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Prosthodontic Rehabilitation of a Severely Resorbed Mandibular Ridge Using Neutral Zone Technique: A Case Report

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ABSTRACT

Completely edentulous patients wearing dentures for long periods often experience instability of mandibular complete dentures due to severe ridge resorption and altered neuromuscular control. The neutral zone technique is an effective method for improving denture stability, retention, and comfort by utilizing the functional balance of surrounding oral musculature. Modern prosthodontics aims to restore function, esthetics, and phonetics in edentulous patients, and the neutral zone concept plays a vital role in achieving these goals. This article describes the management of severely resorbed ridges using the neutral zone technique in maxillary and mandibular complete dentures with materials such as condensation silicone and low-fusing impression compound for recording the neutral zone.

INTRODUCTION

Loss of teeth produces various changes within the oral cavity, including alveolar ridge resorption, enlargement of the tongue, and decreased facial muscle tone[1]. These alterations reduce the denture-bearing area and disturb normal muscular balance, making it difficult to achieve adequate stability, particularly in mandibular complete dentures[1&2].

The fabrication of stable mandibular dentures in patients with severely resorbed ridges therefore becomes a significant clinical challenge. To improve denture retention and stability, it has been recommended that the posterior teeth be arranged directly over the crest of the residual edentulous ridge[2,4].

Complete dentures should be fabricated in harmony with the neutral zone concept to achieve better stability and retention. The neutral zone is the region where the forces exerted by the tongue are balanced by those of the lips and cheeks. Positioning the denture within this area improves comfort and functional efficiency[2,3]. Several materials have been used for recording the neutral zone, including impression compound, soft wax, impression plaster, silicone materials, tissue conditioners, and resilient lining materials. Dimethyl siloxane polymer filled with calcium silicate has also been reported as an effective material for neutral zone registration[3].

In this case report low fusing impression compound was used to record neutral zone.

CASE DESCRIPTION

A 65-year-old female patient reported to department of prosthodontics with loose and unstable mandibular complete dentures causing difficulty in mastication, speech, and comfort. Clinical examination revealed completely edentulous arches with severely resorbed mandibular ridges and compromised neuromuscular control, resulting in poor denture retention and stability. Therefore, rehabilitation using the neutral zone technique was planned to improve denture function and comfort.

Primary impressions were obtained using stock trays with impression compound as a mucocompressive material **(Figure 4)**.Acrylic custom trays were then fabricated for making the secondary impressions. The maxillary final impression was recorded using low-fusing impression compound and elastomeric impression material **(Figure5&6)**. For the mandibular arch, the secondary impression was made using the admix technique, which consists of impression compound and greenstick low-fusing compound mixed in a ratio of 3:7.

Occlusal rims were fabricated on heat-cured acrylic denture bases. The mandibular occlusal rim was then removed completely, and wire loops were attached to the mandibular record base according to the established vertical dimension.

A mixture of impression compound and greenstick compound in a 3:7 ratio was softened in a water bath at 65°C. The softened material was kneaded into a roll corresponding to the crest of the residual ridge and adapted over the retentive wire loops at the established vertical dimension **(Figure 9)**. The compound was reheated and inserted into the patient's mouth with the record base properly seated. The patient was then instructed to perform functional movements such as swallowing, speaking, sucking, pursing the lips,**(Figure 10)** pronouncing vowels, sipping water, and slight tongue protrusion to allow the surrounding musculature to shape the material physiologically.

After approximately 12 minutes, the neutral zone impression was removed from the patient's mouth and transferred onto the master cast. Grooves were made on the cast, and a silicone putty index was fabricated around the recorded neutral zone **(Figure 11)**. The impression compound was then replaced with modeling wax, and the teeth arrangement was carried out precisely according to the putty index.

Following teeth arrangement, a wax try-in was performed **(Figure 14)**, during which the patient was instructed to repeat functional movements to verify denture stability during border movements. The dentures were subsequently processed using conventional techniques, followed by finishing and polishing while preserving the contours of the polished surfaces **(Figure 15)**.

DISCUSSION

The musculature around a denture is dynamic and plays an important role in denture stability. Neutral zone records are patient-specific and are influenced by factors such as muscle tone, functional movements, recording materials, vertical dimension, and duration of edentulism[2]. These muscles participate in normal physiologic functions such as speech, mastication, swallowing, smiling, and laughing[3]. Extensive research has been carried out to determine the ideal tooth position for complete dentures[2].

Accurate recording of the neutral zone and proper arrangement of teeth within this zone are essential for enhancing denture stability[3].

The neutral zone technique is considered one of the most effective methods for fabricating dentures in patients with highly resorbed ridges and It is very useful in cases where dental implants are contra-indicated. It can be combined with other clinical procedures to enhance denture stability, improve patient satisfaction, and achieve better treatment outcomesn[4,5].

Figure 1

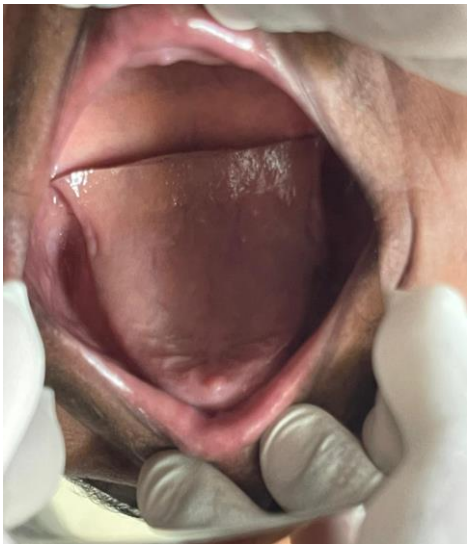

Figure 2

Figure 3

Figure -4

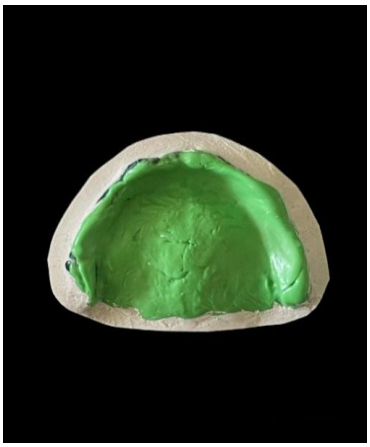

Figure –5

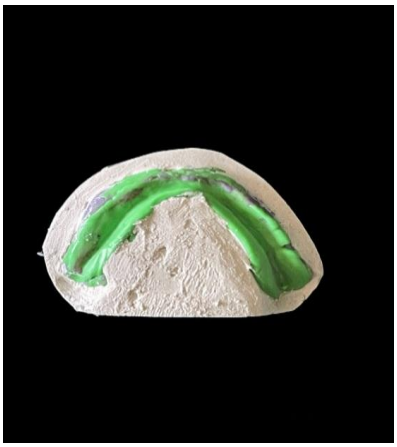

Figure 6

Figure – 7

Figure – 8

Figure – 9

Figure – 10

Figure – 11

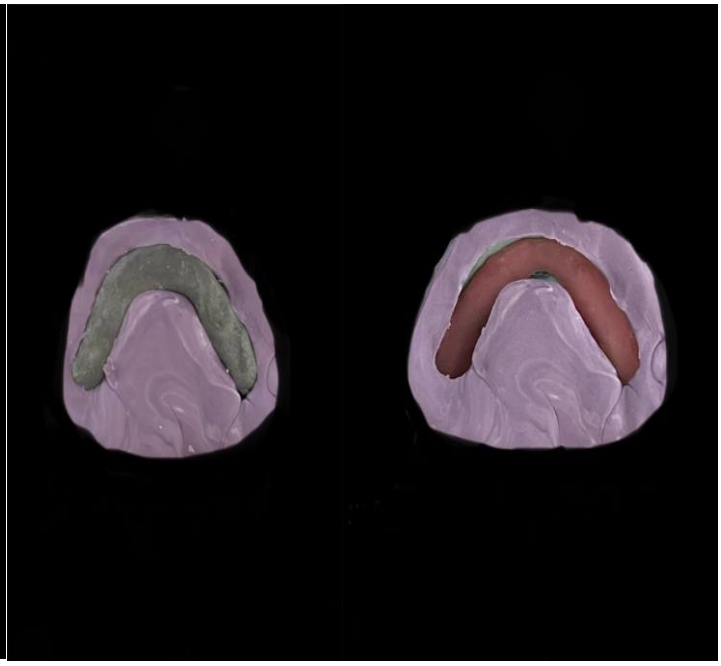

Figure 12

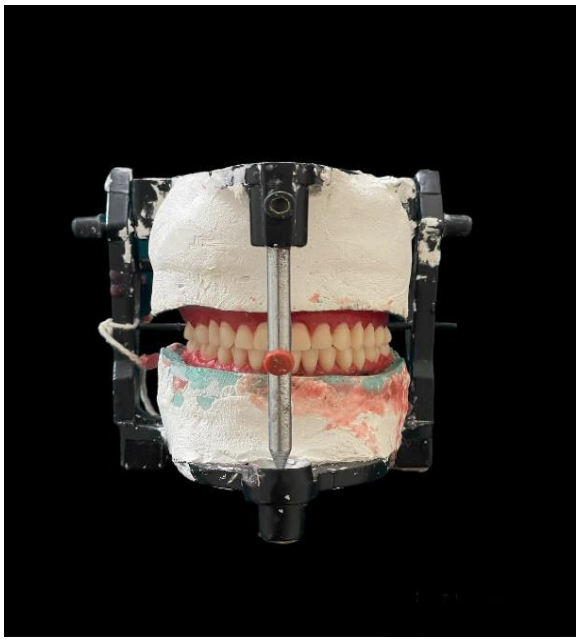

Figure – 13

Figure –14

Figure – 15

Figure -16

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