

Management of a resorbed mandibular ridge using neutral zone technique – A case report

Dr Harshakumar K ¹, Dr Geethu A V ², Dr R Ravichandran ³, Dr S Lylajam ⁴

¹ Professor & HOD, ² Post Graduate Student, ³ Professor, ⁴ Professor

Department of Prosthodontics, Government Dental College, Thiruvananthapuram, Kerala, India

Corresponding Address: Dr Geethu A V., Department of Prosthodontics, Govt. Dental College, Thiruvananthapuram, Kerala, India

Abstract: Highly atrophic mandible often presents a clinical challenge to the prosthodontist in the fabrication of mandibular complete dentures. Neutral zone technique is an alternate approach for the fabrication of complete dentures in such cases. Here the teeth are arranged in the area where the forces from the tongue and the extra oral muscles are balanced. This article describes a case where the complete denture is fabricated for a patient with highly resorbed mandibular ridge using the neutral zone concept.

Key words: atrophic mandible, neutral zone, mandibular complete denture

Date of Submission: 24-03-2018

Date of acceptance: 03-04-2018

I. Introduction:

The successful replacement of missing teeth with good functional and esthetic outcome is always a great challenge to the prosthodontist. This becomes even more challenging when there is severe resorption of residual ridge. The edentulous ridge, following extraction undergoes a series of changes which eventually results in reduced denture foundation area after a prolonged period of time. The mandibular residual ridge resorbs four times faster than the maxillary ridge, resulting in mandibular ridges with flat or concave foundation leading to reduced retention and stability of lower complete dentures¹. Consequently the retention and stability becomes more dependent on correct positioning of the teeth and the contours of the external or polished surface of the dentures.

Sir Wilfred Fish of England in 1931 first described how dentures should be constructed in this dead space², which was later known as the neutral zone. He also described the influence of the polished surface on retention and stability. According to GPT 9 neutral zone is the potential space between the lips and cheeks on one side and the tongue on the other; that area or position where the forces between the tongue and cheeks or lips are equal³. Thus during functional activities the forces exerted by the tongue are neutralized by the lips and cheeks within the neutral zone⁴. The dentures fabricated in this zone will be more stable.

The use of dental implants is steadily increasing now a days for improving the retention of mandibular dentures. But this cannot be opted for all patients because of medical or economic constraints. Neutral zone concept is an alternative practical approach in such cases to improve the stability of the mandibular dentures. This technique is not new, but it is less often practiced. This technique can also be used in patients with partial glossectomy, mandibular resections or motor nerve damage to the tongue which have led to either atypical movement or an unfavourable denture bearing area¹. The following article describes the fabrication of complete denture in a patient with severely atrophic mandibular ridge using the neutral zone concept.

Case report:

A sixty eight year old female patient reported to the Department of Prosthodontics Government Dental college, Thiruvananthapuram with the chief complaint of illfitting mandibular complete denture (fig. 1). The dental history revealed that the patient is a denture wearer for the past 15 years and wanted to fabricate a new complete denture for improved retention and stability. Intra oral examination showed moderately resorbed maxillary ridge and severely atrophied mandibular residual ridge (fig .2).

Procedure:

Preliminary impressions were made using impression compound (DPI pinnacle impression compound) in stock edentulous trays. Special trays were fabricated using autopolymerising acrylic resin. Border molding was done using low fusing impression compound (DPI PINNACLE Tracing sticks) and final impressions were made using zinc oxide eugenol impression paste (DPI impression paste) (fig .3). In the mandibular final impression, the sublingual crescent area was also registered to enhance the retention. Mandibular permanent

denture base was fabricated in heat cure acrylic resin and occlusal rims were made using modelling wax . Jaw relation was done and mounted in the articulator.

Two acrylic pillars were made in the first molar region to act as the vertical stop to maintain the vertical dimension,the wax was removed from the remaining area. Loops were fabricated using orthodontic wire and were attached anterior to the vertical pillars using self cure acrylic resin (fig.4). The acrylic pillars and loops were fabricated in such way that it will not interfere with muscle movements during function.

A variety of materials such as waxes, tissue conditioners, impression plaster , elastomeric materials, impression compound,hydrocolloids⁵ etc can be used for registering the neutral zone. Here green stick and impression compound were softened and kneaded in a 7:3 proportion and was placed on the mandibular denture base. It was then inserted in the patient's mouth and the stability was ensured. The patient was then instructed to perform all the functional movements like smiling, sucking, swallowing, pursing the lips etc. The patient was also asked to produce the sounds 'EEE..' and 'OOO..' in an exaggerated manner. All the excess material which has flown over the acrylic vertical stop was removed. The acrylic vertical stops helped to maintain the correct vertical dimension (fig. 5).

After proper molding, the denture base was removed from patients mouth and was carefully seated in the articulator. Then the putty consistency silicone material was mixed and adapted around the mandibular compound rim except for the occlusal portion to form an index(fig.6). Three triangular grooves were placed in the mandibular cast, two in the posterior region and one in anterior region, before adapting the silicone material. This helped to remove the silicone index as a single unit. After making the index, the compound rim was removed from the denture base. The denture base in place on the cast with the index in position, wax was melted and poured to form the occlusal rim. (fig.7).

The teeth were then arranged in the neutral zone (fig.8). Proper waxing up was done so that the tongue, lips and cheeks will contact the smooth polished surface of the denture during function. The denture was tried in the patient's mouth and was checked for proper esthetics, occlusion and function. It was then processed in the conventional manner. The finished and polished denture was then inserted in the patient's mouth (fig.9) with adequate stability and function.



Fig 1. Preoperative frontal view



Fig 2. Atrophic edentulous mandible



Fig 3. Mandibular final impression



Fig 4. Acrylic pillars and wire loops

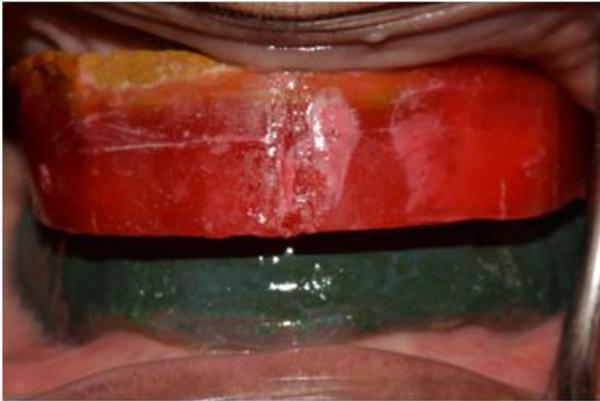


Fig 5. Intra oral view of molded occlusal rim



Fig 6. Compound rim with putty index



Fig 7. Compound rim replaced with wax



Fig 8. Teeth arranged in neutral zone

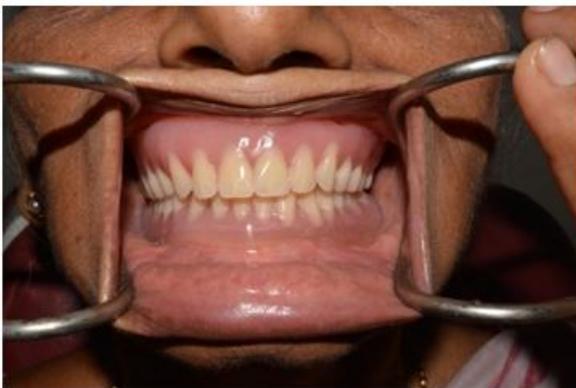


Fig 9. Final denture- intra oral view



Fig 10. Post operative extra oral view

II. Discussion:

Complete dentures must be designed in such a way that they should function in harmony with the surrounding oral structures. The functioning of the complete denture with good neuromuscular coordination determines the success of the complete dentures.⁶ Treating a highly resorbed mandibular ridge is a great challenge to the prosthodontist. After the removal of natural teeth, the mandible resorbs in a much more rapid rate than the maxilla resulting in a flat or concave shaped residual ridge. The reduced area of coverage for the denture affects both the retention and stability of the denture. As the ridge loss increases the denture base area becomes smaller and consequently retention and stability become more dependent on the position of the teeth and the external polished surfaces of the dentures⁷. In order to accomplish this, the teeth should be arranged in the neutral zone.

Neutral zone is defined as the area or position in the dental arch where the forces from the tongue and the cheeks or lips are equal. Arranging the teeth in the neutral zone aims in achieving two important objectives¹. The prosthetic teeth will not interfere with normal muscle movements during function.² As the forces from both the tongue and the lips or cheeks are balanced it will tend to stabilize the denture rather than displacing it.

The technique used in this article utilizes this concept and the teeth were arranged in the area of muscle balance. Apart from the various materials available for registering the neutral zone like tissue conditioners, elastomers, waxes etc, here an admix of green stick and impression compound were used. This allows for making corrections and addition of new material to it while registering the neutral zone. Usually plaster or stone indices are made to preserve the established neutral zone. Here putty elastomer was used for making the index. Because of the flexibility of the material it can be easily removed and placed back in original position without any fracture of the material. The denture fabricated using the neutral zone concept provided adequate retention, stability and comfort to the patient as the denture was in harmony with the oral and perioral muscles.

III. Summary:

This article presents an alternative approach for fabricating a complete denture in a severely atrophied mandibular ridge. Eventhough the technique is not new, it is less often practiced. But with ultimate care and attention it is possible to provide successful removable complete denture in cases with severely atrophied ridges.

References

- [1]. R AK, Prasad KB. CASE REPORT Neutral Zone Impression Technique for Mandibular Compromised Ridges: A Case Report. 2014;1(4):79–82.
- [2]. Gahan MJ, Walmsley AD. The neutral zone impression revisited. Br Dent J. 2005;198(5):269–72.
- [3]. Driscoll CF, Freilich MA, Guckes AD, Knoernschild KL, McGarry TJ, Goldstein G, et al. The Glossary of Prosthodontic Terms. J Prosthet Dent [Internet]. 2017;117(5):C1-e105. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0022391316306837>
- [4]. Garg R, Jain S, Kumar S, Choudhary S. Case Report THE NEUTRAL ZONE TECHNIQUE IN COMPLETE DENTURES FOR ATROPHIC MANDIBLE : A CASE REPORT. 2015;4(December):37–9.
- [5]. Shanker SS, Umamaheswaran A, Nayar S. Biometric denture space- concept of neutral zone revisited using a hydrocolloid impression material. J Clin Diagnostic Res. 2015;9(11):ZD10-ZD12.
- [6]. Beresin VE, Schiesser FJ. The neutral zone in complete dentures. J Prosthet Dent. 1976;36(4):356–67.
- [7]. Raybin NH. The polished surface of complete dentures. J Prosthet Dent [Internet]. 1963;13(2):236–9.

Author Name. "Management of a resorbed mandibular ridge using neutral zone technique – A case report." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 17.3 (2018): 70-73.