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RECONSTRUCTIVE SURGERY OF POST–RESECTION DEFECTS OF THE UPPER JAW

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SUMMARY
Post-resection defects of the upper jaw are one of the most difficult problems in surgery. They can occur after removal of tumors, trauma or infection, and can cause various functional and aesthetic problems in patients. Surgical reconstruction of the maxilla may require the use of bone grafts and/or implants, which may be ineffective or cause a number of complications in the absence of a reconstructive approach.
The aim of the study *was to assess the efficacy and safety of surgical reconstruction of the upper jaw using modified individual plates and bone autografts.*
Materials and methods. *The study was conducted among 35 patients with post-resection defects of the upper jaw. All patients underwent surgical reconstruction using modified individual plates and revascularizable autografts, according to the division into 2 groups. Evaluation of the effectiveness of the reconstruction was carried out based on clinical data in the early and late postoperative periods.*
Results. *The use of revascularized flaps makes it possible to achieve an optimal long-term result with the absence of a large volume of foreign bodies in the recipient bed.*
Conclusions. *Reconstructive surgery using metal structures is fraught with a number of postoperative complications that require corrective manipulations and (or) a fundamentally different approach for repeated interventions. Currently, the gold alternative standard is the use of revascularized flaps, which allowed 16 patients to achieve a long-term stable result with the restoration of the continuity of the upper jaw, followed by prosthetics.*
KEYWORDS: *bone grafting, upper jaw, individual plates, revascularized autografts, post-bresection defects.*

CONFLICT OF INTEREST. *The authors declare no conflict of interest.*

РЕКОНСТРУКТИВНАЯ ХИРУРГИЯ ПОСТРЕЗЕКЦИОННЫХ ДЕФЕКТОВ ВЕРХНЕЙ ЧЕЛЮСТИ

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РЕЗЮМЕ
Пострезекционные дефекты верхней челюсти являются одними из самых сложных проблем в хирургии. Они могут возникнуть после удаления опухолей, травмы или инфекции, и могут вызвать различные функциональные и эстетические проблемы у пациентов. Хирургическая реконструкция верхней челюсти может требовать использования костных трансплантатов и (или) имплантатов, которые могут быть неэффективными или вызвать ряд осложнений при отсутствии реконструктивного подхода.
Цель. *Оценить эффективность и безопасности хирургической реконструкции верхней челюсти при помощи модифицированных индивидуальных пластин и костных аутотрансплантатов.*
Материалы и методы *исследования. Исследование проводилось среди 35 пациентов с пострезекционными дефектами верхней челюсти. Все пациенты были подвергнуты хирургической реконструкции с использованием модифицированных индивидуальных пластин и реваскуляризируемы аутотрансплантатов, согласно разделению на 2 группы. Оценка эффективности реконструкции проводилась на основе клинических данных в раннем и позднем послеоперационных периодах.*

Результаты. *Применение реваскуляризированных лоскутов позволяет достичь оптимального отдаленного результата с отсутствием большого объема инородных тел в реципиентном ложе.*
Выводы. *Реконструктивная хирургия с использованием металлоконструкций чревата рядом послеоперационных осложнений, требующих корригирующих манипуляций и (или) принципиально отличному подходу при повторных вмешательствах. Золотым альтернативным стандартом в настоящее время является применение реваскуляризируемых лоскутов, позволивших у 16 пациентов достигнуть отдаленного стабильного результата с восстановлением непрерывности верхней челюсти с последующим протезированием.*
КЛЮЧЕВЫЕ СЛОВА: *костная пластика, верхняя челюсть, индивидуальные пластины, реваскуляризируемые аутотрансплантаты, пострезекционные дефекты.*

КОНФЛИКТ ИНТЕРЕСОВ. *Авторы заявляют об отсутствии конфликта интересов.*

Introduction

Modified individual plates – a reconstruction method, accompanied by computer modeling and printing of 3D plates, reproduced individually, according to the data of additional visual examination methods for each patient. These plates can be used to create a bone structure that accurately matches the anatomical shape and dimensions of the defect [1].

The use of modified individual plates for bone grafting of the upper jaw makes it possible to achieve high accuracy in matching the implant with the preserved bone structure [2]. At the same time, a number of clinicians noted that the manufacture of metal structures and their subsequent use in the long term leads to an unfavorable outcome in at least 30 % of cases [3]. Such a high percentage is primarily due to the lack of integration of the structure with connective tissue structures, which perceive it as a foreign body [4]. In addition, in the vast majority of cases, there are no suitable conditions for coating a metal structure, in particular, the proper volume of soft tissue structures [5]. To achieve an aesthetic result of prosthetics is also a time-consuming task. The introduction of dental implants becomes impossible and (or) a dubious process. A number of patients, in particular those of working age, are not ready for prosthetics with removable structures and, in striving for a highly aesthetic result, condemn the use of individual titanium implants [6]. To date, the «gold standard» in the reconstruction of post-resection defects of the upper jaw is the use of revascularized autografts [7]. Many opportunities for choosing a donor bed, a large volume of connective tissue and soft tissue structures determine in advance the expediency of choosing this surgical method in eliminating post-resection defects of the upper jaw [8].

Thus, the aim of the study is to assess the efficacy and safety of surgical reconstruction of the upper jaw using modified individual plates and bone autografts.

Materials and methods

The study was conducted among 35 patients, aged 35 to 68 years, with post-resection defects of the upper jaw in State Budgetary Health Institution of the Stavropol Territory «Stavropol Regional Clinical Hospital» from 2015 to 2022. Patients were divided into 2 groups, in the main group 23 patients underwent defect reconstruction using individual plates, 12 patients in the control group using revascularized autografts. The exclusion criteria for patients were: exacerbation of somatic pathology, the presence of vascular occlusion of the recipient and donor beds (occlusion over 30 %) according to X-ray endovascular angiography, lack of consent to participate in the study. All patients immediately before being included in the study signed an informed voluntary consent to participate in this study with permission to take photos, videos, as well as the publication of the results. In the preoperative period, additional visual methods were performed in both study groups, in particular MS CT with subsequent production of stereolithographic templates and X-ray endovascular angiography.

In the control group, according to the design of the study and the extent of the defect, a peroneal flap was chosen as an autograft, which allows volumetric defects of the upper jaw in the "double-barreled" model. In the main group, individual plates were made from a titanium alloy, according to the defect configuration, by reconstruction using computer modeling and subsequent 3D printing.

Results and discussion

In the main group of patients intraoperatively, it was possible to achieve stability of the fabricated structure in all patients, the individual implant-prosthesis was overlapped with soft tissue structures without tension. At the same time, in the early postoperative period, on the 8th day, in 11 patients (50 %), the sutures diverged with the implant exposed. Further observation, taking into account conservative therapy, made it possible to stop the progression of the inflammatory process. At the end of the first month of observation in the main group, 5 patients had the implant exposed by 10 % of its volume with signs of infection of the surgical wound. Conservative management made it possible to stop the process in 3 patients. 2 patients underwent surgery for 2 months of postoperative follow-up with the removal of an individual prosthesis implant. In the control group, in the early postoperative period, 1 patient had a divergence of the sutures in the projection of the surgical wound. Under conditions of conservative administration, delayed sutures were applied, which made it possible to avoid purulent-inflammatory complications. In 2 patients, partial necrosis of the flap in the distal section was noted; under conditions of sparing necrectomy and soft tissue plastic surgery using free palatal grafts, flaps were saved. In the late postoperative period, the integration of the flap was achieved in all patients; at the end of 4 months of dynamic

follow-up, dental implantation was started in patients in the control group. In the control group, in the early postoperative period, 1 patient had a divergence of the sutures in the projection of the surgical wound. Under conditions of conservative administration, delayed sutures were applied, which made it possible to avoid purulent-inflammatory complications. In 2 patients, partial necrosis of the flap in the distal section was noted; under conditions of sparing necrectomy and soft tissue plastic surgery using free palatal grafts, flaps were saved. In the late postoperative period, the integration of the flap was achieved in all patients; at the end of 4 months of dynamic follow-up, dental implantation was started in patients in the control group. In the control group, in the early postoperative period, 1 patient had a divergence of the sutures in the projection of the surgical wound. Under conditions of conservative administration, delayed sutures were applied, which made it possible to avoid purulent-inflammatory complications. In 2 patients, partial necrosis of the flap in the distal section was noted; under conditions of sparing necrectomy and soft tissue plastic surgery using free palatal grafts, flaps were saved. In the late postoperative period, the integration of the flap was achieved in all patients; at the end of 4 months of dynamic follow-up, dental implantation was started in patients in the control group. which allowed to avoid purulent-inflammatory complications. In 2 patients, partial necrosis of the flap in the distal section was noted; under conditions of sparing necrectomy and soft tissue plastic surgery using free palatal grafts, flaps were saved. In the late postoperative period, the integration of the flap was achieved in all patients; at the end of 4 months of dynamic follow-up, dental implantation was started in patients in the control group. which allowed to avoid purulent-inflammatory complications. In 2 patients, partial necrosis of the flap in the distal section was noted; under conditions of sparing necrectomy and soft tissue plastic surgery using free palatal grafts, flaps were saved. In the late postoperative period, the integration of the flap was achieved in all patients; at the end of 4 months of dynamic follow-up, dental implantation was started in patients in the control group.

Conclusions

The use of modified individual plates for bone grafting of the upper jaw in the elimination of post-resection defects is an effective technique to restore the structure and function of the upper jaw. Despite the fact that the results of studies indicate the high efficiency of this technique, the percentage of success of surgical intervention leaves much to be desired. Compared with the use of autografts, the production of titanium implant prostheses is a faster and less labor-intensive method. In turn, the number of postoperative early and late complications, the impossibility of adequate dental prosthetics indicate the inappropriateness of the method. Reconstruction of maxillofacial defects remains a complex surgical procedure; the use of revascularized grafts is increasingly gaining momentum in the practice of maxillofacial surgeons and clearly determines the need for this method in patients with extended jaw bone defects.

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