SCIENTIFIC ARCHIVES OF DENTAL SCIENCES (ISSN: 2642-1623)

Volume 7 Issue 5 May 2024

Case Report

Severe Bone Resorption at the Mandibular Level how to Treat?: About a Clinical Case

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Received: May 17, 2023; **Published:** April 12, 2024

Abstract

Prosthetic rehabilitation of a patient with a mandibular crest that is highly resorbed by the conventional complete removable prosthesis is a challenge for the practitioner. The success of the treatment depends on the latter's consideration of the shape of the prosthetic extrados to ensure optimal prosthetic stability and retention, facial support and aesthetics.

The aim of this article is to present through a clinical case a new method of tissue conditioning of support surfaces and paraprosthetic organs to modify, increase and better exploit the oral prosthetic space.

Keywords: *Severe Bone Resorption; Mandibular Level; Prosthetic Rehabilitation*

Introduction

The instability of mandibular total prostheses remains one of the primary complaints of our patients. It increases with bone resorption which makes it difficult to estimate the prosthetic space. The most legitimate desire of the patient is that these prostheses hold as soon as they are put in the mouth. This is not always the case and the immediate intervention of the practitioner should be careful. The loss of dental organs causes an enlargement of the tongue and its spreading as well as a sagging of the cheeks and lips. This phenomenon is associated with a reduction in the support surface. All these elements contribute to the narrowing of the prosthetic space.

To solve these complex situations, prosthetic therapy will have to focus on the optimal search for biological space in order to ensure good stability and better distribution of pressures during different functions regardless of the anatomo-physiological difficulties [1].

We propose in this article and through a clinical case a new method of tissue conditioning of support surfaces and paraprosthetic organs to modify, increase and better exploit the oral prosthetic space. This space represents the area in which the prosthesis must be harmoniously included without interfering with the muscles around it. It is bounded by the support surfaces, peripheral musculature and occlusal surfaces [2,3].

Problematic

The therapeutic difficulties are specific to the treatment of total edentulousness and lie in the resolution of the compromises necessary to reconcile the aesthetics, phonation and stability of prostheses especially mandibular.

These objectives are all the more difficult to achieve in the presence of a significant class IV resorption of ATWOOD at the level of the mandibular bone with a significant narrowing of the bio-functional space leading to technical difficulties for the realization of the prosthesis [3,4,12].

Objectives of the Study

- Increase the bio-functional space as well as the prosthetic support surfaces to ensure good stability and a better distribution of pressures during the different functions.
- Improve the psychic and organic integration of the prosthesis.

Anatomo-histological recall

- **Histology of the oral mucosa:** The optimal prosthetic treatment of total edentulity depends closely on the quality of the

mucosa covering the support surfaces. The latter is composed of an epithelium and connective tissue separated by a basal lamina.

- The epithelium: It is of the stratified squamous type comprising several layers of cells5. Adhesion and cohesion between epithelial cells is important. They oppose the separation of cells under the effect of the pressures exerted by the successive layers of conditioning material during the phase devoted to increasing the volume of the bio-functional space [4].
- The basal lamina: It is the junction between the epithelium and the underlying connective tissue. It is rich in mucopolysaccharides.
- Connective tissue: It is divided into two layers:
  - A superficial papillary layer consisting of a dense network of very thin collagen and elastic fibers closely linked to the inner face of the basal lamina, which gives this region the possibility of distending and mobilizing in the regions of the mucosa in relation to the edges and with the extrados of the prostheses [6,7].
  - A reticular layer formed by a network of voluminous collagen fibers, intertwined with elastic fibers and reticular fibers. This elastic weft thus constituted, plays a considerable role in the behavior of the tissues in relation to the edges of the prosthesis.

The existence of a looser and more variable weaving of collagen fibers in the mucosa, allows a judicious conditioning of these regions [10].

- **Oral musculature and interrelation with the prosthetic space:**
  - When imprinting the support surfaces, shaping the edges and extrados of the mandibular template, vehicle of the conditioning material, the muscular play must be respected. A balance between the facial muscles, acting vestibularly on the template, and the tongue, which acts on the lingual surfaces, must be achieved [8,13].
  - If such a balance is achieved and if the orientation of the occlusion plane is physiological with a correct vertical dimension, a muscular fixation of the future mandibular prosthesis will be obtained, thus guaranteeing the best possible prosthetic retention and stability.

Case Report

Mrs. A.C. 66 years old, in good general health edentulous complete, consults for rehabilitation by bimaxillary complete prosthesis. The interview revealed that the patient was never fitted with a hearing aid. She wants an improvement in aesthetics and function.

The exooral clinical examination shows:

- A slightly concave profile and sagging of the jugal and labial musculature (Figure 1).
- A decrease in the lower stage of the face accompanied by a mandible slip.
- A loss of lip projection.
- An accentuation of the nasolabial folds (Figure 1).

The endooral clinical situation reveals:

- At upper jaw:
  - U-shaped palace (Figure 2).
  - Class I alveolar crest.
- At lower jaw:
  - Absence of crestal relief (ATWOOD class V) and muscle insertions close to the ridge (Figure 3).
  - Significant narrowing of the bio-functional space reserved for the prosthesis due to spreading of the tongue and abnormal development of the orbiculo-benccinerator strap.
  - Protruding and painful internal oblique line.
  - Thin mucosa.

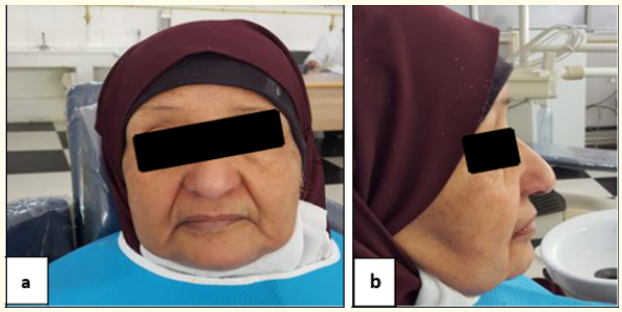

***Figure 1a and 1b*:** *Exooral front and profile views showing subsidence of the floor inferior, an accentuation of the nasolabial folds.*

***Figure 2*:** *Endooral views of the maxilla showing a high and wide ridge.*

***Figure 3*:** *Endooral view of the mandible showing a very resorbed ridge.*

Therapeutic approaches

Faced with the complex requirements imposed by the treatment of this case, we propose a step-by-step treatment plan:

- First step: Making of the maxillary PEI and the mandibular template:
  - Taking the preliminary maxillary and mandibular impression (Figure 4) with a class A alginate. After decontamination we proceeded to their casting (Figure 5).
  - Making of the maxillary individual impression tray in a conventional way (with an alveolo-dental rampart) (Figure 6).
  - Construction of the mandibular gauge in self-curing resin, equipped with a gripping handle prefiguring the alveolo-dental rampart (Figure 7) and retention device for the recording material:
    - Its thickness is 1 mm.
    - Its height, at rest, anteriorly, 2 mm below the dry lip and the wet lip, as well as opposite the labial commissures.
    - Later, it goes dying with half of the retromolar tuber.
- Second step: Realization of secondary impressions:
  - Adjustment of the individual impression tray in the mouth, then functional remargining of the edges of the maxillary individual impression holder (Figure 8) and mandibular (Figure 9) with kerr paste.
  - Taking a maxillary secondary impression (Figure 10), then casting (Figure 11).
  - Impression of the mandibular support surface with medium silicone under digital pressure.
  - Mandibular impression check. After removal of excess with a scalpel blade, modeling of the stabilizing polished surfaces:
    - Semi-empirical stabilizing profile recording by the muscle itself of the neutral passive space between the paraprosthetic organs (lips, cheeks, and tongue):
      - To stimulate lingual proprioception, and jugual and labial exteroception,
      - The impression material is applied simultaneously to the vestibular and lingual faces of the extrados. We have chosen as a vector of modeling the prosthetic neutral space: PHONATION.
      - Insertion in the mouth and centering of the impression,
      - The patient is then asked to repeat the phonemes: “SOU” and “SIS”, as well as the “DE” “TE” “BE” “ME” and this until the silicone is no longer modifiable.
    - Fingerprint removal and verification:
      - All vestibular and lingual surfaces of the MYP should be covered of impression paste (Figure 12), otherwise, all the material is removed, the thickness of the balding part is reduced and the operation is repeated.
      - This impression makes it possible to increase the adhesion between the prosthetic extrados and the paraprosthetic organs to improve the stability of the prosthesis as well as the aesthetics.

- Determination of the level and orientation of the prosthetic occlusion plan in relation to anatomo-physiological elements (lips, commissures, trigons) impressions in the mouth (Figure 13):
    - During these manipulations, the patient must be at rest, head and the bust erected vertically to a correct vertical dimension of rest (to assess the level of orientation of the POP which will be previously delimited by means of a pencil dermographic at the junction of the dry lip and the wet lip at the same level as the commissures, Later, it goes dying with two-thirds of the trigons.

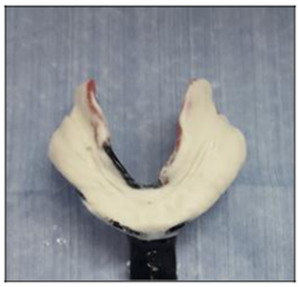

***Figure 4*:** *Mandibular preliminary impression.*

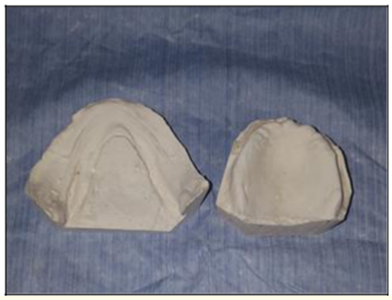

***Figure 5*:** *Preliminary models.*

***Figure 6*:** *Upper individual footprint holder in the mouth respecting aesthetic considerations.*

***Figure 7*:** *Mandibular gauge.*

***Figure 8*:** *Peripheral joint maxillary.*

***Figure 9*:** *Peripheral joint mandibular.*

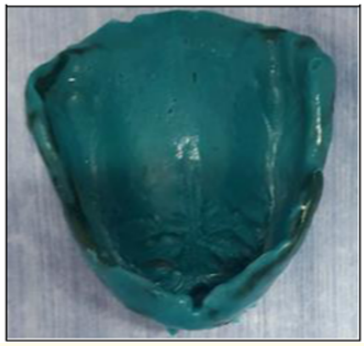

***Figure 10*:** *Maxillary secondary impression.*

***Figure 11*:** *Maxillary secondary model.*

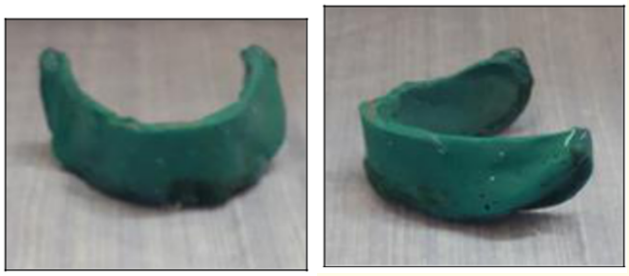

***Figure 12*:** *Prosthetic corridor recorded by a piezographic impression.*

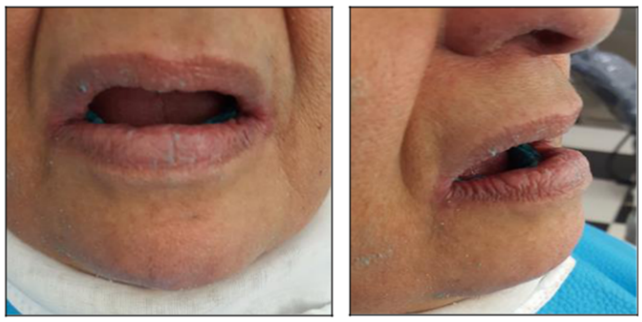

***Figure 13*:** *Mouth impression respecting the level of the occlusion plane.*

***Figure 14*:** *Silicone wrenches to record the situation of the prosthetic corrido.*

- Third step: Registration of the intermaxillary relationship:
  - Realization of maxillary and mandibular occlusion models (Figure 15).
  - Transfer of the maxillary model using an assembly table (Figure 16), then transfer of the intermaxillary relationship to a semi-adaptable articulator (Quick-master) (Figure 17).
- Fourth step: Assembly of prosthetic teeth on semi-adaptable articulator (Quick-Master):
  - The assembly of the teeth respecting the morphology of the piezographic model (Figure 18), must meet the aesthetic and functional imperatives. The assembly of the teeth is done in class II to respect the skeletal class, respecting the concept of the integrally balanced occlusion (Figure 19).
  - Mouth mount test (Figure 20).
  - After polymerization (Figure 21), the prostheses are tested in the mouth (Figure 22).
  - After a month of wearing the prosthesis, the patient confides to us her complete aesthetic and functional satisfaction. Controls are necessary to maintain the vertical dimension and a physiological condylar position.

***Figure 15*:** *Maxillary and mandibular occlusion models.*

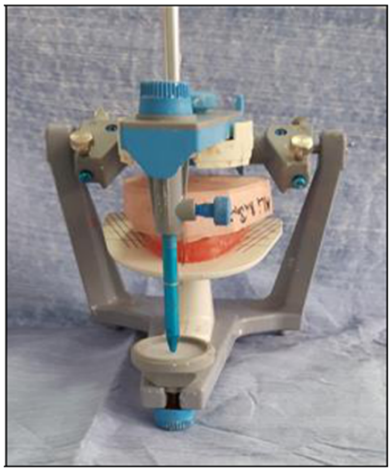

***Figure 16*:** *Transfer of the upper model to articulator using an assembly table.*

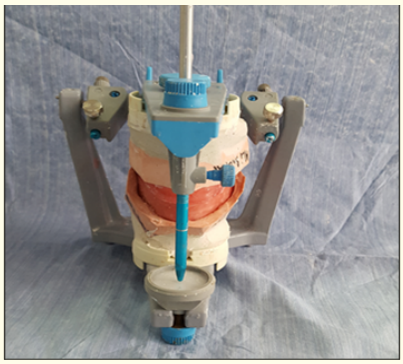

***Figure 17*:** *Transfer of the inter-maxillary relationship to the quick-master articulator.*

***Figure 18*:** *Wax mounting respecting the prosthetic corridor.*

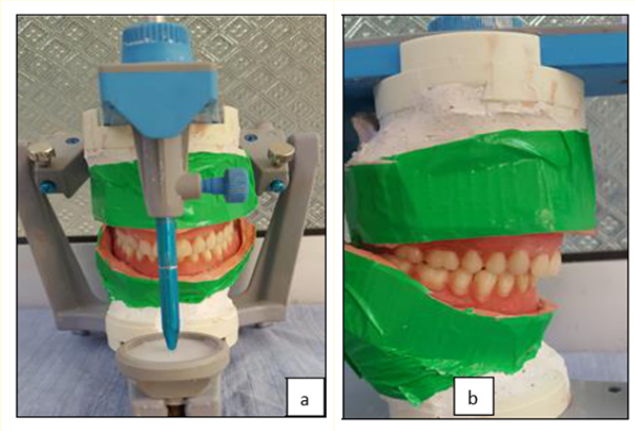

***Figure 19*:** *a and b Front and profile view of the assembly of prosthetic teeth.*

***Figure 20*:** *Mouth mount test*

***Figure 21*:** *Polymerized prostheses.*

***Figure 22*:** *Smile of Satisfaction.*

Result

The treatment of this case allowed the patient to have a better quality of life, thanks to the correct establishment of the various oral functions and especially the improvement of the masticatory efficiency, without forgetting the psychic and aesthetic integration of the prosthesis due to its natural appearance and harmonious smile and especially to its stability.

Discussion/Conclusion

The prosthetic rehabilitation of a formerly edentulous patient, never fitted with ridges without relief is a great challenge for the practitioner. The success of the treatment depends on the latter's consideration of the form of the prosthetic extrados through a piezographic imprint. On the other hand, the benefits of this technique are much greater than those of the traditional technique since it makes it possible to make prostheses that integrate perfectly with the functional muscular game linking anatomy and physiology, adapting the form to the function.

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