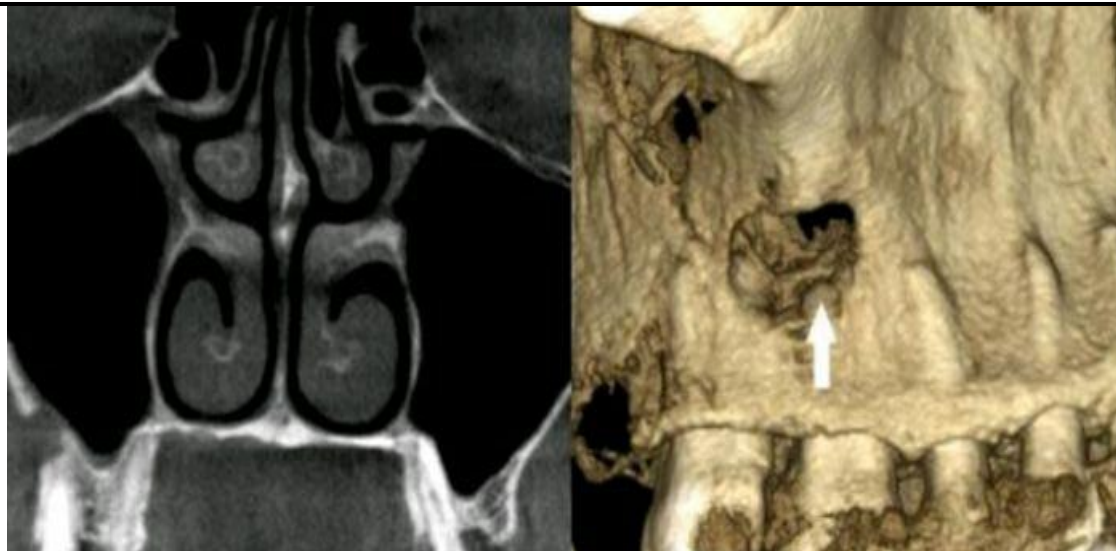


Figure 2 – Patient H., 40 years old. CBCT. Condition after micromaxillotomy on the right. Left coronal projection – paranasal sinuses without pathology; right sagittal projection – arrow points to bone defect after micromaxillotomy.

To assess the improvement in the quality of life of patients after surgery on the maxillary sinus, a survey was conducted using the SNIT-22 test (sinonasal baseline test) questionnaire.

According to the results of the SNIT-22 questionnaire, assessments of complaints made by patients before and after micromaxillotomy with reconstruction (main group) and micromaxillotomy without reconstruction (control group). The total score for complaints filed by patients before surgery according to the SNIT 22 questionnaire in the main group was 24.7 ± 8.1 points, in the control group - 22.5 ± 7.0 points and did not differ significantly ($p > 0.25$), that is, all patients had similar complaints before surgery. Consequently, the division of patients, according to complaints filed before surgery, into the main or control group is weak, but significant ($V = 0.36$, $p = 0.18$).

In general, no special selection into groups depending on the diagnosis. In addition, it does not statistically matter what age the patient complained ($V = 0.14$, $p > 0.92$) and what gender ($\phi = 0.19$, $p > 0.11$).

The reaction after treatment showed the following: The average total score of complaints filed by patients after micromaxillotomy with reconstruction of the CPP or VCT was several times lower than in the control group: 4.0 ± 1.6 points versus 23.6 ± 4.7 points in the first group.

Complaints of patients after micromaxillotomy with reconstruction of the CT or VCT differ sharply from complaints of patients in the control group. Significantly lower average response scores and even complete zeroing of scores were noted for such complaints as nasal congestion, cough, thick nasal discharge, hearing loss, dizziness, ear pain, facial pain, decreased sense of smell and taste, fatigue, decreased performance, anxiety and irritability. The patients of the control clinical group, operated by the micromaxillotomy method, without restoration of the bone defect, noted the persistence of such complaints as runny nose, decreased sense of smell and periodic pain. Objectively, all patients who underwent drug and surgical treatment of chronic diseases of the maxillary sinus after the micromaxillotomy operation note the improvement in their health. But patients of the main clinical group operated by micromaxillotomy with reconstruction of the bone defect of the anterior wall of the maxilla sinus CA or VCT note the most pronounced improvement in well-being, a decrease in clinical symptoms of the disease and an increase in the quality of life.



CONCLUSION

The correlation between the special selection of the treatment method and the complaints of patients belonging to one of the clinical groups (main / control) $V = 0.1$, $p > 0.7$. that is, there is no selection of patients in a specific clinical group was carried out. No differences were found in the main complaints, however, there was a significant decrease in the severity of the symptom - pain / heaviness in the face in the main group. In the control group, the persistence of this symptom is due to the defect on the anterior wall of the maxillary sinus. There is also reliable mathematical evidence of the improvement in the health and quality of life of patients who underwent micromaxillotomy with CAT or DCT reconstruction compared to patients belonging to the control (intact) group. The performed CBCT and clinical test SNIT-22 can confirm the effectiveness of introducing micromaxillotomy in bone defect reconstruction with connective tissue allografts into clinical practice.

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