



## Management of Severely Compromised Mandibular Ridges: A Simple Approach Neutral Zone Technique

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### Abstract

The management of severely atrophic ridges is a challenging task for the clinician. Of the multitude of techniques cited in literature, utilization of the neutral zone technique during rehabilitation offers a greater retention and stability to the patient; as it is the simplest approach and proved to satisfy the patient needs. This review details the various methods and materials used in the Neutral zone technique.

**Keywords:** Neutral Zone Technique; Atrophied Ridges; Dead Space; The Neutral Zone Technique in Complete Dentures

### Introduction

For the majority of elderly patients who are edentulous, particularly those with low socioeconomic status, conventional complete denture therapy continues to be an affordable and viable treatment option. This is true despite the growing trend of implant treatment and its proposal as the standard of care for the edentulous population. The placement of dentition substitutes that are functional and aesthetic and the replacement of associated dental supporting structures are the primary objectives of complete denture treatment for patients with moderate to severe resorption of reduced residual alveolar ridges. Such prostheses have to naturally occupy a substantial volume within the oral cavity of the edentulous patients. The location, extent and available volume of this denture space has been subject to much academic debate [1-4].

The therapeutic challenges associated with designing complete dentures to optimally occupy the edentulous space are substantial as one must also consider the functional dynamics that define the oral cavity and the progressive deterioration that accompanies edentulism. Throughout time, many theories have emerged to illustrate where the prosthetic teeth of the denture should be positioned. These approaches have been challenged from time to time

and found insufficient especially in patients with severely atrophic mandibular ridges and patients [5-7].

In order to ensure a favourable prognosis, the impression material and technique, size and form of the occlusal rims and choice of teeth selected should be based on the present state of the basal tissue support. The selection or choice between techniques is most often based on foundation concepts and techniques, muscles involved, advantages and indications of a technique to achieve stability in highly resorbed mandibular edentulous ridge and also an insight into the rationale of using these techniques. For most of the patients who opt for conventional dentures there is often an inability to adapt to these dentures due to many factors like poor stability, compromised retention, inadequate facial support, poor aesthetics, inefficient tongue function or position, poor mastication or speech and/or gagging. All these factors have been directly related to physiologically inadequate contours of the denture base or denture base volume and functionally inappropriate positioning of denture teeth. Hence the placement of teeth should be dictated by the musculature and will vary for different individuals. To best address such problems, the neutral zone technique was advocated.

The term Neutral zone was coined by Bersin and Schiesser in 1976. Historically, this zone is referred to by various names by various authors, like “Dead zone”, “Stable zone”, “Zone of Minimal conflict”, “Zone of equilibrium”, “Biometric denture space”, “Denture space and Potential denture space” [8-10].

The neutral zone as per GPT -9 is “the potential space between the lips and 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. Rather than just insisting that teeth be placed over the crest of ridge, buccal or lingual to the ridge, teeth should be positioned as dictated by the musculature, as may vary from patient to patient [11].

Increased access to dental care has led to patients losing their teeth at a later stage of life. Compounded by increased life expectancy, this has led to the majority of elderly people wearing complete dentures and for those who have poor neuromuscular control, poor adaptive capacity and severely atrophic ridges it is most often difficult to satisfy even the patient’s basic needs.

The rationale of Neutral Zone is to fabricate a lower complete denture that is optimally situated and in harmony with the structures among the oral cavity and the balancing forces between outer facial muscles and tongue. By doing so, these forces are more likely to be stabilizing rather than unseating [12,13].

**Denture surfaces**

Sir Wilford Fish was the first person to describe that a denture having three surfaces, the impression surface, the occlusal surface and the polished surface, with each surface playing an individual and major role in the overall fit, stability, and comfort of the denture. Equalizing the vertical forces produced by the occlusal surfaces of the teeth and resisted by the vault and ridges has always been a point of interest and implementation while the importance of the horizontal forces exerted on the external surfaces of the dentures has been neglected. Thus, the dental profession has been concerned mainly with only two of the three surfaces--the occlusal surface and the impression surface. The importance of the polished surface, which is the third surface is highlighted in the neutral zone concept. The denture base area will be smaller and the impression surface area will have less of an impact on the stability and retention of the denture as ridge loss increases. The tooth position and contour of the polished surface become more crucial when the area of the impression surface diminishes and the polished surface area increases [14-16].

Indications of neutral zone technique	<ol style="list-style-type: none"> <li>1. Severely atrophied ridges.</li> <li>2. Patient with high mentalis attachment.</li> <li>3. Patient with partial glossectomy.</li> <li>4. Parkinson’s disease.</li> <li>5. Partial mandibular resection.</li> <li>6. To facilitate in locating optimal position for implant.</li> </ol>
Advantages	<ol style="list-style-type: none"> <li>1. Improved stability.</li> <li>2. Better retention.</li> <li>3. To allow the sufficient space for the tongue posterior teeth.</li> <li>4. Enhanced aesthetics.</li> <li>5. Improved masticatory function.</li> <li>6. Better comfort.</li> <li>7. Improved speech.</li> <li>8. Boost psychological attitude of patient</li> </ol>
Steps involved in recording	<ol style="list-style-type: none"> <li>1. Primary impressions</li> <li>2. Secondary impressions</li> <li>3. Assessing the baseplates and recording the occlusion</li> <li>4. Assessing the upper wax try in, the superstructure and OVD</li> <li>5. Neutral zone impression</li> <li>6. Wax try in</li> <li>7. Finish and check record</li> <li>8. Review</li> </ol>

**Table**

**Discussion**

Determination of tooth position or the arrangement of teeth in relation to ridges is vital as it helps to withstand and neutralize the muscular forces from both the sides specifically the tongue and facial muscles and this has been proposed as the Neutral Zone by Bersin and Schiesser in 1976. This zone varies from individual to individual depending upon their musculature and period of edentulousness which has been highlighted in a clinical study by Jain A., et al. and in radiographical study by Fahmi. There exists a controversy in the location of the neutral zone pertaining to the extent of period

of edentulism with some researchers like Hina ZR and Saleem observing a shift more lingually to the crest of ridges while researchers like Powral have stressed that the period of edentulism gender and age doesn't show any significant relationship to a change in the neutral zone position in relation to crest of residual ridges [17-20].

Once the tentative jaw relations have been established the wax in the occlusal rims is replaced by the various materials like tissue conditioners (Viscogel), impression compound, impression plaster, elastomers, wax, zinc oxide eugenol impression material, silicone material, chairside relining material, and acrylic resin and the patient is instructed to perform various muscular movements like drinking water, licking, grinning, pursing the lips, sucking, masticating, and mouth exercises (which include blowing, protruding the tongue, opening and closing the mouth, and exercising the lips, cheek, and tongue). Apart from this literature has mentioned that phonetics and swallowing are the methods that are employed in the recording of the neutral zone [21]. When the both methods are subjectively compared clinically in terms of oriented patient satisfaction related to the final dentures, both the techniques showed similar outcomes [22,23]. Once the neutral zone has been established it is secured by indexing it with various materials like plaster, silicone, stone, or modeling plastic impression compound. The recording material is then replaced by the modelling wax and teeth arrangement is done after which clinical evaluation of patient satisfaction is evaluated during the try in stage. Once the clinical wax try in is deemed satisfactory, denture processing is done. Comparatively, dentures fabricated using the neutral zone, have proven to have significantly better subjective patient satisfaction outcomes in terms of aesthetics, masticatory skills, retention, stability, speech, and comfort and increasing the overall efficacy among resorbed ridges [24-26].

## Conclusion

The neutral zone technique is considered to be an alternative approach for patients complaining of unstable dentures, especially when it is not feasible to do implant therapy. It is especially useful in patients where they cannot afford for dental implants and even for the patients where the implant treatment not indicated the clinician can apt for the neutral zone concept as it is evident dentures fabricated by this technique offer significantly higher patient satisfaction level in all the functional aspects as well as the in the comfort levels and appearance than conventionally fabricated dentures.

## Bibliography

1. Csogor A, Michman J. Initial retention of complete mandibular dentures. *J Prosthet Dent.* 1970;23(5):503-511.
2. Wright CR. Evaluation of the factors necessary to develop stability in mandibular dentures. *J Prosthet Dent.* 1966;16(3):414-430.
3. Sheppard IM. Denture base dislodgement during mastication. *J Prosthet Dent.* 1963;13:462-468.
4. Campbell RL. A Comparative study of the resorption of the alveolar ridges in denture wearers and non-denture-wearers. *J Am Dent Assoc.* 1960;60:143-153.
5. Weinberg LA. Tooth position in relation to the denture base foundation. *J Prosthet Dent.* 1958;8(3):398-405.
6. Payne AG. Factors influencing the position of artificial upper anterior teeth. *J Prosthet Dent.* 1971;26(1):26-32.
7. Rangarajan V, Gajapathi B, Yogesh PB, Ibrahim MM, Kumar RG, Karthik P. Concepts of occlusion in prosthodontics: A literature review, part I. *J Indian Prosthodont Soc.* 2015;15(3):200-205.
8. Cagna DR, Massad JJ, Schiesser FJ. The neutral zone revisited: From historical concepts to modern application. *J Prosthet Dent.* 2009;101(6):405-412.
9. Porwal A, Sasaki K. Current status of the neutral zone: a literature review. *J Prosthet Dent.* 2013;109(2):129-134.
10. Gahan MJ, Walmsley AD. The neutral zone impression revisited. *Br Dent J.* 2005;198(5):269-272.
11. The Glossary of Prosthodontic Terms: Ninth Edition. *J Prosthet Dent.* 2017;117(5):e1-e105.
12. Massad J, Davis WJ, Lobel W, June R, Thornton J. Improving the stability of maxillary dentures: the use of polyvinyl siloxane impression materials for edentulous impressions. *Dent Today.* 2005;24(2):118-120.
13. Makhija P, Shigli K, Nair KC, Sajjan S. Problem solving in complete dentures-An overview. *Clinical Dentistry.* 2014;8(9):974-979.

14. Starcke EN. The contours of polished surfaces of complete dentures: a review of the literature. *J Am Dent Assoc.* 1970;81(1):155-160.
15. Wright SM. The Polished Surface Contour: A New Approach. *International Journal of Prosthodontics.* 1991;4(2): 159-163.
16. Schiesser FJ. The neutral zone and polished surfaces in complete dentures. *J Prosthet Dent.* 1964;14(5):854-865.
17. Jain A, Shetty NS, Ugrappa S. To determine and compare the position of neutral zone in relation to crest of mandibular alveolar ridge with different duration of edentulousness: A clinico-radiographic study. *Indian J Dent.* 2015;6(1):7-13.
18. Raja HZ, Saleem MN. Relationship of neutral zone and alveolar ridge with edentulous period. *J Coll Physicians Surg Pak.* 2010;20(6):395-399.
19. Fahmi FM. The position of the neutral zone in relation to the alveolar ridge. *J Prosthet Dent.* 1992;67(6):805-809.
20. Porwal A, Satpathy A, Jain P, Ponnanna AA. Association of Neutral Zone Position with Age, Gender, and Period of Edentulism. *J Prosthodont.* 2018;27(3):232-239.
21. Massad JJ, Cagna DR, Goodacre CJ, Wicks RA, Ahuja SA. Application of the neutral zone in prosthodontics. *John Wiley & Sons;* 2017:35-48,145-157.
22. Khamis M, Razek A, Abdalla F. Two-dimensional study of the neutral zone at different occlusal vertical heights. *J Prosthet Dent.* 1981;46(5):484-489.
23. Ladha K, Gupta R, Gill S, Verma M. Patient satisfaction with complete dentures fabricated using two neutral zone techniques: a within-subject cross-over pilot study. *J Indian Prosthodont Soc.* 2014;14(2):161-168.
24. Al-Magaleh WR, Swelem AA, Abdelnabi MH, Mofadhil A. Effect on patient satisfaction of mandibular denture tooth arrangement in the neutral zone. *J Prosthet Dent.* 2019;121(3):440-446.
25. Rehmann P, Künkel AK, Weber D, Lotzmann U, Wöstmann B. Do mandibular complete dentures made using a neutral zone technique improve speech?-A pilot study. *Gerodontology.* 2017;34(4):501-504.
26. Bhatt U, Sood P, Singh N, Deshbakht IB, Sinha NR, Begam NN. A Survey Based Estimation and Comparison of the Efficacy of Neutral Zone Technique among Resorbed Ridge Patients: A Questionnaire Based Original Research Study. *Int J Res Health Allied Sci.* 2021;7(2):95-99.