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Case Report

Complete Denture Fabrication and Management of Severely Resorbed Mandibular Residual Ridge in Geriatric Patient: A Case Report

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Abstract: Completely edentulous patients wearing dentures for a longer period resulting in reduced stability of their mandibular complete dentures because of severe resorption of the lower edentulous ridge and altered neuromuscular control. Eventually, the Conventional complete denture therapy for patients with severe residual ridge resorption is challenging. The continuous ridge resorption smaller the denture bearing area that further reduces stability and retention of the denture. This article describes the neutral zone technique to reconstruct a lower complete denture for patients with severe ridge resorption and improves stability, comfort, and function for the patient with severe mandibular ridge resorption.

Keywords: Neutral zone, residual ridge, denture bearing area, resorption, stability, neuromuscular.

INTRODUCTION

RESORPTION of residual ridges is a patho-physiological process that is progressive, irreversible, and cumulative leading to loss of sulcular depth, vertical dimension loss, and decreased lower facial height and continues with advancing age [1]. Continuous resorption will shrink the supporting areas that will lead to reduced stability and retention of the denture. The retention and stability of complete denture become difficult when ridge resorption gets more severe, especially in the mandible. Implant supported prosthesis can provide long-term prognosis and more stable outcome compared with conventional complete dentures [2]. However, for some medically compromised, financially constrained patients, this therapy may not be a superior choice to new conventional dentures [3, 4].

The stability of complete dentures is influenced by the surrounding neuromuscular system in the oral cavity. Dentures should occupy a position in the mouth where all the forces during function are neutralized. Neuromuscular control is the key for the stability of dentures. Selection and arrangement of teeth and the contours of polished surface play an important role in denture's stability as the denture subjected to destabilizing forces from the tongue, lips, and cheeks if they interfere with the function of oral structures [5].

To overcome this problem, dentures are fabricated with their contours harmonizing neutral zone [6]. According to GPT- 9, "The 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 equal [7]."

With advances in material science and the development of innovative clinical techniques, Prosthodontic advantages of the neutral zone technique may be incorporated into any complete denture treatment. This article describes recording the conventional neutral zone technique in different patients and management of patient compliances in following up appointments.

CASE REPORT

An 85 years old woman reported to the Department of Prosthodontics, with the chief complaint of an unstable loose mandibular denture. The medical history of the patient revealed that she was diabetic and under medication. On clinical examination, the maxillary residual alveolar ridge was rounded and

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moderate formed, but the mandibular residual ridge was of unfavourable prognosis because of nearly flat ridge (classified as Atwood's Order V - low and well-rounded) and oral mucosa was very soft and friable (Fig 1).

Fig 1: Intraoral View

Treatment plan

The treatment approach for this patient was to construct a mandibular denture using the conventional neutral zone technique and to use improvised procedures to minimize the chair-side visits for the patient. The objectives of the treatment are rehabilitation with complete denture therapy in a patient with poor neuromuscular coordination using neutral zone technique to achieve maximum prosthesis stability, comfort, and function; locating the neutral zone and arranging the denture teeth accordingly; and minimizing the ongoing diminution of the residual alveolar ridges.

Primary impressions of maxillary and mandibular arches were made using impression compound material (Y Dents, MDM Corporation, Delhi). Customized trays were made using auto-polymerizing acrylic resin.

Border moulding of mandibular arch was done with admixed material (three parts by weight of impression compound and seven parts by weight of tracing compound (DPI - Pinnacle Impression Compound and Tracing Sticks) Fig 2(a) and zinc oxide eugenol impression paste (DPI impression paste India) as wash impression Fig 2(b).The maxillary occlusal plane is established in conventional manner. The mandibular record base was placed in the patient's mouth and checked for extension and stability by guiding the patient to perform mandibular movements.

Fig 2: (a) Lower Border moulding with admixed material (b) Lower final wash impression

The patient was made to sit in an upright position and maxilla-mandibular relation recorded in conventional manner (Fig 3), later this record was mounted on mean value articulator.

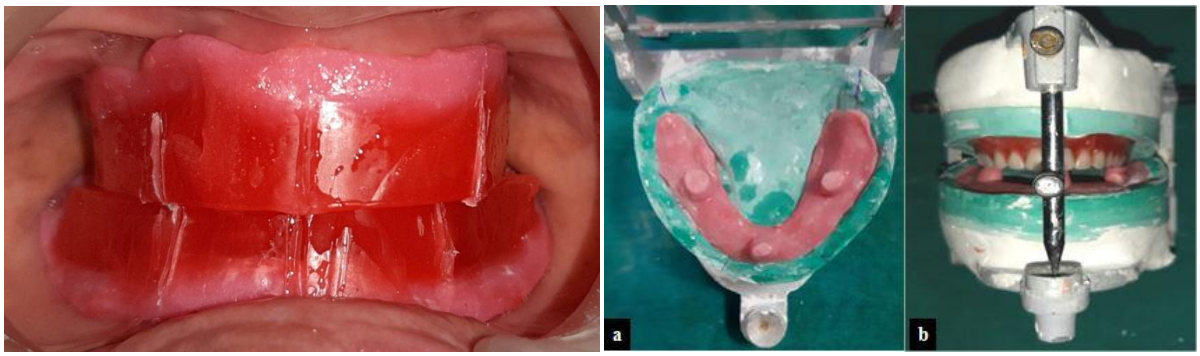

Fig 3: Maxillo-mandibular relationship record, Fig 4: (a) self-cure acrylic stops (b) Maxillary trial denture with stops in occlusion

Maxillary teeth arrangement was done; lower occlusal rim was removed and self- cure acrylic stops fabricated Fig 4(a) over the record base to support the impression compound while recording the horizontal jaw relation and maintaining the exact vertical dimension. Incisal pin should be touching to the incisal table while fabricating acrylic stops Fig 4(b).

This compound material is manipulated in the patient's mouth. The patient was instructed to perform routine mandibular movements (including swallowing, sucking of the lips, and pronouncing the vowels) with upper trial denture in place, which aided in moulding the neutral zone space (Fig 5) while supporting the surrounding oral musculature. The external surface was completely contoured by the orofacial musculature.

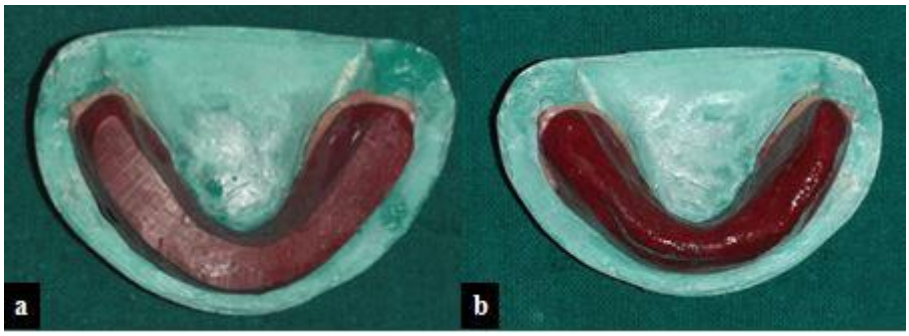

Fig 5: (a) Compound rim (b) Recorded Neutral zone

A polyvinyl-siloxane putty material was used to fabricate an index around the neutral zone recorded to later verify the mandibular teeth arrangement in neutral zone space. Neutral zone record was removed and pillars trimmed from record base. Putty index placed in same relation and wax was poured in the space representing the neutral zone, forming the new occlusal rim on the mandibular record base (Fig 6).

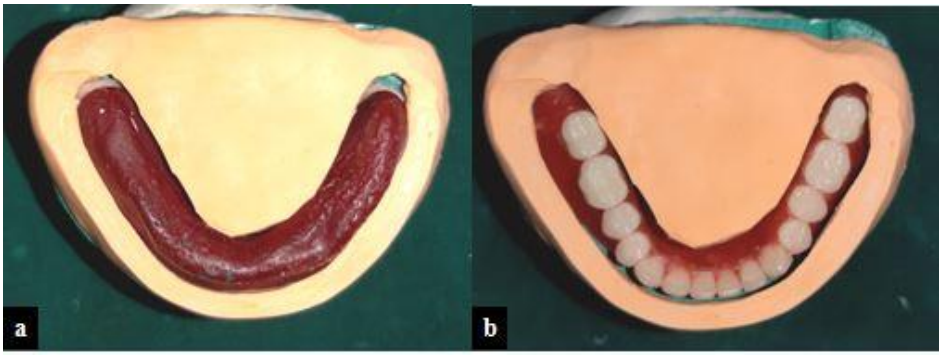

Fig 6: (a) polyvinyl siloxane putty index (b) Verify the mandibular teeth with index

The mandibular teeth were arranged following the index, and the maxillary posterior teeth were modified following the mandibular teeth arrangement. A wax try-in was performed to evaluate mandibular record base stability, aesthetics, and intraoral occlusion (Fig-7). The patient successfully performed all the movements mentioned earlier. The trial dentures were processed with heat-cure acrylic resin (*SR-ivocap Ivoclar)* with injection moulding process (Fig-8). The denture was polished so that the customized contours remained unaltered.

Fig 7: (a) Teeth arrangement (b) Occlusion of trial denture in the mouth

Fig 8: (a) Complete denture cameo surface (b) Silicone relined lower denture

On Periodic recall visits were scheduled to verify the retention, comfort, and function, sore spots are seen, soft tissue at distolingual and retromolar pad areas are very friable and flabby due to very old geriatric patient. Denture relining done with silicone based liner (Moloplast B Detax Gmbh & Co. KG, Germany) Fig 8(b). The denture was inserted and verified for retention, stability, and occlusion. The patient was comfortable with the complete denture prosthesis (Fig 9).

Fig 9: Smile Satisfaction

DISCUSSION

The neutral zone technique described in this article is simplified to record the physiological dynamics of oral and perioral muscle functions. Functional and aesthetic dental treatments for patients with atrophic ridges are an inestimable service provided by a prosthodontist. Denture fabricated with injection moulding process has advantages [8] over normal conventional processed denture. This process ensured limited shrinkage and excellent fit. Porosities are eliminated reducing bacterial growth and foul odours. Wastage of material is avoided because of controlled dosages of monomer and polymer. Inhalation of noxious and toxic particles and vapors is not an issue.

Polyvinyl siloxane putty elastomeric material was for index formation; it shows the smallest dimensional changes upon setting amongst all the elastomeric impression materials, because these are not susceptible to changes in humidity, and these do not undergo any further chemical reactions to release any by products. So chance in shrinkage of index and change in position of space negligible [9]. Anatomic teeth was selected to enhance the chewing efficiency rather than using mono anatomic teeth for stability. Non anatomic teeth do not function efficiently and cannot be corrected by occlusal grinding without impairing their efficiency [8].

This technique has proved to be efficient for patients who are not satisfied with mandibular dentures. The ability of the dental prosthesis to withstand the various forces acting on it, and the residual tissues of the ridge area (along with a properly fabricated prosthesis), help in counteracting these displacing forces and play a role in determining the success of the treatment. In this present case, all the above methods have been utilized to restore masticatory efficiency and improve comfort and aesthetics for a completely edentulous patient with an atrophic mandibular ridge and neuromuscular in coordination.

CONCLUSION

Neutral zone should be recorded in severely resorbed mandibular ridge with altered neuromuscular control which involves only one extra clinical step in conventional denture making that is easy to manipulate. This will help in improving denture stability and will provide more comfort to the patient.

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