Management of resorbed mandibular ridge using neutral zone concept

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Abstract

The most common problem encountered by the complete denture patients who have severely resorbed mandibular ridge is the stability of the complete denture which poses problem for the patients in mastication which is of great importance in providing nutrition at that particular age. Patients with severely resorbed ridges, find difficulty in using the dentures during functional movements of the jaw. As the denture has to counteract the forces from the muscles of the tongue, cheeks, and lips, it becomes extremely difficult for the patient to use the denture during mandibular movements. In such situations, the rehabilitation of completely edentulous patients with resorbed ridges becomes extremely a difficult situation for a prosthodontist. Rehabilitating the patient in the present concept called the neutral zone becomes extremely important as it enhances the stability of the complete denture prosthesis which enables the patient to use the dentures with ease and comfort.

Keywords:
Neutral zone, resorbed mandibular ridge, stability of the denture, stable zone, zone of minimum conflict

Introduction

The neutral zone is defined as "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."[1] Beresin and Schiesser coined the term neutral zone concept in the year 1976.[2] This zone is also known as the stable zone (Gerber) and the zone of minimal conflict (Mathews 1961).

The article presents a case report of a patient who has resorbed maxillary and mandibular ridge, of which the rehabilitation was done using the neutral zone concept.

Case Report

A 75-year-old male patient reported to the clinic with the chief complaint of loose lower denture and wanted replacement of the same. He has been a denture wearer for 10 years and the present denture was in use for 3 years. On intraoral examination, it was found that the lower arch was severely resorbed [Figure 1]. The patient’s medical history revealed that he was a type 2 diabetic for 25 years which could be the reason for the severe resorption of ridges.

The preliminary impressions of the maxillary and mandibular arch were made on a metal stock tray using impression compound (Pinnacle; DPI). The preliminary casts were poured using dental plaster. Custom trays were made using self-cure acrylic resin (DPI), and the conventional border molding procedure was carried out using low fusing compound followed by secondary impression which was accomplished using non-eugenol zinc oxide impression paste. The impressions were then poured in dental stone.

The record bases were fabricated using cold-cure acrylic resin and were checked for the fit intraorally. Occlusal rims were fabricated and tentative jaw relation was accomplished and the casts were mounted on a mean value articulator. The mandibular occlusal rim which was made using modeling wax was replaced with low fusing compound (Pinnacle-DPI) which was stabilized by three pillars fabricated on the finished surface of the denture base using self-cure acrylic resin [Figure 2].

The low fusing compound was softened in warm water and inserted along with maxillary occlusal rim, and the patient was asked to perform functional movements which help in activation of the muscles of the tongue, cheeks, and lip. By doing this, the low fusing compound will mold accordingly to occupy the area of neutral zone [Figure 3].

The mandibular record base with the low fusing compound is removed and placed in cool water bath. After sometime, the rims were transferred again on to the mounted casts [Figure 4].

An index of the mandibular rim that was recorded using neutral zone technique was secured using putty consistency elastomeric impression material [Figure 5].
Once the putty index sets, the low fusing compound was removed from the denture base and was replaced using modeling wax with the help of the index to enable teeth arrangement.

The putty index is removed once the modeling wax is set completely and the conventional teeth arrangement was carried out, and the dentures were tried in the patient’s mouth [Figure 6].

Once the denture trial was satisfactory, the trial dentures were waxed up, carved, and subjected to acrylization. After the process of acrylization, the dentures were retrieved, trimmed, finished, and polished. During insertion, the dentures were assessed for
stability and retention during functional movements, and finally, the patient’s comfort level with the dentures was assessed.

**Discussion**

There is a specific area within the denture space where the function of the musculature will not unseat the denture, and here, the forces generated by the lips and cheeks are actually neutralized by the forces generated by the tongue.

The buccolingual forces are neutralized by the actions of the tongue, lips, cheeks, and floor of the mouth during a specific oral function. When there is greater ridge resorption, the denture base area becomes small and so, there is less influence of the impression surface which affects the stability and retention of the denture. The tooth position and contour of the polished surface becomes more critical with the decrease in the area of impression surface and increase in the area of polished surface. Where there is greater alveolar ridge resorption, the denture stability and retention are more dependent on correct position of the teeth and contours of external surfaces of the dentures.\[3-5\]

The force of the lower lip and the anterior teeth against the anterior surface of the denture will cause the denture to rise unless the teeth and flange are properly positioned and contoured. When the mouth is closed, the denture may remain stable. However, as the mouth opens, the lower lip is like an elastic band pressing against the anterior flange and teeth. The wider the mouth is opened, the tighter the band becomes. Lammie has shown that as the alveolar ridge resorbs, the ridge crest falls below the origin of the mentalis muscle. As a result, the muscle attachment folds over the alveolar ridge and comes to rest on the superior surface of the ridge crest which will lead to posterior positioning of the neutral zone and so, the lower anterior teeth should also be placed further lingually than had been the position of the natural teeth.\[6\]

The neutral zone in most posterior location is located more buccally than lingually. Razek and Abdalla conducted a study on neutral zone and found that the width of the neutral zone is minimum at the level of the occlusal plane and increases gradually as it goes up and down. The width of the neutral zone is also minimum at the posterior region and increases gradually toward the anterior.\[7,8\]

There is no significant difference in the width of the neutral zone in patients with prominent or flat alveolar ridges. The width of the neutral zone decreases as the vertical dimension of occlusion decreases and vice versa.

**Conclusion**

The coordination of complete dentures with neuromuscular function is the foundation of successful stable dentures. Denture fabricated over a severely resorbed mandibular ridge by neutral zone impression technique will ensure that the muscular forces aid in retention and stabilization of the denture rather than dislodging the denture during function. Better speech performance, reduced food lodgement, sufficient tongue space, and comfort for the patient also can be ensured with such neutral zone dentures as their external surfaces are functionally contoured.

**References**
