

Manufacture of removable prostheses for the occlusal restoration of a skeletal class II patient: case report

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Confección de prótesis removibles para el restablecimiento oclusal de paciente clase II esquelética: caso clínico

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ABSTRACT

Variation in the skeletal development of patients makes it difficult to plan the rehabilitation procedure to be performed. Class II Angle patients present occlusal characteristics that vary between: deep bite, teeth whose appearance defines an inverted Spee curve, in addition to increased facial convexity resulting from maxillary enlargement or due to mandibular insufficiency due to protrusion. Therefore, the objective of this clinical case is to present an oral rehabilitation through a complete upper prosthesis and removable partial lower prosthesis in a patient with class II Angle skeletal variation. A 55-year-old female patient, who has been using a complete upper prosthesis for 37 years, sought care at the dental clinic of the Nilton Lins University, reporting difficulty in chewing food due to the absence of the lower posterior teeth, in addition to aesthetic dissatisfaction of the smile and prosthesis maladaptation. Upon intraoral clinical examination, it was observed in the maxillary arch the absence of all teeth without mucosal alteration with a favorable prognosis for the manufacture of a new total prosthesis. In the mandibular arch, the presence of some anterior teeth and absence of the posterior ones was found. The suggested treatment was the manufacture of the prostheses aiming to establish all the lost functions. Therefore, the rehabilitation treatment through the manufacture of the dental prostheses proved to be satisfactory, returning the standard skeletal profile, as well as the ideal occlusion and the lost aesthetics, meeting the patient's expectations.

Keywords: Removable partial denture; Aesthetics; Oral health; Malocclusion; Dental prosthesis.

RESUMEN

La variación en el desarrollo esquelético de los pacientes dificulta la planificación del procedimiento rehabilitador a realizar. Los pacientes de clase II de Angle presentan características oclusales que varían entre: mordida profunda, dientes cuyo aspecto define una curva de Spee invertida, además de convexidad facial elevada derivada del aumento maxilar o debido a insuficiencia mandibular por cuenta de la protrusión. Por lo tanto, el objetivo del presente caso clínico es presentar una rehabilitación oral mediante prótesis total superior y prótesis parcial removible inferior en paciente con variación esquelética clase II de Angle. Paciente de 55 años, género femenino, usuaria de prótesis total superior desde hace 37 años, acudió a la clínica odontológica de la Universidad Nilton Lins, relatando dificultad para triturar los alimentos debido a la ausencia de los dientes posteriores inferiores, además de insatisfacción estética de la sonrisa y desadaptación de la prótesis. Al examen clínico intraoral se observó en el arco maxilar ausencia de todos los dientes sin alteración en la mucosa con pronóstico favorable para la confección de una nueva prótesis total. En el arco mandibular se constató la presencia de algunos dientes anteriores y ausencia de los posteriores. El tratamiento sugerido fue la confección de las prótesis con el fin de establecer todas las funciones perdidas. Por lo tanto, el tratamiento rehabilitador a través de la confección de las prótesis dentales se mostró satisfactorio, devolviendo el perfil esquelético estándar, así como la oclusión ideal y la estética perdida, atendiendo las expectativas de la paciente.

Palabras clave: dentadura parcial removible; estética; salud bucal; maloclusión; prótesis dental.

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Introduction

Variation in the skeletal development of patients makes it difficult to plan the rehabilitation procedure to be performed (1). Patients with Angle Class II skeletal malocclusion present occlusal characteristics that vary between: deep bite, teeth whose appearance defines an inverted Spee curve, in addition to increased facial convexity due to maxillary enlargement or due to mandibular insufficiency due to protrusion (2). This type of condition requires adequate prior planning for the establishment of the main occlusal function adapted to the individual's condition (3).

Early tooth loss has been occurring gradually due to factors that may be associated with: diet, physical activity, harmful habits, but mainly by habits related to hygiene and/or by the patient's lack of knowledge (4). This loss promotes physiological bone resorption of the alveolar ridge, which varies depending on the main cause that led to tooth loss (5). Edentulism is a condition that influences not only functional characteristics, but also aesthetic and psychological ones (6). In addition, edentulous patients, whether total or partial, still have difficulty eating, as the loss of teeth, especially the posterior ones, makes the masticatory process difficult, resulting in future problems associated with the stomatognathic apparatus (7,8).

Dental loss is a routine public health problem evident in the daily clinical challenge (9). It is increasingly common to find people using dental prostheses (10). The search for oral rehabilitation has been widely observed in order to recover aesthetics, function, and to restore lost dental structures, whether through: fixed or removable prostheses, on mucosa, tooth or implants (11,12).

The decrease in the vertical dimension of occlusion occurs with the absence of posterior dental structures and the permanence of the anterior teeth in the mandibular region (13). When they occlude with the edentulous maxilla, it promotes a destabilization of the mouth closure, which in turn develops the vestibularization of the lower anterior teeth (14). These factors, allied to functional habits, end up causing a series of other changes in the oral cavity resulting in occlusal disharmonies (15). The application of dental prostheses in oral rehabilitation returns the lost teeth and in some cases supporting structures that have undergone changes, its use benefits an improvement of the functions related to physical and social well-being, in addition to restoring the characteristics of the stomatognathic system (10).

In view of this, the objective of this clinical case report is to present an oral rehabilitation using a complete upper denture and a removable partial lower denture in a patient with a skeletal variation of Angle class II.

Case presentation

A 55-year-old female patient with normal systemic health, who has been using a complete upper denture for 37 years, sought care at the dental clinic of Nilton Lins University, reporting difficulty chewing food due to the absence of lower posterior teeth, as well as aesthetic dissatisfaction with her smile; poor fit of the denture; difficulty speaking and eating. The consent form was signed and the care was continued. On extraoral clinical examination, the following could be observed: retrognathic mandible with maxillary bone advancement;

absence of anterior dental exposure of the upper arch during smiling. On intraoral clinical examination, it was observed that the edentulous maxillary arch did not show any mucosal changes, making the prognosis favorable for the fabrication of a new complete denture. In the mandibular arch, the presence of teeth 31, 32, 33, 34, 41, 42, 43, and 44 was observed, and the absence of lower posterior teeth was indicated, suggesting the fabrication of a removable partial denture, conditions that fit the profile of the combination syndrome (figure 1).

Figure 1. wa) Initial appearance of the smile; b) Intraoral aspect.



Source: Silva Júnior JP et al (2024).

To complement the clinical examination, a panoramic radiograph was requested to assist in the diagnosis of the patient's current condition. The radiograph revealed adequate bone and dental condition for the adaptation of the lower metal structure (figure 2). Based on the clinical findings and the radiographic findings, the recommended treatment was the fabrication of a complete upper denture and a removable partial lower denture.

Figure 2. Panoramic X-ray.



Source: Silva Júnior JP et al (2024).

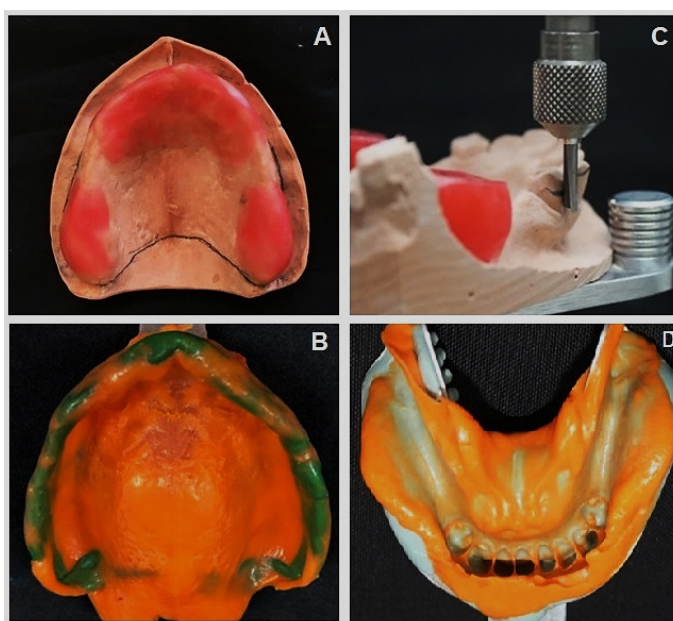
Initially, the adaptation to the oral environment was performed through prophylaxis and scraping of the lower arch. After a period of 7 days, the procedures for making the prostheses were started, performing the anatomical moldings of the upper and lower arches to acquire the study model. A perforated HDR aluminum upper mold and a perforated stainless steel mold for dentition in the lower and alginate (Jeltrate Plus, Dentsply Sirona, NY, USA) were used, the mold was poured with type IV plaster (Durone IV, Dentsply Sirona, NY, USA). With the upper study model ready, reliefs were made with wax 7 in the retentive areas to facilitate the removal of the individual mold from the model (figure 3a).

In sequence, the individual mold was made with self-polymerizing acrylic resin followed by finishing with the maxicut drill, removing excess and sharp edges. Subsequently, peripheral sealing was performed with stick wax followed by functional molding with fluid condensation silicone (Oranwash, Zhermack, Badia Polesine, Italy) (figure 3b). Next, the edge was made with utility wax, encased with wax 7 and the plaster was poured to acquire the working model. After the model was made, the trial base was made with subsequent fixation of wax 7 to perform the orientation plan, after adjustments, the work on the lower arch began.

After the study model was made, the design was performed on the lower model in order to determine the insertion axes. In this way, the parallelism between the abutment teeth was found (figure 3c). Graphite tips were used to determine the prosthetic equator, a 0.25 calibrator was used to determine the retention degree and the correct positioning of the retentive terminal. The design of the frame was developed by defining the supporting dental elements where the retention clasps of the metal frame would be positioned.

Based on the analyses on the lower model, it was determined to be Kennedy class I and thus the teeth 34 and 44 were defined as abutment teeth with a T-shaped clasp. The preparations for the occlusal support niches were made with a 3069 tapered drill with abundant cooling. After the planning on the study model, the functional mold was made with condensation silicone (Zetaplus, Zhermarck, Badia Polesine, Italy), associated with the use of PVC film providing space for the fluid condensation silicone (Oranwash, Zhermarck, Badia Polesine, Italy), used in order to obtain details of the dental structures (figure 3d). The same was poured with type IV gypsum (Durone IV, Dentsply, NY, USA), thus obtaining the lower working model, the model was sent to the laboratory for the manufacture of the metal frame.

Figure 3. a) Delimitation of the relief zones of the plaster model; b) Functional impression with individual tray after peripheral sealing; c) Outline of the lower model; d) Functional molding of the lower arch after designing and making the niches.

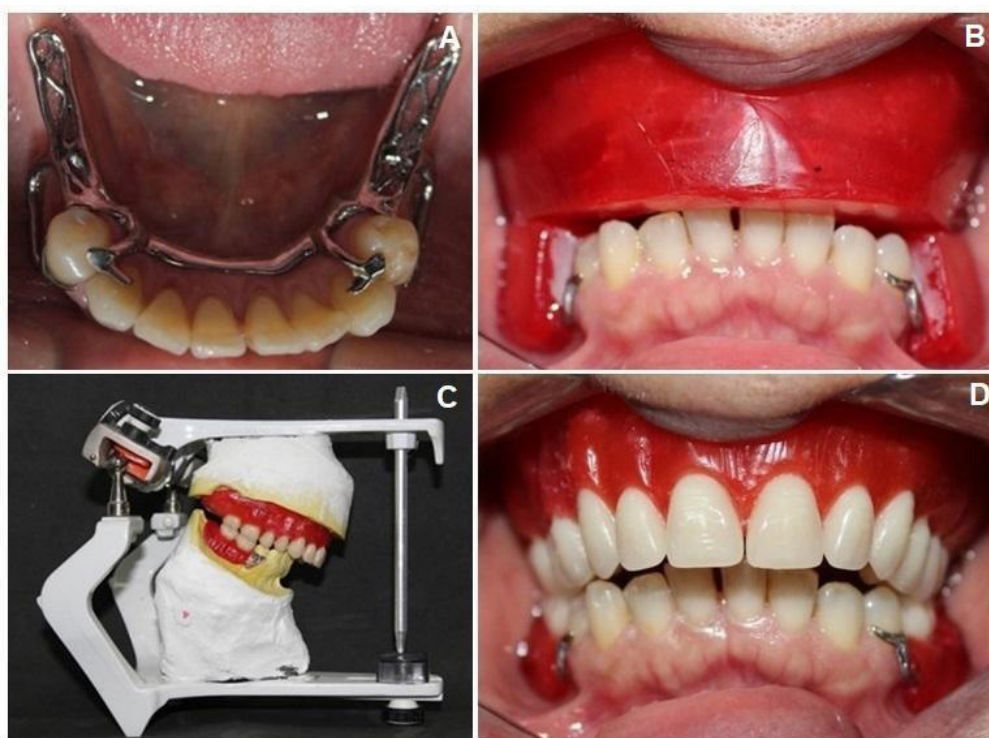


Source: Silva Júnior et al (2024).

The metal framework was tried in the mouth and found to be suitable for continuation of the case (figure 4a). The necessary adjustments were made for better accommodation and fitting of the prosthesis (figure 4b). The assembly of the articulator was necessary so that we could observe the movements of protrusion, laterality, and intrusion. The adjustments of the orientation planes were performed, for the upper, we checked labial support, nasolabial angle, height of the plane in the anterior region and oral corridor, with the aid of the Fox ruler, we checked parallelism with the bipupillar line and Camper's plane, finally, with the aid of dental floss, the lines of the commissures, midline, and the high smile line were recorded to establish the width and height of the teeth that were installed. The registration of the vertical dimension of occlusion was done by the metric, swallowing, and phonation methods.

The assembly on the articulator began with the model with facial arch registration, then the lower was assembled where the centric relation position was obtained by the chin technique (figure 4c). The models were sent to the laboratory to assemble the teeth, in the occlusal planning, it was opted for the exclusion of teeth 35 and 45 seeking a more favorable intercuspatation mechanics. At the next appointment, the dentures were tried in the mouth and the patient reported that she was satisfied with the size, color, and shape of the selected teeth (figure 4d). Later, through a millimeter ruler, the profile of protrusion was observed measuring approximately 1 cm, marking an acceptable measure for referral for acrylicization (figure 5a). Next, the choice of the color of the artificial gum was made with the intention of bringing the maximum of naturalness and sent again to the prosthetic to be acrylicized.

Figure 4. a) Metal frame test; b) Clinical appearance after adjustments; c) ASA assembly; d) Teeth test.



Source: Silva Júnior et al (2024).

Finally, after the return of the prosthetist, the prostheses were installed, presenting excellent retention, stability, and aesthetics, returning the patient's lost labial support (figure 5b). There were no complaints of pain or difficulty in placing or removing the prosthesis, and only minor adjustments and polishing were necessary. The patient was instructed on hygiene care and possible discomforts until she adapted to the appliance. After 7 days, she returned for follow-up and necessary adjustments, showing no adaptation difficulties or complaints, demonstrating the effectiveness of the proposed treatment (figure 5c).

Figure 5. a) Measurement of the overjet with a flexible ruler, showing 1cm of distance; b) Final appearance of the smile; c) Final intraoral appearance after oral rehabilitation with installed prostheses.



Source: Silva Júnior et al (2024).

Ethical considerations

This work was submitted to the Ethics and Research Committee on Human Beings, approved under opinion 5,499,195.

Discussion

Oral rehabilitation of patients through the use of prosthetic devices such as: total and partial prostheses, highlight the importance of maintaining healthy structures, as well as residual teeth and oral tissue, restoring factors associated with aesthetics, masticatory function, swallowing, and phonation (1). These factors restore self-esteem and consequently the individual's interaction in social interaction, being edentulism the main culprit of this condition, as it causes not only aesthetic disharmony, but also psychological changes in the individual's profile (5,16). In the present clinical case, aesthetic dissatisfaction and difficulty during eating were the determining causes that triggered the patient's search for a new dental treatment.

Edentulism is a condition that affects a high rate of individuals in the population, generating functional, social, and psychological problems, which generate various diseases with advancing age (9). Roberto et al. (17), reported that this condition is the result of causes associated with the lack of information on the part of the individual, lack of prevention and above all the absence of care with oral hygiene. According to Almeida et al. (6), this prevalence causes a significant increase in the use of dental prostheses. However, other reasons may also be associated, such as the difficulty of accessing care in public dental services.

Patients with Angle class II occlusal alterations, according to Curado (3), require proper pre-planning with the main objective of restoring occlusal harmony, consequently leaving the profile in class I. This alteration gives the individual convexity characteristics, due to changes in the gnathic bones, presenting a reduced size of the mandible in relation to the maxilla (2). In her skeletal profile, the patient presented mandibular retrusion with advancement of the maxillary bone. Maruo (18), discuss that variant skeletal anatomy can occur due to: posterior position of the temporomandibular joint, small mandible or posteriorly positioned lower teeth. Class II patients have absent anterior contact and accentuating overjet, bringing a different approach to the mounting of the anterior and posterior teeth so that effective contacts occur as discussed in this report.

There are several types of treatments in different dental specialties for the restoration of the ideal occlusal profile (3,8,10). Among the treatment methods presented to the patient, it was chosen to rehabilitate the mouth through a superior mucosal-supported total prosthesis combined with a removable partial prosthesis lower. According to Liu (19) dental implants are becoming increasingly common in the clinical setting, and implant-supported prostheses offer patients and dentists a variety of options during planning, but they present challenging decisions regarding the surgical procedure to be selected.

Removable partial dentures remain a well-established form of treatment, according to Fokkinga et al. (20), meeting the needs of many partially edentulous patients, with durability and accessibility. However, Ercalik et al. (12), assure that the same prosthesis can trigger lesions to the supporting tissues, as well as damage to the abutment teeth, acting as an inconvenient agent in the environment. Regardless of the appearance and condition of dental prostheses, users can maintain good oral health through the prevention and maintenance of oral hygiene (9,10) The patient needs to be advised on their responsibility in relation to the use of new prostheses (11).

A comparison of the clinical aspects presented in Figures 1 and 5 reveals a clear facial change. Despite the challenging task of rehabilitating patients with skeletal defects, the restoration of labial support with the appearance of the anterior teeth after the installation of new prostheses is evident. The change in vertical dimension of occlusion generated by the posterior absence in the lower arch and the use of the old prosthesis with only anterior contacts resulted in the wear of the anterior teeth. This defect was restored with the fabrication of new prostheses in both arches, promoting posterior contact to minimize possible bone resorption (7). This procedure followed the conventional protocol of clinical stages for the fabrication of removable prostheses (11). However, it is important to emphasize that the principles highlighted in this report are focused on the restoration of mastication, which was reported to be deficient during the medical history. According

to the patient's report, mastication was restored and, as a consequence, aesthetic improvement was achieved.

Conclusion

Therefore, the rehabilitation treatment through the fabrication of dental prostheses proved to be satisfactory, meeting the patient's expectations, returning a favorable profile aimed at restoring the functions of the stomatognathic apparatus, as well as the occlusion and lost aesthetics.

Author's contributions

Jefferson Pires da Silva Júnior: Conceptualization; Methodology; Edition

Jorge Henrique de Sousa Martins: Conceptualization; Investigation; Essay; Resources

Ana Barbara Simões Lopes Jardim: Methodology, Validation; Essay; Revision

Thais de Souza Pereira: Project Management; Revision

Daniel da Silva Lima: Accompaniment and Supervision

Franklin Barbosa da Silva: Writing and Preparation of the Original Draft

Ana Caroline Farias Bonfim: Conceptualization; Investigation; Essay; Resources

Conflict of interests

No conflict of interest to declare.

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