

## Neutral Zone Approach: Rehabilitation of Severely Resorbed Mandibular Ridge - A Case Report

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### Abstract:

Retention and stability of complete denture becomes more dependent on factors like appropriate position of teeth and the contours of the polished surface of the dentures. Improper tooth placement may lead to an adverse effect on the success of the prosthesis. Therefore, these surfaces should be well contoured such that horizontally directed forces applied by peri-oral musculature acts to seat the denture in the well balanced muscular zone. Neutral zone technique is an alternative technique for the rehabilitation of severely resorbed mandibular ridges as it improves the stability of mandibular denture.

**Key words:** Neutral Zone, Atrophic Ridge, Retention, Stability.

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### I. Introduction:

Goal of dentistry is to maintain oral function throughout life in health and comfort. These oral functions include mastication, swallowing, speech, smiling and laughing and are dependent upon the combined actions of tongue, lips, cheeks and floor of the mouth.

If a clinician fails to recognize the cardinal importance of tooth position, contour and flange form, then it may result in mandibular denture instability, even though it was meticulously planned and constructed<sup>1</sup>. The lower denture commonly presents the most difficulties; with loss of retention and stability being the most common complaint given by the patients<sup>2</sup>.

Mandibular ridge atrophies are at a greater rate than maxilla. As the resorption rate increases, the influence of impression surface on denture retention and stability decreases<sup>3</sup>.

Neutral zone is described as the potential space in between the cheeks and lips on one side and the tongue on the other side; that area or position where the outward forces of tongue is neutralized by inward forces of cheeks and lips, and in this specific zone, forces are equal (Fig 1).

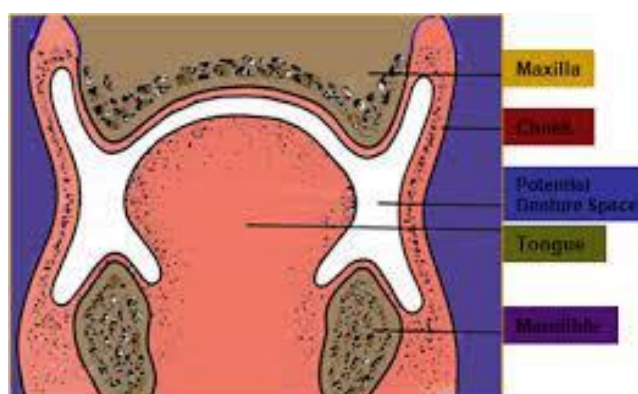


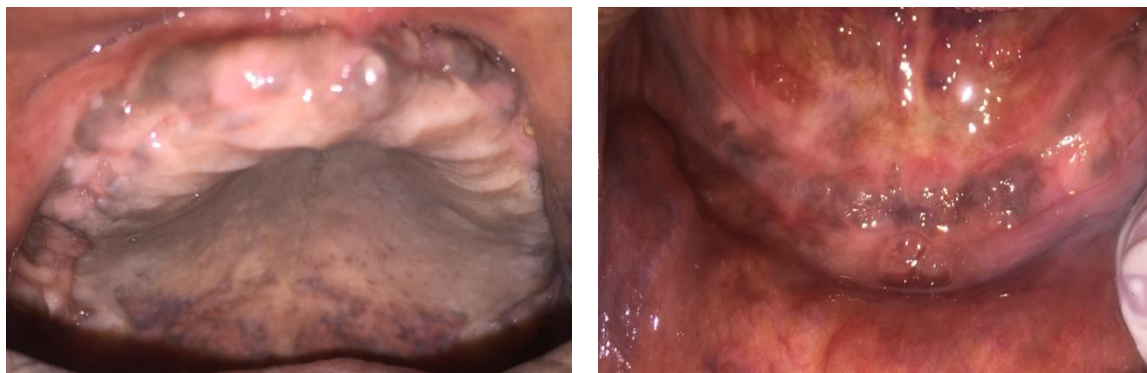
Fig 1: Potential denture space

It is also known as dead zone<sup>4</sup>, stable zone<sup>5</sup>, zone of minimal conflict<sup>6</sup>, zone of least interference<sup>7</sup>, biometric denture space<sup>8</sup>, denture space<sup>9</sup>. It is that potential denture space where oral function will not unseat the denture; in fact, tooth position and flange contour are considered at least as important for denture stability as any other factor.<sup>10</sup>

This technique is indicated in cases where there is extensively resorbed mandibular ridge with minimal bone available to support a denture, poor neurological conditions, patients who have previously had partial glossectomies, mandibular resection and/or motor nerve damage to the tongue and where dental implants are not feasible. Thus, this article presents a modified neutral zone technique for rehabilitation of an atrophic mandibular ridge.

## II. Case Presentation:

A 62-year-old male patient reported to Department of Prosthodontics, Inderprastha Dental College and Hospital, Ghaziabad, India with the chief complaint of difficulty in eating and speaking due to loss of teeth. During dental history, it was revealed that he had been edentulous since last 6 years. On clinical examination, it was diagnosed that maxillary residual ridge was favorable but the mandibular ridge was severely atrophic (Fig 2). Therefore, it was decided to fabricate mandibular complete denture utilizing neutral zone impression technique to improve the stability of the denture.



**Fig 2:** Pre-operative view of maxillary and mandibular arch

### TECHNIQUE:

Primary impressions of maxillary and mandibular edentulous ridges were made with modeling plastic impression compound in a metal stock tray (Fig 3). The cast was poured using dental plaster and a custom tray was fabricated.



**Fig 3:** Maxillary and mandibular primary impression

Border molding for both arches was performed with green stick compound. Secondary impression for maxillary arch was made with zinc oxide eugenol impression paste and light body impression material was used for mandibular arch (Fig 4).



**Fig 4:** Maxillary and mandibular secondary impression

Master casts were fabricated followed by record bases and occlusal rims. Maxillo-mandibular relationship was recorded and casts were mounted on an articulator. After mounting, lower occlusal rim was removed. Two vertical stents were incorporated in the canine region of the record base to maintain the vertical height of the rim. Retentive loops were placed in the premolar and molar region of the record base and they acted as a retentive arm for impression compound (Fig 5).



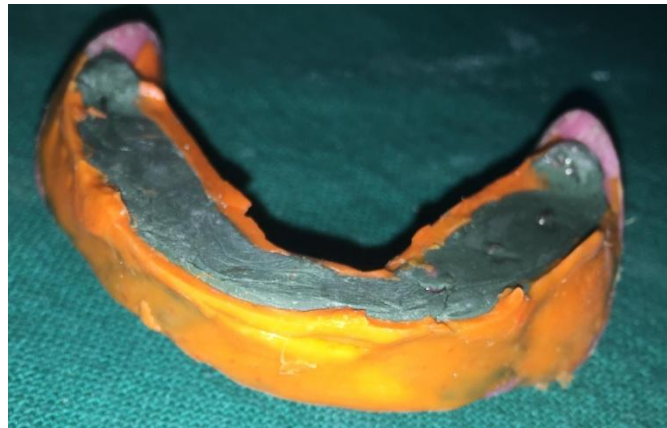
**Fig 5:** Acrylic stents and retentive loops were placed on the denture base

Impression compound and green stick compound were mixed in the ratio of 3:7 respectively to record the neutral zone. Patient was instructed to do various functional movements like swallowing, lip sucking, whistling, smiling, licking the lips and pronouncing the vowels. Mandibular compound rim was taken out from patient's mouth and excess compound was trimmed away till the level of the acrylic stent. The compound rim was re-softened, placed in the patient's mouth and functional movements were repeated. This procedure was performed for about 10 times till a narrow accurate neutral zone was recorded (Fig 6).



**Fig 6:** Neutral zone was recorded using functional movement.

The polished surface of the compound rim was recorded with light body impression material using functional movements (Fig 7).



**Fig 7:** Polished surface was recorded using light body impression material

Reference points for putty index were made by making triangular notches on the mandibular cast. Addition silicone was used for putty index of recorded neutral zone (Fig 8).



**Fig 8:** Putty index was made using addition silicone material

After removing the putty index, retentive loops and acrylic stents were removed (Fig 9).



**Fig 9:** Retentive loops and acrylic stents were removed

The putty index was placed according to their reference notches and molten wax was flown to obtain a wax rim in the neutral zone area (Fig 10).



**Fig 10:** Molten wax was flown into the empty putty index

Mandibular teeth were first arranged in the neutral zone and checked by replacing the putty index (Fig 11). Maxillary teeth were arranged according to mandibular teeth.



**Fig 11:** Mandibular teeth were arranged in Neutral zone

After teeth arrangement, wax try-in was performed (Fig 12).



**Fig 12:** Wax try-in

The trial denture was used as a tray for recording an accurate impression of the contours of the external surface of the denture. The material of choice was light body addition silicone impression material. The patient was asked to perform all functional movements. After the material was set, the trial denture was removed from the mouth and excess material was cut (Fig 13).



**Fig 13:** External surface recorded using light body addition silicone impression material

The dentures were processed in the conventional manner and remounted to check for occlusal discrepancies. The processed dentures were finished, polished and inserted in the patient's mouth (Fig 14).



**Fig 14:** Final denture

### **III. Discussion:**

Neutral zone approach is an alternative technique for the fabrication of complete dentures on severely resorbed mandibular ridges. Different materials are used for recording the neutral zone including impression plaster, impression waxes, impression compound, regular bodied silicone, tissue conditioner, polyether and hard relining material.

In this case report, combination of impression compound and green stick compound was used. The admix material allows better flow and an accurate impression for recording the neutral zone.<sup>11</sup>

For secondary impression of mandibular ridge, light body impression material was used due to its excellent dimensional accuracy, good tear strength, good working and setting time and excellent wettability.<sup>12</sup>

This technique describes the concept that artificial teeth should be placed as directed by musculature which is controlled by action of cheeks, lips and tongue. In previous study, it was stated that that the posterior part of the arch form will be determined to a great extent by the "neutral zone". It was also suggested that the artificial teeth should be placed in the approximate position occupied by the natural teeth.<sup>13,14</sup>

It was also suggested that mandibular posterior teeth should be arranged over the buccal shelf to provide increased tongue space and to facilitate the development of vertical facial polished surfaces against which an effective facial seal can be achieved and maintained.<sup>15</sup>

#### **IV. Conclusion:**

Use of neutral zone technique for severely atrophic mandibular ridge has an advantage that it can stabilize the denture with the surrounding soft tissues and prevent against the dislodging forces. If the prosthetic teeth are arranged within the neutral zone, they do not interfere with the normal oral function and improve the stability of the denture. This modification technique helps to place posterior artificial teeth in a slight facial position rather than their arrangement over the crest of the alveolar ridge.

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