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Complete Denture Fabrication Using Neutral Zone Technique- A Case Report

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ABSTRACT

The complete denture with neutral zone is not a brand new concept. The difficulty encountered with complete denture patients is the resorption of ridges over time and hence compromised retention. The neutral zone concept aims to the construct complete denture utilising oral structures, when in function and to utilize the space available between these oral structures. This article gives an overview about neutral zone concept and the challenges that are faced by the prosthodontist, when the patient has severely resorbed ridge.

Keywords: Complete dentures, Neutral Zone, Impression Technique, Stability

INTRODUCTION

The major goals of providing complete denture prosthesis to an edentulous patient include the provision of functionally aesthetic substitutes and the replacement of associated structures within the oral cavity.[1] The complete dentures should use the spaces available and redefine the retention. When it is achieved, the complete denture prosthesis occupies substantial volume in the oral cavity. In edentulous patients, ridge resorption continues with advancing age. The greater the ridge resorption, the smaller the denture base area, that leads to reduced stability and retention of the denture. To overcome this problem, dentures are fabricated with their contours harmonizing neutral zone. [2] According to GPT- 9, "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." [3]

Many materials have been suggested for shaping the neutral zone namely modelling plastic impression compound, [2,4] soft wax, [5] impression plaster, [6] a polymer of dimethyl siloxane filled with calcium silicate, [7] silicone, [8] tissue conditioners and resilient lining materials. [9,10]Many techniques have also been suggested using the materials in conjunction with movements including sucking and pursing the lips along with phonetics & swallowing. [11]

CASE REPORT

A 56-year-old female patient reported with complete edentulous maxillary and mandibular arches.Patient was denture wearer since 5 years & presented with complain of ill-fitting lower denture. On clinical examination it was found that maxillary and mandibular arches were severely resorbed (Fig.1).

Figure 1- Pre operative intra oral view

The diagnostic impression of the arches were made with the help of impression compound and cast poured with plaster of Paris. On the diagnostic cast custom tray was constructed by autopolymerising acrylic resin material and border moulding was done using low fusing green stick compound. Secondary impression were made on custom trays with zinc oxide eugenol impression material. While making secondary impression the patient was asked to do all the functional movements. This impression was poured in Type-III Gypsum Product (Dental Stone).

Figure 2 Face bow transfer

Figure 3- Jaw relation recorded

The record bases were fabricated with modelling wax and face bow transfer was done (Fig 2) and tentative jaw relation was recorded with the help of lower denture base having autopolymerising acrylic resin stops in the molar region, which helped in maintaining the vertical jaw relation (Fig 3). With the help of impression material (Green Impression Compound; Kerr Corp) neutral zone was recorded. The impression material was softened in a 65°C water hot bath; the softened compound was kneaded and placed as roll on the special tray with the help of acrylic stops on the tray to stabilise impression material. This impression material was reheated and placed in patient's mouth.The patient was made to carry out all functional and physiological movements like swallowing, sucking, pursing lips, sipping water, pronouncing vowels and protruding tongue several times.

Universal tray adhesive was applied on the surface of the temporary denture base. After that Condensation silicone (Poly-Dimethyl Siloxane) putty impression material was adapted around the modified denture base at established vertical dimension &was moulded according to the muscle action in neutral zone by asking the patient to do actions like swallowing & saying words like "tic", "tac" "toe".The neutral zone recorded lower rim was placed in the articulator and vertical verified. (Fig 4)

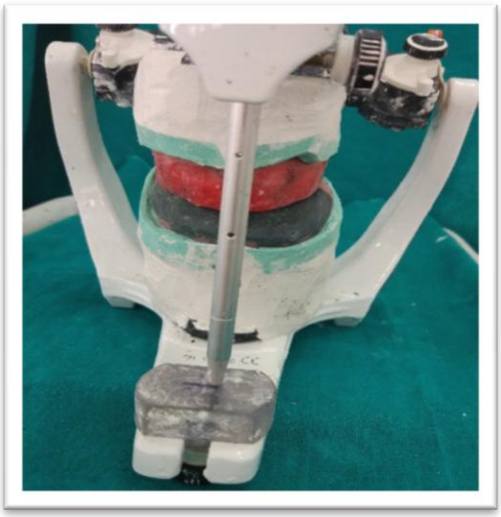

Figure 4- Recorded jaw relation

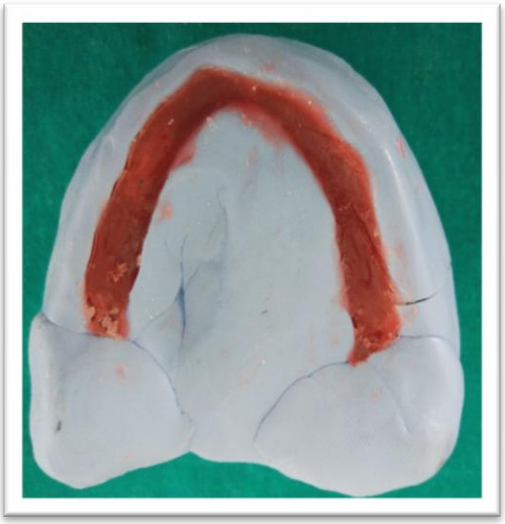

Figure 5- Neutral zone index used to formulate wax occlusal rim

The neutral zone was preserved using the index and molten modelling wax was made to flow into the space created between the index that will take the shape of the moulded occlusal rim in neutral zone. (Fig 5). After that teeth arrangement was done and the position of the teeth was verified by placing the index around the wax try-in (Fig 6 &7). Once the waxed up dentures were ready, they were checked in the patient's mouth for aesthetics, phonetics

and occlusion. Once the try in was deemed satisfactory, the dentures were acrylised following all the lab procedures and delivered to the patient (Fig 8).

Figure 6- Completed teeth arrangement

Figure 7- verification of the teeth arrangement using the index

Figure 8: Post- operative view

DISCUSSION

The main goal of prosthodontic treatment is to restore the function and aesthetics. Complete denture is influenced by not only the ridge but also by the surrounding oral cavity, occlusion, biting forces and many other factors.[12] Fish and other researchers emphasized on the concept of neutral zone that it is the zone of equilibrium in which the outward forces exerted by tongue counterbalances the inward forces of lips and cheeks in complete denture construction.[13] Fish pointed that out of the three surfaces of the denture the polished surface is bounded by the tongue and the cheeks. These are involved in normal physiologic movements such as speech, mastication, swallowing, smiling, and laughing.

Complete denture must be fabricated with function because physiologically unacceptable denture will have poor prosthesis stability and retention, insufficient tissue support and compromised phonetics.[12] Wright and associates pointed out that the border seal area for the mandibular denture extends downward tothe floor of the mouth and posteriorly into the lateral throat form.[14] Rinaldi and Sharry refer to a study that indicated that the tongues of aged

persons showed no atrophic tendencies, which is not true of other tissues. It is advantageous to record the positions of the tongue during sucking, swallowing, and movement. [15] A thorough understanding of the anatomy and physiology of the oral structures can aid the Clinicians to achieve complete dentures that are without any discomfort and do not require additional clinical sittings to obtain neutral zone that impact prosthesis stability.

CONCLUSION

The neutral zone for complete dentures utilizes the associated and adjacent oral tissues, as an advantage to stabilize the dentures. It greatly enhances the retention and stability of dentures. When implant overdenture therapy is not a treatment option due to several factors like age, economical reasons etc., the neutral zone technique provides a good alternative. Using the modern techniques that are being developed like 3D impressions, Intra oral scanning andCAD/CAM, the limitations of neutral zone technique can be overcome. This will help in improving denture stability and will provide more comfort to the patient. This technique can be used in management of severely resorbed ridges in day to day practice.

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