

# “Developing muscular balance in a denture”

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## ABSTRACT

Complete denture prosthesis functions in an environment where muscles are predominantly strong in nature. Tongue with its spring like action can displace mandibular complete denture, even if it's highly retentive otherwise. Placing an occlusal table in an area of the mouth where the forces from either side of the denture are harmonious with the function of the denture improves patient compliance to the dentures. We present a case of an elderly male patient who reported with a complaint of the loose mandibular denture. While extra oral examination presented normal features, intra oral picture of the mandibular residual alveolar ridge (RAR) was that of severe resorption. Both maxillary and mandibular dentures were fabricated using the concept of the neutral zone to locate the occlusal surface. The material used in this case was a heat cure soft liner, that holds ideal properties in term of dimensional stability over a period of time.

**Keywords** – neutral zone, complete denture, vertical dimensions, jaw relations, soft liner

## INTRODUCTION

Most of the focus in complete denture prosthesis has always been its retention. Different methods, both old and new have been described in the literature to enhance retention. Simple methods like hollowing out the denture from the inside has been shown to enhance retention.<sup>1</sup> One of the other important objectives of impression making in complete dentures is to achieve stability of the final denture base which extends vertically from their respective basal seat area so as to hold artificial teeth. The position of the artificial teeth has to be in an area where the muscles on the buccal and lingual sides do not impair the denture base stability. This zone where the influence of muscular forces is either nonexistent or minimal has been referred to as a neutral zone.<sup>2</sup> The space occupied by the artificial teeth within the denture have also been called as a dead space where there is no conflict between the muscles and the dentures.<sup>3</sup> Creating a polished denture surface that conforms to the anatomical contours of the muscles has been one of the oldest methods to place artificial teeth in the neutral zone. With new materials like self cure soft liner, the technique can become simple with less incorporation of material errors. This article in the form of a case report presents a simple technique

of recording the neutral zone on a trial denture base and then arranging the teeth within the confines of the recorded contours.

## CASE REPORT

An elderly male patient in his early sixties reported to the post graduate section of the department of prosthodontics with a chief complaint of loose mandibular dentures. Medical history was non-contributory while social history revealed he was a school teacher by profession. Dental history disclosed that the patient has been completely edentulous since last 6 years and the current denture was his third denture. The present dentures were fabricated three months back at a local dentist, who had convinced the patient that his mandibular dentures will be always loose in the future due to his poor foundation. Extra oral examination did not disclose any negative findings (**Fig 1A**) while intra oral examination revealed a well formed maxillary residual alveolar ridge (RAR) (**Fig 1B**) and a poorly built mandibular RAR (**Fig 1C**). All other intra oral features were within normal limits. Treatment options that would eliminate his problem of loose dentures included implant supported fixed complete denture for both maxillary and mandibular arches, implant supported overdenture with three or more implants. Economically viable treatment option presented to him was the construction of a conventional complete denture with location of neutral zone. Due to his financial restrictions, the option of implant supported prosthesis was outrightly rejected. Complete denture treatment started by making preliminary impressions and following routine clinical and laboratory procedures of denture fabrication until jaw relations. After jaw relations were recorded, the master casts are mounted on a mean value articulator (Nirmala, India) and the mandibular occlusal rim was stripped of its wax except in the posterior molar region to maintain vertical dimensions. A 19 gauge stainless steel orthodontic wire (Pigeon Dental stainless steel, India) was then bent into a zig zag fashion to create a scaffold for the retention of soft liner (**Fig 1D**). The trial denture base with the mesh was then tried to fit in the patient's mouth and vertical dimensions were verified at the same time (**Fig 2A**). Fresh mix of soft liner (GC Supersoft, Japan) was mixed and applied onto the mesh and the occlusal rim was inserted in the patient (**Fig 2B**). The patient was instructed in advance about various functional movements of the

lips, cheek and the tongue that needed to be performed when the material was still soft. After performing the necessary movements the trial denture base with the recorded neutral zone area was removed and allowed to polymerize (Fig 2C). The external surface form was then recorded in a putty consistency of elastomeric impression material (Reprosil, Dentsply/Caulk; Milford, DE, USA) to

form a putty index, which would mold the trial denture for future neutral zone transfer. Final clinical steps were performed and the denture was inserted at a later date. The patient was put on a frequent follow up, during which he claimed to be highly satisfied with the outcome of the present denture (Fig 2D). Instructions regarding the use of the denture were reiterated at each follow up during visits.

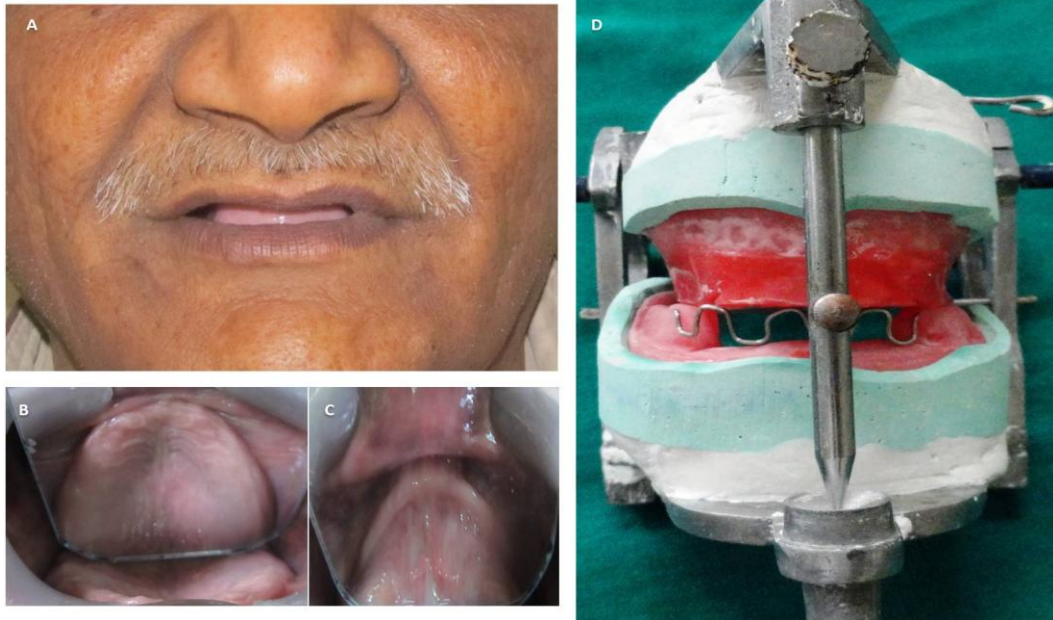


Figure 1: (a) Extra oral view (b) Maxillary completely edentulous arch (c) Mandibular completely edentulous arch showing resorption (d) Incorporating a zig zag stainless steel orthodontic wire on the mandibular trial denture base opposing maxillary occlusal rims at a recorded functional vertical dimension.

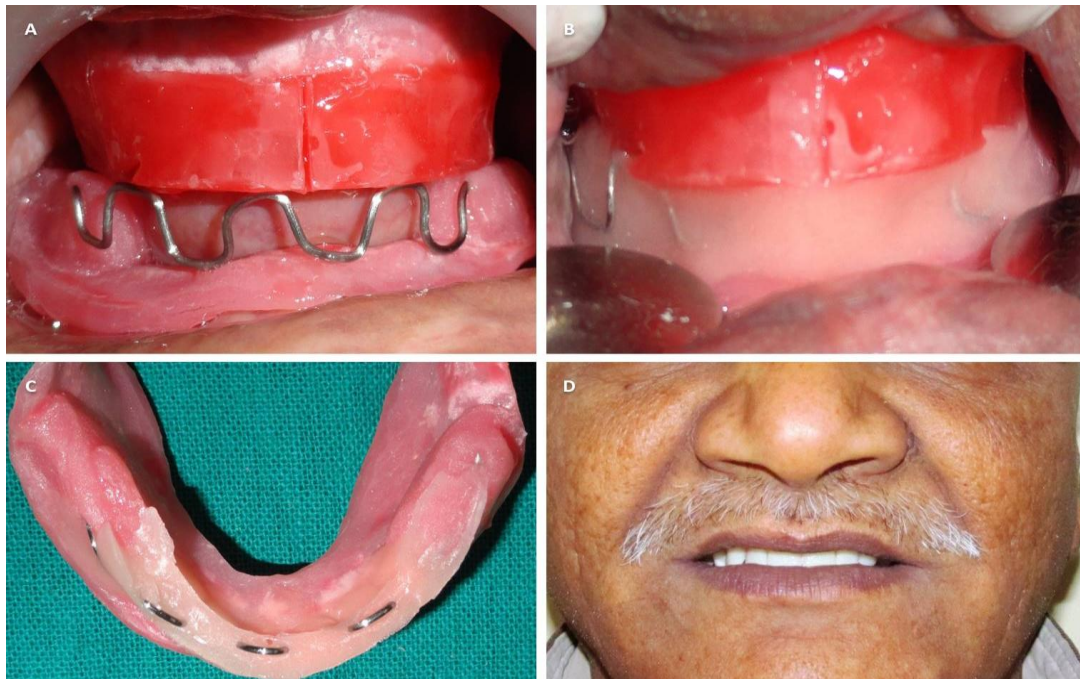


Figure 1: (a) Trial denture base in patients mouth (b) Molded soft liner (c) Neutral zone recorded trial denture base showing impression of the musculature on both sides (d) Final complete denture in patients mouth.

## DISCUSSION

A complete denture fabrication with a neutral zone recording incorporated in the flanges of the mandibular denture has been presented. The unique feature of this article is the material used to record the neutral zone. Compared to other materials used (wax, self cure denture base resin) the soft liner allows multiple recording of the neutral zone during clinical procedures. It also allows variable molding that can be done in increments. The material is dimensionally stable and is not affected by temperature variations usually associated with use of modelling wax. A similar technique in context has been presented in the recent literature.<sup>4,5</sup> However, in that technique the posterior support was provided by self cure acrylic resin which is difficult to remove while our technique uses modelling wax and soft liner in alternate fashion. For any technique to be effective, it has to locate the area which may vary according to the individual's anatomy and his way of functioning.<sup>6</sup> While the pressure applied to the basal seat by the dentist has been shown to vary in spite of the tray design selected,<sup>7</sup> a similar situation exists for recording of neutral zone also. The clinician has no control over the efficacy of tongue and lip or cheek movements that a patient performs during neutral zone recording. The tongue is a very strong muscular organ that is flexible and besides strength it is also fixed at one end while free at the other. This enhances the ability of the tongue to dislodge the denture, especially during mastication of food. The forces are more severe when the tongue tries to identify the shape of the food particles against the flanges of the complete denture.<sup>8</sup> After recording of neutral zone the flanges are no longer straight. Most of the flanges are convex thus providing the external surface of the tongue to adapt better to the lingual flange. This feature has been shown to improve masticatory efficiency in maxillofacial rehabilitation cases including those of maxillectomy.<sup>9</sup> In such cases, the buccal and labial musculature shows better adaptation against a polished surface that allows fitting of the buccinator muscle within its surface. The polished surfaces of the denture for both maxillary and mandibular dentures should allow the surrounding oral musculature to readily adapt according to their individual contours.<sup>10,11</sup>

## CONCLUSION

Incorporating a neutral zone within the complete denture allows patients to overcome the problem of retention that is due to abnormal forces from surrounding musculature. The technique described in this article is recommended for those who are less experts since the use of soft liner allows the addition of increments till the surface has not been molded properly.

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