



NEUTRAL ZONE

Dentistry

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ABSTRACT

When all of the remaining natural teeth are removed; there exists within the oral cavity a void that may be called the potential denture space. The denture space is bounded by the tongue, medially or internally, and by the muscles and tissues of the lips and cheeks laterally or externally. Within the denture space, there is an area that has been termed the neutral zone. The neutral zone is that area in the mouth where during function, the forces of the tongue pressing outward are neutralized by the forces of the cheeks and lips pressing inward. Since these forces are developed through muscles contraction during the various functions of chewing, swallowing and speaking, they vary in magnitude and direction in different individuals and in different periods of life. The way these forces are directed against the dentures will either help to stabilize them or will tend to dislodge them. In summary, the neutral zone philosophy is based on the concept that for each individual patient, there exists within the denture space a specific area where the function of the musculature will not unseat the denture and at the same time, where the forces generated by the tongue are neutralized by the forces generated by the lips and cheeks. Furthermore, denture stability is as much or more influenced by tooth position and flange contour as by any other factors.

KEYWORDS

Denture space, Stability, Neutral zone.

INTRODUCTION

The goal of dentistry is for patients to keep all of their teeth throughout their lives in health and comfort. If the teeth are lost despite all efforts to save them, a reestablishment should be made in such a manner as to function efficiently and comfortably in harmony with the muscles of the stomatognathic system and the temporomandibular joints. The lower denture commonly presents the most difficulties with pain and looseness being the most common complaint.¹ This is because the mandible atrophies at a greater rate than the maxilla and has less residual ridge for retention and support.^{2,3}

Clinical And Laboratory Procedures

After a thorough examination of the patient, stock trays are selected for the patient. Primary impressions of the maxillary and mandibular ridges are made with modelling compound. While making the impressions, the patient is asked to do the functional movements, including sucking and swallowing movements. There should be minimal displacement of tissues, while making impressions. After acceptable impressions are made, they are poured in plaster.

Construction of the Acrylic Base

The acrylic base to be made in the neutral zone approach in complete dentures has to serve two purposes. On this acrylic base, occlusion rims will be constructed that will be formed and molded by the patient to locate the individuals neutral zone and to establish a tentative vertical dimension and centric relation. It's second purpose is to serve as a tray for the final impression which is obtained by a closed mouth procedure.

Manipulation of Compound

To develop the body of the denture and register the neutral zone by the use of modeling compound, there are three important factors to be considered. First, the compound must be very securely attached to the tray. Second, the compound must be thoroughly and uniformly softened for the muscles to mold the material. Third, it must be hard enough so that it will not flow and will maintain its shape as an occlusion rim until inserted into the mouth for forming the neutral zone. The consistency of the compound should be similar to that used when making a primary impression. Instead of impression compound, low fusing green sticky wax or the mixture of two^{4,5} can be used to record the neutral zone depending on operator's choice to modify the properties. A water bath, preheated to the adequate temperature, is used to soften the material. It is then kneaded and rolled into 'U' shaped and adapted on the temporary denture base. The compound is tempered in the water bath. This keeps the compound soft so that it can be molded. Repeated flaming, tempering and shaping keep the compound soft,

while it is shaped into the form of an occlusion rim. **Locating the Neutral Zone**

To locate the neutral zone for the lower arch, the patient's lips are lubricated with petroleum jelly. The tray with the softened modeling compound is rotated and carefully seated. Care must be used so that the lips do not press against the compound until it is completely seated.

The patient is instructed to swallow and then purse the lips as in sucking. Most patients will swallow without any problem. However, some patients will have difficulty in swallowing correctly. With these patients, it is necessary to practice before they can deliver a proper swallow on command. The practice or instructional procedure is as follows:

1. Remove the compound rim from the mouth and instruct the patient to swallow. If the patient swallows correctly several times, explain that this is exactly what should be done when the material is put into the mouth. If the patient does not swallow correctly, instruct the patient to keep the lips together and swallow as if swallowing a bolus of food.
2. If difficulty still persists, place a few drops of water on the tongue by means of a syringe to help the patient swallow.
3. Once the patient has swallowed correctly several times, resoften the compound and proceed in locating the neutral zone.

Testing the Stability of Occlusion Rims

The occlusion rims are placed back into the patient's mouth and checked for stability by having the patient open wide, wet the lips with the tongue, count from 1 to 100, and say exaggerated 'oh' 'ahs' and 'eess'. If these movements raise the rim, the lack of stability must be caused by an improper molding of the compound, as the tray or base was proved to be stable.

The next procedure is to test the outer edge of the rim with the tip of the index finger in the bicuspid and incisor regions. If pressure on the outer edges causes the opposite side of the rim to lift up, then the rim must be narrowed from the labial or buccal to where the vertical pressure will not cause the rim to tilt. This will occur where there has been extensive ridge resorption and where the residual ridge is narrow buccolingually and labiolingually.

After the labial contour and curvature of the occlusion rim have been established and if the width of the anterior section is thicker than the incisal edges of the anterior teeth, the occlusion rim should be narrowed by trimming from the lingual.

The final test is to have the patient speak, swallow, wet the lips and open wide without the rim moving or being dislodged.

Final Impressions

To achieve optimum success in complete denture prosthesis, the dentures should be both retentive and stable. The retention of a denture is mainly dependent on the accuracy of the impression and fit of the denture base to the tissues.

Impression techniques can be either closed mouth or open mouth. Both these can be incorporated into the neutral zone approach, but a closed mouth technique is preferred. The advantages with the use of a closed mouth technique are as follows:

- A more accurate functional molding of the borders can be obtained, especially in the lower arch.
- By having the patient to close gently and swallow, there is more even distribution of pressure and impression material with less likelihood of excessive pressure in one area or another.

Fabrication of Tongue, Lip and Cheek Matrices

Prior to construction of the matrices, the casts must be indexed so that the matrices will fit back into their proper positions. Several circular holes are made on the labial and buccal surfaces of the cast and a cross is made in the tongue area of the lower model.

With the lower occlusion rim in place, the lower model is lubricated and stone is placed on the lingual portion of the model, forming an artificial tongue and, on the labial and buccal of the lower model, completely encasing the occlusion rim. These matrices are trimmed to the exact height of the lower occlusal plane, which was established in the mouth. This preserves the height of the lower occlusal plane. The same is done for the upper model and occlusion rim.

After the stone is set, the labial and buccal matrices are split in the middle to facilitate removal. When two occlusion rims are now removed, the matrices can be placed back into position. Instead of stone, rubber base putty can also be used to form the matrices⁶ (Fig. 1).

The space between the matrices on the lower rim represents the neutral zone and indicates where the teeth should be positioned. The matrices on the upper indicate the outer limits of the neutral zone and serve as a guide for positioning the upper anterior teeth (Fig. 2).

After selection of the proper size, occlusal morphology and material of the posterior teeth to be used, we go in for the positioning or arrangement of teeth.

The Trial Denture

After the verification and correction of the stability, retention, vertical dimension, phonetics, centric relation and esthetics are done. There is an important step to be completed during the trial denture try-in: the making of external impressions on the labial, buccal and lingual surfaces of the dentures. These will determine the thickness, contours and shape of the polished surfaces of the denture. With conventional complete dentures, the technician or dentist

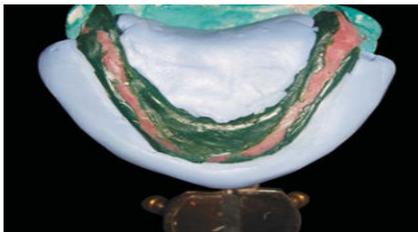


Fig. 1: Construction of matrices

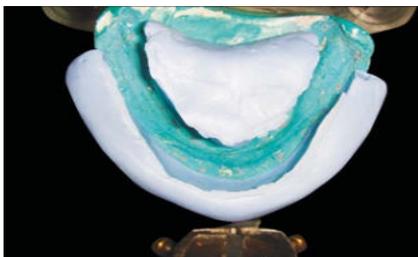


Fig. 2: Potential denture space



Fig. 3: External impression of polished surface empirically waxes the external surface. By means of external impressions, a physiologic molding is made so that the external surfaces are functionally compatible with muscle action.

The trial denture acts as a tray to be used for the accurate secondary impression for forming the contours of the external surface of the denture. The trial dentures are waxed up so that there is just enough wax to hold the tooth in position. The materials for the external impressions are either zinc oxide eugenol, one of the conditioning materials or light body addition silicone impression material.

Both the upper and lower trial denture external impressions are done in two steps, either the labiobuccal and then the lingual or palatal, or vice versa.

The impression material is placed on the lingual surfaces of the lower denture, between the necks of the teeth and the denture periphery. The upper trial denture is placed in position, and the lower is then rotated into the mouth, taking care not to wipe off any material on the lips. With the lower trial denture in position, the patient is asked to close, purse the lips as in sucking and swallow. This is repeated several times. After the material has set, the trial dentures are removed from the mouth, and the gross excess is cut away. The impression material is then placed on the buccal and labial surfaces of the lower trial denture, and sucking and swallowing motions are repeated (Fig. 3). The same procedure is then followed for the upper external impressions.

The impression on the lingual of the lower trial denture will frequently result in a very large and extensive ledge in the anterior region. This should be duplicated exactly in the processed denture. Experience has shown that practically all patients do tolerate these contours which rarely have to be reduced. As a matter of fact, these ledges seem to help to retain the lower denture. The tongue sits on these ledges and helps to keep the lower denture in position.

Processing of the Dentures

The laboratory procedures for investing, packing and processing of the dentures using the neutral zone technique are generally the same as for conventional dentures. However, because of the materials used for the external impressions, it is necessary to be especially careful in some of the procedures.

When zinc oxide eugenol paste has been used for taking the impression of the polished surface, the flasks should not be allowed to remain in the boil-out tank for more than 5-minute. Reason being the zinc oxide eugenol paste gets liquefied, if left for a longer time. This results in bleached appearance of the processed denture.

After the dentures are being processed, they are mounted on the articulator.

CONCLUSION

The neutral zone philosophy is based on the concept that for each individual patient there exists within, the denture space, a specific area where the function of the musculature will not unseat the denture and, at the same time, where the forces generated by the tongue are neutralized by the forces generated by the lips and cheeks.

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