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CASE REPORT

PROSTHODONTIC REHABILITATION OF A SEVERELY RESORBED MANDIBULAR RIDGE USING NEUTRAL ZONE TECHNIQUE: A CASE REPORT

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ABSTRACT:
An unstable lower complete denture is one of the most common problems faced by edentulous patients. Rehabilitation of a patient with severely resorbed mandibular ridge is a challenge to the prosthodontist. The neutral zone is the area in the oral cavity where during function, the forces of the tongue pressing outward are neutralized by the forces of the cheeks and lips pressing inward. The technique of neutral zone is to construct a denture that is shaped by muscle function and is in harmony with the surrounding oral structures. This clinical report describes rehabilitation of a patient with severely resorbed mandibular ridge using neutral zone impression technique.
Key words: Neutral zone, resorbed mandibular ridge, denture stability

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INTRODUCTION

The coordination of complete dentures with the neuromuscular function is the foundation of successful, stable dentures.[1] Incorrect placement of the teeth and arbitrary shaping of the external or polished surfaces of the denture may have an adverse effect on the stability of the prosthesis. Sir Wilfred Fish in 1931, first described the influence of the polished surfaces on retention and stability.[2] 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.[3]

Weinberg[4] stated that buccal cusps and fossae of the posterior teeth should be placed directly over the crest of the edentulous ridges. Campbell[5] stated that mandibular posterior denture teeth should be arranged slightly lingual to the crest of the edentulous ridge and the maxillary posterior denture teeth arranged slightly buccal to the edentulous ridge. Robinson[6], Payne[7] and Murray[8] are of the opinion that artificial teeth should be arranged to occupy the position of their natural tooth predecessors.

Beresin and Schiesser[9] suggested that the artificial teeth should be placed in the neutral zone area, where during function the forces exerted by the tongue pressing outward are neutralized by the forces of cheek and lips. In a clinical study, Fahmy and Kharat[10] evaluated patients satisfaction for complete dentures made with either a conventional or a neutral zone technique. Subjects reported greater comfort and improved speech clarity with the dentures fabricated using the neutral zone technique compared with their conventional prepared dentures.

This article presents a case of rehabilitation of a severely resorbed mandibular ridge using neutral zone impression technique.

CASE REPORT

A 55 year old female patient reported to the Department of Prosthodontics, Government Dental College, Trivandrum with a chief complaint of difficulty in mastication due to loose-fitting lower denture. After a thorough clinical examination of the patient, evaluation of her previous dentures was done. The lower denture was found to be unstable and was not retentive. The mandibular ridge was highly resorbed (Figure1). It was decided to fabricate a new set of complete dentures using neutral zone technique in the severely resorbed mandibular arch.

PROCEDURE

1) Primary impressions were made using impression compound in stock trays. Impressions were retrieved and poured in plaster.
2) Custom trays were fabricated and the border molding was performed using low fusing impression compound to record the functional depth and width of the sulcus. Final wash impression was made using zinc oxide eugenol impression paste and master casts were poured in dental stone. The master casts were duplicated.
3) Stainless steel orthodontic wires were bent and incorporated into the wax up for mandibular permanent denture base for future retentive purposes (Figure 2). Wires were blocked out using putty impression material during investing procedure for easy removal while deflasking (Figure 3). Finishing and polishing of the permanent denture base was done (Figure 4).
4) Wax bite rims were fabricated and jaw relation of the patient was recorded. Two acrylic pillars were constructed on either sides of the lower wax occlusal rim after removing the wax from the respective areas (Figure 5).
5) Maxillary wax occlusal rim was placed into the patient's mouth. Mandibular denture base was inserted into patient's mouth after removing wax. Maxillo-mandibular relation was reanalyzed (Figure 6).
6) Softened impression compound and green stick in the ratio of 3:7 was mixed as per McCord's technique (Figure 7). It was loaded onto the lower acrylic denture base. Impression compound mixture on the lower acrylic denture base was reheated in a water bath and carried into the patient's mouth (Figure 8).
7) With the record base firmly seated in the oral cavity, the patient was asked to perform a series of actions like speaking, sucking, swallowing, pursing lips, sipping water, pronouncing vowels, and slightly protruding the tongue several times. The retentive loops provided retention for the impression compound and acrylic pillars maintained the vertical dimension during the procedure. After 5- 10 minutes, the set impression was removed from the mouth, placed in cold water and examined (Figure 9).
8) The neutral zone impression so obtained was placed on the master model. Both the upper wax occlusal rim and lower impression were then replaced on the articulator to evaluate the vertical dimension.
9) Index was made around the molded impression compound rims using die stone and sectioned.
10) The molded impression compound rims were removed and the index was replaced (Figure 10). Wax was then poured into this space which gave an exact representation of the neutral zone (Figure11).
11) The new wax rims were then placed on the articulator and teeth arrangement was done exactly within the index boundaries. The position of the teeth after arrangement was verified by placing the index (Figure 12).
12) The trial dentures were checked in the patient's mouth for aesthetics, phonetics and occlusion. The trial dentures were then processed and finished.
13) As the denture was constructed in harmony with the surrounding musculature, the patient was satisfied with its improved stability and retention (Figure 13).

Figure 1: Intra oral view of severely resorbed mandibular ridge.

Figure 2: Stainless steel orthodontic wires bent and incorporated into the wax up.

Figure 3: Wires blocked out using putty impression material.

Figure 4: Mandibular permanent denture base.

Figure 5: Acrylic pillars incorporated into the wax bite rims.

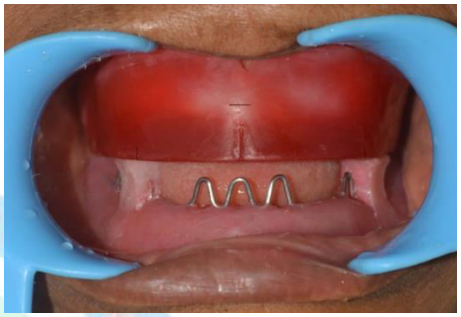

Figure 6: Maxillo-mandibular relation reanalyzed.

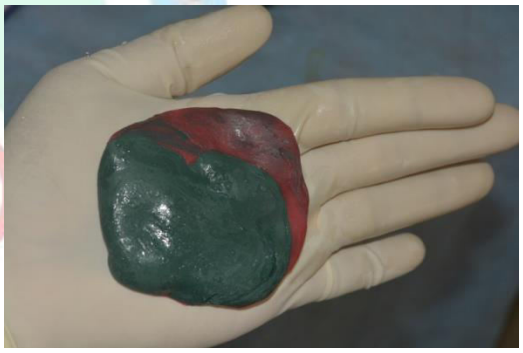

Figure 7: Mixture of softened impression compound and green stick in the ratio 3:7.

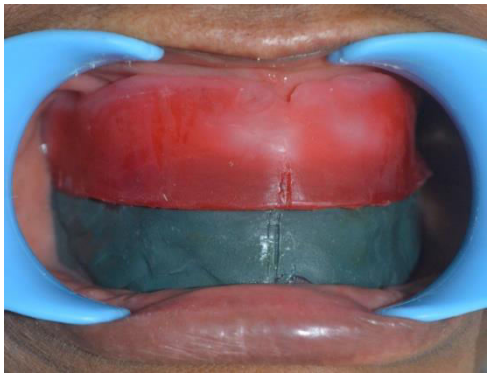

Figure 8: Lower denture base inserted for functional molding**.**

Figure 9: Molded impression on lower permanent denture base.

Figure 10: Molded impression material removed and index placed.

Figure 11: Wax poured into the index area.

Figure 12: Position of teeth analyzed with the help of index.

Figure 13: Patient wearing the complete denture.

DISCUSSION

The two important objectives achieved by arranging the artificial teeth in the neutral zone are: (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 causing denture displacement.[11] In advanced resorption, the maxillary ridge moves lingually and mandibular ridge moves buccally.[12] The fabrication of the denture must be in harmony with the normal physiologic movements during functions such as speech, mastication, swallowing, smiling, and laughing.

Conventional methods used for denture fabrication results in external contours that may not facilitate prosthesis stability against oral and perioral muscle function. Denture fabricated over a severely resorbed mandibular ridge by neutral zone impression technique will ensure that the muscular forces aid in the retention and stabilization of the denture rather than dislodging the denture during function.[13] The other advantages are reduced food lodgement, good esthetics due to facial support and proper positioning of the posterior teeth which allows sufficient tongue space.[14] It is also a treatment of choice in patients affected by decreased facial muscle tonicity[13], partial glossectomy cases[15], mandibular resections or motor nerve damage to the tongue which have led to neuromuscular decline or gross dysfunction due to unfavourable denture bearing area.

CONCLUSION

Regardless of the treatment methods, a dentition out of harmony with the neutral zone will result in instability, functional interferences or discomfort to the patient. When medical or economical conditions are not favourable for the placement of implants in

atrophic mandible, neutral zone technique can be used for the stabilization of dentures. The neutral zone technique results in a denture that is more physiologically acceptable to the patient.

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