ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at:www.ijdsir.com

Volume – 8, Issue – 1, February – 2025, Page No. : 101 - 106

Harnessing The Power of The Neutral Zone Concept for Improved Outcomes – A Case Report

[1]Dr. Arjun D Menon, Post Graduate Student, Department of Prosthodontics, St. Gregorios Dental College, Chelad, Kothamangalam

[2]Dr. George Francis, Professor and HOD, Department of Prosthodontics, St. Gregorios Dental College, Chelad, Kothamangalam

[3]Dr. Paul Kariyatty, Professor, Department of Prosthodontics, St. Gregorios Dental College, Chelad, Kothamangalam

[4]Dr. Arun K Joy, Reader, Department of Prosthodontics, St. Gregorios Dental College, Chelad, Kothamangalam

[5]Dr. Anjali Ashok, Post Graduate Student, Department of Prosthodontics, St. Gregorios Dental College, Chelad, Kothamangalam

[6]Dr. Reshma Mathew, Post Graduate Student, Department of Prosthodontics, St. Gregorios Dental College, Chelad, Kothamangalam

Corresponding Author: Dr. Arjun D Menon, Post Graduate Student, Department of Prosthodontics, St. Gregorios Dental College, Chelad, Kothamangalam

Citation of this Article: Dr. Arjun D Menon, Dr. George Francis, Dr. Paul Kariyatty, Dr. Arun K Joy, Dr. Anjali Ashok, Dr. Reshma Mathew, "Harnessing The Power of The Neutral Zone Concept for Improved Outcomes – A Case Report", IJDSIR- February – 2025, Volume – 8, Issue – 1, P. No. 101 – 106.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Mandibular ridge resorption is a complex, degenerative condition characterized by relentless bone loss, compromising denture stability. This irreversible process leads to diminished sulcular depth, reduced vertical dimension, and decreased lower facial height. Patients with long-term complete dentures face significant challenges due to the disproportionate resorption rate of the lower edentulous ridge compared to the upper jaw. For prosthodontists, rehabilitating patients with severely resorbed ridges poses a significant clinical challenge. This article showcases the effective integration of the neutral zone concept into impression techniques to enhance complete denture success

Keywords: Residual Ridge Resorption, Neutral Zone, Stability

Introduction

Complete dentures are a mechanical device that performs a functional activity in the oral cavity, the teeth arrangement and polished surface of denture must be in an appropriate and acceptable manner so that they are in harmony with the all intra oral and extra oral muscular functions, such as talking, eating, whistling, deglutition, smiling, and laughing, involving the interactions

between tongue, lips, cheeks, and floor of the mouth. With the increase in resorption rate, the influence of impression surface on denture retention and stability decreases [3]. Prosthodontists often face difficulties with mandibular complete dentures that lack stability.

Residual ridge resorption, a complex condition with multiple contributing factors, progresses relentlessly, causing irreversible damage. This degenerative process is an inherent aspect of the aging process. As bone loss advances, achieving optimal denture stability and retention relies heavily on precise tooth positioning and meticulous design of the denture's external surface[3]. Therefore, these surfaces should be so contoured that horizontally directed forces applied by perioral muscles should act to seat the denture.

Fish picked up one out of other three surfaces of the denture that is polished surface which is bounded by the tongue and the cheeks. In 1931 Wilfred Fish of England introduced neutral zone concept. What is neutral zone? It is the potential space between the lips and cheeks on one side and the tongue on other, that area where forces between the tongue and cheeks or lips are equal. Neutral zone technique is most effective way for patients who have unstable and unretentive dentures. The neutral zone technique is favourable for patients with multitudinous, unstable, unretentive mandibular complete dentures [5].

Case Report

A 72-year-old male patient presented to the Department of Prosthodontics at St. Gregorios Dental College in Kothamangalam, Kerala, complaining of a loose and unstable lower denture with severely worn teeth. He had been wearing complete dentures for over a decade. Intraoral examination revealed completely edentulous upper and lower arches, characterized by a sharply resorbed V-shaped mandibular ridge. Notably, excessive alveolar bone loss had resulted in close proximity of muscle attachments to the residual ridge, including labial, and lingual frenum, classified as Class III attachment and the buccal frenum classified as class II.

Figure 1:

Figure 2:

Clinical Procedure

Primary impressions of the maxillary and mandibular arches were made using alginate in stock trays. Diagnostic casts were created by pouring the impressions with Type II gypsum. Custom trays were then fabricated, followed by border molding of both arches with low-fusing impression material. Final impressions were made using low-viscosity zinc oxide eugenol, and poured in Type III dental stone to produce master casts (Figure 3).

Figure 3:

A maxillary record base was fabricated using self-curing acrylic resin, while a mandibular record base was created with heat-cured acrylic resin (DPI) to enhance comfort and stability. Wax occlusal rims were then attached to the record bases. On the next appointment tentative jaw relation was done and facebow transfer was performed to accurately orient the maxillary cast. The casts were subsequently articulated in a semi-adjustable articulator (Figure 4)

Figure 4:

Following removal of the wax from the mandibular occlusal rim, self-cure acrylic pillars were secured to the record base, ensuring accurate preservation of the established vertical height (Figure 5).

Figure 5:

Maxillary occlusion rim and modified mandibular record base with acrylic pillars were evaluated intra orally for their fit & ensured that acrylic pillars do not interfere with muscle movement during functional movements.

To register the neutral zone, the maxillary wax rim was retained intraorally to support facial muscles. With the patient's shoulders relaxed and head unsupported, the maxillary rim's occlusal plane and support were verified. Next, Admix material (a 3:7 blend of fusing impression compound and low-fusing green stick) was softened in a 63-65°C water bath. The kneaded compound was then rolled onto the acrylic pillars on the record base, maintaining the established vertical dimension. To engage the muscles, the patient performed repeated physiological actions: whistling, speaking, lip pursing, swallowing, sucking, sipping water, and slight tongue protrusion (Figure 6, 7).

Figure 6:

Figure 7:

After 5 minutes, the set impression was taken out from the mouth. The neutral zone impression obtained was transferred on the master cast. Locating grooves were cut on the master cast(Figure 8).

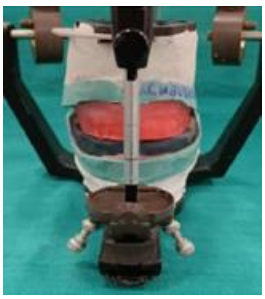

Figure 8:

Buccal and lingual indices were created using laboratory putty, precisely shaping them to match the established lower occlusal plane height. This ensured accurate preservation of the mandibular occlusal rim's vertical dimension. While the putty set, strategic cuts were made with a BP blade to facilitate easy index separation. Once set, the putty indices replaced the compound occlusal rim and acrylic pillars. Molten wax was then flowed between the indices to capture the neutral zone, forming a wax rim.(Figure 9).

Figure 9:

Initially, the mandibular teeth were arranged within the neutral zone, followed by the maxillary teeth arrangement, which was harmonized with the mandibular teeth position. To verify the teeth alignment, a putty index was placed around the mandibular teeth arrangement, ensuring accurate registration of the occlusal relationship(Figure 10).

Figure 10:

A wax trial denture was evaluated for stability by replicating the movements used to record the neutral zone. Aesthetic, phonetic, and occlusal assessments were also performed (Figure 11).

Figure 11:

Satisfied with the results, the denture was fabricated using heat-cured acrylic resin via the conventional method. Following finishing and polishing, the denture was delivered to the patient. (Figure 12).

Figure 12:

Post insertion instructions were given to the patient and recalled after 24 hours for 1st checkup followed by 1 week.

Discussion

In the field of oral rehabilitation, particularly in geriatric patients, many factors contribute to the overall performance of complete dentures. Usually, the mandibular denture is relatively less stable than the maxillary with increasing life expectancy and progressive severe mandibular resorption. One of the philosophies being introduced to overcome the challenge of unstable dentures in clinics is the concept of the neutral zone. Hickey and Zarb stated that the posterior

part of the arch form will be determined to a greater extent by the "neutral zone." [4]

Watt suggested that the artificial teeth should be placed in the approximate position occupied by the natural teeth.

Beresin and Schiesser stated that the neutral-zone philosophy is based upon the concept that is for each individual patient, there exists within the denture space a specific area where the function of the musculature will not unseat the denture and where forces generated by the tongue are neutralized by the forces generated by the lips and cheeks. The influence of tooth position and flange contour on denture stability is equal to or greater than that of any other factor leading to retention. We should not be dogmatic and insist that teeth be placed over the crest of the ridge, buccal or lingual to the ridge. Teeth should be placed as dictated by the musculature, and this will vary for different patients. This technique simply delineates the concept that artificial teeth should not be placed on the crest or buccal or lingual to it but rather be placed as dictated by musculature by the controlling action of cheeks, lips, and tongue that confine the dentures.

Arranging artificial teeth within the neutral zone achieves 2 important objectives:

I. Prosthetic teeth do not interfere with normal muscle function; and II. Normal oral and perioral muscle activity imparts force against the complete dentures that serves to stabilize and retain the prostheses rather than cause denture displacement[1][2].

The technique of neutral zone described in this article is simple but technique sensitive to record the physiological dynamics of perioral muscular functions. The material used for recording neutral zone should be reasonably slow setting to allow the oral parafunctional musculature to shape it to the appropriate contour and dimensions. Artificial teeth to be arranged within the neutral zone to achieve two important objectives: No interfere seen between prosthetic teeth and normal muscle function and perioral muscle activity imparting force against the complete dentures that serves to stabilize and retain the prosthesis rather than causing denture to displace.

Conclusion

Recent advancements in prosthetic dentistry, including innovative materials and techniques, have significantly enhanced denture stability, support, and retention. Notably, recording the Neutral Zone offers a straightforward, non-invasive, and cost-effective solution, requiring only one additional clinical step, yielding substantial improvements in denture stability. Therefore, this procedure should be considered essential for all complete denture patients with resorbed ridges, either as a standalone solution or in conjunction with other techniques, and should be integrated into the fabrication process of every complete denture.

References

1. Beresin ve, schiesser fj. The neutral zone in complete dentures. The journal of prosthetic dentistry. 1976 oct 1;36(4):356-67
2. Beresin ve, schiesser fj. The neutral zone in complete dentures. Journal of prosthetic dentistry. 2006 feb 1;95(2):93-100.
3. Saravanakumar p, thangarajan st, mani u. Improvised neutral zone technique in a completely edentulous patient with an atrophic mandibular ridge and neuromuscular incoordination: a clinical tip. Cureus. 2017 apr;9(4).
4. Asnani s. Neutral zone technique in complete denture: a case report. International journal of medical science and dental health. 2016 nov 1;2(11):01-4.

5. Fish ew. An analysis of the stabilizing force in full denture construction. Br dent j 1947;83:137-42
6. 3. Wright sm. The polished surface contour: a new approach. Int j prosthodont 1991;4:159-163
7. Garg S, Garg S, Mehta M, Goyal S. The neutral zone concept: an alternative approach for construction of mandibular complete denture: a clinical case report. Indian journal of dental sciences. 2012 sep 1;4(3).