

Research Article

Comparison of Quality of Life in Moderate to Severe Resorbed Ridges in Edentulous Patients Rehabilitated With Neutral Zone Technique

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ABSTRACT:- Several studies have been published for dentures fabricated using neutral zone technique. However, studies comparing patient quality of life in terms of comfort, chewing, speech, aesthetics, self-esteem level and general satisfaction of the dentures made with neutral zone technique could not be identified in the literature. The aim of the study was to compare and evaluate the effectiveness of recording neutral zone on patient compliance before and after giving new denture. Sixteen denture wearers with moderate to severe mandibular ridge resorption were included in this study. For each subject trays were prepared in autopolymerizing acrylic resin and impression made in elastomeric impression material after border moulding procedures. To shape the neutral zone; functional tongue movements and swallowing pattern are recorded. The resulting neutral zone impressions were leveled to the same occlusal height by gently grinding the occlusal surface on sandpaper until it corresponded with landmarks (corners of the mouth, two thirds of the height of the retromolar pads, bilaterally) noted on the cast.

After recording neutral zone, an elastomeric putty index were created and normal teeth arrangement procedures were followed by curing of dentures. After denture insertion all the patients have been interviewed through questionnaires, aimed to evaluate impact on quality of life by 7 Point Likert Scale of values into a range from “0” to “7”, that are extremes which respectively mean “extremely dissatisfied” and “extremely satisfied”; through this evaluation scale it has been able to measure overall impact of recording neutral zone on patient quality of life in terms of comfort, chewing, speech, aesthetic and general satisfaction.

KEYWORDS:- Neutral zone, Ridge resorption, Likert Scale, Dead space, Zone of minimal conflict, Impression techniques.

I. INTRODUCTION

The neutral-zone approach in complete denture fabrication was contributed by Wilford Fish¹ and Russell Tench². Many others²⁻⁹, including Perry¹⁰ have helped to advance and develop both the theoretical basis and practical procedures. The term neutral zone concept was coined by Beresin and Schiesser in 1976¹¹. When the natural teeth have been lost, there exists a void within the oral cavity called the potential denture space.

NEUTRAL ZONE: also known as stable zone, Dead space, and Zone of minimal conflict¹² is defined as According to GPT 8 "The potential space between lips & cheeks one side & tongue on the other side. That area or position where the forces between tongue & cheeks or lips are equal"¹³. 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. These forces are developed through muscular contraction during the various functions of chewing, speaking, and swallowing. The technique for recording is referred as the anthropoidal pouch technique according to Jagger D¹⁴, denture from impression technique according to McCord JF¹⁵, piezograph technique according to Mersel A¹⁶ and border moulding technique¹².

Several studies have been published for dentures fabricated using neutral zone technique. However, studies comparing patient quality of life in terms of comfort, chewing, speech, aesthetics, self-esteem level and general satisfaction of the dentures made with neutral zone technique could not be identified in the literature.

This present article measures the overall impact of recording neutral zone on patient quality of life in terms of comfort, chewing, speech, aesthetic and general satisfaction.

II. MATERIALS AND METHODS

Eleven patients between the age group of 50 to 60 years were selected based on the inclusion criteria which consisted of requirements such as 8-10 years of edentulism, with clinically moderate to severely resorbed mandibles and absence of any pathological conditions. On clinical examination, patients had no gross facial asymmetry. The TMJ, muscles of mastication and facial expression were asymptomatic. There was no hyper mobile tissue on palpation. The materials used in this study were the basic armamentarium used to carry out the clinical and laboratory procedures in the fabrication of a denture.

For every patient, denture was fabricated using the neutral zone concepts and compared with the previous denture in terms of comfort, chewing, speech, aesthetics, self-esteem level and general satisfaction.

III. TREATMENT PROCEDURE FOR NEUTRAL ZONE TECHNIQUE

The primary impressions of maxillary denture bearing area was made with Irreversible Hydrocolloid material while of mandibular denture bearing area was made by McCord and Tyson's technique²⁰. Impression compound (DPI Pinnacle, The Bombay Burmah Trading Corporation, Mumbai, India) and green tracing stick (DPI Pinnacle Tracing Sticks, The Bombay Burmah Trading Corporation, Mumbai, India) in the ratio of 3:7 parts by weight is placed in a bowl of water at 60 °C and kneaded to a homogenous mass that provides a working time of about 90 seconds. The impressions were made and poured in plaster of paris and primary casts were prepared. The custom trays were fabricated with self cure resin over the primary casts keeping the borders 2mm short of the sulcus. The borders of the trays were molded with green stick impression compound and the secondary impressions were made with light body addition silicone impression material. The master casts were poured in dental stone.

The record bases were fabricated for stability, extension and comfort. Wax rims were made over the record bases for recording the maxillomandibular jaw relations and mounted in mean value articulators. The wax rims were cut at three places at first molar and central incisor regions and replaced with autopolymerizing resin. These resin pillars will now act as vertical occlusal stops. Now the remaining wax is removed and is attached with retentive loops made of thin orthodontic wire. The record bases are trimmed and checked in the patient's mouth and ensured that loops and vertical pillars do not interfere with muscle movements during function.

Mixture of 3 parts of impression compound and 7 parts of green stick compound is kneaded in a hot water bath and placed over the retentive loops and the neutral zone recorded. During this procedure the patient was asked to make the movements like puckering lips, swallowing, sucking, pouting, grinning and by producing exaggerated sounds like OOO and EEE to record the neutral zone. Excess material if any will be displaced and should be removed. In case of insufficient material, additions can be easily made using extra material and the process is repeated. Now the maxillary rim was adjusted at the same vertical height with mandibular rim maintaining the vertical stop determined by the maxillo-mandibular relationship with wax occlusal rims. Both the compound rims were then replaced on the articulator to evaluate the vertical relation again.



Figure 1. Patient maxillary and mandibular edentulous ridges.

Figure 2. Initial Impressions



Figure 3. Border moulding and application of tray adhesive.

Figure 4. Final Impression with light body addition silicone impression material.



Figure 5. Swallowing pattern and Functional movements Recording.

Figure 6. Jaw relations completed.



Figure 8. Patient performing swallowing.

Figure 9. Neutral zone recording in oral cavity.



Figure 10. Neutral zone recorded

Figure 11. Articulated occlusal rims.

On the impression compound rims putty indices were constructed. The compound rim is then removed from the record bases. The indices are rearranged and wax flowed into the space to make an occlusal rim to confirm to the patients neutral zone. The teeth arrangement was carried on this occlusal rim and the trial denture was verified using the putty indices to confirm the position of the teeth is within the neutral zone. Try in was carried in the patients mouth. The trial denture was then relined along the flanges using light body impression material to achieve additional retention and stability. Following this the dentures were flaked, processed, trimmed and polished using conventional method and denture insertion was done.



Figure 11. Putty index made
Figure 12. Teeth arrangement according to neutral zone



Figure 13 & 14. Follow up after 1 month

The patient was recalled after 24 hrs, 1 week, 1 month and 1year for follow up and was evaluated for retention, stability and their level of expectations and experiences was noted by means of 7 point Likert scale. 0- Extremely Dissatisfied; 1- Moderately Dissatisfied; 2- Slightly Dissatisfied; 3- Neutral; 4- Slightly Satisfied; 5- Moderately Satisfied; 6-Very Satisfied. The patients were satisfied with the new complete denture as they were retentive, stable with increased chewing efficiency and their quality scale score gave values between neutral to extremely satisfied in comparison to previously worn dentures. The dentures made with neutral zone technique shown good results and improvement in patient general satisfaction in terms of comfort, chewing, speech, aesthetics and self-esteem level.

IV. DISCUSSION

The results of the present study indicate that patients found neutral complete dentures more comfortable and esthetic than their old dentures. 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 where forces generated by the tongue are neutralized by the forces generated by the lips and cheeks.

The influence of tooth position and flange contour is very important. Teeth should be placed as detected by the musculature and this will vary for different patients. Positioning artificial teeth in the neutral zone achieves two objectives –

Teeth will not interfere with normal muscle function.

The forces generated by the musculature against the denture are more favorable for stability and retention.

V. CONCLUSION

In summary, the neutral zone philosophy is based on the concept that for each individual patient 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 to any other factor. In other words, we should not be dogmatic and insist that the teeth should always be placed over the crest of the ridge, or lingual to the ridge or buccal to the ridge! Placement of the teeth should be dictated by the musculature and will vary for different patients. The neutral zone has not been given enough importance, in the literature, but as a determinant of occlusion it cannot be ignored. Orthodontic, relapses, postoperative problems, unsuccessful periodontal procedures and relapses with orthognathic surgery can be attributed to neutral zone imbalance. Complete and partial denture failures are often related to non compliance with neutral zone factors. Regardless of the method of treatment, any part of the dentition out of harmony with the neutral zone will result in instability, interference with function, or some degree of discomfort or will bother the patient. Thus, the neutral zone must be evaluated as an important factor before one rates any changes in arch form or alignment of teeth.

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