

# Neutral Zone in Complete Dentures

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## ABSTRACT

Incorrect tooth placement and arbitrary shaping of the polished surfaces may have an adverse effect on the success of the prosthesis. This is particularly true for patients with reduced mandibular residual ridges, yielding flat or concave foundations due to severe bone resorption. The neutral zone technique is an alternative technique for the construction of complete dentures with severely resorbed ridges. It is the most effective method for the management of lower denture instability. The technique is by no means new but is a valuable practical approach to clinicians.

**Keywords:** Atrophic Ridge, Index, Neutral Zone, Retention, Stability

## I. INTRODUCTION

As the patient grows, the position of teeth, size and relationship of jaws are controlled by muscles, both in repose and in function. Similarly when the natural teeth are lost, the shape and function of their artificial replacements must be determined by the muscles, if they are to be successful<sup>1</sup>. Prosthodontic treatment is influenced by this concept. The lower denture commonly presents the most difficulties with pain and looseness being the most common complaint<sup>2</sup>. This is because mandible atrophies at a greater rate than maxilla and has less residual support for retention and support. With the increase in resorption rate, the influence of impression surface on denture retention and stability decreases<sup>3</sup>. Stability and retention becomes more dependent on correct position of teeth and the contours of external or polished surface of the dentures. Therefore these surfaces should be so contoured that horizontally directed forces applied by perioral muscles should act to seat the denture in the well balanced muscular zone<sup>4</sup>. Neutral zone technique is most effective way for patients who have unstable and unretentive dentures.

## II. METHODS AND MATERIAL

### 1. CASE REPORT

A 66 year old male patient reported to the department of Prosthodontics, Lenora dental college, Rajanagaram with the chief complaint of difficulty in chewing due to loose lower dentures. He had been edentulous since 8 years. He was a denture wearer and was willing for new set of dentures due to reduced retention. On examination it was diagnosed that maxillary residual ridge was favourable, but the mandibular ridge was unfavourable due to resorption (Fig 1). Thus it was decided to provide lower complete denture utilizing neutral zone impression technique.

- Primary impressions of maxillary edentulous ridge was made with modelling plastic and mandibular impression material was made using McCord's technique<sup>5</sup> in a metal stock tray (Fig 2). The cast poured using dental plaster and a custom tray was fabricated.
- The borders of the tray were molded with green stick impression compound and secondary impressions made with zinc oxide eugenol



impression material. The master casts were poured with dental stone. Acrylic denture bases were made for the master casts with stapler pins incorporated in the mandibular denture base for better retention of the occlusal rims.

- A properly fitting occlusal rim was placed in the maxilla trimmed to meet the particular esthetic need for the patient. A mixture of impression compound and green stick compound in the ratio of 3:7 was adapted to the top of mandibular record base and heated uniformly in a water bath. The record base was carefully placed in the mouth together with the maxillary occlusal rim and the patient was asked to smile, grin, purse lips, count from 60 to 70, pronounce the vowels, swallow, slightly protrude the tongue and lick the lips (Fig 3). These actions were repeated until the material has set. Thus Neutral zone impression for the patient was established (Fig 4). Anterior segment of the compound rim shows the lingual inclination which may be due to the increased tonus of lower lip and the action of tongue during swallowing. The stability of the lower occlusal rim was evaluated by asking the patient to open the mouth wide, wet the lips with tongue and to say exaggerated “OHS” “AHS” and “EES”. A stable base and body were confirmed. The vertical dimension and centric relation were recorded and mounted on a three point articulator.
- The mandibular occlusal rim was removed from the mouth and prepared for duplicating in the wax. The record base with moulded material was placed on the mandibular cast and keyways were prepared on the cast for easy removal of indices. Buccal and lingual indices were fabricated with laboratory putty and the matrices are shaped to the exact height of lower occlusal plane, which was established in the mouth (Fig 5). This preserves the height of lower occlusal rim. While the material sets, cuts were made with BP blade for easy separation of indices and again secured by staple pins. After the putty sets, compound rim is replaced by modelling wax (Fig 6).

2. Semianatomic posterior teeth were selected to achieve maximum intercuspation and improve mastication. Trimming of artificial posterior teeth were done to accommodate the narrow space of neutral zone(Fig 7). Wax try in done and dentures were processed and remounted in routine manner. Dentures were inserted in the patient and evaluated for stability and occlusion (Fig 8).

### III. RESULT AND DISCUSSION

#### Figures



Fig 1 Edentulous mandibular ridge



Fig 2 Primary impression by Mc cords technique



Fig 3 Functional movements



Fig 6 Wax poured in the neutral zone space

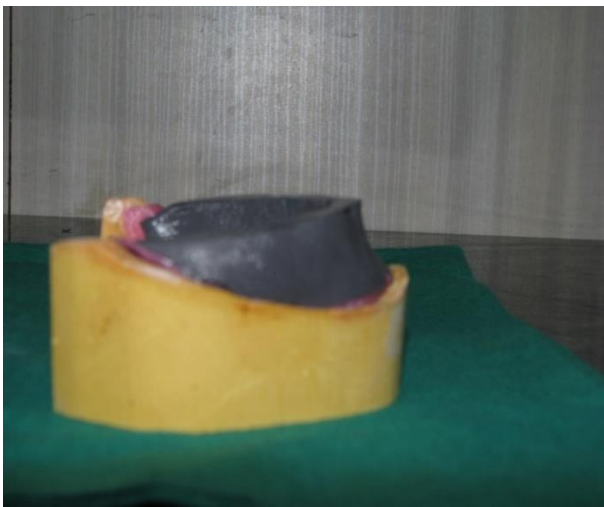


Fig 4 Neutral zone impression

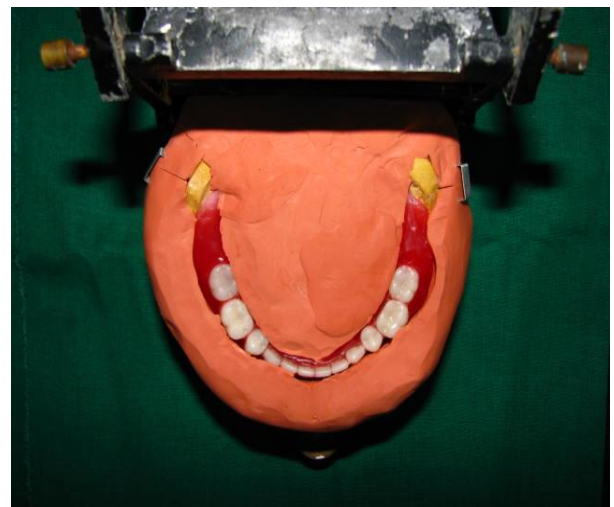


Fig 7 Teeth arrangement in neutral zone

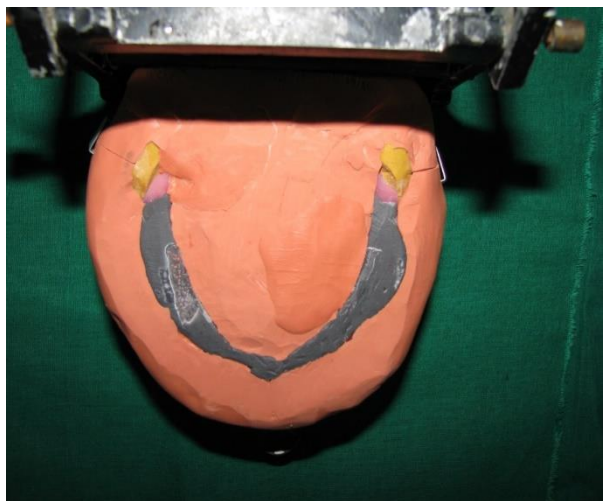


Fig5 Putty index around the neutral zone impression

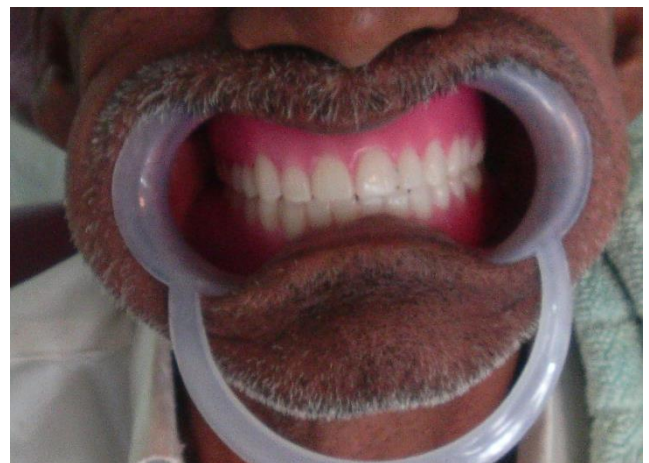


Fig 8 Denture insertion

## DISCUSSION

Complete dentures are primarily mechanical devices, since they function in the oral cavity, they must be designed in harmony with normal neuromuscular function<sup>6</sup>. All oral functions, such as speech, mastication,



swallowing, smiling, and laughing, involve the combined actions of the tongue, lips, cheeks, and floor of the mouth which are very complex and highly individual. Failure to recognize the cardinal importance of tooth position and flange form and contour often results in dentures which are unstable and unsatisfactory, even though they were meticulously planned and constructed<sup>7</sup>. Weinberg designated that the buccal cusp and fossae of the posterior teeth should be directly over the crest of the ridge<sup>8</sup>. Hickey and Zarb stated that the posterior part of the arch form will be determined to a greater extent by the "neutral zone." Watt suggested that the artificial teeth should be placed in the approximate position occupied by the natural teeth<sup>9</sup>.

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:

- (1) Prosthetic teeth do not interfere with normal muscle function; and
- (2) 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<sup>10</sup>.

#### IV. CONCLUSION

Neutral zone is an alternative technique for the construction of complete dentures on highly atrophic ridges. It is especially useful in cases where dental implants are not possible. The aim of the neutral zone is to construct a denture in muscle balance, as muscular control will be the main stabilising and retentive factor during function. The technique is relatively simple but there is increased chair time and laboratory costs.

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