

Prosthodontic Management of Edentulous Patient with Bucket Handle Fracture: A Clinical Report

Kavita Maru¹, Anup Vyas², Yamini Dhiman³, Aparna Dwivedi⁴

¹Reader and MDS, Department of Prosthodontics, Sri Aurobindo College of Dentistry, Indore, Madhya Pradesh, India, ²Professor and MDS, Department of Prosthodontics, Sri Aurobindo College of Dentistry, Indore, Madhya Pradesh, India, ³MDS 3rd Year Post Graduate Student, Department of Prosthodontics, Sri Aurobindo College of Dentistry, Indore, Madhya Pradesh, India, ⁴MDS 2nd Year Post Graduate Student, Department of Prosthodontics, Sri Aurobindo College of Dentistry, Indore, Madhya Pradesh, India

Abstract

Conventional complete denture therapy for patients with severe residual ridge resorption or a patient with an altered denture space caused by disease, trauma or burns could be a challenge. It is in these patients that a prosthodontist should think outside the box and work out of the comfort zone. The neutral zone, though not a new concept, but definitely is a highly ignored and neglected one. Reasons may vary from added appointments to ignorance and skepticism in the concept. However, if followed correctly, it does provide added stability in cases that can use it. The purpose of this article was to discuss a successful denture delivery using the neutral zone technique in a case that presented with a severely resorbed lower ridge along with the bucket-handle fracture.

Key words: Complete denture, Mandibular fracture, Neutral zone, Resorbed ridge

INTRODUCTION

The loss of teeth causes adverse esthetic and biomechanical sequel, a predicament that is worse when the patient is completely edentulous, and the entire periodontal ligament is lost.¹ The unstable complete mandibular denture is a problem, which dentists repeatedly encounter. Over the past many years, numerous articles have appeared in the literature regarding neutral zone, and how one can fabricate a stable denture by this concept. The neutral zone is defined as 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 equal.² This zone has been given many names such as dead zone,³ stable zone,⁴ zone of minimal conflict,⁵ zone of equilibrium,⁶ zone of least interference,⁷ and potential denture space. Increasing denture stability by using neutral zone of the patient is not only significant in

resorbed ridges, but also proves highly useful in unstable denture bases due to other causes such as glossectomy, hyperactive perioral muscles, fractured and/or malunited jaws, or any other neuromuscular condition that can cause unstable denture bases. It is for these patients that the neutral zone concept becomes increasingly significant and proves highly beneficial for the long term without any surgical intervention.

This clinical report presents prosthodontic management of the edentulous patient with bilateral para-symphysal mandibular fracture with complete denture fabricated using neutral zone concept.

CLINICAL REPORT

A 75-year-old male patient reported with the chief complaint of old unstable mandibular complete denture and a history of bucket handle fracture in the para-symphysal region bilaterally one month back. There was no significant medical history. On intraoral examination it was found that he was completely edentulous with moderately resorbed maxillary arch and lower arch showed substantial amount of fibrotic scar tissue on the ridge portion presenting as a bulge in the first molar region; with

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Corresponding Author: Dr. Kavita Maru, Sri Aurobindo College of Dentistry, Indore, Madhya Pradesh, India. Phone No: 9009648648.
E-mail: drkavita_maru@rediffmail.com

residual ridge, anterior to the scar tissue, severely resorbed (Figure 1). Upon radiographic examination, it was found that there was a mal-union of the fractured part with full fractured segment displaced and rotated downward. The patient was advised for the fabrication of upper and lower complete denture with neutral zone technique as other treatment options like implant-supported complete denture was not feasible due to the age and cost factors.

Primary/Secondary Impressions

Primary impressions were made conventionally with irreversible hydrocolloid and custom tray fabricated. For the upper jaw, border molding was carried out conventionally, and a final impression was made with light body, whereas secondary impression for the lower jaw was made using putty and light body addition silicone impression material. The final cast for the upper jaw and secondary cast for the lower jaw were poured. Custom tray, with auto-polymerizing resin, was then made on this lower secondary cast for a final impression. Border molding with low fusing impression compound was done in sections, with posterior section first then anterior. Anteriorly, the resorbed ridge area was also covered in green stick in the border molding procedure. This was then followed by a definitive impression with light body silicone impression material (Figure 2).

Jaw Relation Procedure

Maxillary and mandibular wax occlusion rims were then fabricated on stabilized record bases in the usual manner. Facebow record and Jaw relation was recorded in the conventional manner, occlusion rims were mounted on Hanau articulator (H2 series).

Neutral Zone Approach

After the mounting, with the maxillary wax rim in place, lower wax rim was completely removed from the record base, and an acrylic shim was made at the established vertical height (in contact with maxillary wax rim). This shim was then perforated to enhance mechanical retention to admix material with which neutral zone of the patient is to be recorded. The patient was made to sit in a comfortable, upright position with the head unsupported. The mandibular compound rim was then inserted into patient's mouth and he was asked to perform a series of actions designed to simulate the physiological functioning, such as asking the patient to smile, grin, wide/large mouth opening, pout/purse lips, count from 60 to 70, talk aloud, pronounce the vowels, sip warm water, swallow, slightly protrude the tongue, and lick the lips. These actions were repeated until the compound became hard and record base with compound rim stable. The occlusal surface of the lower compound rim was then scraped with a sharp blade, to the height of acrylic shim and tried on the articulator with the upper wax rim in place (Figure 3).



Figure 1: Preoperative photograph and orthopantomogram



Figure 2: Mandibular final impression

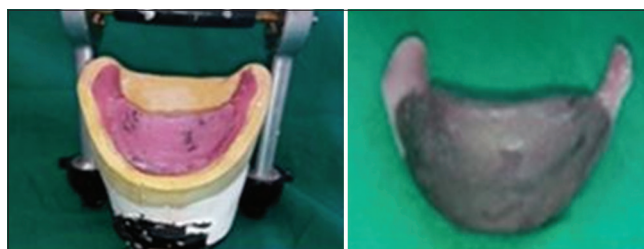


Figure 3: Acrylic shim and neutral zone record in admix material

Neutral Zone Indices

The compound rim was placed on the duplicate master cast. Thick plaster mix was molded around the compound rim, buccally, labially, and lingually; and allowed to set. An intraoral periapical (IOPA) film was coated with petroleum jelly on both the sides and carefully inserted in the plaster mix in the lower central incisor region while the molding procedure. This allowed us to make two sections in the labial index for its easy insertion and removal (Figure 4). Then the molded impression compound rims were removed from the base plate, and the index was replaced and stabilized with wax. The indices preserve the space of the neutral zone. Wax was then poured into the space giving an exact representation of the neutral zone. These newly formed wax rims were then replaced on the articulator.

Teeth Arrangement and Try In

The 0° (cusp-less) teeth were used and maxillary anterior were set first. This was followed by teeth arrangement in the lower wax rim (anterior and posterior). Then the maxillary posteriors were set. Mandibular teeth arrangement was done exactly following the indices. During the setting up of the teeth, their position was checked by putting the indices together around the wax try-in denture. Trimming of the artificial posterior teeth had to be done to accommodate it on the narrow space of neutral zone provided by the patient. Gross balancing was done at this stage to avoid too much trimming of artificial teeth during balancing after denture curing. Wax try-in was done conventionally, and maxillary anteriors were checked for esthetics and phonetics and adjusted accordingly. Since the harmony between the polished denture surface and the surrounding tissues during function is important, it was recorded using metallic oxide impression paste after the try-in (Figure 5). Dentures were processed in the routine manner and were lab remounted. Balancing was done on average values and finished. Polishing for lower denture was done lightly so as to preserve the contour of the flanges (Figure 6).

The patient was recalled periodically to check the tissue response, and the results have been satisfactory.

DISCUSSION

The notion of constructing a complete denture in neutral zone is neither new nor original but, rather, involves an amalgamation of the concepts and ideas of many men into an accomplishable and practical procedure.^{8,9}

Complete dentures, in the oral cavity, act as mechanical devices meant for numerous intentions and must be fabricated in understanding with normal neuromuscular function so that it enhances their stability, especially while functioning.¹⁰ As appropriately mentioned by Beresin.¹¹ “All oral functions such as speech, mastication, swallowing, smiling, and laughing involve the actions of the tongue, lips, cheeks, and floor of the mouth, which are very complex and highly individual. Failure to recognize the cardinal importance of tooth position and flange form and contour often results in dentures, which are unstable and unsatisfactory, even though they were skillfully designed and expertly constructed.”

This philosophically based complete denture design concept has been shown to be especially effective for mandibular removable prosthesis in affected patients with neuromuscular decline and gross dysfunction or post-cancer or post-trauma anatomic deformity or insufficiency.¹²⁻¹⁵

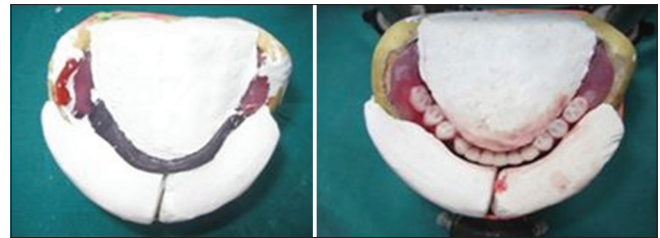


Figure 4: Plaster index of neutral zone



Figure 5: Wax try-in with polished surface impression



Figure 6: Prosthesis insertion

CONCLUSION

The neutral zone technique for denture fabrication takes advantage of stabilizing potential of surrounding soft tissues improving retention and stability in a compromised situation.

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