

## Use of the multifunctional guide to gain predictability in an immediate inferior loading protocol on implants

Uso do guia multifuncional para ganho de previsibilidade em protocolo de carga imediata inferior sobre implantes

Utilización de la guía multifuncional para ganar previsibilidad en un protocolo de carga imediata inferior sobre implantes

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### **Abstract**

The treatment with dental implants has evolved significantly from the 1970s to the present day, both in terms of planning and in bioengineering and surface treatment of these implants, with the aim of making the treatment more effective. Currently the use of immediate implants has been increasingly studied by researchers and used for the oral rehabilitation of patients. The literature shows us that the immediate insertion of post-extraction dental implants is a type of treatment with high success rates, enabling the patient to undergo only one surgery, and return to a faster masticatory and aesthetic function. This requires correct planning and adequate patient selection for successful treatment, considering bone and periodontal conditions. The aim of this study is to discuss the planning of the oral rehabilitation of a patient who underwent total extraction of the lower teeth, installation of 4 immediate dental implants and fabrication of a protocol-type immediately loaded total prosthesis.

**Keywords:** Dental implants; Immediate dental implant loading; Denture complete immediate.

### **Resumo**

O tratamento com implantes dentários tem evoluído significativamente desde a década de 70 até os dias atuais, tanto na questão de planejamento quanto na bioengenharia e tratamento da superfície desses implantes, com o objetivo de tornar o tratamento mais eficaz. Atualmente o uso de implantes imediatos tem sido cada vez mais estudado pelos pesquisadores e utilizado para a reabilitação oral dos pacientes. A literatura nos mostra que a inserção imediata de implantes dentários pós-extração é um tipo de tratamento com altas taxas de sucesso, possibilitando ao paciente ser

submetido a apenas uma cirurgia, retorno à função mastigatória e estética mais rápidas. Para isso são necessários planejamento correto e seleção adequada do paciente para o sucesso do tratamento, levando em consideração a condição óssea e periodontal. O objetivo deste estudo é discorrer sobre o planejamento da reabilitação oral de uma paciente que foi submetida da extração dentária total dos dentes inferiores, instalação de 4 implantes dentários imediatos e confecção de uma prótese total com carga imediata do tipo protocolo.

**Palavras-chave:** Implantes dentários; Carga imediata em implante dentário; Prótese total imediata.

### Resumen

El tratamiento con implantes dentales ha evolucionado significativamente desde los años 70 hasta la actualidad, tanto en la planificación como en la bioingeniería y el tratamiento de la superficie de estos implantes, con el objetivo de hacer más efectivo el tratamiento. Actualmente el uso de implantes imediatos ha sido cada vez más estudiado por los investigadores y utilizado para la rehabilitación oral de los pacientes. La literatura nos muestra que la inserción inmediata de implantes dentales post-extracción es un tipo de tratamiento con altas tasas de éxito, permitiendo al paciente someterse a una sola cirugía, y volver a la función masticatoria y estética más rápido. Para ello, es necesaria una correcta planificación y una adecuada selección del paciente para el éxito del tratamiento, teniendo en cuenta el estado óseo y periodontal. El objetivo de este estudio es discutir la planificación de la rehabilitación oral de un paciente que se sometió a la extracción total de los dientes inferiores, a la instalación de 4 implantes dentales imediatos y a la realización de una prótesis total de tipo protocolo con carga imediata.

**Palabras clave:** Implantes dentales; Carga imediata del implante dental; Dentadura completa imediata.

## 1. Introduction

Modern oral implant dentistry began in the 1950s, when the first implants were used. Their use was not supported by scientific or clinical evidence, and therefore the results were poor, although occasionally successful cases were reported. The realization of titanium screw osseointegration was a giant step in the evolution of concepts widely applied today. (Brånemark, Adell, Breine, Hansson, Lindström, 1969)

Per-Ingvar Branemark placed his first commercially pure titanium implant in 1965 during a fully anchored fixed jaw rehabilitation in a totally edentulous patient. This patient died in 2009 with original implants still in function. Overall, the 1970s was the era of implant developments, and research was conducted empirically by changing implant designs and surgical and prosthetic treatment protocols. (Brånemark, Hansson, Adell, Breine, Lindström, Hallén, 1977)

The original Branemark protocol advocated the use of a two-stage surgical approach in which the turned implants were for several months under the mucosa. This stress-free prolonged submerged healing period was considered a prerequisite to achieve osseointegration. It was believed that otherwise, soft-tissue interposition would occur and jeopardize the outcome. After 3–6 months a second surgery was required. At this stage the abutments were connected and the prosthetic procedure was initiated. (De Bruyn, Raes, Östman, & Cosyn, 2014)

De Bruyn et al., 2014 were among the first to attempt to load dental implants immediately; however, success was rather limited as a result of fibrous encapsulation. (De Bruyn et al., 2014) This made the dental community adopt the delayed protocol, with a period of unloaded healing, of 3–6 months, as the standard.

The literature shows us that immediate post-extraction dental implant insertion is a type of treatment with high success rates, clinical outcomes are associated with immediate, early and late implant placement, finding similar success rates between the different procedures. However, immediate placement has certain advantages over late placement of implants such as reduced treatment time and avoidance of a second surgery. (Pellicer-Chover et al., 2014)

This article aims to describe a clinical case, which was performed the oral rehabilitation of a patient through the confection of an upper total prosthesis and total exodontia of the lower teeth, immediate installation of 4 dental implants and confection of lower total prosthesis of the immediate protocol type.

## 2. Methodology

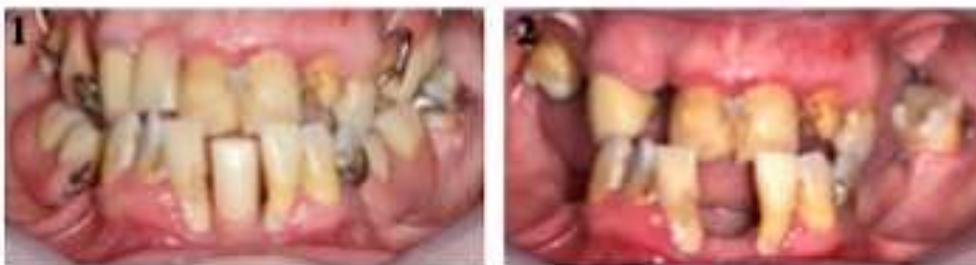
This clinical case report is part of a descriptive observational study, which in addition to discussing the proposed treatment, also aimed to discuss the topic through the bibliographic survey carried out (Pereira, 2018) and thus contribute to the scarce scientific literature on the subject.

Thus, representing a descriptive and qualitative content. The case was conducted according to clinical and professional ethics. The patient reported in the study has a personal data sheet and anamnesis, where he authorized the use of images, clinical, radiographic, and socioeconomic data for educational and research purposes, and with this signed a Free and Informed Consent Form and the Informed Consent Form. Consent of the Person's Participation as a Subject, which were duly read and explained.

## 3. Case Report

Patient S.R.C.M.G, 62 years old, female, was in the oral rehabilitation clinic of the Fundação Araraquarense de Ensino e Pesquisa Odontológica - FAEPO, referring wanting to change the upper and lower removable dental prostheses that she had been using for 15 years (Figure 1 and 2), to improve aesthetics. The intraoral clinical and radiographic examination showed a patient with Angle Class III skeletal pattern, periodontal involvement of the upper anterior teeth with buccal inclination, misalignment and presence of generalized periodontitis and grade II mobility of the lower anterior teeth (Figure 3). The patient had no pathologies or allergies.

**Figure 1** - Initial case - patient in dental occlusion wearing removable partial dentures. **Figure 2** - Initial case - patient in dental occlusion without the use of removable partial dentures.



Source: Authors.

Given the patient's complaints and clinical picture, the following planning was performed: total extraction of the upper teeth and fabrication of an upper total prosthesis and total extraction of the lower teeth with installation of 4 dental implants and fabrication of an immediate loading protocol with installation of a screw-retained lower total prosthesis. The entire surgical procedure and the stages for making the prosthesis were explained and the patient agreed with the proposed treatment.

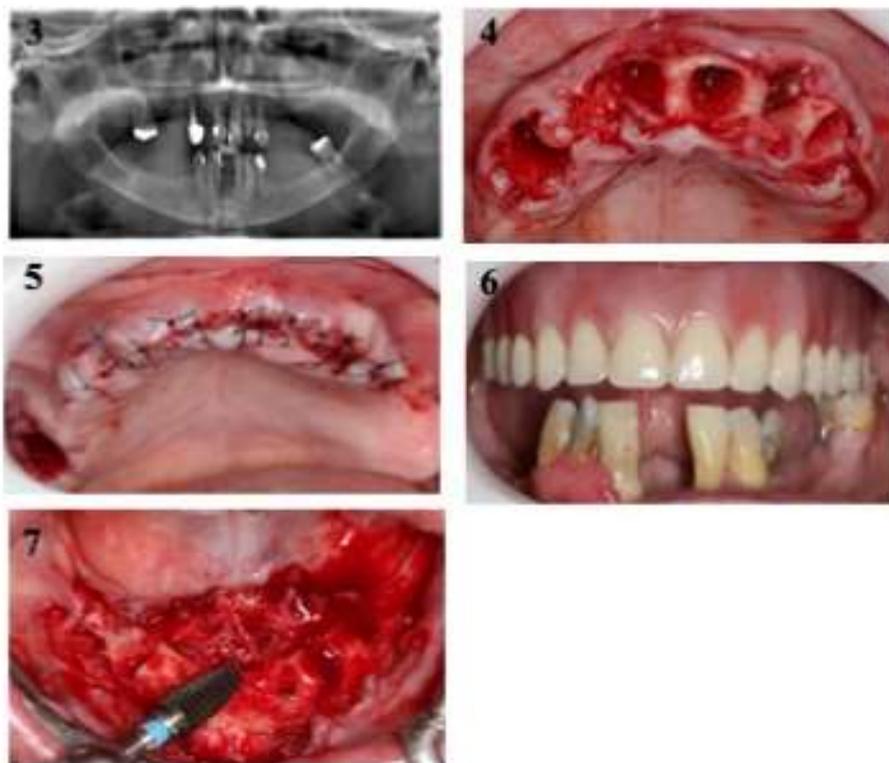
We started the treatment with the making of the working and functional impressions, for making the upper total prosthesis, performing the necessary steps for the complete making, and preparing the patient for the surgical procedure of extracting the upper and lower teeth for the installation of the lower dental implants. The planning for the installation of the 04 dental implants was performed through the analysis of the cone beam tomography.

The surgical procedure was started with local anesthesia with mepivacaine 2% - 1:100000 with infiltrative epinephrine in the right upper anterior and posterior sulcus, gingival mucosa and papillae, and in the right lower anterior

sulcus, blocking the left alveolar nerve and the bilateral mental nerve and local anesthesia in the lower gingival mucosa and papillae.

All upper teeth were extracted, the dental alveoli were sutured with 5.0 nylon thread (Figures 4 and 5), and the upper total prosthesis was installed (Figure 6). Next, all the lower teeth were extracted, an incision was made in the lower alveolar ridge, with mucoperiosteal detachment, bone regularization of the lower alveolar ridge (Figure 7), and implant installation was started.

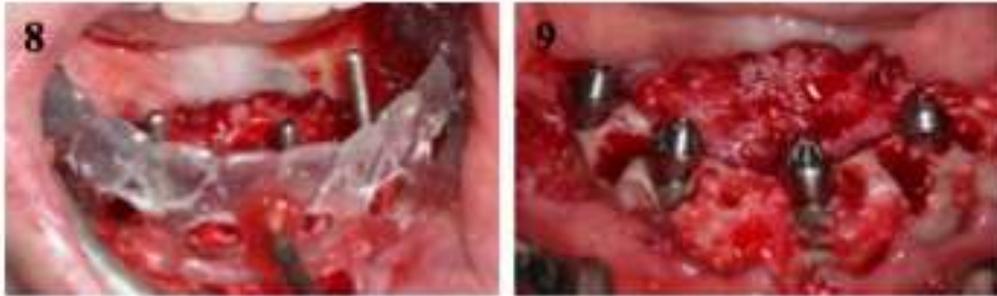
**Figure 3** - Initial panoramic x-ray. **Figure 4** - Dental alveolus after extraction of the upper teeth. **Figure 5** - Maxilla after suture of the dental alveoli. **Figure 6** - Upper full denture in position after tooth extraction surgical procedure. **Figure 7** - Osteotomy for regularization of the inferior alveolar ridge after extraction of the lower teeth.



Source: Authors.

Neodent® Helix Grand Morse Aqua morse taper implants were selected. The dental implants were installed using a multifunctional guide (Figure 8). A 3.75 x 13 mm implant with a torque of 45 Newtons and a 3.5 mm high micro-pillar was installed in the region between the left mandibular canine and left mandibular lateral incisor, a 3.75 x 13 mm implant with a torque of 60 Newtons with a 17 degree and 2, 5 mm high, a 3.75 x 13 mm implant was installed in the lower right lateral incisor region with a torque of 60 Newtons, a 30 degree micro-pillar and 2.5 mm high, and a 3.75 x 11.5 mm implant with 45 Newtons, a 30 degree micro-pillar and 2.5 mm high was installed in the lower right premolar tooth region. (Figure 9)

**Figure 8** - Presence of the inferior multifunctional guide during the installation of the inferior implants. **Figure 9** - Lower implants installed and installation of the components - micro-unit.



Source: Authors.

The sutures were made with 5.0 nylon thread and the implant molding transfers were installed. The components (impression transfers) were bonded to each other and to the multifunctional guide using acrylic resin (Figure 10). The patient's occlusion was checked and manipulated for the correct positioning of the multifunctional guide occlusion with the upper full denture (Figure 11).

**Figure 10** - Installation of the transfers for impression taking and bonding using acrylic resin for later fabrication of the metal bar. **Figure 11** - Occlusion checking using the multifunctional guide and marking the occlusion points with acrylic resin.

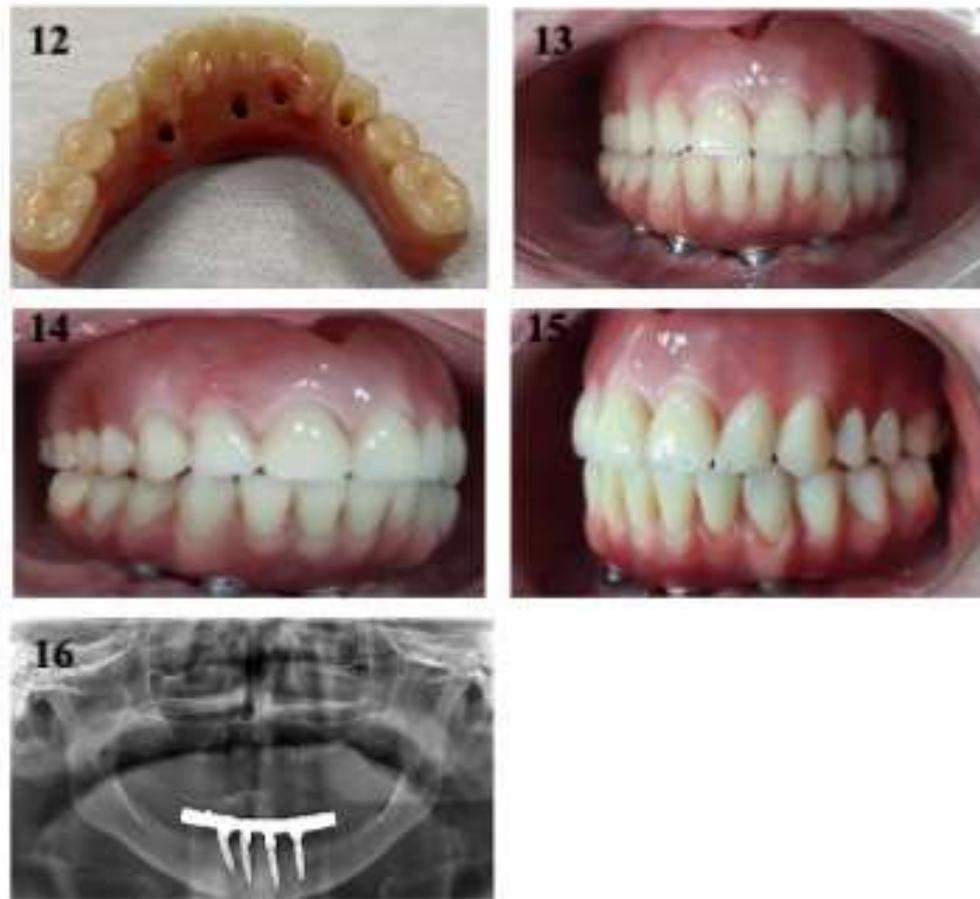


Source: Authors.

Functional molding was performed with lightweight addition silicone material and the patient's dental occlusion was marked with 3 acrylic resin points on the multifunctional guide. The entire set was removed from the patient's mouth and sent to the dental laboratory to make the metal bar and mount the teeth in wax on the lower prosthesis for subsequent testing of the structure.

After 24 hours, the structure of the metal bar was tested and the lower teeth were mounted, and the installation and adaptation occurred correctly. Acrylization of the prosthesis and definitive installation of the lower prosthesis were performed (Figures 12, 13, 14 and 15). After 30 days a radiographic examination was performed to evaluate the implants and adaptation of the lower prosthesis (Figure 16).

**Figure 12** - Occlusal view of the inferior protocol prosthesis **Figure 13** – Frontal view of the inferior protocol prosthesis. **Figure 14** – Lateral right view of the inferior protocol prosthesis. **Figure 15** – Lateral left view of the inferior protocol prosthesis. **Figure 16** – Final panoramic x-ray.



Source: Authors.

#### 4. Discussion

Over the last decade, immediate implant surgery has undoubtedly gained attention due to its similar results with fewer surgical interventions and high levels of satisfaction with treatment. However, the difficulty in achieving primary stability and the possibility of no bone formation around the implant as a result of micro-movements may be factors in reducing implant survival and esthetic results in the long term. (Pellicer-Chover et al., 2014)

The immediate insertion of implants in post-extraction sockets is a treatment modality with high success rates. (Quirynen Van Assche, Botticelli, 2007)

Chen et al., 2004 conducted a literature review of success rates and clinical outcomes associated with immediate, early, and delayed implant placement, finding similar success rates among the different procedures. Nevertheless, immediate placement has certain advantages over delayed implant insertion: the reduction in treatment time and the avoidance of second surgery. (Chen, Wilson Jr, 2004)

It is thought that the long-term success of dental implant treatment depends on many factors, including periodical maintenance and follow-up examinations. (Gallucci, Hamilton, Zhou, Buser, & Chen, 2018)(Muñoz-Cámara, Águila, Pardo-Zamora, & Camacho-Alonso, 2020) However, few long-term controlled follow-up studies of implants that include periodontal parameters have been reported. (Yao, Cao, Bornstein, & Mattheos, 2018) Zanetti et al. conducted a literature review and

concluded that the parameters that may be applied for assessing the state of peri-implant health and the severity of peri-implant disease include: plaque accumulation, probing depth, bleeding on probing, keratinized mucosa width and crevicular fluid volume.(Zanetti, Pascoletti, Cali, Bignardi, & Franceschini, 2018)

According to a recent literature review, to date there have only been a very limited number of randomized clinical trials that compare immediate and delayed implants. No controlled studies have been found evaluating the influence on peri-implant health of placing implants immediately following tooth extraction or after allowing socket healing in patients rehabilitated with fixed full-arch prostheses.(Den Hartog, Huddleston Slater, Vissink, Meijer, & Raghoobar, 2008) (Lang, Pun, Lau, Li, & Wong, 2012) (Chavarri-Prado et al., 2021)

Crespi et al., evaluated changes in the bone around 40 immediate implants, 20 immediately restored and 20 loaded after three months. The authors reported a success rate of 100% in both groups, and radiographic results were similar.(Crespi , Capparé, Gherlone, 2008) A review by den Hartog et al., of single implant restorations in the esthetic zone, found no statistically significant differences in clinical trials comparing immediate, early and delayed implant placement.(Den Hartog et al., 2008) In contrast, for Atieh et al., there is an added risk in the immediate restoration of immediate implants placed in the esthetic region compared to those placed in healed sites.(Atieh, Payne, Duncan, & Cullinan, 2009)

Quirynen et al. (2007) performed an extensive systematic review to investigate immediate and early placement in partially and fully edentulous sites. The studies included in their review were extremely heterogenous. Nevertheless, they concluded with an excellent consensus report that presented the different advantages and potential risks of immediate placement and called for strict consideration of certain factors including proper patient selection and treatment planning to achieve a successful outcome. However, none of the previous studies discussed the combined approach of immediate restoration/ loading of single implants placed in extraction sockets as compared with those placed in healed sites. (Quirynen, Van Assche, Botticelli, 2007)

Botticelli et al., treated 18 patients with 21 immediate implants and after a five-year follow-up found stable bone levels and even gains around some implants. (Botticelli, Renzi, Lindhe, & Berglundh, 2008).

The present study with a short follow-up showed implant success and peri-implant marginal bone loss among immediate implants supporting full-arch fixed prostheses. No changes in peri-implant health such as plaque index, gingival recession, keratinized mucosa, probing depth, modified gingival index and presence of mucositis were found for the one-month follow-up.

Another factor to be analyzed is that the greatest occlusal stress on the implant is concentrated in the alveolar ridge bone. Therefore, the role of the implant length in the trans osteal region around the implant has been debated. (Brennan, Houston, O’Sullivan, 2010)The implant length seems to be particularly relevant with immediately loaded implants by providing initial stability, considering that remodeling does not occur uniformly around the implant. The additional length allows remodeling in one region, while the other region can stabilize the immediately loaded implant. In general, the critical length and diameter of the immediately loaded implant implants still needs to be investigated.(Al-Sawai & Labib, 2016)(Afrashtehfar, Assery, & Bryant, 2021)

## 5. Conclusion

Immediate implant installation surgery after extraction has shown very favorable results and advantages over conventional treatment, which is to wait for bone formation after extraction and then install the implant in a second surgery.

However, it is clear from the literature that specific care is needed for this procedure, such as adequate planning, bone density or morphology assessment, occlusal load assessment, and periodontal condition. A high degree of stability of the primary implant (high insertion torque) seems to be a prerequisite for a successful procedure. We agree that this type of case is

important because the use of the multifunctional guide brings great predictability during the planning of the prosthetic outcome and is of great assistance in the transoperative both in the installation of the dental implants and in the fabrication of the prosthesis.

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