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Case Series

Neutral Zone Technique for Severely Resorbed Mandibular Ridge: Case Series -

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ABSTRACT

Neutral zone technique is one of the method of management of severely resorbed mandibular ridge cases. Various materials can be used to record the neutral zone. Balanced occlusion is one of the parameter used to aid in the stabilization of the lower denture. In this case series we will discuss about different materials such as low fusing impression compound and tissue conditioner used to record the neutral zone with different form of occlusion.

Keywords: Neutral zone; Severely resorbed mandibular ridge; Balanced occlusion, Low fusing impression compound; Tissue conditioner

INTRODUCTION

The goal of dentistry is for patients to keep all of their teeth throughout their lives in health and comfort. If the teeth are lost despite all efforts to save them, a restoration should be made in such a manner as to function efficiently and comfortably in harmony with the muscles of the stomatognathic system and the temporomandibular joints [1]. The stable position of the teeth represents equilibrium of all the forces acting on them. If that position of equilibrium namely the neutral zone, is not found, the resulting dentition will not last long and will not be esthetically pleasing and the patients use of functional efficiency, maximum length of use and pleasing esthetics will not have been met [2]. To understand the stable position of teeth, the concept of neutral zone is important. The neutral zone concept in complete denture was proposed by Sir E. Wilfred Fish in 1931 [3]. Neutral zone is defined as potential space between lips and cheeks on one side, and tongue on other side, that area or position where forces between the tongue and lips or cheeks are equal [1]. Neutral zone approach to complete denture is to locate the area in edentulous space where the teeth should be positioned in such a way that the forces exerted by muscles will stabilize the denture [4]. Neutral zone technique is the most effective way for patients who have unstable and unretentive dentures.

Occlusion is also one of the important factor affecting stability of denture. To minimize dislodging forces the occlusion can be balanced throughout the functional range of movement of the patient [5].

In this article two cases of severely resorbed mandibular ridge rehabilitated by complete denture using two different materials for recording neutral zone technique with balanced occlusion and centric occlusion are presented.

CASE PRESENTATION

Case report 1

A 60 year old female patient reported to the department of prosthodontics with the chief complaint of difficulty in mastication due to all missing teeth in upper and lower arch since 6 years. Extraoral examination showed ovoid facial form, concave and sunken profile. The lip length was average (Figure 1). Intraoral examination showed favourable maxillary residual ridge and severely resorbed mandibular ridge (Figure 2). Thus it was decided to fabricate lower complete denture utilizing neutral zone impression technique.

Primary impression: A primary impression for maxillary ridge and mandibular ridge was made with impression compound (Y-Dent) in a metal stock tray (Figure 3). The primary impression was poured with dental plaster (Dent kaldent). On primary cast, custom tray was fabricated.

Final impression: The sectional border moulding was done

for maxillary arch with low fusing impression compound (DPI-Pinnacle). All green technique was used to record the borders of mandibular arch [6]. Final impression was made with Zinc oxide eugenol impression paste (DPI-Impression Paste) (Figure 4). Final cast was poured in dental stone (Dent kaldent).

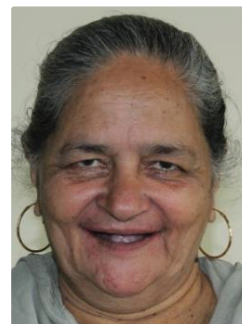


Figure 1: Extraoral picture.



Figure 2: Intraoral picture.

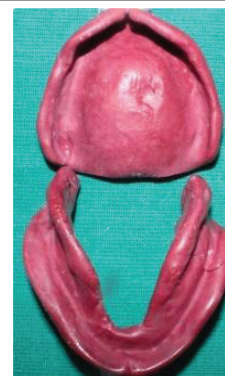


Figure 3: Primary impression.

Jaw relation: Two sets of autopolymerising denture base were fabricated. On one set wax rims were fabricated. Horizontal and Centric jaw relation was recorded. Facebow record was made to orient maxillary cast on articulator (Hanau). The Mandibular cast is mounted using the centric relation record.

Recording neutral zone: On articulator three acrylic pillars one in center, two in molar region were made on second set of mandibular denture base to maxillary denture base to maintain the vertical dimension. Wires were adapted in between the pillars for reinforcement (Figure 5). Low fusing impression compound was manipulated and adapted on mandibular denture base [7]. With whole assembly placed in mouth patient was asked to purse lips, count from 60 to 70, smile, grin, pronounce the vowels, swallow, slightly protrude the tongue and lick the lips until the material has set. A wash impression with zinc oxide eugenol paste (DPI-Impression Paste) was made to record the Neutral zone (Figure 6). On articulator, dental plaster index was made in three sections right buccal, left buccal, lingual around neutral zone impression (Figure 7).

Teeth arrangement: Molten wax was poured in neutral zone space. Mandibular occlusal rim height was adjusted according to previously recorded jaw relation. Semi-anatomic crossed-linked acrylic denture teeth for both anterior and posterior region were selected. These teeth were selected as they don't put more pressure on ridge thereby prevents underlying bone resorption and allows easy reshaping for occlusal adjustments. Mandibular anterior and posterior teeth were arranged according to plaster index (Figure 8). Complete teeth arrangement was done so as to provide multiple bilateral posterior contacts in centric relation. A protrusive interocclusal record was made to set the condylar guidance on the articulator (Figure 9). Anterior try-in was done and anterior guidance was set. Programming of articulator was done as lateral condylar guidance of 15°; horizontal condylar guidance of 25° and anterior guidance of 5° for balanced occlusion.



Figure 4: Final impression.



Figure 5: Adaptation of wires between acrylic pillars.

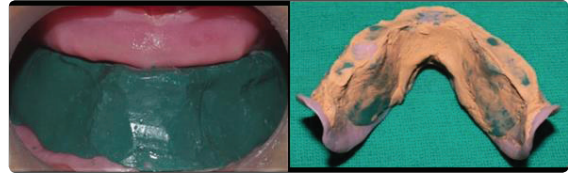


Figure 6: Recording neutral zone with low fusing impression compound and zinc oxide eugenol wash on recorded neutral zone.



Figure 7: Plaster index of recorded neutral zone.

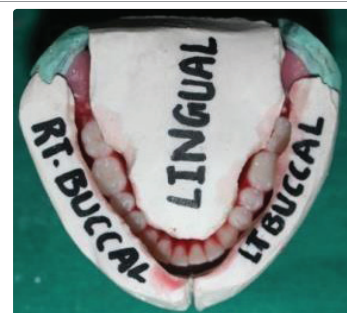


Figure 8: Mandibular teeth arrangement within plaster index.



Figure 9: Protrusive bite record for balanced occlusion.

Try-in: Trial Dentures were evaluated to verify centric relation, occlusal vertical dimension and Balanced occlusion.

Denture insertion: Dentures were fabricated, inserted and evaluated (Figure 10).

Case report 2

A 65 year old female patient reported to the department of prosthodontics with the chief complaint of loose lower denture since 1 year. Extraoral examination showed tapered facial form and concave profile and medium lip line (Figure 11). Intraoral examination showed adequate maxillary residual ridge and severely resorbed mandibular

ridge (Figure 12). All the steps followed were same. Neutral zone was recorded using tissue conditioner [8] (D- soft) (Figure 13). Dentures were fabricated, inserted and evaluated (Figure 14).

DISCUSSION

The ability of a denture to be firm, steady or constant, to resist displacement by functional stresses and not to be subjected to change of position when forces are applied defines stability. With severe resorption the muscular attachment comes nearer to the residual ridge affecting stability of mandibular denture more than maxillary denture [9]. To overcome the problem of unstable denture, the neutral zone concept was introduced. Neutral zone is the space where the forces between the tongue and cheeks or lips are equal or neutralized [9]. It is used as a guide to develop physiologic contour



Figure 13: Recording neutral zone with tissue conditioner.



Figure 14: Final dentures.

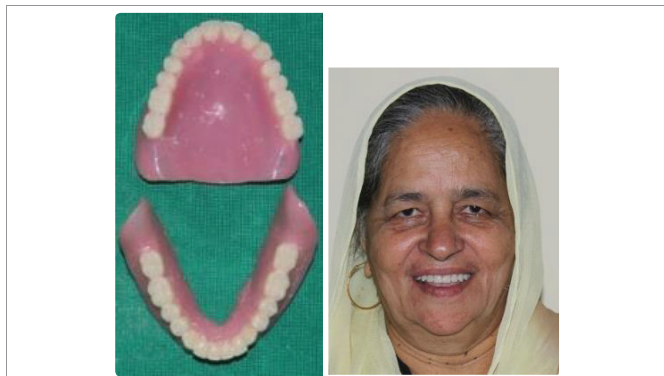


Figure 10: a. Final dentures. b. Post-operative extra oral view.



Figure 11: Extraoral picture.



Figure 12: Intraoral picture.

for polished surfaces of the mandibular denture and for determining physiologically appropriate facio-lingual tooth position. The neutral zone technique is used to achieve retention and stability in atrophic mandibular ridges [10].

Various materials have been used to record the neutral zone such as, waxes, impression plaster, impression compound, tissue conditioners, and polyether. The material should be reasonably slow setting to permit the oral musculature to shape it to the appropriate contour and dimensions. Adel AM et al, in 2019 conducted study to determine relationship between the crest of the alveolar ridge and neutral zone and to compare its location recorded by low fusing impression compound and tissue conditioner. They concluded that no significant difference was noted in the positions of neutral zone recorded in relation to the alveolar ridge crest [10].

In this case series two commonly available materials namely, low fusing impression compound with zinc oxide eugenol paste wash and tissue conditioner were used to record the neutral zone. Low fusing impression compound is a thermoplastic material with low viscosity allowing ease in manipulation of oral musculature, better flow and good accuracy. Tissue conditioners are viscoelastic material they have long working time, good flow, longer durability and don't resist forces exerted by the surrounding tissues. Thus most accurate neutral zone position which is close to crest of ridge was recorded by using the above two materials.

Occlusion is one of the factors for enhancing the principles of denture. Balanced occlusion helps in directing the forces of mastication to aid in the balance and stabilization of the functioning mandibular denture. Thus, denture fabricated by neutral zone impression technique and balanced occlusion aids in retention and stabilization of the denture rather than dislodging the denture

during function as well as reduced food lodgement, good esthetics due to facial support, proper positioning of the posterior teeth allowing sufficient tongue space. Clinicians must identify and record the neuromuscular dynamics of the oral tissues and this should be applied in the construction of the definitive prosthesis [3].

CONCLUSION

The coordination of complete dentures with neuromuscular function is the foundation of successful stable dentures. Neutral zone impression technique and type of occlusion are one of the factors aiding in stabilization and retention of the mandibular denture in severely resorbed ridge cases.

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