

Neutrality for Complete Denture- A Clinical Report

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Abstract

Resorption of mandible is a chronic, progressive, irreversible biomechanical disease leading to loss of vertical dimension, loss of sulcular depth and decreased lower facial height. Residual ridge resorption becomes a very big challenge for a clinician during the fabrication of a complete denture. It's difficult for the patient to adapt to the mandibular denture and frequently result in complain of loose denture. Recording the neutral zone is an effective approach for construction of denture in highly resorbed ridges and in patient with history of denture instability. The neutral zone technique is not new by any means but it is certainly a valuable one. This case report describes neutral zone technique for a patient with an atropic mandibular ridge and neuromuscular incoordination.

Keywords: Complete denture, Neutral zone, Non anatomic teeth, Resorbed mandible

Introduction

Complete dentures are primarily mechanical devices that perform function in oral cavity and are in harmony with normal neuromuscular function. All oral functions such as speech, mastication, swallowing, smiling, and laughing involve the synergistic actions of tongue, lips, cheeks and floor of the mouth, forming a complex muscular arrangement imparting varying amount of forces on removable complete denture.⁽¹⁾ Failure to recognize the cardinal importance of tooth position and flange form and contour often result in unstable dentures which perform unsatisfactory function, in spite of skillfully designed and expertly constructed.⁽²⁻³⁾ The coordination of complete dentures with neuromuscular function is the foundation of successful, stable dentures.⁽⁴⁾

Muscular forces vary in magnitude and direction in different individuals while performing functions such as chewing, speaking and swallowing.⁽⁵⁾ The neutral zone is that area in the potential denture space where the forces of the tongue pressing outward are neutralized by forces of the cheeks and lips pressing inward. Denture fabricated in this zone will have better stability, retention and can perform better function.

Following case report describes neutral zone technique for a patient with an atropic mandibular ridge and neuromuscular incoordination.

Case Report

A 62 years old female patient reported to the Department of Prosthodontics, Post Graduate Institute of Health Sciences, Rohtak with the chief complaint of difficulty in chewing due to loose mandibular denture. Patient had been edentulous since 6 years and using a set of denture since last 5 years (Fig. 1). Patient also complained of instability of the lower denture since she started using it and is willing for new set of denture which can eliminate the problems associated with her current denture.

On extraoral examination patient had a class I profile, unsupported lips, wrinkled and drooping of the commissures. Patient had a medium lip length. No abnormalities in temporomandibular joint detected. On intraoral examination patient presented with medium sized gently rounded edentulous maxillary arch and thin inverted V shaped mandibular arch with Class III lateral throat form (Fig.2). Appropriate interarch space was present. Normal salivary flow, tongue size and position could be appreciated.

Primary impressions of maxillary and mandibular edentulous ridges were made with irreversible hydrocolloid impression material. The cast was poured using dental plaster and a custom tray was fabricated. The borders of the tray were molded with green stick low fusing impression compound and final impressions were made with zinc oxide eugenol impression material (Fig. 3). The master casts were poured with dental stone. Acrylic denture bases

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and occlusal bite were made on the master casts.

Maxillomandibular relationship was recorded at appropriate vertical dimension and centric relation of patient and articulated on a semi adjustable articulator. Mandibular occlusal bite was replaced with a mixture of impression compound and green stick compound in the ratio of 1:7. It was heated uniformly in the water bath. The record base was carefully placed in the patient's mouth and she was asked to smile, grin, purse lips, count from 60 to 70, pronounce the vowels, swallow, slightly protrude the tongue and lick the lips. These actions were repeated until the material had set. Thus, neutral zone impression for the patient was established. Anterior segment of the compound rim showed the lingual inclination which may be due to the increased tonus of lower lip and the action of tongue during swallowing. The stability of the lower occlusal rim was evaluated by asking the patient to open the mouth wide, wet the lips with tongue and to say exaggerated "OHS" "AHS" and "EES". A stable base and body was confirmed.

Buccal and lingual indices were fabricated with laboratory putty and the matrices were shaped to the exact height of lower occlusal plane, which was established in the mouth. This preserves the height of mandibular occlusal bite. While the material sets, cuts were made with BP blade for easy separation of indices and again secured by staple pins. After the putty had set, compound rim was replaced by modeling wax (Fig.4).

Non anatomic posterior teeth were selected to achieve maximum intercuspsation and to improve mastication. Trimming of artificial posterior teeth was done to accommodate the narrow space of neutral zone. Try-in was done and dentures were processed. Laboratory remounting was done for occlusal correction (Fig 5a, b). Dentures were inserted in the patient's mouth and evaluated for stability and occlusion (Fig 6).

Patient was recalled for follow-up after one week at which she was found to be satisfied with the stability of the denture but complained of longer chewing with non- anatomic teeth. Patient was reassured regarding adaptation to new masticatory cycle with time. After the follow-up of 1 month, patient was found to be comfortable and satisfied with the denture use.

Discussion

Both maxillary and mandibular ridges undergo resorption after the loss of teeth. The greater the ridge loss, the smaller the denture

base area that decreases the retention and stability of the denture.^{3,4} As the area of the impression surface decreases and the polished surface area increases, tooth position and contour of the polished surface become more critical. In severely resorbed ridges, denture stability and retention are more dependent on correct position of the teeth and contour of the external surfaces of the dentures.^{3,7}

One should recognize and utilize the forces resulting from muscle function for denture stability. This can be accomplished after having complete knowledge of neutral zone. It is the potential space between the lips and cheeks on one side and tongue on the other. It's the area or position where the forces between tongue and cheeks or lips are equal. Hence, the neutral-zone approach to complete denture locates this area in the edentulous mouth where the teeth should be positioned so that the forces exerted by muscles will tend to stabilize the denture rather than unseat it. The influence of the lip on stability of the lower denture becomes more critical with increase in resorption of the ridge as the patient ages. So, neutral zone concept usually explains about the positioning of the mandibular teeth.

Weinberg designated that the buccal cusp and fossae of the posterior teeth should be directly placed over the crest of the ridge.² Hickey and Zarb stated that the posterior part of the arch form will be determined to a greater extent by the "neutral zone."^{2,3} Watt suggested that the artificial teeth should be placed in the approximate position occupied by the natural teeth.^{3,8}

In order to construct dentures which function properly in chewing, swallowing, speaking, etc., we must develop not only proper tooth position but also the fit and contour of the polished surfaces just as accurately and meticulously as the fit and contour of impression

and occlusal surfaces.

Conclusion

This technique simply explains that artificial teeth should not be placed on the crest or buccal or lingual to it but rather be placed as dictated by musculature by the controlling action of cheeks, lips, and tongue that confine the dentures. It has also been noticed that when the occlusal surfaces of the teeth are not in contact, stability of the denture is determined by the fit of the impression surface and the direction and magnitude of forces transmitted through the polished surfaces.

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Figure 1: Pretreatment extraoral frontal profile view

Figure 2: Resorbed mandibular ridge

Figure 3: Secondary Impression maxilla and mandible

Figure 4: Putty index around neutral zone record to preserve lower occlusal bite height.

Figure 5a: Try- In

Figure 5b: Finished maxillary and mandibular denture with non anatomic posterior teeth

Figure 6: Post insertion extraoral view

