

A modified method for immediate loading and reinforced metal framework overdenture: clinical case

Um método modificado para overdenture com carga imediata e estrutura metálica de reforço

Un método modificado para sobredentadura con carga inmediata y la estructura metálica de refuerzo

Humberto **GENNARI FILHO**
José Vitor Quinelli **MAZARO**
Marcelo Coelho **GOIATO**
Karina Helga Leal **TURCIO**

Dental Materials and Prosthodontics Department, School of Dentistry at Araçatuba, UNESP – Univ. Estadual Paulista, Brasil, Araçatuba – SP, Brazil

Abstract

The aim of the present study was to report a modified protocol for immediate implant-supported full-arch rehabilitation on three interforaminal implants and two implants placed in the posterior mandible, one on each side. This article describes a treatment protocol that can be used to reduce the time required for the fabrication and placement of an implant-supported prosthesis. It is described a technique that improved patient comfort when compared to conventional technology and propose the possibility of using a denture with internal reinforcement framework with captured abutments.

Descriptors: Dental Implants; Immediate Dental Implant Loading; Denture, Complete.

Resumo

O objetivo deste trabalho foi relatar um protocolo modificado de prótese imediata implantosuportada sobre três implantes interforaminais e dois implantes na região posterior da mandíbula, um de cada lado. Este artigo descreve um tratamento que pode ser usado para reduzir o tempo requerido para a fabricação e instalação da prótese, melhorando o conforto do paciente quando comparada à técnica convencional, possibilitando a inserção de uma estrutura metálica de reforço internamente à prótese, junto aos pilares capturados.

Descritores: Implantes Dentários; Carga Imediata em Implantes Dentários; Prótese Total.

Resumen

El objetivo de este estudio fue demostrar un protocolo modificado de prótesis soportada en tres implantes inmediatos interforaminais y dos implantes en la región posterior de la mandíbula, un a cada lado. Este artículo describe un procedimiento que se puede utilizar para reducir el tiempo requerido para la fabricación e instalación de la prótesis, mejorando el confort del paciente en comparación con la técnica convencional, lo que permite la inserción de una estructura metálica de refuerzo en el interior de la prótesis, junto con los pilares capturados .

Descriptores: Implantes Dentales; Carga Inmediata del Implante Dental; Dentadura Completa.

INTRODUCTION

According to the original protocol, Brånemark implants require a two-step surgical procedure in order to become osseointegrated. The two-stage surgery is sometimes uncomfortable for the patient, and recent research has shown that osseointegration can also be achieved with a one-stage technique with early or immediate implant loading in good quality bone, which simplifies and shortens treatment for the patient's benefit. Turkyilmaz et al.¹ studied edentulous patients treated with two unsplinted dental implants supporting mandibular overdentures and observed that the early loading approach of two dental implants supporting a mandibular overdenture does not injure peri-implant soft tissue health, marginal bone resorption, and implant stability.

Immediate occlusal implant loading has been documented as a viable treatment option with many indications.²⁻⁶ However, documentations related to full-arch rehabilitation are usually limited to the treatment of one jaw at a time, thereby leaving the opposite dentition unchanged. Implant stability follow-up of a patient receiving immediate implant-supported full-arch rehabilitation in both jaws and evaluation of the patient's acceptance for this kind of rehabilitation are presented⁷ showing that a slightly staged approach for full-arch rehabilitation in both jaws using immediate implant loading protocols is a realistic treatment option. Furthermore, resonance frequency analysis (RFA) follow-up indicates that immediately occlusally loaded implants placed in reduced bone quality and quantity are more prone to loose stability in the early healing period when compared to implants placed in dense bone quality.

There is still few information in literature on which levels of primary stability can be obtained in different jawbone regions and of what factors may influence primary stability. Ostman et al.⁸ evaluated primary stability by resonance frequency analysis (RFA) measurements of implants placed according to a surgical protocol that aimed for high primary stability. The results suggest that factors related to bone density and implant diameter/length may affect the level of primary implant stability. Furthermore, greater stability was observed in male than in female patients. High primary implant stability was achieved in all jaw regions, although the use of thinner drills and/or tapered implants cannot fully compensate the effect of soft bone. Castellon et al.⁹ conducted a literature search using PUBMED and Ovid databases. They considered for review 31 articles in English from 1969 to 2003 concerning immediate loading of the anterior mandible. This literature review demonstrated that immediate loading of anterior mandibular implants is an acceptable method, with predictable results. This case series demonstrates the potential for

delivering a final bar on the surgery day, based on the current evidence and clinical application.

A strict protocol was studied to evaluate the feasibility of immediate/early function on implants placed in fresh extraction sockets located in maxillae and posterior mandibles, including defects around implants treated according to a regenerative procedure¹⁰. These procedures seem to be safe and reliable when using a strict protocol.

Although the predictability of endosseous dental implants is well documented, the restoration of the maxilla posterior region remains a challenge. The placement of short implants is one therapeutic option that decreases the need for augmentation therapy. A retrospective study to assess the survival rates of 6 to 8.5 mm-long implants in the severely resorbed maxilla following a surgical protocol for optimized initial implant stability proposed by Renouard and Nisand¹¹ demonstrated that the use of short implants may be considered for prosthetic rehabilitation of the severely resorbed maxilla as an alternative to more complicated surgical techniques. Although implant length was presented by the majority of clinical studies, its role on implant success was limited. Few authors described failures for shorter implants, especially when placed in sites where limited bone was available¹².

Achilli et al.¹³ evaluated if there is a difference between immediate and early loading implants in premolar and molar areas of the mandible and maxilla and compared data to historic data after implant surgery. They also monitored clinically and radiographically the marginal bone remodeling at baseline, and 3, 6, and 12 months after loading. No implant failure occurred. Mean marginal bone resorption was 1.24 (0.88) mm for the immediate loading group and 1.19 (1.01) mm for the early loading group after 1 year, demonstrating that if accurate surgical and prosthetic protocols are followed, immediate and early function are predictable and safe approaches even in premolar and molar areas with low bone density.

CASE REPORT

Paciente D. E. L, 56 years old, female, using maxillary complete denture presented at Araçatuba Dental School (Unesp) complaining about the lack of retention in lower prosthesis during speech and masticatory function. Patient evaluation was performed by means of anamnesis and clinical examination. Her medical history revealed no significant health problems. The lack of retention was confirmed by an experienced professional, and during first clinical session the patient was informed about the benefits of implant-supported prosthesis. Immediate loading complete mandibular denture was

proposed as prosthetic rehabilitation for the patient, and suitable details were explained for her. After she received necessary information about treatment, she gave her consent.

Initially, conventional bimaxillary complete dentures were built and aesthetic and functional proofs were conducted. The waxed lower prosthesis was doubled with alginate and a mucosa-supported surgical guide was manufactured with chemically activated colorless acrylic resin.

The implants location and length were determined based on panoramic radiograph measurements what allowed, in the area at the functional cast corresponding to the residual ridge, the determination of the points where the implants would be inserted.

The guide adaptation on this model allowed, by its transparency, to drill the model in demarcated points. These perforations were then transferred to the waxed lower denture (Figure 1), and processed.



Figure 1. Perforation were transferred to the waxed lower denture

It should be noted that the perforations corresponding to the implants location were filled with silicone for inclusion, maintaining its conservation after deflasking. These references also served as a basis to determine the reinforced framework contours so that they would not interfere with the implants insertion axis (Figure 2a and 2b).



Figure 2a. Denture processed

After acrylic resin polymerization, the implants drilling location remained well characterized. After finishing and polishing the prosthesis, the next step was the implants installation directed by the guide.

All surgical technique followed the protocol concerning patient's health, safety and wealth supported by buccal and general diagnosis.



Figure 2b. References to determine the reinforced framework contours

Through the use of the surgical guide, the initial drilling was performed on the alveolar ridge to establish the placement of implants (Figure 3) and then a crestal incision was made and a mucoperiosteal flap was raised both at labial and lingual aspects, to enable better visualization and location of the sockets. Drilling was performed using a sequence of drills with increasing diameter under constant irrigation. Posterior implants (10 mm long and 4.0mm diameter- HE - Conexão Sistemas de Prótese) and interforaminal anterior implants (13mm long and 3.75mm diameter – HE – Conexão Sistemas de Prótese) insertion torque was measured with the aid of the drilling unit and with a manual torque wrench of at least 45 Ncm.



Figure 3. Initial drilling with the surgical guide for implant placement

Afterwards, the abutments were installed with 20 Ncm torque (Figure 4) and over them copings previously rough with aluminum oxide (50 µm) were adapted to be captured by the denture, with autopolimerizing acrylic resin Jet (Clássico).



Figure 4. Implant and abutments were installed

The surgical wound was protected by rubber dam and small cotton balls closed the light of the coping (Figure 5). The perforation opening was

necessary to provide that there would be no interference during dentures installation (Figure 6).



Figure 5. Surgical wound protected by rubber dam



Figure 6. Drillings were made in the denture to eliminate the interference during installation

Once installed, autopolymerizing acrylic resin (Clássico) was placed in the denture perforations, and it was requested to the patient to keep his mouth on minimal occlusion pressure (Figure 7).



Figure 7. Autopolymerized acrylic resin was placed in the denture perforation

After polymerization it was removed, completed with same acrylic resin, and lingual and buccal flanges were cut.

Sequentially to the polishing procedure, in the definitive installation, prosthesis screw torque was 10N cm and the holes were sealed with autopolymerizing acrylic resin (Clássico) (Figure 8).



Figure 8. Definitive installation after the denture finishing process

The occlusal adjustment was based on bilateral balanced group guidance to bring greater stability to the upper denture. The patient was advised about the initial care, alimentation and prosthesis cleansing and maintenance.

DISCUSSION

The original Brånemark protocol for dental implant treatment was based on submerged healing prior to loading. In recent years, immediate functional loading has been reported to be possible with high success rate for various indications including several splinted mandibular implants supporting a fixed prosthesis. However, the time spent in the bar metal foundry, framework passivity, transfer molding and articulator mounting, are factors that make the work slower.

The technique described proposes a bar reinforced denture construction before the implants insertion which will be attached to them immediately, with autopolymerizing acrylic resin. Thus, the time spent is lower and the operation less tiring.

Despite the technique described refers to prosthesis with posterior implants, it can be very well applied in interforaminal implants. However, the thickness of the bar should not be neglected, so that the cantilever resists the mastication force.

Although this is a low cost technique, there is a disadvantage related to this kind of treatment. When the planning does not become possible only with the use of the panoramic radiograph, more accurate radiographs should be used, turning the treatment more expensive to the patient. The greatest limitation is the lack of information from panoramic radiograph concerning the thickness of the alveolar ridge, which may hinder the surgical procedure of implants installation. However, a correct indication and planning, result in success with attached implant prosthesis, turning the technique less expensive.

CONCLUSION

The technique facilitates protocol prostheses manufacture and the time required for the work and installation becomes reduced, offering comfort to the patient.

REFERENCES

1. Turkyilmaz I, Tözüm TF, Tumer C, Ozbek EN. A 2-year clinical report of patients treated with two loading protocols for mandibular overdentures: early versus conventional loading . J Periodontol, 2006; 77: 1998-2004.
2. Tallarico M, Meloni SM, Canullo L, Caneva M, Polizzi G. Five-Year Results of a Randomized Controlled Trial Comparing Patients Rehabilitated

- with Immediately Loaded Maxillary Cross-Arch Fixed Dental Prosthesis Supported by Four or Six Implants Placed Using Guided Surgery. *Clin Implant Dent Relat Res*. 2015 Oct 7. doi: 10.1111/cid.12380.
3. Takeshita K, Vandeweghe S, Vervack V, Sumi T, De Bruyn H, Jimbo R. Immediate Implant Placement and Loading of Single Implants in the Esthetic Zone: Clinical Outcome and Esthetic Evaluation in a Japanese Population. *Int J Periodontics Restorative Dent*. 2015; 35:715-23.
 4. Inchingolo F, Ballini A, Cagiano R, Inchingolo AD, Serafini M, De Benedittis M, Cortelazzi R, Tatullo M, Marrelli M, Inchingolo AM, Vermesan D, Del Corso M, Malcangi G, Diteodoro S, Mura SA, Cantore S, Cortelazzi A, Paduanelli G, Resta G, Muollo F, Cirulli N, Pettini F, Farronato D, De Vito D, Caprio M, Haragus H, Dipalma G. Immediately loaded dental implants bioactivated with platelet-rich plasma (PRP) placed in maxillary and mandibular region. *Clin Ter*. 2015; 166:e146-52.
 5. Grandi T, Guazzi P, Samarani R, Tohme H, Khoury S, Sbricoli L, Grandi G, Esposito M. Immediate, early (3 weeks) and conventional loading (4 months) of single implants: Preliminary data at 1 year after loading from a pragmatic multicenter randomised controlled trial. *Eur J Oral Implantol*. 2015; 8:115-26.
 6. Melo AC, Toscano R, Vieira RA, Sartori IA, Bernardes SR, Thomé G. Immediate Loading of Edentulous Mandible With Prefabricated Bars: A Long-Term Study of 7 Years. *Implant Dent*. 2015; 24:472-6.
 7. Portmann M, Glauser R. Report of a case receiving full-arch rehabilitation in both jaws using immediate implant loading protocols: a 1-year resonance frequency analysis follow-up. *Clin Implant Dent Relat Res*, 2006; 8: 25-31.
 8. Ostman PO, Hellman M, Wendelhag I, Sennerby L. Resonance frequency analysis measurements of implants at placement surgery. *Int J Prosthodont*, 2006; 19: 77-83.
 9. Castellon P, Blatz MB, Block MS, Finger IM, Rogers B. Immediate loading of dental implants in the edentulous mandible. *J Am Dent Assoc*, 2004; 135: 1543-1549.
 10. Vanden Bogaerde L, Rangert B, Wendelhag I. Immediate/early function of Brånemark System TiUnite implants in fresh extraction sockets in maxillae and posterior mandibles: an 18-month prospective clinical study. *Clin Implant Dent Relat Res*, 2005; 7: 121-30.
 11. Renouard F, Nisand D. Short implants in the severely resorbed maxilla: a 2-year retrospective clinical study. *Clin Implant Dent Relat Res*, 2005; 7: 104-10.
 12. Attard NJ, Zarb GA. Immediate and early implant loading protocols: A literature review of clinical studies. *J Prosthet Dent*, 2005; 94: 242-258.
 13. Achilli A, Tura F, Euwe E. Immediate/ early function with tapered implants supporting maxillary and mandibular posterior fixed partial dentures: Preliminary results of a prospective multicenter study. *J Prosthet Dent*, 2007; 97: 52-58.

CONFLICTS OF INTERESTS

The authors declare no conflicts of interests.

CORRESPONDING AUTHOR

Humberto Gennari Filho
gennari@foa.unesp.br

Received 25/04/2016

Accepted 12/05/2016