



Research Paper

Fabrication of Complete Dentures For A Patient with Resorbed Ridge Using Neutral Zone Technique

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ABSTRACT: The dentistry has always given importance to vertical forces and has ignored the importance of the horizontal forces exerted on the polished or external surface of the denture. Masticatory function requires a unique coordination with muscles and oral structures. If the denture is placed in a zone where the displacing forces of tongue, lips, cheeks and modulus are balanced, then the denture will be retained more effectively during function. This zone is known as neutral zone. If the denture stays outside / inside the neutral zone it will be unstable during the activities such as talking, swallowing and mastication.

Keywords: Instability, Atrophic Ridge, Muscle Function, Neutral Zone

I. INTRODUCTION

Restoration of the patient to normal function, contour, esthetics, speech and health is the primary objective of any prosthodonticservice¹. It is difficult to achieve optimum denture stability in conventional complete dentures. This problem is more magnified in mandibular dentures. The design of prostheses to replace lost teeth and resorbed ridges is largely determined by the position and amount of morphological changes in the denture bearing area of the jaws². These changes dictate artificial tooth positions in complete denture patients. As the area of the impression surface decreases (due to alveolar ridge resorption) denture retention and stability also decreases, consequently retention and stability becomes more dependent on correct positioning of the teeth and the contours of the external or polished surface of the dentures. Therefore these surfaces should be so contoured that horizontally directed forces applied by the peridonture muscles should act to seat the denture in well balanced muscular space known as neutral zone. Sir Wilfred Fish of England described neutral zone concept in 1931. The neutral zone is defined as the potential space between the lips and cheeks on one side and the tongue on other, that area where forces between the tongue and cheeks or lips are equal.

As implant supported denture is best treatment for such patients and dental implant stabilizes the denture fabricated over atrophic mandibular ridge. However, there may be certain medical, surgical or economic conditions when it is not possible to provide implants. In such complex cases the neutral zone impression technique is the only option left for the stabilization of the complete denture. It is not only a treatment of choice in atrophic mandible. Neutral Zone advocated as an alternative method of complete denture construction in poorly resorbed ridge² The neutral zone technique is not new but is one that is valuable and yet not often practiced. This present article describes the fabrication of a complete denture using neutral zone impression technique for enhanced stability and masticatory efficiency. In addition to simply replacing missing oral tissues, complete dentures serve to structurally redefine true spaces and potential spaces within the oral cavity. Regardless of the fabrication technique used, functionally inappropriate denture tooth arrangement or physiologically unacceptable denture base volume or contour have been implicated in poor prosthesis stability and retention³ compromised phonetics,^{4,5} inadequate facial tissue support,⁶ inefficient tongue posture and function⁷ and hyperactive gagging^{8,9}.

II. CASE REPORT

A 68 years old male patient reported to the OPD of Dr Z A Dental College amu Aligarh with the chief complaint of loose mandibular denture. Patient had been edentulous for the past 10 years. Patient had two sets of complete dentures which were made earlier and with both the dentures patient had the problem of instability of mandibular denture. Intra oral examination revealed completely edentulous maxillary and mandibular arch,

extremely strong mentalis and buccinator muscle which on activation led to narrowing of labial and buccal sulcus.

The mandibular ridge was in order IV, muscle attachments were higher and close to the residual ridge [Fig1]. Critical examination of previous denture showed the posterior teeth were positioned lateral to the crest of the ridge. The mandibular occlusal plane was also higher further adding to instability of mandibular denture. It was therefore decided to use neutral zone impression technique to determine the optimum position of teeth and contour the polished surfaces of denture in harmony with the surrounding musculature.

Preliminary And Secondary Impressions: The preliminary impressions were made in stock tray with a mucocompressive material (impression compound). The secondary impression was made in special tray with low viscosity mucostatic zinc oxide eugenol material. [Fig.3]

Jaw Relation: The occlusal rims were made on heat cured acrylic record denture bases for increased stability. The permanent record base was assessed for extension, comfort and stability (Fig.4). The mandibular occlusal rim was shaped properly to provide good support for the musculature labially and buccally [Fig.5]. Orientation, centric relations were recorded.

Neutral zone impression: Before making the neutral zone impression, the patient was made comfortable in an upright position with the head unsupported. Maxillary wax rim was inserted in the mouth and reassessed for support & occlusal plane. The impression compound and green stick in ratio 3:7 (DPI) was softened in a 65°C water bath. The softened compound was kneaded and a roll was formed according to the crest and was adapted to retentive loop at established vertical dimension. The attached roll of compound was reheated in the water bath and was carried into the patient's mouth. With the record base firmly seated, the 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. These actions molded the material by muscle activity. After 10 mins, the set impression was removed from the mouth [Fig6]. The neutral zone impression so obtained was placed on the master model, locating grooves were cut on the master cast and was covered with a silicone putty index around the impression on both the labial and lingual sides [Fig.7&8].

The compound occlusal rim was then removed from the base and the index is replaced. The index would have preserved the space of the neutral zone. Teeth arrangement was done exactly following the index [Fig.9]. The position of the teeth was checked by placing the index together around the wax try in.

Completion of Denture: The waxed up dentures were placed in the mouth and patient was asked to repeat all the movements previously mentioned. The denture was stable after all the movements, Aesthetics, phonetics and occlusion were assessed. The dentures were then processed as a conventional denture. Finishing and polishing of denture was done carefully so that the contour of the polished surfaces remained unaltered. On insertion of denture, minor occlusal discrepancies were corrected [Fig.10]. Dentures provided enhance the appearance, retention and stability during function because they are in harmony with their surrounding musculatures [Fig 11].

III. DISCUSSION

The ultimate goal of prosthodontic treatment is to restore the function, form, and aesthetics of the patient. Fish pointed out that there are three surfaces of the denture, the polished surface is bounded by the tongue and the cheeks⁴. Dentures are involved in normal physiologic movements such as mastication, smiling, swallowing, speech, and swallowing. Hence, the denture should be in harmony with these functions because physiologically unacceptable denture is responsible for poor prosthesis stability and retention, insufficient facial tissue support, less tongue space and compromised phonetics.⁵⁻⁷. 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^{8,9}. The dentures will also have other advantages such as reduced food lodgement, good esthetics due to facial support, proper positioning of the posterior teeth which allows sufficient tongue space¹⁰. Clinicians must identify and record the neuromuscular dynamics of the oral tissues and this should be applied in the construction of the definitive prosthesis that will exist within the stabilizing boundary conditions of the neutral zone area.

IV. CONCLUSION

With advancement in dental material science and development of newer techniques in prosthodontics, the neutral zone impression technique may be incorporated into fabrication of any complete denture. Though this is indicated for patients with severe residual ridge resorption, the procedures discussed can also be used for full mouth rehabilitation of edentulous patients with dental implants. Dental profession has always been

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concerned with equalizing the vertical forces that are delivered to the occlusal surfaces of the teeth horizontal forces on the external surface have been ignored.

The neutral zone is an alternative technique for the construction of lower complete dentures on highly atrophic ridges. It is especially useful in cases where dental implants are not possible and the copy technique would be inappropriate. "It gives less consideration to the leverage involved in tooth ridge relation while it places greater emphasis on buccinator around the denture. Both factors must be recognized and considered if maximum success is to be achieved."

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Fig .1 intra oral view



Fig 2: Primary maxillary and mandibular primary casts



Fig 3: Denture bases



Fig 4: Record base prepared of low fusing compound



Fig 5: Intraoral photograph



Fig 6: Intraoral photograph low fusing compound occlusal rims



Fig 7: Impression obtained



Fig 8: Orientation Grooves And Silicone Putty Indexing



Fig 9: Arranging the teeth in accordance with the putty index



Fig 10: Denture Occlusion



Fig 11: Post denture insertion

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