BULLETIN OF STOMATOLOGY AND MAXILLOFACIAL SURGERY
Volume 20, Issue 1

DOI: 10.58240/1829006X-2024.1-16

RESEARCH ARTICLE

COMPARATIVE ANALYSIS OF PROSTHETIC REHABILITATION OF PATIENTS WITH COMPLETELY EDENTULOUS JAWS USING DIFFERENT OPTIONS FOR IMPLANT-SUPPORTED STRUCTURES

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Received: *Jan 6, 2024;* ***Accepted:*** *Mar 10, 2024;* ***Published:*** *Mar 25, 2024*

Abstract

Objectives: To conduct a comparative analysis the effectiveness of prosthetic rehabilitation of patients with completely edentulous jaws using various options for implant-supported structures.

Materials and methods: We examined and carried out complex treatment with the installation of implants in 82 patients (56 to 73 aged) years with completely edentulous jaws.

All patients underwent a clinical examination and using cone beam computed tomography (CBCT) analyzed of residual bone. Patients with edentulous were rehabilitated with three implant-supported prosthetic protocols. The patient was divided into 3 groups: 21 (1grup.) patients received removable overdenture supported by 4 implants using a bar system, 19 (2grup) patients received removable overdenture supported by 4 implants using rail system of attachments, 23 (3grup) patients received fixed restorations supported by 4 implants.

Peri-implant marginal bone level (MBL), immediately (base line for comparison) and 1 year, 3 years, and 5 years after implant installation, compared with values at last follow-up.

The method of questioning patients was used. The assessment was carried out using a point system: chewing efficiency, ease of care and use, stability of the dentures. Quality of life, assess used the Oral health-related quality of life the OHIP-G scale.

Results: In clinical follow-up the implants showed no mobility, soreness or pain during function, patients had healthy soft tissues.

For patients 1group MBL after 1 year 0.82 mm, after 3 years 1.23 mm, after 5 years was 1.46 mm.

For patients 2group MBL after 1 year 0.84 mm, after 3 years 1.28 mm, after 5 years was 1.49 mm. For patients 3 group MBL after 1 year 0.91 mm, after 3 years 1.32 mm, after 5 years was 1.53mm. The patients were satisfied with the result of treatment using implants. Speech adaptation of patients with removable dentures, fixed implants, occurred within a week. 5-year implants cumulative survival rate 1group rates was 96.7%, 2 group was 97.2%, 3 group rates was 96,9%.

The prosthesis cumulative survival rate 1group was 96.7%, 2 group was 97.4%, 3 group was 97,6%.

Conclusion: Implant-supporting structures on implants, installed between the mental foramens, are a reliable and predictable method for patients with complete edentulous jaws and significant jaw resorption. This solution is a reliable alternative to bone grafting, demonstrating fewer complications, fewer additional surgical procedures, and demonstrating satisfactory long-term survival.

Keywords: *overdenture; dental implant; edentulous*

Introduction

Edentulism, the loss of all natural teeth, is an important public health problem worldwide, associated with significant disability, and is one of the most complex tasks in prosthetic dentistry.[1]

Tooth loss leads to a deterioration in quality of life, many people with tooth loss are characterized by loss of self-esteem, decreased social status and decline in function, and treating tooth loss means returning to a normal lifestyle and improving quality of life.[2,3]

For prosthetic rehabilitation of edentulous patients, there are mainly three rehabilitation strategies: (RCD), implant-supported removable denture (ISOD) or implant-supported fixed denture (ISFAFDP).[4-6]

Among patients rehabilitated with a removable complete denture, there is dissatisfaction associated with difficulties in adaptation and the resulting feelings of insecurity.[7,8]

The introduction of the implant system into clinical practice has significantly expanded the possibility of providing edentulous elderly patients with a more reliable alternative to removable dentures.[9,10]

Treatment with dental implants can provide fully edentulous patients with functions and aesthetics similar to the natural dentition.

Basically, dental implants with (length > *10 mm* and *diameter > 3.5 mm*) are used in various clinical situations.[11]

Although the advantages of fixed implant restorations are undeniable, in many patients' restoration with fixed implants is not possible without bone grafting and additional surgical procedures, as well as additional time and cost involved.[12]

To install an implant in the atrophied posterior part of the jaw, additional procedures are required: autogenous bone grafting, sinus lifting, repositioning of the inferior alveolar nerve, distraction method.[13-18]

However, these methods are complex, labor-intensive, require a long time for rehabilitation, there is a risk of complications and is not indicated for all elderly patients.

Modern trends in implantology offer alternative, more reliable and predictable methods for installing implants in the interforaminal area, in order to avoid additional bone restoration procedures. Placement of four implants with distal cantilever prosthetic appendages is one of the methods proposed for this purpose, very popular and ALL 4 implants placement techniques.[19-20]

Another solution is to use short implants in the posterior atrophied area, short implant support in the posterior region provided a more balanced stress distribution by reducing the stresses on implants via forces applied from the molar region, but with severe bone resorption sometimes even the installation of short implants is not possible.[21-25]

It is also possible to install four implants in the interforaminal area and support them with hybrid removable dentures of different fixations (ball-shaped, beam-rail). Using this concept, even a severely atrophied lower jaw can be rehabilitated, eliminating the elongation of cantilevers.[26]

Most patients prefer fixed restoration designs to feel like "natural teeth" and with the patient being able to maintain adequate oral hygiene, fixed implant restorations would be a suitable and comfortable treatment option.

This protocol represents a beneficial option for improving retention and stabilization of implant prostheses.[27]

The benefits of dental implant supported or retained dentures include increased retention and stability of the denture, improved chewing and phonation, and a reduced rate of ridge resorption, all of which have a positive impact on the well-being and quality of life of patients.

There are many types of attachment system that can be used for implant overdentures, e.g., ball, bar, locator, magnets, telescope, TiSiSnap. Selecting the attachment system must consider their role, such as only improving overdenture retention (e.g., ball attachment), or retention and stability (e.g., round bar attachment with non-rigid anchorage), or retention, stability and support (e.g., milled bars with rigid anchorage). Main advantages of removable dentures on implants are associated with improved retention, stability of the denture which will increase chewing efficiency, speaking and comfort, which has a positive effect on quality of life), reduced gag reflex compared to conventional dentures, leads to a lower rate of bone resorption due to behind. it is better tolerated by patients who are wary of complex medical interventions. Plaque control in implant-supported removable dentures is easier compared to

implant-supported fixed dentures.

The main objective of this study was to compare rehabilitation options for mandibles with severe posterior atrophy with four implants supporting a fixed complete denture or a removable complete denture with different fixation on 4 implants.

Materials and methods

We examined and carried out complex treatment with the installation of implants in 82 patients (56 to 73 aged) years with completely edentulous jaws.

Patients were given detailed information about the methods and concepts of treatment with implants. All patients gave informed written consent to participate in the study and to publish the data obtained. All patients underwent a clinical examination and using cone beam computed tomography (CT) analyzed of residual bone. CT image is taken before implants insertion and after prosthetic rehabilitation.

Implants were placed according to standard surgical protocol using flapless technique and placement of the healing abutments, therefore, there is no need for another surgical step (Figure 1).

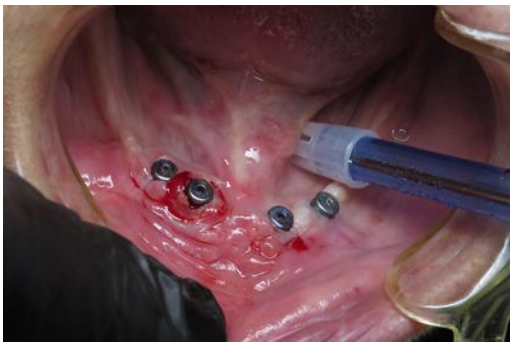
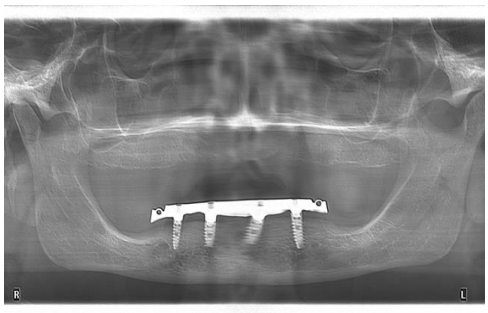


Figure 1. *Flapless technique and placement of the healing abutments*

Patients with edentulous were rehabilitated with three implant-supported prosthetic protocols.

The patient was divided into 3 groups:

1) 1 group (21) patients received removable overdenture supported by 4 implants using a bar system (Figures 2-6).
2) 2 group (19) patients received removable overdenture supported by 4 implants using rail system of attachments (Figures 7-11).
3) 3 group (23) patients received screw fixed bridge restorations supported by 4 implants (Figures 12-16).



Figures 2. *OPG by 4 implants using a bar attachments system*

Figure 3. *Removable overdenture using a bar attachments system*

Figure 4. *Intraoral Frontal View of bar system supported by 4 implants*

Figure 5. *Intraoral Frontal View of removable overdenture supported by 4 implants using a bar system*

Figure 6. *Intraoral lateral view of removable overdenture supported by 4 implants using a bar system*

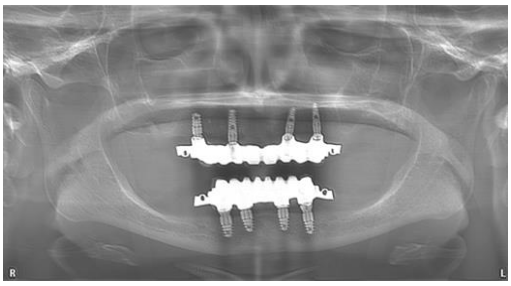


Figure 7. *OPG On 4 implants fixed bridge prosthesis in upper jaw on 4 implants fixed bridge prosthesis the lower jaw*

Figure 8. *Extra oral view on 4 implants fixed bridge prosthesis and removable overdenture using rail attachments system for the in upper jaw*

Figure 9. *Extra oral view on 4 implants fixed bridge prosthesis and removable overdenture using rail attachments system for the lower jaw*

Figure 10. *Intraoral frontal view of removable overdenture supported by 4 implants using a rail system*

Figure 11. *Intraoral lateral view of removable overdenture supported by 4 implants using a rail system*

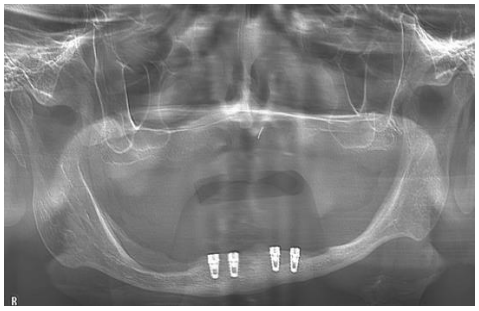


Figure 12. *OPG On 4 implants in lower jaw*

Figure 13. *Removable overdenture in upper jaw*

Figure 14. *On 4 implants screw fixed bridge prosthesis for lower jaw*

Patients were advised to strictly follow the postoperative instructions. Postoperative instructions target mainly postoperative medications, the adequate plaque control and using a soft diet during the first weeks.

Immediate loading with temporary provisional prostheses was carried out when the implant diameter and length were sufficient, the insertion moment was 45 N cm or more in the presence of a complete removable prosthesis. Final dental prosthetics was

performed 4 months after surgery in the maxilla, respectively after at least 2-3 months in the mandible.

Peri-implant marginal bone level (MBL) has been evaluated immediately (base line for comparison) 1 year, 3 years, and 5 years after implant installation, compared with values at last follow-up.

Patients' clinical follow-ups were scheduled every 6 months. Success criteria were evaluated according to Buser et al.[28]

The method of questioning patients was used. The assessment was carried out using a point system: chewing efficiency, ease of care and use, stability of the dentures.

Quality of life, assess used the Oral health-related quality of life the OHIP-G scale.[29] The questionnaire included the following questions (from 1 to 5 points):
1) Are you satisfied with your implant?
2) Are you satisfied with the operation?
3) Are you satisfied with the prosthetics?
High scores imply high patient satisfaction and high quality of life associated with oral health, while low scores indicate dissatisfaction.

Results

Data were analyzed from 82 patients; no postoperative complications were reported. In clinical follow-up the implants showed no mobility, soreness or pain during function, patients had healthy soft tissues.

For patients 1group MBL after 1 year 0.82 mm, after 3 years 1.23 mm, after 5 years was 1.46 mm.

For patients 2 groups MBL after 1 year 0.84 mm, after 3 years 1.28 mm, after 5 years was 1.49 mm.

For patients 3 groups MBL after 1 year 0.91 mm, after 3 years 1.32 mm, after 5 years was 1.53mm.

The patients were satisfied with the result of treatment using implants. Mean OHIP-G scores (out of a maximum of 5 points) were.

- patients rated their satisfaction with the implant at 1group 4.7 ± 0.2, 2 groups 4.6 ± 0.3, 3 groups 4.2 ± 0.4.
- patients' satisfaction with the operation 1 group 4.6 ± 0.3, 2 groups 4.5 ± 0.3, 3 groups 4.7 ± 0.4.
- patients' satisfaction with prosthetics 1group 4.7 ± 0.2, 2 groups 4.6 ± 0.3, 3 groups 4.8 ± 0.4.

Speech adaptation of patients with removable dentures, fixed implants, occurred within a week.

5-year implants cumulative survival rate 1group rates was 96.7%, 2 group was 97.2%, 3 group rates was 96,9%. The prosthesis cumulative survival rate 1group was 96.7%, 2 group was 97.4%, 3 group was 97,6%.

Discussion

After a long period of tooth extraction, significant resorption of the alveolar bone sometimes limits the installation of standard implants, which requires different strategies for increasing bone height.[30]

Often, edentulous patients are elderly and face barriers to accessing treatment (e.g. limited financial resources, transportation difficulties, communication problems associated with hearing or visual acuity loss). They are less willing to accept complex treatment options, including major surgery such as bone grafting and sometimes even implants. Often older people have systemic concomitant diseases, which are sometimes risk factors for the development of complications. Considering the above, simpler treatment methods with high predictability and easy maintenance procedures are preferred.

Implant prostheses in edentulous patients, despite the increase in their use, still have a low prevalence. Despite these factors limiting the use of implant dentures in patients with complete edentulous loss, due to their superior treatment outcomes compared to conventional dentures or dentures, they are likely to become a widely used standard treatment option in the future.[31,32]

The use of implants for prosthetic rehabilitation is likely to increase over time due to advances in dental research and technology, coupled with decreased costs of implant treatment and increased acceptance of this treatment option by the general public.[33,34]

In patients with deteriorating general health who require extensive augmentation procedures, minimally invasive techniques should be considered. In this regard, the use of implants installed in the area installed between the mental foramens may be the optimal solution.

Implant-supported dentures are an excellent treatment option for edentulous patients. Retention is achieved through the use of attachments placed directly on implants or on bar superstructures. Adequate cleaning and hygiene measures, as well as

care of the removable denture and intraoral retention elements, are critical for long-term clinical success.

Patients treated with implant-supported dentures have significantly higher chewing performance, functional scores, and quality of life than patients wearing conventional complete dentures. Implant-supported fixed dentures require less ongoing routine maintenance than implant-supported dentures (these dentures are removable and require the patient to put them in and out daily).

In this study, all patients 5 years after rehabilitation with implantation and prosthetics were satisfied with the functional, aesthetic and social results of treatment.

The results of a study of patients' subjective assessment of the effectiveness of treatment clearly demonstrate the advantages of fixed dentures fixed on implants, according to the criteria of "chewing function", "simplicity", addiction, "general satisfaction", "lack of food", getting under the prosthesis", "stability of the prosthesis when chewing". Patients noted that they quickly got used to handling the new type of prosthesis, as well as to the ease of removing and installing prostheses.

Thus, summing up the data from the examination and questionnaire, it can be argued that the use of dental implants for the purpose of stabilizing a complete removable denture on the jaw significantly improves the quality of life of this category of patients.

Conclusion

Implant-supporting structures on implants, installed between the mental foramens, are a reliable and predictable method for patients with complete edentulous and significant jaw resorption. This solution is a reliable alternative to bone grafting, demonstrating fewer complications, fewer additional surgical procedures, and demonstrating satisfactory long-term survival.

Declarations

Conflicts of interest and financial disclosures

The author declares that he has no conflict percent and there was no external source of funding for the research in question.

Ethical approval

The study was approved by the University ethics committee and was conducted in accordance with the Declaration of the World Medical Association.

Source of funding

This research received no external funding.

Data Availability Statement

Not applicable.

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ԱՄԲՈՂՋՈՎԻՆ ԱՆԱՏԱՄ ԾՆՈՏՆԵՐՈՎ ՀԻՎԱՆԴՆԵՐԻ ՄՈՏ ԻՄՊԼԱՆՏՆԵՐԻ ՎՐԱ ՀԵՆՎԱԾ ՏԱՐԲԵՐ ՕՐԹՈՊԵԴԻԿ ՊՐՈԹԵԶԱՅԻՆ ԿԱՌՈՒՑՎԱԾՔՆԵՐԻ ՀԱՄԵՄԱՏԱԿԱՆ ՎԵՐԼՈՒԾՈՒԹՅՈՒՆ

Տիգրան Հակոբյան,[1] Վլադիսլավ Տարասենոկ[2]

1. Երևանի Մ. Հերացու անվան պետական բժշկական համալսարանի բերանի խոռոչի և դիմածնոտային վիրաբուժության ամբիոնի ասիստենտ, Կամար ստոմատոլոգիական կենտրոնի հիմնադիր, Երևան, Հայաստան
2. Երևանի Մ.Հերացու անվան պետական բժշկական համալսարանի օրդինատոր, Երևան, Հայաստան

Ամփոփում

Նպատակներ: Կատարել լրիվ անատամությամբ հիվանդների պրոթեզների արդյունավետության համեմատական վերլուծություն՝ օգտագործելով իմպլանտների վրա հենված օրթոպեդիկ կառույցների տարբեր տարբերակներ:

Նյութեր և մեթոդներ: Լրիվ անատամությամբ 82 հիվանդների (56-ից 73 տարեկան) մոտ հետազոտվել և կատարվել է համալիր բուժում՝ իմպլանտների վրա հիմնված տարբեր օրթոպեդիկ կառույցներով:

Բոլոր հիվանդները ենթարկվել են համալիր կլինիկական հետազոտության և օգտագործելով նաև ճառագայթային համակարգչային տոմոգրաֆիա (CT):

Հիվանդները օրթոպեդիկ ռեաբիլիտացիան իրականացվել է իմպլանտների վրա հիմնված երեք պրոթեզային պրոտոկոլներով:

Հիվանդները բաժանվել են 3 խմբի՝

Հիվանդների 1 խումբը (21) պրոթեզավորվել են շարժական պրոթեզներով 4 իմպլանտների վրա հենված աղեղային համակարգի միջոցով,

Հիվանդների 2 խումբը (19) պրոթեզավորվել են 4 իմպլանտների վրա ֆիքսված անշարժ օրթոպեդիկ կառույցների և նրանց հետ ռելսային համակարգով ամարացված հիբրիդային շարժական պրոթեզեզների կիրառմամբ,

Հիվանդների 3 խումբը (23) պրոթեզավորվել են 4 իմպլանտների վրա պտուտակներով ֆիքսված անշարժ օրթոպեդիկ կոնստրուկցիաներով:

Հարիմպլանտային ոսկրային մակարդակը (MBL) գնահատվել անմիջապես (համեմատության բազային գիծ), իմպլանտի տեղադրումից հետո 1 տարի, 3 տարի և 5 տարի հետո՝ համեմատած վերջին հետազոտության արժեքների հետ:

Օգտագործվել է հիվանդների հարցման մեթոդը: Գնահատումն իրականացվել է բալային համակարգի միջոցով՝ ծամելու արդյունավետություն, խնամքի և օգտագործման հեշտություն, ատամնաշարի կայունություն: Կյանքի որակը գնահատվել օգտագործելով բերանի առողջության հետ կապված կյանքի որակը OHIP-G սանդղակը:

Արդյունքներ: Կլինիկական հետազոտության ժամանակ իմպլանտները չեն ցուցաբերել շարժունակություն կամ ցավ ֆունկցիայի ընթացքում, հիվանդներն ունեցել են առողջ հարիմպլանտային փափուկ հյուսվածքներ:

Հիվանդների 1 խմբի MBL 1 տարի հետո 0,82 մմ, 3 տարի հետո 1,23 մմ, 5 տարի հետո 1,46 մմ: Հիվանդների 2 խմբի MBL 1 տարի հետո 0,84 մմ, 3 տարի հետո 1,28 մմ, 5 տարի հետո 1,49 մմ: Հիվանդների 3 խմբի MBL 1 տարի հետո 0.96 մմ, 3 տարի հետո 1.32 մմ, 5 տարի հետո 1.53 մմ: Հիվանդները գոհ էին իմպլանտների միջոցով բուժման արդյունքից: Իմպլանտների 5 տարվա արդյունավետությունը 1 խմբի մոտ ցուցանիշները կազմել են 96.7%, 2 խմբի ցուցանիշները՝ 97.2%, 3 խմբի ցուցանիշները 96.9%, պրոթեզների արդյունավետությունը 1 խմբինը՝ 96.7%, 2 խմբինը՝ 97.4%, 3 խմբինը՝ 97.6%.

Եզրակացություն: Իմպլանտների հետ համակցված օրթոպեդիկ կառույցները հուսալի և կանխատեսելի բուժման մեթոդ են ամբողջական անատամությամբ և ծնոտի զգալի ապաճով հիվանդների համար: Այս լուծումը հուսալի այլընտրանք է ոսկրային փոխպատվաստմանը, ցույց տալով ավելի քիչ բարդություններ, ավելի քիչ լրացուցիչ վիրաբուժական միջամտություններ և ցույց տալով բավարար երկարաժամկետ գոյատևում:

СРАВНИТЕЛЬНЫЙ АНАЛИЗ ОРТОПЕДИЧЕСКОЙ РЕАБИЛИТАЦИИ ПАЦИЕНТОВ С ПОЛНОЙ АДЕНТИЕЙ ЧЕЛЮСТЕЙ С ИСПОЛЬЗОВАНИЕМ РАЗЛИЧНЫХ ВАРИАНТОВ КОНСТРУКЦИЙ НА ИМПЛАНТАТАХ

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Абстракт

Задачи: провести сравнительный анализ эффективности ортопедической реабилитации пациентов с полной адентией челюстей с использованием различных вариантов конструкций на имплантатах.

Материалы и методы: нами обследовано и проведено комплексное лечение с установкой имплантатов у 82 пациентов (в возрасте от 56 до 73 лет) лет с полной адентией челюстей.

Все пациенты прошли клиническое обследование и анализ остаточной кости с помощью конусно-лучевой компьютерной томографии (КЛКТ).

Пациенты с полной адентией были реабилитированы с помощью трех протоколов протезирования с опорой на имплантаты.

Больные были разделены на 3 группы.

21 пациенту (1-я группа) были установлены съемные протезы, фиксированные на 4 имплантатах с помощью балочной системы, 19 пациентам (2-я группа) - съемные гибридные протезы и постоянные ортопедические конструкции с опорой на 4 имплантата с использованием рельсовой системы аттачменов, 23 пациенты (3 группа) несъемные ортопедические конструкции с опорой на 4 имплантата с использованием винтовой фиксации.

Уровень маргинальной кости вокруг имплантата (MBL) сразу (базовая линия для сравнения) и через 1 год, 3 года и 5 лет после установки имплантата по сравнению со значениями при последнем наблюдении.

Использовался метод анкетирования больных. Оценка проводилась с использованием балльной системы. эффективность жевания, простота ухода и использования, стабильность зубных протезов. Качество жизни, оцениваемое с использованием качества жизни, связанного со здоровьем полости рта, шкалы OHIP-G.

Результаты: При клиническом наблюдении имплантаты не показали подвижности, болезненности или боли во время функционирования, у пациентов были здоровые мягкие ткани.

У больных 1 группы MBL через 1 год составила 0,82 мм, через 3 года 1,23 мм, через 5 лет 1,46 мм. У больных 2 группы МБЛ через 1 год составила 0,84 мм, через 3 год 1,28 мм, через 5 лет 1,49 мм. У больных 3 группы МБЛ через 1 год составил 0,91 мм, через 3 года 1,32 мм, через 5 лет 1,53 мм. Пациенты остались довольны результатом лечения с использованием имплантатов. Речевая адаптация пациентов со съемными протезами, несъемными имплантатами произошла в течение недели. Суммарная выживаемость 5-летних имплантатов в 1-й группе составила 96,7%, во 2-й группе — 97,2%, в 3-й группе — 96,9%. Кумулятивная выживаемость протезов в 1-й группе составила 96,7%, во 2-й группе - 97,4%, в 3-й группе - 97,6%,

Заключение: Имплант-протезные конструкции на имплантатах, устанавливаемые между подбородочными отверстиями, являются надежным и прогнозируемым методом для пациентов с полной адентией челюстей и значительной резорбцией челюстей. Это решение является надежной альтернативой костной пластике, демонстрируя меньше осложнений, меньше дополнительных хирургических процедур и демонстрируя удовлетворительную долгосрочную выживаемость.

Hakobyan T, Tarasenok V. Comparative Analysis Of Prosthetic Rehabilitation Of Patients With Completely Edentulous Jaws Using Different Options For Implant-Supported Structures. ***Bulletin of Stomatology and Maxillofacial Surgery*****. 2024;20(1):16-25. doi: 10.58240/1829006X-2024.1-16**