

Total removal of the buccal flange in maxillary prosthetic preparation: a necessity?: case report

Remoção total do flange vestibular no preparo protético de maxila: uma necessidade?: relato de caso

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ABSTRACT

Fixed implant-supported complete maxillary dentures aim to rehabilitate aesthetic, phonetic, and functional aspects of edentulous arches. A previous prosthetic preparation without a flange in the anterior sector makes it possible to evaluate the labial support and the existing space for the future prosthesis. Thus, it allows the most appropriate choice of the type of rehabilitation and surgical technique. However, follow-up studies have shown that when proceeding this way, problems in the posterior sector are still occurring, such as the lack of vertical space for an adequate bar design and concave internal designs, which make access to hygiene difficult. Faced with the problem, the aim of this study is to report a clinical case in which the previous prosthetic preparation included the removal of the flange

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also from the posterior sector during the teeth try-in and the duplication of this assembly in a transparent multifunctional guide that allowed the visualization of the amount of bone removal needed. The osteotomy, performed before the installation of the implants, provided enough space for the bar, acrylic, and prefabricated denture teeth in the prosthesis that was installed, an important fact considering that this is an area with greater chewing efforts. It also allowed for correct internal design in the prosthesis, which will ensure access to correct hygiene. Based on the analysis of the rehabilitated case, it seems fair to conclude that the total removal of the buccal flange at the time of testing the wax try-in of the teeth and its duplication is a differential in the approach of cases and should always be adopted to ensure a lower margin of error and greater longevity in the proposed rehabilitative treatment.

Indexing terms: Dental Implants. Dental prosthesis design; Dental prosthesis, implant-supported.

RESUMO

Próteses totais fixas implantossuportadas objetivam reabilitar arcos edêntulos nos aspectos estético, fonético e funcional. Um preparo protético prévio sem flange no setor anterior permite avaliar o suporte labial e o espaço presente para a futura prótese, auxiliando na escolha do tipo de reabilitação e da técnica cirúrgica mais adequada. No entanto, estudos de acompanhamento tem mostrado que ao proceder dessa maneira ainda estão ocorrendo problemas no setor posterior, como falta de espaço vertical para um desenho adequado da barra e desenhos internos côncavos, que dificultam o acesso à higienização. Frente ao problema, o objetivo do presente trabalho é relatar um caso clínico no qual o preparo protético prévio incluiu a remoção do flange também do setor posterior durante a prova dos dentes e a duplicação dessa montagem em um guia multifuncional transparente permitindo a visualização da quantidade de remoção óssea necessária. A osteotomia, realizada antes da instalação dos implantes, proporcionou espaço suficiente para a barra, acrílico e dentes de estoque na prótese que foi instalada, fato importante considerando ser essa uma zona com maiores esforços mastigatórios. Também permitiu a confecção de desenho interno correto na prótese, que garantirá o acesso para correta higiene. Com base na análise do caso reabilitado, parece lícito concluir que a remoção total do flange vestibular no momento da prova dos dentes em cera e sua duplicação é um diferencial na abordagem dos casos e que deveria sempre ser adotada para garantir menor margem de erros e maior longevidade no tratamento reabilitador proposto.

Termos de indexação: Implantes Dentários. Planejamento de prótese dentária. Prótese dentária fixada por implante.

INTRODUCTION

Prosthetic rehabilitation in edentulous patients with implant-supported dentures has high survival rates [1] allowing aesthetic, phonetic, and functional restoration.

When it comes to the maxilla, treatment is challenging due to the anatomy, pattern of bone resorption, quality and availability of bone for implant installation, prosthetic emergence profile, and the impact that installing fixed-type dentures has on facial and dental aesthetics. Facts that explain the need for thorough, detailed, and careful planning [2].

Success in prosthetic treatment depends on planning, prosthetic design, and quality in the execution of the procedures [3]. Prosthetic preparation is, therefore, essential as the design of the future prosthesis is projected during this stage, which then helps in the diagnosis and treatment plan. Therefore, the wax try-in of the mounted teeth is a fundamental diagnostic tool recommended to evaluate the prosthetic

compensation in the definitive denture and its effects on the supporting oral tissues, besides helping to assess the existing space for the future prosthesis and to determine the most appropriate type of prosthesis for the case [4]. Such analysis allows patients to have a better understanding of the proposed treatment [5].

With the intention of visualizing the position of the teeth in relation to the residual ridge[6] and to simulate the labial esthetics of the future implant-supported fixed denture, a flangeless test base is conducted in the anterior sector of the maxilla so that during the adjustments of the wax planes the labial support can be studied and the indication for a fixed prosthesis — or not — can be understood in the functional test of the teeth [5-7] In cases where the need to replace the labial support is understood and there is no possibility or desire for surgical reconstruction, a fixed dental prosthesis over an implant can be used, associated with an attachment-retained gingival prosthesis (epithesis), which can be made of thermopolymerized acrylic resin or resilient silicone [8].

Case reports on the removal of the flange on the anterior sector have been widespread in the literature for years, but there are still only a few papers regarding the posterior sector. Through follow-up studies, the persistence of some interferences in the posterior sector was observed, such as the lack of vertical space for an adequate bar design and concave internal designs, making access to hygiene difficult and alerting to the need for further care [9].

By duplicating the approved prosthesis, it is possible to obtain a multifunctional guide made of acrylic resin, which will represent the final arrangement of the prefabricated denture teeth. It will guide the osteotomy stage, the milling of the implants, and the selection of prosthetic components, in addition to serving as a tray and interocclusal registration at the time of transfer impression [10]. However, many professionals are unaware of this technique. For this reason, the aim of this study is to report a clinical case in which, during the prosthetic preparation, the flange was removed from the posterior sector in order to assist in surgical and prosthetic planning. This assembly was then duplicated to obtain a transparent surgical guide that allowed for clinical visualization of the space, prior to implant installation.

CASE REPORT

A 74-year-old Caucasian female patient with good general health status (ASA I) sought dental care at the Faculdade Ilapeo (Curitiba, Paraná, Brazil) dissatisfied with the aesthetics, stability, and discomfort of her upper complete denture. X-rays (panoramic radiography (figure 1) and cone beam computed tomography) and blood tests (complete blood count, glycemia, coagulogram, creatinine, and glycated hemoglobin) were requested. After the clinical and radiographic analyses, the treatment proposed was the installation of implants in the maxilla and rehabilitation with a fixed implant-supported complete denture, and in the mandible, free gingival graft, extraction of elements 34 and 35, and installation of implants in the region of 34 to 36, 45, and 46.

Initially, impressions of the upper and lower arches were taken and the prosthetic laboratory was asked to make a wax plane on a flangeless test base in the anterior sector. After adjusting the wax plane in the mouth, the models were mounted on a semi-adjustable articulator, the prefabricated denture teeth were chosen, and the wax mounting was requested. In the functional test, good lip support was observed, which indicated the possibility of rehabilitation with a fixed implant-supported denture without the need for grafting procedures to gain lip support. However, as it was not possible to analyze whether or not there was enough space for the prosthesis in the posterior sector, the base was returned to the laboratory to carry out the complete removal of the buccal flange. The new functional test brought awareness to the need for osteotomy during surgery (figure 2).



Figure 1. Initial panoramic X-ray.



Figure 2. A) Right upper ridge. B) Wax try-in of the teeth with flange in the posterior sector on the right side. C) Try-in base in the mouth after total removal of the buccal flange. D) Frontal view of the wax try-in of the teeth with buccal flange in the posterior region. E) Frontal view of the functional testing after removal of the flange allowing visualization of the available space and the need for osteotomy.

Next, the flange was completed on the entire buccal face of the test base and this assembly was duplicated to obtain the transparent multifunctional guide. The piece was used as a guide for the osteotomy and for the milling operations for the installation of the implants, as a tray, and as interocclusal registration. The limit of the osteotomy that was transferred to the ridge was marked on the guide with a copy pencil. After anesthesia, using a PM No.1 spherical diamond bur (KG Sorensen, Cotia, Brazil), perforations were made in order to mark the osteotomy points on the bone and indicate the amount of removal at the time of surgery (figure 3).



Figure 3. A) Multifunctional guide with space required for the prosthesis marked. B) Frontal view of the ridge with transferred marks. C) Perforations at the boundary of the osteotomy region for orientation after flap peeling and rebating.

The guide was also used to conduct the drilling. After installing six implants (Helix GM, Neodent, Curitiba, Brazil), one measuring 5x11.5mm and the other five measuring 3.75x11.5mm, cover screws were installed due to the low insertion torque of the implants (20Ncm). Sutures were performed with 5-0 nylon thread (Techsuture, Bauru, Brazil) and relining of the patient's complete denture with resilient material (Bosworth Trusoft, Skokie, USA).

After three months, the reopening surgery was performed and, at that moment, the surgical guide was used again to diagnose the need to remove the soft tissue. The intermediates (Mini conical abutments, Neodent, Curitiba, Brazil) and the impression components were installed. These were joined together and connected to the multifunctional guide with acrylic resin (Pattern Resin LS, GC, Alsip, USA). With the same material, three occlusal points (two posterior and one anterior) were made to record the centric relationship. Initial contact silicone (Panasil X-light, Kettenbachdental, Eschenburg, Germany) was then inserted and the material was allowed to polymerize. The transfers were unscrewed and removed together with the guide.

The fixed implant-supported hybrid maxillary denture was installed three days after the reopening procedure and occlusal adjustment was performed (figure 4). Thanks to the osteotomy, there was enough space to make the prosthesis, with a correct internal design and respecting the convex profile that allowed proper access for hygiene (figure 5). The treatment of the lower arch followed the initial plan (figure 6).



Figure 4. A and B) Right lateral view in protrusive movement and frontal view of the fixed implant-supported complete denture after its installation.



Figure 5. A and B) Internal design of the prosthesis, ensuring access for correct cleaning.

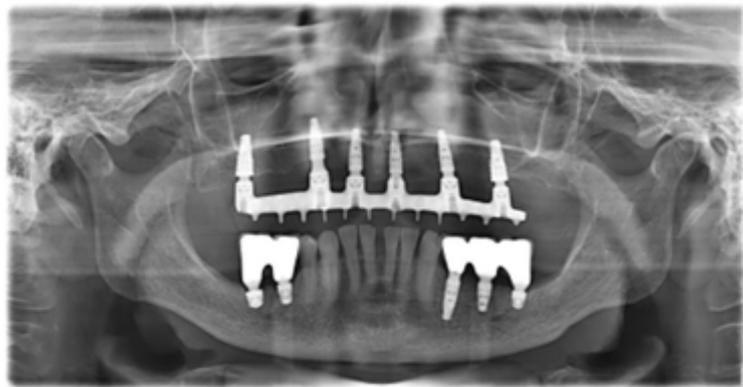


Figure 6. Panoramic X-ray obtained after the installation of the upper and lower prostheses.

DISCUSSION

An adequate pre-surgical prosthetic preparation is fundamentally important for the success of the rehabilitation treatment, guiding the dental surgeon in each step. In this clinical case, we observe the importance of previous prosthetic preparation to allow a correct diagnosis and planning, which goes in agreement with authors who reported this step as an excellent tool that helps in the analysis and more detailed understanding of important points, such as the existing space for rehabilitation, determining the choice of the material best suited for the case, the type of prosthesis, and diagnosing the labial support [11] besides providing the patient with a more realistic understanding[5] of the proposed treatment.

Total removal of the buccal flange is a differential in the approach to the cases [12]. The presented case allowed us to understand the need for osteotomy during surgery, providing enough space for the bar, acrylic, and prefabricated denture teeth in the future prosthesis and avoiding possible failures and fractures. Because it is an area with greater chewing efforts, such an analysis becomes essential for the success of the treatment.

Such care also allowed the creation of a prosthesis with a convex shape on the entire internal surface. This design, called modified ovate pontic [13-15] is indicated for allowing intimate contact of the prosthesis to the ridge (to prevent air leakage) and effective contact of dental floss on the entire internal surface of the prosthesis, to ensure internal cleaning, favoring better hygiene [12] and biofilm control in this region. Minimal contact with the mucosa is essential so that there is no space for air or saliva to escape

during speech [11,16] as well as an adequate emergence profile of the fixed prosthesis of the edentulous ridge to avoid food impaction [17,18] and correct distribution of the space between the implants for access to hygiene [19] ensuring longevity in the rehabilitation treatment. These points were confirmed in this case report, corroborating a cross-sectional study [9] on maxillary dentures that found concave internal designs in posterior areas, making cleaning difficult and causing biological complications in the peri-implant hard and soft tissues [9]

The adequation of spaces through osteotomy is reported and indicated to optimize the minimum required spaces according to the type of material that is chosen for the manufacture of the prosthesis. However, planning is crucial so that the minimum necessary is removed. In this clinical case, the transparency of the guide was fundamental to allow the visualization of the ridge. Dental necks were the reference for calculating the amount of removal required. The hybrid prosthesis requires a space of around 4mm above the dental necks to allow the creation of a bar with characteristics of physical retention for the prefabricated denture teeth and characteristics of convexity [14] This is similar to the space required for prostheses in monolithic zirconia.[4] The demarcations made with drills were also important since the information was transferred to the bone. After opening the flap, visualization was possible. The excess soft tissue was not removed in the first surgery because the immediate loading technique was not adopted. The guide also played a fundamental role in the reopening surgery as it was used to diagnose the amount of soft tissue that needed to be removed.

CONCLUSION

Based on the experience obtained in conducting this clinical case, it seems fair to conclude that the total removal of the buccal flange at the time of wax try-in of the teeth is a differential in the approach of cases such as this one and should be adopted to ensure a lower margin of error and greater longevity of the proposed rehabilitative treatment.

Collaborators

SGA Alves, responsible for planning, surgery, photographic documentation and writing the manuscript. LG Alexandrino, assistance with planning and surgery. GE Casagrande, assistance with photographic documentation and surgery. RA Vieira, surgical advisor teacher and planning guidance. IAM Sartori, prosthetic advisor teacher, planning guidance and reviewer.

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