

*Case Report***Stabilizing Mandibular Complete Dentures Using a Simple and Modified Neutral Zone Impression Technique: A Case Report**

Nisar A, Singh A, Sangur R, Banerjea A

Abstract: The loose and unstable lower complete denture is one of the most common problems faced by denture wearers. Masticatory function requires a unique coordination with muscles and oral structures. If the denture is placed in a zone where the displacing forces of tongue, lips, cheeks and modulus are balanced, then the denture during function will be retained more effectively. This zone is known as neutral zone. It is in this zone that the natural teeth lie, and this is where the artificial teeth should also be positioned. This area is achieved by using the neutral zone technique. The neutral zone technique is easy to perform but requires an extra visit of the patient. This article presents a simple and modified neutral zone impression technique where the number of visits is the same as for conventional complete denture fabrication.

Key words: Atrophic Ridge; Denture impression; Denture stability; Mandible, Mouth rehabilitation.

INTRODUCTION

The life expectancy of the Indian population is steadily increasing, which could lead to a rise in the number of complete denture wearers.¹ The Stability of mandibular complete denture is difficult to achieve because of the continuous residual ridge reduction. As the area of the impression surface decreases (due to residual ridge resorption), denture retention and stability also decreases, making retention and stability more dependent on correct positioning of the teeth and the contours of the polished surface of the dentures. Therefore these surfaces should be so contoured such that the horizontally directed forces applied by the peridure muscles act to seat the denture in a balanced muscular space known as neutral zone.²

The neutral zone has been defined as the area in the mouth where during function, the forces of the tongue pressing outwards are neutralized or balanced by the forces of the cheeks and lips pressing inwards.³ The most common complaint of the denture wearer is the looseness of the lower denture.⁴ This is because the mandible atrophies at a greater rate than the maxilla and has less residual ridge area for retention and support.⁵ Dental implants may provide stable and retentive mandibular complete dentures for the atrophic mandible, however implant placement is not always possible due to medical, surgical or costs factors. The neutral zone technique is an alternative approach for such cases. The technique is

not new but is one that is quite valuable and yet not often practised.

In 1931 Sir Wilfred Fish was the first to describe the influence of the polished surfaces of dentures on its retention and stability. Since that time literature has presented number of techniques, to achieve the neutral zone.^{6,7} All these techniques used a soft, mouldable material (usually wax or compound) that was placed in the mouth and patients were asked to perform different actions with their lips and tongues. These actions determined the position of teeth and the shape of the polished and finished surfaces of the denture. The aim of neutral zone recording is to produce a denture moulded by the muscle function of the patient that is in harmony with its surrounding structures so enhancing stability and retention of the denture. The neutral zone technique is fairly easy to perform but requires an extra visit of the patient. This article presents a simple and modified neutral zone impression technique where the number of visits is the same as for conventional complete denture fabrication.

CASE REPORT

A 55 years old male patient reported to the department of Prosthodontics Rama Dental College- Hospital & Research Centre, Kanpur, with the chief complaint of loose and unstable lower denture. Patient was edentulous from past 10 years. An intra oral examination was carried out and no abnormality. Examination of the mandibular

denture bearing area revealed severely resorbed mandibular ridge (Fig 1). It was then decided to make a new denture with modified neutral zone technique.



Figure 1: Severely resorbed mandibular ridge

Steps for Modified Neutral Zone Impression Technique:

1. Primary impressions and secondary impressions: The primary impressions were made in a stock tray with impression compound. Primary models were poured in the laboratory and upper and lower custom trays were fabricated using self-cure acrylic resin. Secondary impressions were recorded using zinc-oxide eugenol impression paste (Fig 2). The borders must be moulded to represent muscle activity, recording the functional depth and width of the sulcus. The master casts were poured in the laboratory and upper and lower base plates were fabricated.

2. Jaw relation: Wax rims were made over upper and lower base plates and conventional jaw relation was recorded ((Fig 3).

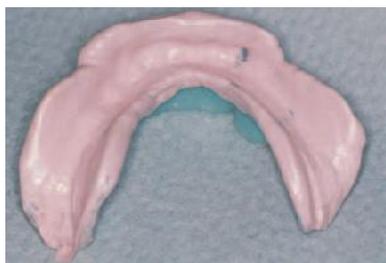


Figure 2: Secondary impression with ZOE



Figure 3: Bite registration

3. Recording of the Neutral Zone Impression:

The mandibular wax block or rim was removed from mouth and the wax was trimmed (from buccal, labial and lingual surfaces) so that there is free movement of the tongue, cheeks and lips (Fig 4). Care should be taken not to overtrim the wax rim, it should be trimmed just enough for the free movement otherwise the wax rim may get distorted when patient closes on it. Wax was not removed from the occlusal surface of the rim so that vertical dimension is not changed. This modified mandibular wax rim was placed in chilled water so that wax becomes hard.



Figure 4: Modified mandibular occlusal rim



Figure 5: Visco-gel

Tissue conditioner material such as Visco-gel was used to record the neutral zone impression (Fig 5). Visco-gel was applied over chilled wax rim except on the occlusal surface which was coated with the separator so that visogel does not adhere to it, and was placed in the patient's mouth. The patient was then told to perform various oral movements of his lips, tongue and the cheek. These movements facilitated neutral zone recording by shaping the tissue conditioner. During function of the lips, cheeks, and the tongue, the forces exerted on the tissue conditioner molded it into the shape of the neutral zone (Fig 6). These movements (as explained earlier) were performed for a period of 20 minutes. Any material flown to the occlusal surface was carefully removed.

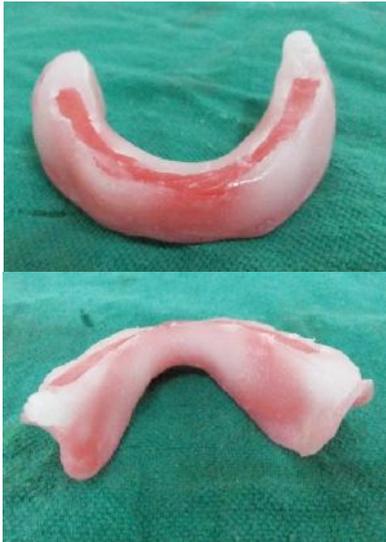


Figure 6: Neutral zone impression a) Labial view
b) Lingual view.

This finished neutral zone impression was again placed in patient's mouth and centric relation was recorded using staple pins (Fig 7) and it was mounted using mean value articulator.



Figure 7: Centric relation record

Silicone putty index was placed around the neutral zone impression. The Visco-gel impression was then removed from the base plate and the index replaced (Fig 8). The index has preserved the space of the neutral zone. Wax was then poured into this space giving an exact neutral zone representation (Fig 9). Teeth arrangement was done following the index. During the teeth arrangement their position was checked by putting the index back.

3. Try-in: Trial of the maxillary and mandibular dentures was performed. Occlusion, retention and stability was checked. The trial dentures were then returned to the laboratory for processing and finishing as usual. Dentures must be polished lightly so that the contours remain unaltered.



Figure 8: Putty index with removed Visco-gel impression



Figure 9: Wax filled Neutral zone impression

4. Final Insertion: The dentures were inserted into the patient's mouth and minor adjustments were done (Fig 10).



Figure 10: Finished & polished dentures placed in mouth

DISCUSSION

Rehabilitation of edentulous mouth with conventional complete denture may not always yield satisfactory outcome. In cases with severely resorbed ridges, there will be increased inter-ridge distance, which eventually causes shift in the occlusal plane away from the residual ridge making denture unstable. For these situations arranging the teeth in neutral zone is crucial, as occlusal plane is the one which determines stability. Along with this, buccal contours of the teeth influence the muscular forces acting on the denture there by lifting the denture. So fabrication of the prosthesis within the confinements of oral musculature is important and challenging task.⁸

The neutral-zone philosophy is based upon the concept that for each individual patient, there is a specific area within the denture space where the forces of the tongue are balanced by the forces of lips and cheeks. Teeth should be placed as dictated by the musculature, and this varies from patient to patient.⁹ The main displacing forces acting on a lower complete denture are by the tongue, the lower lip and the modiolus. If the denture is placed in the zone that balances these displacing forces then the denture will have more retention and stability during function. To minimise the displacing forces of the surrounding structures neutral zone technique is used.¹⁰

Positioning artificial teeth in the neutral zone achieves two objectives:

1. The teeth will not interfere with the normal functions of the muscles
2. The forces exerted by the musculature against the dentures are more favorable for stability and retention of the denture.

Muscular control is the main stabilizing and retentive factor for denture during function in highly atrophic mandible.⁸ A denture shaped by the neutral zone technique will ensure that the muscular forces are working more effectively and in harmony with the surrounding structures.

The dentures will have other advantages:

- Improved stability and retention
- Correct positioning of posterior teeth with sufficient tongue space
- Minimum food trapping adjacent to the molar teeth
- Good aesthetics due to facial support

The neutral zone technique is most effective for patients with previous unstable, unretentive lower complete dentures. The neutral zone approach has also been used for the patients with partial glossectomy and mandibular resections.¹¹ The technique is not new but is one that is very valuable and yet not practiced often.

CONCLUSION: Recording of the Neutral zone is a simple and effective procedure which involves only one extra clinical step and tremendously improves the denture stability. The neutral zone is an alternative

technique for the construction of mandibular complete dentures on highly resorbed ridges. It is especially useful in cases where dental implants are not possible and the conventional technique would not give good results. Neutral zone aims to construct a denture in muscle balance, as muscular control is the main factor for stabilization and retention of denture during function. This article presents a simple and modified neutral zone impression technique with no extra visit of the patient.

Author affiliations: 1. Dr. Aamina Nisar, PG student, 2. Dr. Anshika Singh, PG student, 3. Dr. Rajashekar Sangur, MDS, Professor & Head, 4. Dr. Animesh Banerjea, PG student, Department of Prosthodontics, Rama Dental College Hospital and Research Center, Lakhanpur, Kanpur-208024, U.P. India.

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Corresponding Author:

Dr. Aamina Nisar
Post graduate student
Rama Dental College Girls Hostel
Contact no: 9760799540
Email id: aaminabhat@gmail.com

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