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Case Report

REDEEMING THE RESORBED RIDGES WITH NEUTRAL ZONE CONCEPT- A CASE REPORT

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ABSTRACT

Rational goals for denture construction are basically directed at the restoration of esthetics and masticatory function and the healthy preservation of the remaining natural tissues. Long term denture wearers often pose a problem due to lack of stability of their mandibular complete dentures because of excessive resorption of lower edentulous ridge. Therefore, it becomes the duty of a prosthodontist to rehabilitate those patients to near normal function, irrespective of the clinical difficulties. This article presents two neutral zone techniques, to overcome the problem of instability of lower dentures which may be caused by excessive forces from tongue and cheeks or due to altered neuromuscular control.

Keywords: Neutral Zone, Resorbed edentulous ridge, Low fusing compound.

INTRODUCTION

Achieving stability in lower complete denture is recognized as a most difficult treatment objective in patients who have highly resorbed lower edentulous ridges. These patients frequently complain about the looseness and discomfort caused by their mandibular complete dentures which is a difficult task for a prosthodontist to manage it.

Complete dentures are primarily mechanical devices but since they function in the oral cavity, they must be fashioned so that they are in harmony with the normal neuromuscular function. 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 various causes of unstable dentures are¹:

Incorrect extensions of buccal or lingual flanges.

Poorly adapted fitting surfaces. Atrophic mandibular ridge.

Inappropriately contoured polished surface.

Poor neuromuscular control of the patient.

Size and position of prosthetic teeth²

Destabilizing forces from the tongue, lips and cheeks

Many concepts and theories emerged to describe where prosthetic teeth of complete denture should be positioned, but the concept that survived above all the concepts was – The

Neutral Zone Concept. Sir Wilfred Fish first described the influence of the polished surfaces on retention and stability in 1931³. He also described how dentures should be constructed in the 'dead space', which later became known as the neutral zone⁴. The neutral zone refers to that space in the oral cavity where the forces exerted by the musculature of the tongue are equal and balanced with the forces exerted by the buccinator muscle of the cheek laterally and the orbicularis oris muscle anteriorly. 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 skill-fully designed and expertly constructed.

Though, dental implants placed with neutral zone technique can stabilize the denture fabricated over atrophic mandibular ridge, but, there may be certain medical, surgical or economical conditions when it is not possible to provide implants.

Resorption of mandibular ridge occurs from the lingual plate allowing for more space for tongue movement leading to tongue enlargement over the years. On the contrary the cheek and lip muscles lose their tonicity with the advancing age. This results in a shift of the neutral zone more towards the buccal and labial sides. Accurate recording of this zone and

arranging the teeth in this zone is very important in increasing the denture stability.

Therefore, the two case reports discussed here demonstrate accurate recording of the zone for arranging monoplane teeth for attaining maximum stability of the complete denture.

CASE REPORT 1

A seventy six year old female patient reported to the Department of Prosthodontics, with the chief complaint of difficulty in chewing food due to loss of teeth. The patient had been edentulous for past five years and had never experienced complete denture prosthesis.

Intra Oral Examination:

Clinical evaluation revealed resorbed maxillary ridge and flat (atrophic) mandibular ridge Atwood Order V and an increased interarch space (Fig.1).



Figure 1: Intra-oral view



Figure 2: Border molding and final wash impression

Clinical Procedure II: Jaw Relations and Neutral Zone Record

- Record bases were made with self cure acrylic, occlusion rims were fabricated using model wax and conventional jaw relations were carried out. Bite blocks were then mounted on three pin articulator.
- The mandibular wax occlusion rim was removed and a superstructure consisting of retentive wire loops were attached to the record base from premolar to premolar

region, with two acrylic pillars in molar region to maintain vertical dimension. (Fig.3a)

- A high viscous mix of Viscogel (Dentsply, Weybridge, UK), which is a tissue conditioner, was used for recording the neutral zone. The mix was placed along the base plate and superstructure. The material is mixed so that it can be manipulated by hand and positioned as an approximate rim on the lower base plate (Fig.3b).

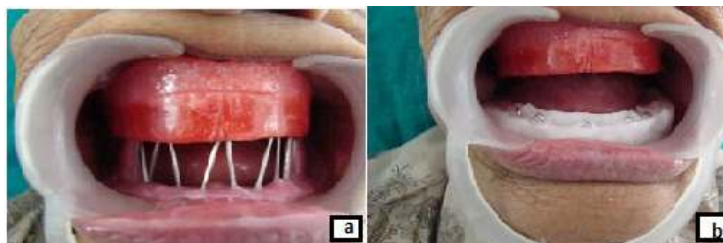


Figure 3: a) Retentive wire loops with acrylic pillars on record base
b) Tissue conditioner positioned on record base and molded

- d) The record bases were then rotated into the patient's mouth and patient are asked to perform a series of actions such as: smile, grin, pout/purse lips, count from sixty to seventy, pronounce the vowels, sip water, swallow, slightly protrude the tongue and lick the lips. These actions are repeated for 10 minutes until material had set.

Laboratory Procedure I:

- The neutral zone impression record was placed back on the articulator on the master model
- Locating grooves were cut on the master model and a silicone putty index was prepared around the impression.
- The Viscogel impression is then removed from the base plate and the index replaced. The index will have

preserved the space of the neutral zone. Wax can then be poured into the space giving an exact representation of the neutral zone. Teeth can then be set up exactly following the index. During the setting up of the teeth their position can be checked by putting the index together around the wax try-in. (Fig.4a)

Clinical Procedure III: Denture Delivery

Once the wax try-ins are deemed satisfactory the dentures may be processed and finished. The denture provided the patient with improved facial appearance, stability and retention during function — as they have been constructed in harmony with their surroundings (Fig.4b).



Figure 4: a) Teeth set-up within the putty index.
b) Denture insertion.

CASE REPORT 2

A seventy year old female patient reported to the Department of Prosthodontics, with the chief complaint of loose lower dentures. Intra Oral Examination revealed adequate maxillary ridge height but resorbed mandibular ridge (Fig.5).



Figure 5: Intra oral view

Preliminary Impressions: The preliminary impressions of the maxillary and mandibular arches were made with irreversible hydrocolloid (Zelgan, Dentsply India Pvt. Ltd.)

Secondary Impressions and Jaw Relations:

- The primary casts were obtained over which special trays were fabricated using auto-polymerizing resin (DPI Dental products, India) keeping them 2mm short of the sulcus.
- Border molding for maxillary ridge was done using low fusing impression compound and wash impression was made with zinc oxide eugenol impression paste.
- In case of mandibular ridge, one step border molding for maxillary arch was carried out using heavy body polyether impression material (Impregnum™ Penta Soft

Heavy Body, 3M ESPE) and the definitive impression was made using fast setting light body polyether impression material (Impregnum™ Penta Soft Light Body, 3M ESPE).

- Master casts were constructed and maxillary and mandibular occlusal rims were fabricated on acrylic record bases, followed by jaw relation procedures in conventional manner.

Laboratory phase I:

- The lower occlusal rim is removed from record base and substituted with a base plate with acrylic pillars in premolar and anterior region with wire loops to retain the impression material on the record base.
- The acrylic pillars preserved the VDO during neutral zone recording procedure.

Recording neutral zone:

- The impression compound and green stick compound were mixed in 3:1 ratio in a 65°C water bath to modify the viscous property, the softened compound was kneaded and a rope was formed, which was then attached to the base. The attached roll of compound was reheated in the water bath and was carried into the patient's mouth (Fig.6a).
- With the recording 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 tongue several times which simulated physiological functioning (Fig.6b).
- After a few minutes when the compound has cooled, the record base with the compound rims removed and placed in cool water bath.

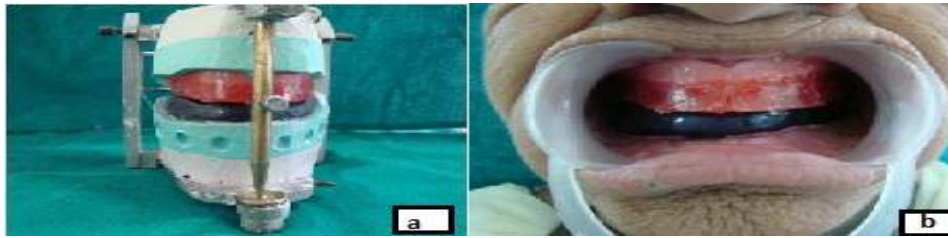


Figure 6: a) Softened compound placed over the retentive loops
b) Functional molding in mouth

Laboratory phase II:

- a) The neutral zone impression so obtained was placed on master model, location grooves were cut on the master cast and was covered with a plaster index around the impression on both the labial and lingual sides (Fig.7a)
- b) The compound occlusal rim was then removed from the base plate and the index was again and space between the indices was filled with modelling wax.

- c) The teeth were arranged exactly following the putty index (Fig.7b).

Denture Trial:

The waxed up dentures were checked in the patient’s mouth for esthetics, phonetics and occlusion .Once the try in was deemed satisfactory, the dentures were processed and finished (Fig.8).



Figure 7: a) Plaster index fabricated b) Teeth set up within plaster index.



Figure 8: Denture delivery

CONCLUSION

Neutral zone concept is an important treatment options for patients complaining of unstable lower complete denture and if implant treatment is not feasible either due to medical reasons or due to economic reasons. 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 are increased chair times.

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