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CLINICAL ARTICLES

SINGLE IMPLANT-RETAINED MANDIBULAR OVERDENTURE: A CASE REPORT

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Abstract

Edentulism is a public health problem, impacting the quality of life of many people worldwide. Factors related to the mandibular ridge minimal support may hinder the common use of complete dentures. The use of overdentures supported by a minimum of one implant can be considered as reliable approach in this situation.

Aim: To present a case report of a single implant-supported overdenture in the mandibular symphysis for public health policies.

Case report: A 65-year-old edentulous patient complaining of discomfort in a mandibular denture was referred to the Universidade Federal Fluminense. On clinical examination, residual mandibular ridge resorption and soft tissue trauma were observed, which was in line with the reported discomfort. A mandibular overdenture retained by a single implant in the symphysis region was planned. A hex-type 4.0 mm in diameter and 11.0 mm in length implant was placed and a new set of complete dentures were made till the date of complete osseointegration. After four months, a second surgery exposed the implant platform to fit a ball attachment with a 32 N.cm torque. The denture was relieved on its tissue surface for the placement of a metal attachment matrix with a rubber O-ring inside, using a fast-curing resin, and the patient was locked into maximum intercuspitation during the acrylic polymerization process. Excessive resin was removed and the region was polished for daily use after the process. The patient reported an improvement in chewing condition and restorative esthetics.

Conclusions: A minimum requirements protocol has achieved relevant results and may be feasible in public health policies. Maintenance visits are recommended to maintain retention quality and to decrease the risk of failures.

Keywords: Edentulous Mandible, Complete Denture, Dental Implants

Introduction

Edentulism is a public health problem, impacting the quality of life of many people worldwide. Aesthetic, functional and phonetic difficulties, along with decreased self-esteem, social integration can be

reported.^{1,2} Complete dentures are the most common treatment option in these cases, despite its biomechanical limitations.³ Mandibular full dentures are related to limited stability and retention, due to ridge resorption, muscle activity and less contact area

with the oral mucosa compared to a maxillary denture.⁴ Therefore, it is important that alternatives should be considered. Thus, the use of implant-retained overdentures expands the number of individuals treated and increases the social reach. The use of two implants to retain a mandibular overdenture has been established over the years.⁵ Since the year 1997, many discussions on the subject have been conducted.⁶ Some authors consider it feasible to use a single implant in the symphysis region, since the bone quality and quantity in this region guarantee the necessary primary stability, high implant survival rates, and patient satisfaction.^{2, 7-9}

The aim of this study is to present a clinical case report of a single implant supporting a mandibular overdenture as a viable option in public health policies.

Case report

A 65-year-old edentulous female patient complained of great discomfort when using conventional dentures related to food retention and instability. In the anamnesis, only controlled arterial hypertension was reported, with no significant history of pathologies, medication use, or other surgical contraindications. The prostheses were in use by the patient for about eight years. Clinical evaluation observed decreased retention and stability, especially in the lower denture.



Figure 1: (A) Completely edentulous lower ridge; (B) Transverse tomographic image of the mandible with graphic simulation using the Dental Slice® software

The vertical dimension was reduced due to wear of the occlusal surfaces and also due to lack of other maintenance care, such as not relining the denture base over the years. No facts related to temporomandibular dysfunctions were observed. Extreme bone resorption in the lower ridge was also observed, but no clinical signs of mucosal trauma were observed. The upper ridge showed moderate resorption. The mucosal lining of the ridges and the lips and cheeks presented normal color and texture (Figure 1A). The treatment planning option was a

new set of dentures. A conventional denture for the upper jaw and an overdenture supported by a single implant for the mandible. An informed consent was given, followed by the acceptance of a treatment plan. Computed tomography images revealed sufficient bone availability in the mandibular symphysis area to plan the installation of a regular implant at least 10.0 mm in length by using the Dental Slice® software (Bioparts, Brasília, DF, Brazil) (Figure 1B). Blood test results (total blood count, blood coagulation, and blood glucose levels) were within the normal range. Surgical flaps were raised in the region of the symphysis and the ridge was flattened under local anesthesia. A hexagonal-type implant (Titamax Ti, Neodent®, Curitiba, Brazil) with 4.0 mm in diameter and 11.0 mm in length was placed, with the installation of a cover screw (Figures 2A, 2B, and 2C). The suture was made to wait for the osseointegration period. Mandibular denture was relieved and relined with soft resin to avoid trauma. The suture was removed after 14 days.

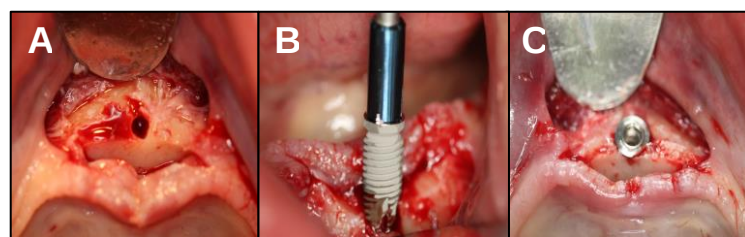


Figure 2: (A) Ridge crest flattening and drilling completion; (B) Installation of the external hexagon implant 4.0 mm in diameter (platform 4.1 mm) and 11.0 mm in length; (C) Top view of the installed implant

The fabrication of the new upper and lower dentures was started after 21 days. All conventional technical steps were performed, especially functional molding, in order to achieve optimum adaptation and stability in both the upper and lower prostheses. After fabrication and delivery of the prostheses, the patient was able to use them with greater comfort, though she still experienced lack of retention and stability in the lower denture, especially while eating. Despite that, the oral and facial esthetics were restored satisfactorily, and diction was improved (Figure 3A). The re-opening surgery was performed four months after surgery, which is the recommended period for osseointegration. A healing abutment 4.1 mm in diameter and 5.0 mm in height was installed (Figures 3B and 3C) followed by suturing (removed after

seven days) and relief with soft relining of the prosthesis.



Figure 3: (A) New upper and lower complete dentures; (B) Re-opening surgery; (C) Installation of a healing abutment 4.1 mm in diameter and 5.0 mm in height

Thirty days after re-opening, a Neodent® mini ball abutment of 4.1 mm diameter and 4.0 mm transmucosal height was screwed into the implant after the healing abutment was removed. A torque wrench of the same manufacturer was used to provide a 32 Ncm torque, according to the manufacturer's instructions (Figure 4A). A metallic cylinder with a rubber O-ring inside, which provides a resilient retention, was inserted in the internal portion of the resin base of the lower denture, perfectly aligned with the ball abutment in the position of mucosal adaptation and centric occlusion of the prosthesis. The technique described by the manufacturer determines the internal relief of the prosthesis and the use of self-curing acrylic resin to hold the cylinder (Figures 4B and 4C).

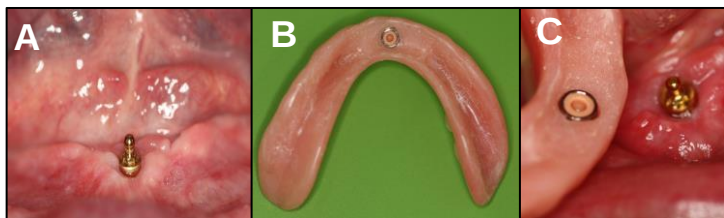


Figure 4: (A) Buccal view: Installation of the ball abutment, 4.1 mm in diameter and 4.0 mm transmucosal height; (B) Internal view of the lower complete denture: Capsule capture with the O-ring; (C) Internal view of the lower complete denture and the ball abutment in the mouth

The Oral Health Impact Profile in Edentulous Adults questionnaire (OHIP-EDENT) was administered to assess the physical and psychological aspects at three time points: with the old prosthesis (31 points), with the mucosa-retained new prosthesis (27 points), and with the implant-retained prosthesis (21 points). The progressive decrease in the score indicated increasing satisfaction. The patient was followed up after installing the implant-supported denture to remove trauma areas in the mucosa, as expected after better prosthesis retention. Periodic appointments should be

held every six months for clinical evaluation and replacement of some prosthetic component, if necessary. In addition, a panoramic radiograph should be requested to monitor implant osseointegration.

Discussion

A pioneering study was published in 1997, after a five-year follow-up with 100% successful implants and prostheses in 21 patients.⁶ Since then, higher satisfaction rates have been reported by most authors as compared to the conventional prosthesis.^{7, 10-13} The exceptions are the studies that detected no interocclusal thickness discrimination improvement after one to six years¹⁴ and that stated that it is not possible to recommend this therapy to improve health-related quality of life after two years.¹⁵ Many studies compared the use of a single implant with that of two or more implants, without observing a statistically significant difference between the groups.¹⁶⁻¹⁹ A systematic review concluded that single implant-retained mandibular overdentures showed significantly less marginal bone loss and a lesser number of implant losses as compared to the treatment using two implants.²⁰ In contrast, a study highlighted the advantages of two-implant overdentures with respect to the satisfaction index and chewing performance 12 months after installation of the prosthesis.²¹ The loss of a single implant loaded after osseointegration is rare.^{2, 8} A randomized clinical trial reported loss of one implant in conventional loading and nine in immediate loading, four months after loading.²²

Other studies reported similar findings with immediate loading: three losses in the first year (against seven with two-implant prostheses),¹⁸ and two losses out of a total of 34 implants after 12 months.²³ These reports led the authors to not recommend immediate loading as the first choice in this treatment. Despite these results, studies following 25²⁴ and ten¹⁷ implants installed with immediate loading for 12 months reported no losses. Another study, comparing the use of one and two implants with immediate loading reported no loss in the first group and five losses in the second group after five years.¹⁶ As for prosthesis maintenance, several authors report the great frequency of replacement of the retention matrix of the ball and locator attachment,^{8, 16, 25, 26} which can be a

complicating factor from the perspective of treating large number of patients. However, the most serious complications are reports of prosthesis fractures, usually adjacent to the abutment, which was reported by few authors. One study reported 11 single-implant prosthesis fractures in nine out of 42 patients, and six two-implant prosthesis fractures in four out of 43 patients. Although these differences were not statistically significant, they were still a point of concern, because they showed that two-implant overdentures could also fracture.²⁷

Another five-year study reported that the group with one implant showed more incidences of prosthesis fractures as compared to the group with two implants (22 events in 12 patients versus 13 events in seven patients), but without a statistically significant difference.¹⁶ One study highlighted a statistically significant difference in fractures with immediate loading as compared to conventional loading. This was attributed to the greater prosthesis relief in the area where the retention matrix was installed, since the tissues were recently manipulated, and hence were more voluminous.²⁵ The largest clinical follow-up ever published (ten years) reported eight fractures in 11 patients.²⁶

The authors did not mention the lifetime limit of a complete denture, which could justify some of the fractures. Some structural reinforcement proposals are cited in the literature, such as a cast bar incorporated into the prosthesis in the anterior

segment,^{28, 29} or a thin metallic mesh incorporated throughout the prosthesis extension.³⁰ All studies consider that the antagonism to a mucosa-retained maxillary complete denture is an essential condition. In addition, the use of an at least 10.0 mm long regular implant is recommended.⁹

A surgical guide is not considered essential,² in order to grant access to low-cost therapeutic proposals to a large number of patients. The clinical case reported here corroborated the results published in the literature regarding patient satisfaction, according to the decreasing scores of the OHIP-EDENT questionnaire³¹ administered at three different time points.

Conclusion

This is an interesting and minimalistic initiative in the field of Implantology with favorable scientific evidence. This could help increase the attention given to completely edentulous mandibles, which is one of the major health problems faced by the older Brazilian population, providing better functional and psychological benefits as compared to the conventional prostheses. Success is more predictable when immediate loading is not performed. Prosthesis maintenance is important as it requires frequent retention component replacement and because of the risk of fracture.

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Մարսելո Գոմես դա Սիլվա ^{1*}, Լուիս Էդուարդո Կարնեյրո-Կամպուս ¹, Կլաուդիո Պինեյրո Ֆերնանդես ¹, Էդուարդո Սեյշաս Կարդոզու ¹, Նիկոլաս Հոմսի ¹, Յուլիա Կարնեյրո Սաբինո ¹, Դանիելա Ռիբեյրո Սոպոն ¹, Մաուրիսիու դե Ալբուկերկե ²

¹ Ստոմատոլոգիայի դպրոց, Նովա Ֆրիբուրգոյի առողջապահական ինստիտուտ, Ֆլումինենսե դաշնային համալսարան, Նովա Ֆրիբուրգո, ՌՋ, Բրազիլիա

² Իմպլանտոլոգիայի բաժին, Բրազիլիայի ատամնաբուժական ասոցիացիա, Ռիո Դե Ժանեյրո, Բրազիլիա

Ամփոփում

Ստորին ծնոտի ապաճը կարող է դժվարացնել ամբողջական ատամնապրոթեզի օգտագործմանը: Այս իրավիճակում հուսալի մոտեցում կարելի է համարել նվազագույնը մեկ իմպլանտին հենված ատամնապրոթեզի օգտագործումը:

Նպատակը: Ներկայացնել ծնոտի սիմֆիզի հատվածում մեկ իմպլանտին հենված ատամնապրոթեզի մի դեպքի մասին հաղորդումը:

Դեպքի հաշվետվություն: 65-ամյա անատամ հիվանդը, որը գանգատվում էր ստորին ծնոտի ատամնաշարի անհարմարությունից, ուղարկվել է Universidade Federal Fluminense: Կլինիկական հետազոտության ժամանակ նկատվել է ստորին ծնոտի կատարի ապաճ և փափուկ հյուսվածքների վնասվածք, որը համահունչ էր հաղորդված անհանգստությանը: Նախատեսվում էր ծնոտի ատամնապրոթեզ, որը հենված էր մեկ իմպլանտին սիմֆիզի շրջանում: Տեղադրվել է 4.0 մմ տրամագծով և 11.0 մմ երկարությամբ իմպլանտ: Չորս ամիս անց օստեոինտեգրումից հետո պատրաստվել է ամբողջական պրոթեզների նոր հավաքածու: Հիվանդը հայտնել է ծամողական և էսթետիկայի բարելավման մասին:

Եզրակացություն: Նվազագույն պահանջների արձանագրությունը հասել է համապատասխան արդյունքների և կարող է իրագործելի լինել հանրային առողջապահության քաղաքականության մեջ:

ПРОТЕЗ НИЖНЕЙ ЧЕЛЮСТИ С ОДИНАРНЫМ ИМПЛАНТАТОМ: КЛИНИЧЕСКИЙ СЛУЧАЙ

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Резюме

Факторы, связанные с резорбцией гребня нижней челюсти могут препятствовать использованию полных съемных протезов. Надежным подходом в этой ситуации можно считать использование съемных протезов с опорой как минимум на один имплантат.

Цель: Представить клинический случай съемного протеза с опорой на одиночный имплантат в нижнечелюстном симфизе в соответствии с политикой общественного здравоохранения.

Клинический случай: 65-летний пациент с адентией, жалующийся на дискомфорт в нижнечелюстном протезе, был направлен в Федеральный университет Флуминенсе. При клиническом осмотре наблюдались остаточная резорбция гребня нижней челюсти и травма мягких тканей, что соответствовало сообщениям о дискомфорте. Планировался съемный протез нижней челюсти с опорой на один имплантат в области симфиза. Был установлен имплантат диаметром 4,0 мм и длиной 11,0 мм и изготовлен новый комплект полных съемных протезов до даты полной остеоинтеграции. Через четыре месяца во время второй операции платформа имплантата обнажилась, чтобы установить шаровидную насадку с крутящим моментом 32 Н·см. Пациент сообщил об улучшении состояния жевания и восстановительной эстетики.

Выводы: Протокол минимальных требований дал соответствующие результаты и может быть реализован в политике общественного здравоохранения.