



# Incorporation of Special Techniques in the Complete Denture Workflow for an Impaired Elderly Patient: A Case Report

Dimokritos Papalexopoulos<sup>1\*</sup>, Nikitas Sykaras<sup>1</sup> and Nick Polychronakis<sup>1</sup>

<sup>1</sup>Department of Dentistry, NKUoA, Thivon 2, Goudi, Athens, Greece.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

## **Article Information**

### Editor(s):

(1) Dr. Roberta Gasparro, University of Naples Federico II, Italy.

### Reviewers:

(1) Manal R Alammari, King Abdulaziz University, Saudi Arabia.

(2) Firas Abd Kati, Middle Technical University, Iraq.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/73891>

Case Report

**Received 02 July 2021**

**Accepted 11 September 2021**

**Published 14 September 2021**

## **ABSTRACT**

**Aims:** To report a case of complete removable dentures fabrication for an impaired elderly patient incorporating techniques such as the neutral zone without increasing the number of clinical appointments.

**Presentation of Case:** Many factors took part in implant refusal as a part of the rehabilitation plan such as systemic conditions, anatomic restrictions, patient's needs and financial limitations. Consequently, knowledge of how to adequately treat these cases with conventional means is of major importance. Case report of an 83 year old female patient with visual and tactile impairments requesting prosthetic rehabilitation of complete edentulousness. Complete removable dentures were constructed utilizing techniques such as the neutral zone and the "all-green" impression being incorporated in a workflow that maintains the same number of clinical appointments with conventional procedures.

**Discussion:** Application of the neutral zone technique might present a challenge for both the clinician and the dental technician. However, it offers numerous advantages regarding stability, aesthetics, phonetics, comfort, masticatory ability, function and oral health related quality of life.

**Conclusion:** Special techniques associated to traditional prosthodontics may increase treatment efficiency of difficult cases where implant rehabilitation is excluded for various reasons.

**Keywords:** Removable prosthodontics; complete dentures; efficient workflow; neutral zone; all green technique; elderly patient.

## 1. INTRODUCTION

Edentulism emerges as a result of periodontal diseases, caries or trauma. Resorption of residual ridges, deterioration of masticatory ability, phonetics and aesthetics, as well as the subsequent psychological burden are some of the negative impacts of tooth loss [1]. This condition has been connected with well-documented consequences upon general health and oral health related quality of life.

Conventional rehabilitation of edentulous arches includes the construction of removable complete dentures. Improvements in the field of implantology have made implant-supported removable or fixed prostheses an additional therapeutic option. Lack of adequate retention and stability, pain and discomfort that are sometimes connected with mandibular complete dentures have led to the suggestion of a two-implant-retained mandibular overdenture as the first choice for the rehabilitation of the lower jaw [2].

However, reasons such as general health conditions, anatomical restrictions, financial limitations and patient's desires, very often render complete dentures as the only available option. These parameters along with the increase of life expectancy result in a significant percentage of edentulous patients, especially in developing countries, which makes the application of modified conventional techniques of utmost importance. Such techniques are the "all green" impression or the "neutral zone" registration which attempt to effectively combine the prosthetic intervention with the indicated restorative space and the neuromuscular system [3,4].

Neutral zone is defined as the area where forces from buccinator, orbicularis oris and modiolus are balanced by the tongue. It is also called a position of "muscular balance" providing retention, stability and comfort to dentures fabricated with this concept [3]. This concept becomes significant in a clinical environment where mechanical and physical factors affecting retention tend to decline gradually, while neuromuscular adaptation tends to improve as stimulants from external receptors of oral mucosa lead to the establishment of new muscular kinetic patterns.

The aim of the present report is to describe the incorporation of cost-effective techniques in a shorter but more efficient workflow for conventional removable dentures designed for an impaired elderly patient.

## 2. PRESENTATION OF CASE

### 2.1 Record- Clinical Examination- Treatment Plan

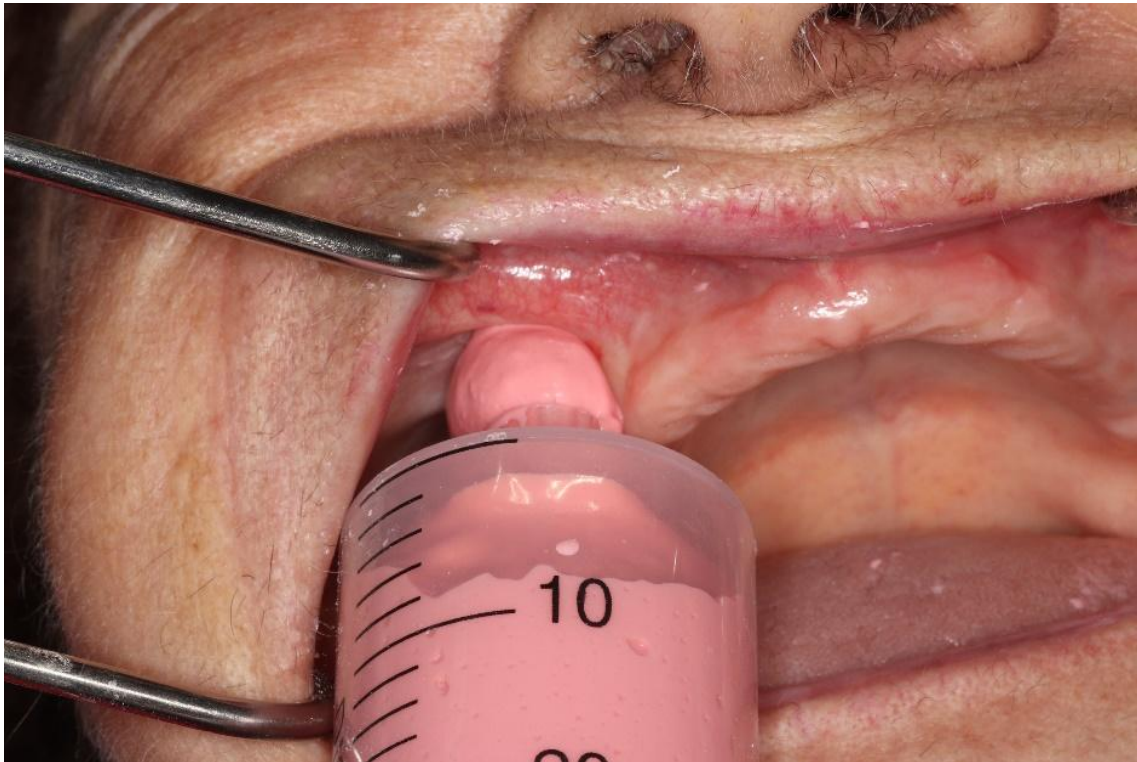
An 83-year-old woman presented with the chief complaint of ill-fitting removable prostheses in both jaws. Medical record did not involve general health problems apart from recently diagnosed cataracts, which, along with the reduced tactile dexterity, were the main reasons for the patient to reject implant therapy due to the limited oral hygiene capabilities. Financial restrictions also played a major role in the final decision.

Extraoral and intraoral clinical evaluation, as well as radiographic examination did not reveal any pathological findings, besides the severely resorbed residual ridges, with inadequate maxillary tuberosities and high muscular attachments in the mandible. Patient mentioned several complaints regarding the existing lower removable denture, in terms of retention and stability. The denture was made eight years ago in a private clinic. Detailed screening of the prosthesis revealed wear of the acrylic teeth, underextended flanges, buccal inclination of teeth and calculus accumulation.

Severe resorption of the mandible negatively affects the basal seat of the prosthesis with reduced retention, stability and functional adaptation. For this reason, the accurate spatial orientation of the prosthesis via the neutral zone technique becomes a crucial step of the removable denture fabrication workflow [3,4].

## 3. IMPRESSION

An alginate (Cavex CA 37, Cavex, Netherlands) impression of the maxilla was made with the application of a less viscous amount of the material in the vestibule with a large syringe before seating a metal tray for edentulous arch carrying the rest of the material which was of regular viscosity [5] (Fig. 1).



**Fig. 1. Intraoral view of the less viscous amount of alginate being inserted in the vestibule with a wide-nozzle syringe**

Regarding impression of the mandible, the all green technique was selected. For this reason, a duplicate denture was made with self-polymerizing acrylic resin and pre-heated impression compound (Impression Compound, Kerr, Switzerland) was painted on the intaglio surface. The same movements that are carried out during conventional border molding were performed. Tissue area and flanges had been reduced beforehand to avoid an overextended impression. Finally, a zinc oxide (SS White Impression Paste) wash impression was made for a detailed record of the edentulous ridge.

## **2.2 Jaw Registrations – Neutral Zone Record**

The vertical dimension of occlusion was calculated with the conventional technique of rest position and was maintained with wire loops. The loops were adjusted and stabilized with flowable resin composite in three places on the baseplate, forming a triangle that offers support of the upper rim at the established vertical dimension. After the vertical dimension was verified and confirmed that the loops did not interfere with the movements requested from the patient, their retention was further secured with acrylic resin.

Tissue conditioner (Visco-gel, Dentsply Detrey GmbH, Konstanz, Germany) was selected for the neutral zone registration, because of the long setting time and the ability to adjust the viscosity by altering the powder-liquid ratio [3]. The material was placed on the baseplate and the right amount was defined by the height of the loops.

Patient was asked to carry out functional movements, speak and swallow water via a straw in order to activate the neuromuscular system and shape the applied material by the exerted forces, that will also be present during function of the final prosthesis [3]. After complete setting of the material, patient was ordered to count and to pronounce certain syllables in order to assure that the baseplate is not displaced [6]. Direct sight of the upper part of the loops at occlusal view, ensures that the record has been made at the correct vertical dimension (Fig. 2).

Baseplate with record material was positioned on the cast and silicone (Golden Putty) matrices were formed on the buccal and lingual surfaces of the tissue conditioner material, engaging V-shaped notches on the cast for precise assembly [7]. Tissue conditioner was then replaced by wax and the wax rim was used to check the vertical dimension and record the centric relation.



**Fig. 2. Optical assessment of the neutral zone record. Wire loops have assisted in maintaining the correct vertical dimension during the procedure**

### 2.3 Teeth try-in

The morphology of the polished surfaces can be recorded in detail by applying either low viscosity polyvinylsiloxane or zinc oxide impression paste at the outer surface of the baseplate with the teeth setup both at the buccal and lingual side. Patient is asked to activate the musculature by performing functional movements to shape the material and identify areas that are over- or underextended. This procedure has been associated with improved functional stability and less food entrapment [6].

### 2.4 Denture Delivery

Dentures were delivered after pressure spots relief and occlusal adjustments, followed by instructions for the correct denture use and maintenance and determination of recall appointments [8].

## 3. DISCUSSION

Oral functions demand the synergic, complex and individualized action of lips, cheeks, tongue and floor of the mouth [9]. Failure to accurately define the position of artificial teeth, shape and extension of flanges and morphology of polished surfaces and place them in a three-dimensional area where the applied forces act in favor and

not against retention in order to achieve a flawless cooperation between dentures and the neuromuscular system might lead to prostheses that lack functional stability [3].

The neutral zone concept partially negates the mechanistic guidelines that demand artificial teeth placement directly above the residual ridge and brings forward a more biologically oriented and holistic perspective [7]. The results of studies attempting to relate neutral zone with residual ridges indicate that an absolute association cannot be defined as the relationship depends on age, duration of edentulism and examined area.

A prerequisite for the correct record of the neutral zone that is often neglected, is the determination of the correct vertical dimension of occlusion beforehand [3]. From a practical viewpoint the clinician can more precisely calculate the amount of the material placed on the baseplate, which can either be tissue conditioner, silicone material, acrylic resin, chairside relining material, zinc oxide eugenol impression material or wax. Materials such as segmental wax rims, acrylic resin or impression compound pillars have been suggested as supporting structures. However, these materials might interfere with the lip, cheeks or tongue occupying some of the volume that should be possessed by the material used to record the neutral zone [3].

Complete dentures fabricated with the neutral zone technique have shown enhanced stability, aesthetics, phonetics, comfort, masticatory ability, function, oral health related quality of life and less problems after the delivery. Neutral zone may also be used in a variety of applications such as rehabilitation of maxillofacial defects or implant supported prostheses [7].

Increased clinical and laboratory time may be regarded as a drawback of the abovementioned technique. However, with the impression strategy described in the present report an effort to apply a cost-effective impression strategy was made. Conventional techniques include a preliminary impression which is essential for the fabrication of a custom tray. This tray is border molded and the impression is made with elastomeric materials or zinc oxide eugenol impression paste. The ongoing tendency for the simplification of certain procedures has led to clinical reports eliminating the two steps impression with similar efficiency compared to the standard protocol [5,10].

#### 4. CONCLUSION

In the present report the procedure of fabricating complete dentures by incorporating cost-effective techniques has been thoroughly described. The advantages of this approach are:

- 1) The conventional workflow is enhanced with techniques that reduce time but not the quality of the final prosthesis while being comfortable for the elderly patient.
- 2) Neutral zone utilization is strongly suggested in cases of severe resorption.
- 3) The combined incorporation of special techniques is demanding in terms of experience and requires the supportive cooperation of clinician and dental technician.

#### CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

#### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Geckili O, Bilhan H, Mumcu E, Dayan C, Yabul A, Tuncer N. Comparison of patient satisfaction, quality of life, and bite force between elderly edentulous patients wearing mandibular two implant-supported overdentures and conventional complete dentures after 4 years. *Spec Care Dentist*. 2012;32(4):136-41.
2. Feine JS, Carlsson GE, Awad MA, Chehade A, Duncan WJ, Gizani S, et al. The McGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patients. Montreal, Quebec, May 24-25, 2002. *Int J Oral Maxillofac Implants*. Jul-Aug. 2002;17(4): 601-2.
3. Gahan MJ, Walmsley AD. The neutral zone impression revisited. *British dental journal*. Mar 12 2005;198(5):269-72.
4. Beresin VE, Schiesser FJ. The neutral zone in complete dentures. *The Journal of prosthetic dentistry*. Oct 1976;36(4):356-67.
5. Vecchia MP, Regis RR, Cunha TR, de Andrade IM, da Matta JC, de Souza RF. A randomized trial on simplified and conventional methods for complete denture fabrication: cost analysis. *Journal of prosthodontics : official journal of the American College of Prosthodontists*. 2014;23(3):182-91.
6. Clarke P, Leven AJ, Youngson C. Managing the Unstable Mandibular Complete Denture - Tooth Placement and the Polished Surface. *Dent Update*. 2016; 43(7):660-2,4-6, 9-70.
7. Cagna DR, Massad JJ, Schiesser FJ. The neutral zone revisited: from historical concepts to modern application. *The Journal of prosthetic dentistry*. 2009; 101(6):405-12.
8. de Villa Camargos G, Armenine TE, Paleari AG, Nascimento GMO, Munhoz MFV. Teaching Complete Denture Procedures to Dental Students by Conventional or Simplified Methods: A Randomized Clinical Trial. *J Dent Educ*. 2019;83(3):303-13.



9. Bhorgonde D, Nandakumar K, Khurana PR, Kumari VS, Reddy MS, Siddique S. An evaluation of the position of the neutral zone in relation to the crest of mandibular alveolar ridge - An In-vivo study. J Int Oral Health. 2014;6(2):45-54.
10. Carlsson GE, Ortorp A, Omar R. What is the evidence base for the efficacies of different complete denture impression procedures? A critical review. Journal of dentistry. 2013;41(1): 17-23.

---

© 2021 Papalexopoulos et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
<https://www.sdiarticle4.com/review-history/73891>