

CASE REPORT



Management of Severely Resorbed Mandibular Ridge using Neutral Zone and Monoplane Occlusion Concept

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ABSTRACT:

Severe alveolar ridge resorption is a major complicating factor in the construction of complete dentures. The amount of residual bone will determine both stability and retention of the complete denture. To overcome this problem, the "neutral zone" or "denture space determination" technique may be applied, which takes advantage of balanced muscle activity of the oral cavity and tongue. The stability of mandibular complete dentures can also be improved by reducing the transverse forces on the denture base through monoplane occlusion, as it reduces horizontal vectors of force at occlusal contact.

This article describes the combination of both i.e. neutral zone technique and monoplane plane occlusion to achieve optimum stability in the mandibular complete denture.

Key words: Neutral zone, Monoplane occlusion

INTRODUCTION

The neutral zone or potential denture space refers to a space between the tongue, lips and cheeks, in the edentulous jaws. During functional activity of the mouth, the pressure of the tongue is neutralized by pressure exerted by the cheeks and lips within this neutral zone. Dawson commented that a complete denture is more likely to be stable if located within this denture space.^{1,2,3,4}

In 1948, Sir Wilfred Fish concluded that dentures have three surfaces, each with its own function and important role in achieving denture retention and stability. The three surfaces are: (1) the impression surface (in contact with the tissues), (2) the occlusal surface (in contact with the opposing teeth or denture), and (3) the polished surfaces⁵ (consisting of labial, buccal and lingual surfaces). The polished surfaces which are in contact with the cheeks, lips and tongue, together determine the neutral zone.¹

Zero degree teeth may establish a monoplane (flat plane) occlusal scheme.^{6,7} A monoplane occlusal scheme reduces the horizontal force components because the direction of forces between zero degree teeth in centric and eccentric positions is essentially vertical.⁶

Thus this article describes impression technique utilizing the neutral zone concept and monoplane occlusion to improve the stability of mandibular denture in resorbed ridge cases.

CASE REPORT

A 45 year female patient reported to the Department of Prosthodontics, Kamineni Institute of Dental Sciences, for the prosthetic rehabilitation of maxillary and mandibular edentulous ridges.

Medical history revealed that the patient was a known diabetic and was under medication. The patient was edentulous since 10 months. On examination, the patient had moderately resorbed maxillary ridge and severely atrophied mandibular ridge.

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Procedure

Maxillary and Mandibular primary impressions were made in stock trays using Impression compound. Custom trays were fabricated in autopolymerizing resin and final impression taken in zinc oxide eugenol impression paste after border moulding. Jaw relations were then recorded using conventional occlusal rims made of modelling wax and the record bases were mounted on semiadjustable articulator (Fig 1).

An additional autopolymerizing resin maxillary and mandibular denture base were fabricated and were attached with retentive loops made of thin orthodontic wire in the centre. Two vertical pillars made of autopolymerizing resin were placed in First molar region at established vertical dimension (Fig. 2). This autopolymerizing resin base were placed in the mouth, checked for stability and ensured that loops and vertical pillars do not interfere with muscle movements during function.

Various materials like tissue conditioners⁸, Impression compound , Waxes, Impression plaster and elastomeric impression material have been advocated to record neutral zone.

Impression compound and green stick in 1:1 ratio were softened and mixed together, admixed compound was placed over the denture base and inserted in the mouth and patient was instructed to perform all muscle functions by sucking and swallowing movements and by producing exaggerated 'EEE...' and 'OOO...' sounds¹. The final record should be perfectly stable in place (Fig 3).

The impression of denture space were placed over the master casts. Indices were made using silicone putty (Fig 4). Once polymerized, putty matrices were removed from the cast. Admix material was removed from the bases and replaced with wax using putty matrices .

Neutral zone limits the labial position of the anterior teeth. Zero degree teeth were selected for maxillary and mandibular posterior region to establish a monoplane (flat plane) occlusion (Fig 5).The mandibular posterior teeth were arranged first. They must be positioned within the neutral zone and to the proper height of the occlusal plane.The upper posterior teeth are then positioned.

External impression of the facial and the lingual aspect of trial dentures were made with zinc oxide eugenol impression paste. While recording external impression patient was instructed to do the functional movement like pucker the lips forward, smile broadly etc.

Trial dentures were removed and examined for denture flange dimensions and extensions .Any excess material were trimmed and eliminated all material covering the denture teeth.

Flasking, processing, finishing and polishing of denture is then done using conventional method .

DISCUSSION

Providing stable mandibular dentures for patients with severely resorbed mandibular ridges is a challenge. One can overcome this problem if dentures are fabricated with their contours harmonizing neutral zone. The aim of neutral zone technique is to construct a denture in muscle balance and also aid in determining the correct tooth position.⁹ That is a denture which is in harmony with its surroundings to provide optimum stability, retention and comfort.^{1,3} And monoplane occlusal scheme reduces the horizontal (lateral) force components. So a denture shaped by neutral zone technique with monoplane occlusion will ensure that the muscular forces are working more effectively in harmony and gives advantage of stabilizing potential of oral and perioral musculature⁵ improved speech, and reduces cheek biting.¹⁰

CONCLUSION

The neutral zone concept and monoplane occlusion can be applied in the construction of complete dentures, to improve both denture retention and stability during speech and mastication, especially in those patients with significant loss of alveolar bone.The technique is also able to reduce the incidence of lip,cheek and tongue biting, food entrapment in the molar region as well as improve patient comfort. The neutral zone impression technique may be modified according to circumstances, as long as the basic principle is adhered where the placement of the teeth is within this neutral zone.

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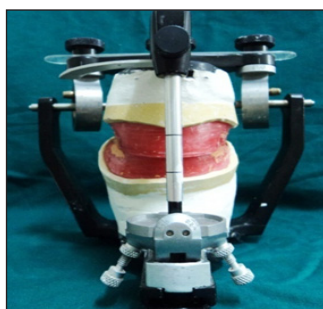


Fig 1. Record bases mounted



Fig 2. Retentive loops attached to denture bases

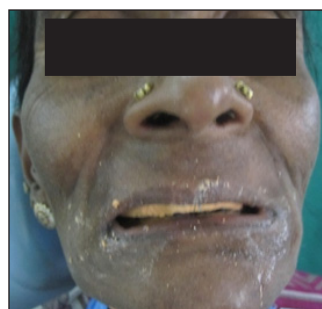


Fig 3. Neutral zone recording



Fig 4. Putty index



Fig 5 Maxillary teeth arrangement



Fig 6 Mandibular teeth arrangement



Fig 7. Trial denture



Fig 8. Trial denture

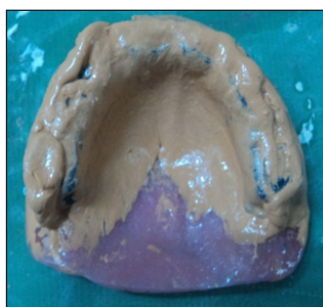


Fig 9. External impression



Fig 10. Finished denture



Fig. 11 Pre - operative view



Fig. 12 Post- insertion view