ORIGINAL RESEARCH PAPER

Dentistry

NEUTRAL ZONE TECHNIQUE USED FOR MANAGING ATROPHIC MANDIBULAR ARCH: A CASE REPORT

KEY WORDS: Stomatognathic System, Neutral Zone, Retention, Stability

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ABSTRACT

Completely edentulous patients wearing dentures since long time have a problem with decreased stability of their mandibular complete dentures because of severe resorption of lower edentulous ridge and altered neuromuscular control. This problem can be overcomed by incorporating neutral zone technique in complete denture fabrication. In this case report, the steps of recording the influence of neutral zone in both maxillary & mandibular complete dentures are described using condensation silicone material.

INTRODUCTION

Whenever there is the loss of teeth and rehabilitation is planned it should be done in a way that allows efficient and comfortable functioning as well as be in harmonious relationship with the stomatognathic system and the temporomandibular joint[1]. Loss of teeth can lead to multifactorial changes in the mouth like alveolar ridge resorption, expansion of the tongue, and looseness of muscle tone of the face[2]. In case of the resorbed mandibular alveolar ridge, dental implants can impart better stability of mandibular complete dentures; however, it is not always feasible to provide dental implants due to systemic conditions, economical background or patient's psychological condition[1].

Neuromuscular control is said to be the major criteria for providing stability in mandibular complete denture because the available area for support is far less as compared to the maxillary support area. A very significant role in the stability of mandibular complete denture is played by the size, position of prosthetic teeth as well as the contours of the polished surface as they are likely to be affected to impaired forces from the tongue, lips and cheeks if placed in objection with the functioning of these structures[3]. So there exists a space in the oral cavity when all the existing teeth are not present which is known as the Neutral zone/Potential denture space/Dead space/Zone of minimal conflict/Zone of equilibrium[3, 4]. This Neural zone has been 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[5].

This technique of recording zone of minimal conflict is favourable for patients with multitudinous, unstable, unretentive mandibular complete dentures. The objective of this procedure is to place the teeth in such a way that the forces exerted by the tongue and the cheek muscles are balanced and the teeth remain in a safe, protected zone where it is dictated by the oral musculature that may vary from one patient to another[6]. This article attempts to represent a simple yet effective method to attain the above qualities of the denture by using simple chairside dental materials and techniques which can be practised by every dental clinician.

Case Report

A completely edentulous 71 years old female patient with severely resorbed mandibular ridge reported in the Department of Prosthodontics. Patient was denture wearer since 5 years & presented with complain of ill-fitting lower denture.

Maxillary primary impressions was made using impression compound and Mandibular primary impressions was made using McCord's technique5 in a metal stock tray (Fig 2). The cast poured using dental plaster and a custom tray was fabricated.

Fig-1

Fig-2

Custom trays are fabricated in autopolymerizing resin (Rapid Repair Powder; Dentsply) and final impression taken in zinc oxide eugenol impression paste (DPI Impression Paste) after border moulding.

Jaw relation records are then recorded using conventional occlusal rims made of modelling wax (HIFLEX-Modelling Wax, Prevest Denpro) and occlusal blocks are mounted on semiadjustable articulator(fig-3).

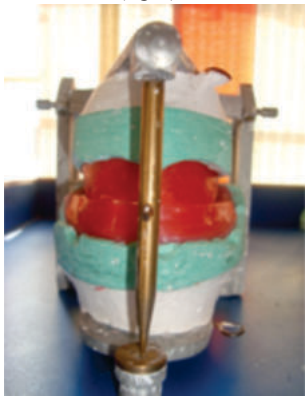

Fig-3

Temporary denture bases were constructed using autopolymerising acrylic resin on master cast. Wax occlusal rims were fabricated and jaw relation was made using tentative method & articulated.

After establishing tentative vertical dimension and centric relation record, new denture bases were fabricated with acrylic stops in molar region that engaging the orthodontic stainless steel wire to it for retention of the moulding material while recording neutral zone. Over posterior acrylic stops, vertical stops were established at the level of vertical dimension using low fusing green stick compound. (Fig-4) Universal tray adhesive was applied over temporary denture base.

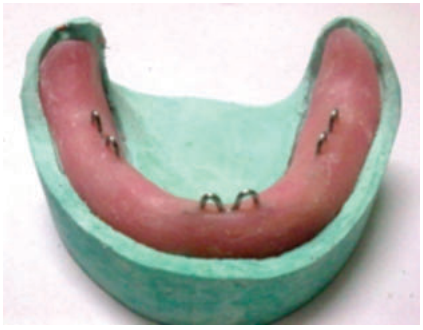

Fig-4

After that impression compound impression material was adapted over the modified denture base at established vertical dimension & moulded according to the muscle action in neutral zone by asking the patient to do actions like swallowing & saying words like "oo", "eee". The internal (Tongue musculature) and external muscle groups (Buccinator Orbicularis group of muscles) have been brought into action, moving them through their respective action paths. In doing so, reciprocating pressures have been exerted upon the impression compound impression material , which had gradually moulded into a state of neutral balance and become centrally inert in relation to all of the complex forces acting upon it. (Figure 5)

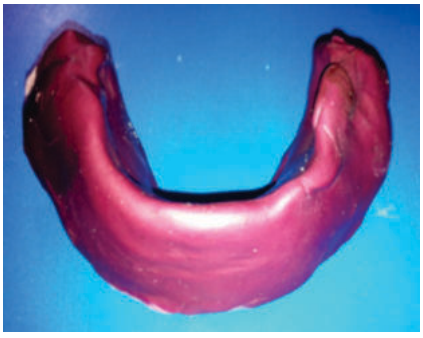

Fig-5

The neutral zone impression so obtained was placed on master model, location grooves were cut on the master cast and was covered with Type-I Dental Plaster index around the impression on both the labial and lingual sides. (Figure 6)

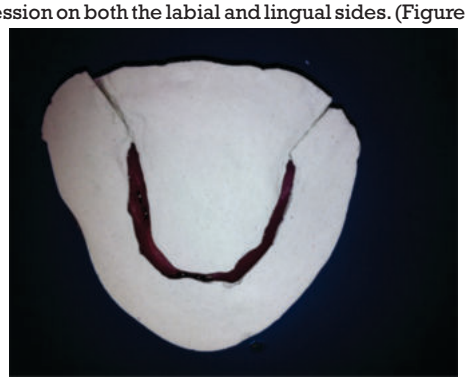

Fig-6

1. Impression compound impression material was then removed from the base plate, the neutral zone space can be preserved using plaster index and molten modelling wax was flowed into the space created between the index that will take the shape of the moulded occlusal rim in neutral zone. Similar procedure was done for moulding maxillary counter part After that teeth arrangement was done and the position of the teeth was checked by placing the index around the wax try-in.

2. Once the waxed up dentures were ready, they were checked in the patient's mouth for esthetics, phonetics and occlusion. Once the try in was deemed satisfactory, the influence of the external & internal group of muscles once again recorded using zinc oxide eugenol paste. (Figure-7)

Fig-7

After completion of try-in, denture fabrication was done in heat cure acrylic resin. Finished and polished complete denture was inserted in patient's mouth after doing minor occlusion correction. (Figure-8)

Fig-8

Post denture instructions given to the patient and recall after 24 hours for checkup. Regular follow-up was done in 3 months interval upto 1 year.

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. That is a denture which is in harmony with its surroundings to provide optimum stability, retention and comfort. A denture shaped by neutral zone technique will ensure that the muscular forces are working more effectively in harmony and gives advantage of stabilizing potential of oral and perioral musculature. Fish and other researchers emphasized on the concept of neutral zone that is the zone of equilibrium in which the outward forces exerted by tongue counterbalance the inward forces of lips and cheeks in complete denture construction[7]. Fish pointed that out of the three surfaces of the denture the polished surface is bounded by the tongue and the cheeks. These are involved in normal physiologic movements such as speech, mastication, swallowing, smiling, and laughing[8, 9]. Hence, the fabrication of the denture must be in harmony with these functions. Maxillary ridge resorption occurs from buccal to palatal side whereas mandibular ridge resorption occurs from the lingual plate towards the buccal side results in more space for tongue movement leading to tongue

enlargement over the years. On the other side, the cheek and lip muscles lose their tonicity with aging. This results in a shift of the neutral zone more towards the buccal and labial sides. Accurate recording of this zone and arranging the teeth in this zone is very important in increasing the denture stability[10]. In this case report, the influence of neuromuscular action on both upper & lower complete dentures was recorded. Technique used here describes the fabrication of denture in coordination with neuromuscular action to develop proper complete denture contours and denture tooth positions.

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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