

Neutral Zone Approach for Complete Denture Fabrication in a Severely Resorbed Residual Ridge

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Abstract

One of the most challenging aspects of complete denture therapy is patients with atrophic residual alveolar ridges. The neutral zone technique is considered to be an important approach to those patients complaining of unstable dentures. In clinical cases with optimal bone availability, physiologically optimal denture contours and physiologically appropriate denture tooth arrangement should be achieved to maximize prosthesis stability, comfort, and function for patients. The aim of this technique is to arrange the denture teeth in harmony with the adjacent soft and hard tissue. This case report describes the simplest form of recording neutral zone in severely resorbed mandibular ridge.

Keywords: Neutral Zone; Complete Denture; Atrophic Mandible; Impression Technique; Residual Alveolar Ridges; Resorbed Ridge.

Introduction

The neutral zone is that area in the potential denture space where the forces of the tongue pressing outward are neutralized by forces of the cheeks and lips pressing inward [1]. According to the Glossary of Prosthodontic Terms (2005) [2] the neutral zone is "the potential space between the lips and the cheeks on one side and the tongue on the other; that area or position where the forces between the tongue and cheeks or lips are equal." The aim of the neutral zone technique is to construct a denture in muscle balance through physiologically optimal denture contours and physiologically appropriate denture teeth arrangement [3].

The other technique for recording neutral zone are the denture form impression technique [4] muscle formed mandibular denture technique [5], and border molding technique [6]. This article describes the neutral zone impression technique in complete denture fabrication in severely resorbed mandibular ridge.

Case Report

A 57-year-old male patient reported with the complaint of loose lower denture and wants its replacement (Figure 1). Intraorally, the upper arch has adequate bone height for denture support. However, the lower arch had severe ridge loss combined with a knife-edge form. The labial vestibule depth was almost lost.



Fig 1: Pre-operative frontal view

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According to American College of Prosthodontics Index for diagnostic classification of the edentulism, radiographic finding revealed the less vertical height of mandibular bone was found to be approximately 10mm or less, defined as Type IV. A clinical examination showed that only the posterior lingual vestibule present. Thus, the muscle attachment classification is Type D (Figure 2).

Procedure

The preliminary impressions of maxilla and mandible were made using impression compound (MDM Ltd, India). The secondary impressions were made with custom tray with zinc oxide eugenol impression material (Dental Products of India Ltd, India).

Before the material set, the patient was instructed to perform various functional movements such as licking lips, sucking, puckering, smiling, grinning, swallowing, pronouncing some words, or combination of these. These actions should be repeated until the material completely set. After setting, the displaced excess material was removed. The obtained impressions were poured with dental stone. The record bases were fabricated, assessed and modified for stability, extension and comfort. Before making the neutral zone impression, the patient was made comfortable in an upright position with the head supported. The impression compound was softened in a 65°C water bath. The softened compound was kneaded and adapted on record bases according to the shape of residual ridge. Attached roll reheated in water bath. The patient was asked to perform a series of actions like swallowing, speaking, sucking, pursing lips,

pronouncing vowels, sipping water and slightly protruding the tongue several times which simulated physiological functioning. The soft compound molds with the action of the surrounding musculature in physiologic movement (Figure 3). Maxillary rim was oriented in the patient's mouth, the height of the lower compound rim was adjusted with a sharp knife and jaw registration was carried out.

Molded impression compound rim placed in putty indices (Figure 4). Notches were made on the maxillary and mandibular cast, the putty indices were made around the molded impression compound rim. Then the molded impression compound rims were removed from the base plate and the index was replaced. The indices preserve the space of the neutral zone.

Wax was poured into the space confined by the putty matrices to make a wax rim, which exactly represented the neutral zone on the newly formed baseplate on the master cast. Teeth arrangement was done exactly following the indices. During the setting of the teeth their position was checked by putting the indices together around the teeth (Figure 5). The waxed up trial dentures were checked in the patients mouth for aesthetics, phonetics and occlusion (Figure 6).



Fig. 2: Edentulous maxillary and mandible ridges

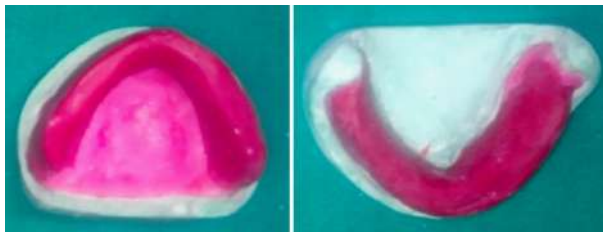


Fig. 3: Neutral zone recorded using impression compound



Fig. 4: Silicone Putty indices of maxillary and mandibular rims



Fig. 5: Teeth arrangement according to silicone putty index



Fig. 6: Waxed up trial denture



Fig. 7: Impression of the polished surface of denture



Fig. 8: Post-operative frontal view

Later on, wax was removed from the labial and the lingual surfaces of the trial dentures leaving only minimal wax which could support the teeth that were placed. Patient was trained for making physiological movements such as tongue, cheek and lip movements. Once the patient was trained regarding the functional movements addition silicone light body (Aquasil Ultra LV Fast Set; Dentsply Caulk) was placed on the labial as well as lingual surfaces of the trial dentures, it was placed in the mouth and patient was asked to perform movements. This procedure was carried out for both the maxillary and mandibular arches. This recorded the polished surfaces of the denture according to the neutral zone (Figure 7). Dentures were processed and finished in a routine manner. Finally, the polished dentures were delivered to the patient (Figure 8).

Discussion

The concept of neutral zone is not new in our dentistry, but techniques available to fabricate a complete denture with customized neutral zone are limited. The important objective achieved by arranging artificial teeth in neutral zone are following: (1) Normal muscle function do not interfered by prosthetic teeth; and (2) normal oral and perioral muscle imparts stabilizing force against the complete dentures that serves in retaining the prostheses. There are other different techniques for neutral zone impression like: (1) Without inserting the upper recording base, the neutral zone impression is made using impression compound as occlusal rim to record the neutral zone contour before the final impression is completed [8-9]. (2).

Refining the polished surface of the trial wax denture with the impression material, [10] or relining the polished surface of delivered denture by the functional impression activities. Use of the neutral zone method to identify and register the anatomy and physiology that impact prosthesis stability may result in improved prosthodontic therapy for patients.

Conclusion

With the recent advancement in material aspect of dentistry, the neutral zone concept considered important treatment option for patient with unstable complete denture particularly in which implant treatment is not feasible. The aim of this technique is to place denture where force generated by lips, cheeks and tongue have a stabilizing rather than dislodging forces. Thus the neutral zone technique is considered important in patient with severely resorbed atrophic ridges.

References

1. Beresin VE, Schiesser FJ. The neutral zone in complete dentures. *J Prosthet Dent* 1976;36:356-67.
2. The glossary of prosthodontic terms. *J Prosthet Dent* 2005;94:10-92.
3. Cagna DR, Massad JJ, Schiesser FJ. The neutral zone revisited: from historical concepts to modern application. *J Prosthet Dent* 2009;101:405-12.
4. McCord JF, Grant AA. Impression making. *Br Dent J* 2000;188:484-92.
5. Walsh JF, Walsh T. Muscle-formed complete mandibular dentures. *J Prosthet Dent* 1976;35:254-8.
6. Ohkubo C, Hanatani S, Hosoi T, Mizuno Y. Neutral zone approach for denture fabrication for a partial glossectomy patient: a clinical report. *J Prosthet Dent* 2000;84:390-3.
7. Beresin VE, Schiesser FJ. The neutral zone in complete dentures. 2nd ed. St Louis: CV Mosby Co, 1978:20.
8. Fahmy FM, Kharat DU. A study of the importance of the neutral zone in complete dentures. *J Prosthet Dent* 1990;64:459-62.
9. Makzoume JE. Morphologic comparison of two neutral zone impression techniques: a pilot study. *J Prosthet Dent* 2004;92:563-8.
10. Lott F, Levin B. Flange technique: an anatomic and physiologic approach to increased retention, function, comfort, and appearance of dentures. *J Prosthet Dent* 1966;16:394-413.