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CASE REPORT ARTICLE

Management of Severely Resorbed Mandibular Ridge Using Neutral Zone Technique :A Case Report

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Abstract

Residual ridge resorption leads to a compromise in denture stability and retention. A neutral zone approach can be used to enhance denture retention and stability using all the oral muscular forces in balance to enhance the quality of life in such patients. This case report describes the use of the cocktail impression technique for resorbed ridges along with the neutral zone approach to increase denture stability and retention.

Keywords: Cocktail impression technique, Denture stability, Neutral zone, Resorbed ridges.

Introduction

The surrounding neuromuscular system in the oral cavity affects the stability of complete dentures. The cornerstone of successful, stable dentures is the synchronization of the complete dentures with neuromuscular function.[1]

The neutral-zone technique for the fabrication of a complete denture is not a new or unique approach but is the synthesis of many men's beliefs and ideas into a feasible and effective technique.[2] Loss of the natural teeth in the oral cavity leads to the potential denture space. A neutral zone, also known as a zone of minimal conflict, is the potential space where the inward forces of the lips, cheeks are balanced by the outward forces of the tongue.[3]

This case report entails the use of the neutral zone technique along with the cocktail impression technique for the management of severely resorbed ridges.

Case Report

A 60- year old male patient reported to the Department of Prosthodontics with the chief complaint of inability to eat food due to the missing teeth in the upper and lower arch from the past 10 years. The patient also had a history of the previous loose lower denture. Intraoral examination revealed a low- well rounded mandibular ridge making it difficult for the fabrication of a stable denture. The tongue was enlarged due to the long span of edentulism.

Treatment Plan

The various treatment alternatives were addressed after a comprehensive examination of the patient's history and current clinical circumstances. Pre-prosthetic procedures followed by conventional complete denture prosthesis, implant-supported prosthesis, and conventional complete denture prosthesis were the various treatment choices. The patient chose the conventional complete denture as the treatment option.

On the first clinical visit, the primary impression of the maxillary and the mandibular ridge was made **(Figure 1A)**. Impressions were poured using dental plaster to obtain the primary casts. Custom trays were fabricated using the auto polymerising resin. The mandibular custom tray was fabricated with cylindrical rests placed on the molar region using the auto polymerising resin.

On the second clinical visit, border molding and the definitive impression was made using green stick and the zinc oxide eugenol impression paste respectively for maxillary arch**(Figure 1B)** whereas that of the mandibular ridge was made using the cocktail impression technique. Wax spacer was removed and the impression was made using McCord and Tyson's technique [4] by loading tray with 3:7 parts of impression compound and green stick. Various functional movements like sucking cheeks, licking the lips, and swallowing were performed to record the impression in the functional state **(Figure 1C)**. Reheating the impression or adding to deficient areas is not done to avoid differential tissue loading. Wash impression **(Figure 1D)** was then made using light body consistency addition silicone and poured using dental stone to obtain the master casts **(Figure 1E)**.

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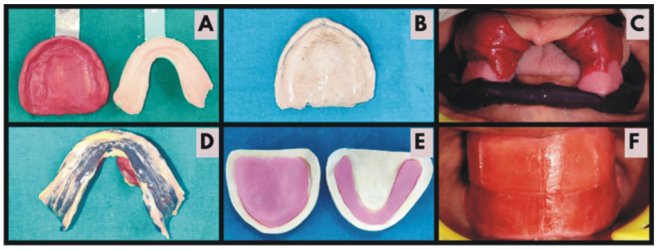

Figure 1: A) Primary impression of the maxillary and mandibular arch, B)Final impression of the maxillary arch, C) Single-step cocktail impression technique with the admixed material, D) Final impression of the mandibular arch, E) Temporary denture bases adapted on the maxillary and the mandibular arch, F) Recording of jaw relations.

On the third clinical visit, maxillo mandibular relationships were recorded **(Figure 1F)** and mounted on the mean value articulator **(Figure 2A)**. The mandibular occlusal rim was then removed from the denture base and spurs or fins made of a stainless steel wire corresponding to the occlusal rim height were adapted to the denture base posteriorly using the auto polymerizing resin. Green stick wax was placed anteriorly on the mandibular denture base corresponding to the anterior height of the mandibular occlusal rim **(Figure 2B).**

On the fourth clinical visit, the admixed material (3:7 parts of impression compound and green stick) was then placed on the mandibular base plate and the patient was then asked to perform various functional movements like talking, swallowing, drinking water, licking the lips, sucking the cheeks, etc **(Figure 2C)**. The set impression was removed from the mouth after 5-10 minutes and examined. The neutral zone was then recorded and the putty index was made **(Figure 2D)**. The admixed material and spurs were removed followed by the addition of modelling wax for the teeth arrangement **(Figure 2E)**. Teeth arrangement was done according to the putty index**(Figure 2F)**.

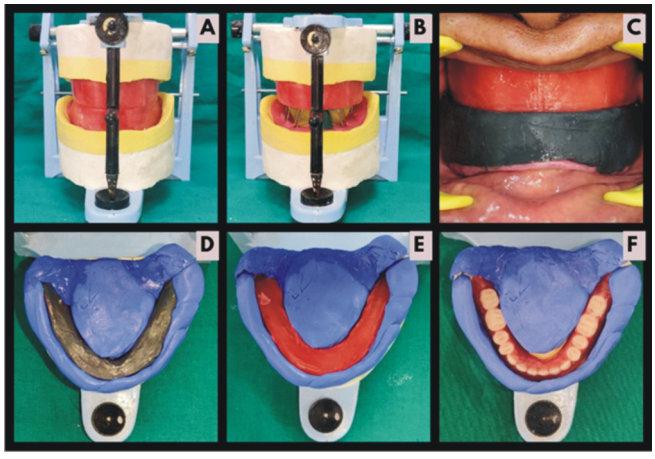

Figure 2: A) Mounting of occlusal rims on the mean value articulator, B) Spurs made of a stainless steel wire were adapted to the denture base, C) Recording the neutral zone, D)Putty index corresponding to the neutral zone, E) Wax was melted and added in the space provided by the admixed material, F) Teeth arrangement according to the putty index.

On the fifth clinical visit, the try-in of the denture was done to check the fit, function, and esthetics **(Figure 3A)**.

On the next clinical visit, the patient was delivered the final complete denture, finished and polished**(Figure 3B)**. The patient was kept on a regular 3 monthly follow-up. The patient found the denture satisfactory.

Figure 3: A) Try-in of the complete denture, B) Insertion of the complete denture, C) Pre-rehabilitative frontal view of the patient, D) Post-rehabilitative frontal view of the patient.

Discussion

The ultimate goal of prosthodontics is to restore form, function, and aesthetics. Anatomic, metabolic, functional, and prosthetic aspects all have a role in the rate of residual ridge resorption. [5] Although our understanding of these causes is limited, we are aware that resorption can occur despite our best attempts to prevent it.

One of the main functional concerns in the atrophic mandible, aside from instability, is the inability of the remaining residual ridge and its overlying tissues to sustain masticatory stresses. Furthermore, because the muscle attachments are at the crest of the ridge, the muscles have a higher dislocating impact. As a result, the impression must precisely capture the range of muscle motion as well as the areas into which the denture may extend without dislocating.[4]

The impression material advised by McCord and Tyson for atrophic mandibular ridges was utilized to capture the functional position of the muscles. This homogeneous material allows for the creation of a definitive impression in a single step by moulding it in a suitable viscosity. Further, the mandibular rests that fit on the maxillary alveolar ridge have the benefit of stabilizing the custom tray during the final impression by avoiding horizontal movement.[6]

The neutral zone has been recorded using a number of materials throughout the years, including impression plaster, waxes, impression compound, tissue conditioners, and polyether. The patient may ingest bits of impression plaster while performing functional motions because impression plaster is chaotic. The impression compound has a high viscosity, making

it difficult to perform oral tasks including blowing, sucking, and pursing the lips. The uniform softening of all wax rims is crucial for capturing full functional motions, and if done incorrectly, might result in an erroneous neutral zone recording. Tissue conditioners lack adequate substance, making them difficult to use even when held by wire loops. Polyether impression material sets by an irreversible chemical process, making any changes to the set material and reuse impossible. Admixed material is a low viscosity substance, allowing easier manipulation of the musculature of the mouth. It improved flow and provided a more accurate impression. It also provides good results in patients with poor neuromuscular coordination.[7]

The neutral zone approach for the fabrication of denture makes advantage of their stabilizing capabilities instead of being displaced by surrounding soft tissues. The laboratory component of this procedure is a drawback. It is important to increase laboratory time and expense, and the laboratory worker must be educated to support this clinical practice.[1]

Conclusion

Modifications to treatment plans and techniques should be explored to meet the functional and aesthetic needs of the patient. The cocktail impression technique provides a relatively simple and effective method for the rehabilitation of patients with severe atrophic ridges. The neutral zone is another simple alternative method for the fabrication of complete dentures in patients with severely atrophic ridges which aims to provide a denture that is stabilized by the oral musculature.

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