

Case Report

Prosthetic Rehabilitation of Atrophic Mandible with Neutral Zone Technique - A Case Report

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Abstract: One of the most commonly faced problems among long term denture wearers is reduction in the denture foundation. Prosthetic Rehabilitation of a patient with severely resorbed ridge is the most challenging therapy a prosthodontist to undertake. One of the methods used to solve this problem is the neutral zone technique. The neutral zone is the area where the displacing forces of the lips, cheeks, and tongue are in balance. It is in this zone that the natural dentitions lie and this is where the artificial teeth should be positioned. This area of minimal conflict may be located by using the neutral zone technique. This article presents the application of neutral zone (NZ) concept being incorporated to achieve successful complete denture therapy.

Keywords: Neutral zone, Atrophic mandible, Stability

INTRODUCTION

The goal of dentistry is for patients to keep all of their teeth throughout their lives in health and comfort. If the teeth are lost despite all efforts to save them, a reestablishment should be made in such a manner as to function efficiently and comfortably in harmony with stomatognathic system and temporomandibular joints. All oral functions, such as speech, mastication, swallowing, smiling, and laughing, involve the synergistic actions of the tongue, lips, cheeks, and floor of the mouth which are very complex and highly individual. The coordination of complete dentures with the neuromuscular function is the foundation of successful, stable dentures[1]. When all of the natural teeth have been lost, there exists within the oral cavity a void which is the potential denture space. The neutral zone 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[2]. This is particularly true for patients with reduced mandibular residual ridges, yielding flat or concave foundations due to severe bone resorption. The unstable lower complete denture is a continuing problem for our profession[3,4].

Various theories have been put forward to enhance stability of mandibular denture. Majority of literature support that posterior denture teeth should be arranged to occupy the position of their natural tooth predecessors[5,6]. Weinberg suggested that buccal cusps and central fossae of mandibular posterior denture teeth should be arranged directly over the crest of the edentulous residual ridge[7].

Pound recommended that the lingual surfaces of mandibular posterior denture teeth should occupy an area bounded by two lines originating from the mesial surface of the mandibular canine and extending posteriorly to the lingual and buccal aspects of the retromolar pad[8,9].

Wright *et al*[10] believed that posterior mandibular denture teeth should be arranged directly over the centre of the denture stress-bearing area. This location may not correlate with the crest of the edentulous ridge, particularly in the presence of severe ridge atrophy.

Dental implants placed with neutral zone technique are also a treatment option to stabilize the denture fabricated over atrophic mandibular ridge. However, there may be certain medical, surgical or economical conditions when it is not possible for placement of implants. In such complex cases the neutral zone impression technique is the only option left for the stabilization of the complete denture [11].

This present article describes the fabrication of a complete denture using neutral zone impression technique for enhanced stability and masticatory efficiency.

CASE REPORT

A 65-year old male patient visited the outpatient department of Narayana Dental College and Hospital, Narayana Dental College and Hospital, Nellore, Andhra Pradesh, with the chief complaint of worn out old dentures and difficulty to chew food. The dentures were 25 years old. Denture examination revealed that the teeth were completely attired with ill-fitting denture bases were. Intraoral examination revealed within favourable maxillary arch and highly resorbed mandibular completely edentulous arches and decreased vertical dimension.

1. Primary and secondary impressions were made with alginate and zinc oxide eugenol respectively. The obtained impressions were poured with dental stone.
2. Master casts were obtained on which denture bases were fabricated using self-cure acrylic resin (DPI) and maxillary occlusal rim was fabricated using modelling wax (HDP).
3. After the orientation jaw relation the lower occlusal rim was inserted into the patients' mouth which was made up of impression compound and low fusing compound [Fig-1].
4. Patient was asked to perform a series of actions like swallowing, speaking, sucking, pursing lips, pronouncing vowels sipping water and slightly protruding the tongue several times which simulated physiological functioning.
5. During function of the lips, cheeks, and the tongue exerts forces on the soft compound which molds it into the shape of the neutral zone. This is repeated several times till the compound material become firm then the record base with the compound rim is removed and placed in cool water bath.
6. Then jaw relations are recorded in a conventional manner [Fig-2].



Fig-1: Occlusal rim made with impression



Fig-2: Jaw relation recorded compound and low fusing compound

7. The neutral zone impression so obtained was placed on the master model, indexing was made on the master cast and was covered with a silicone putty index [Fig-3] around the impression on both the labial and lingual sides.
8. Teeth arrangement was done exactly following the index. The position of the teeth was checked by placing the index together around the wax try-in.
9. Once the waxed up trial dentures were ready, they were checked in the patients mouth for aesthetics, phonetics and occlusion. Once the try-in was deemed satisfactory the dentures were processed and finished.
10. Care was taken during finishing and polishing of the dentures so that the contours recorded previously are unaltered. During insertion [Fig-4] the dentures were fully checked to eliminate any minor errors.
11. The dentures provided the patient with improved facial appearance, stability and retention during function — as they have been constructed in harmony with their surrounding structures.



Fig-3: Silicone putty index



Fig-4: Denture insertion

DISCUSSION

Rehabilitation of edentulous mouth with conventional complete denture always may not yield satisfactory outcome in dentist as well as patient's biologic stand point. In cases with severely resorbed ridges, problem arises in attaining stability for the denture, especially with mandibular one[12]. There will be increased inter-ridge distance in these cases, which eventually causes shift in the occlusal plane away from the residual ridge making unstable denture. For these instances setting the teeth in neutral zone is crucial, as occlusal plane is the one which determines stability.

Along with this, buccal contours of the teeth influence the muscular forces acting on the denture there by lifting the denture. So fabrication of the prosthesis within the confinements of oral musculature is a challenging task. Even though problems exist in functional jaw positioning in highly resorbed ridges, with the above technique we can easily attain the position with help of which teeth can be set.

CONCLUSION

The neutral-zone philosophy is based upon the concept that 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. Positioning artificial teeth in the neutral zone achieves two objectives. First, the teeth will not interfere with the normal muscle function, and second, the forces exerted by the musculature against the dentures are more favourable for stability and retention.

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