



IMPROVING THE STABILITY: NEUTRAL ZONE CONCEPT: A CASE REPORT

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ABSTRACT Stability is the most important requirement of complete denture prosthesis therapy owing to its contribution to physiologic comfort to the denture wearer. Perioral musculature plays an important role in stability of complete denture and in a patient with advanced residual ridge resorption it becomes a critical factor for long term success. Neutral zone concept utilizes the physiologic functional activity of perioral musculature to mold the external polished surface of denture which enhances the stability with respect to dentofacial kinetics. The present case report describes rehabilitation of severely resorbed mandibular ridge by complete denture prosthesis with neutral zone concept and conventional maxillary complete denture prosthesis.

KEYWORDS : Complete denture, neutral zone, prosthesis, stability.

INTRODUCTION:

Construction of complete denture prosthesis in severely resorbed ridges is a challenging task. Loose and unstable denture is always a major problem faced by complete denture patient. Stable position of the teeth represents equilibrium of all the forces acting on them and perioral musculature plays the prime role in maintaining that equilibrium. Neutral zone is that area in mouth where forces of the tongue pressing outward are neutralized by the forces of cheek and lip pressing inward¹. However in absence of teeth tongue enlarges to occupy the space previously occupied by teeth and outward forces exerted by tongue is tend to be more. Progressive loss of residual alveolar ridge further compromises the neutralization of forces and fabrication of complete denture prosthesis with arrangement of teeth in this situation leads to compromised prosthesis stability. When all teeth are lost there exists within the oral cavity a void that may be called the potential denture space bounded by soft tissues both externally and internally. Since these forces are developed through muscular contraction during various functions of chewing, speaking and swallowing, they vary in magnitude and direction in different individual in different periods of life. These soft tissues that form the external and internal boundaries of denture space affect and influence the stability of denture and help to determine the teeth position and external contours of the polished surface of denture.

Sir Alfred Fish² was the first person to describe the importance of polished surface in denture stability and he was first to describe the concept of neutral zone. Many authors like Levin³,

Dr. Russell Tench⁴, Beresin and Schiesser⁵ supported his concept. Beresin and Schisser⁵ in 1976 concluded that the neutral-zone philosophy is based upon the concept that for each individual patient there exists within the denture space a specific area where the function of the musculature will not unseat the denture and where forces generated by the tongue are neutralized by the forces generated by the lips and cheeks.

Many materials are tried in literatures to locate the neutral zone supported by different authors. Buchman and Gelb, Lott and Levin have described the use of waxes in locating the neutral zone. Beresin, Schisser and Tench⁵ have suggested the use modeling compound and this method has been used in this case.

Case report: A female patient aged about 45 years reported in the Deptt. of Prosthodontics, Regional dental college, Guwahati, complaining of missing all teeth in her upper and lower jaw since past 6 months. On clinical examination, the maxillary residual alveolar ridge was rounded and well formed, but the mandibular residual ridge was severely resorbed (fig 1). The treatment approach for this patient was to construct a mandibular denture with conventional neutral zone technique using admixed compound (mixture of modeling impression

compound and low fusing green stick compound). Closed mouth impression was made in the original technique given by Beresin and Schisser¹. Here open mouth impression is made, original concept given by Beresin and Schisser being the same.

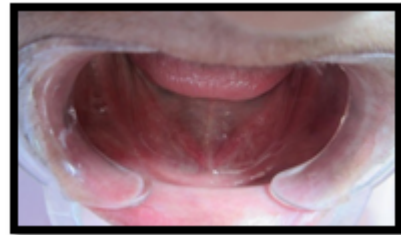


Fig : 1 Severely resorbed mandibular ridge.

Primary impressions of the upper and lower jaws were made with impression compound (Pyrax Polykem ,India) and the model was poured with type III dental stone.(Kalstone ,Kalabhai , Mumbai, India). Fig 2

Fig 2 Border molding is done with low fusing green stick compound (DPI Pinnacle) and final impression is made with zinc oxide eugenol impression paste (DPI) and secondary caste is poured with type III dental stone.(Kalstone ,Kalabhai , Mumbai, India). Fig 5 Fig 4 Tentative jaw relation done and the maxillary and mandibular occlusal rims were articulated in a mean value articulator.

Lower occlusal rim is removed and fins projecting upward are attached to the lower denture base to secure the admixed compound (Fig 2). Lower occlusal rim is replaced by admixed compound.



Fig 2: projecting fins

After softening in warm water, lower special tray with admixed compound inserted into patient's mouth and carefully seated. Patient is instructed to swallow and then purse the lips as in sucking.

These actions will mold the compound by the contraction of perioral musculature. A well developed neutral zone can be obtained through

proper handling of the material. (Fig: 3)

Excess compound is trimmed and patient is instructed to repeat the movement once again.



Fig: 3: recorded neutral zone

Three notches were made on the cast: one in the anterior and two in the posterior regions. This was followed by applying separating medium on the cast, the record base, and over the neutral zone record. Boxing was done with modeling wax, and plaster of Paris was poured into the boxing up to the upper surface. The plaster indices were sectioned into a labial and buccal index and a lingual index in order to guide the removal and placement of these indices. (Fig: 4).

The neutral zone record is then removed, and the vertically projecting fins are removed. Separating medium was applied on the inner surfaces of the indices which were then reassembled. Wax was poured in the space representing the neutral zone, forming the new occlusal rim on the mandibular record base

The mandibular teeth were arranged following the index, and the maxillary teeth were arranged following the mandibular teeth arrangement. In order to preserve the contours established by the plaster indices in the neutral zone, no additional wax added to the denture flanges.



Fig: 4: plaster index

A wax try-in was performed to evaluate mandibular record base stability, aesthetics, and intraoral occlusion. The patient successfully performed all the movements mentioned earlier (Fig 5). The trial dentures were processed with heat-cure acrylic resin. The denture was polished so that the customized contours remained unaltered.



Fig: 5: Denture Try-In

The denture was inserted and verified for retention, stability, and occlusion. The patient was comfortable with the complete denture prosthesis. Periodic recall visits were scheduled to verify the retention, comfort, and function (Fig: 6).



Fig: 6: Finished denture

DISCUSSION:

The neutral zone has not been given enough importance in the literature. But as a determinant of stability its importance cannot be ignored. The two men who probably have contributed the most to these concepts are Sir Wilfred Fish and Dr. Russell Tench. Sir Wilfred Fish² described the importance of polished surface of denture in providing stability of the prosthesis. The theory of neutralization of forces that stabilizes the denture and rationale involved was one of the major contributions made by Dr. Russel Tench⁴. Many materials have been suggested to locate the neutral zone and accordingly to shape the polished surface of denture like: modeling plastic impression compound, soft wax, a polymer of dimethyl siloxane filled with calcium silicate, silicone, and tissue conditioners and resilient lining materials. Irrespective of the material used, location of neutral zone is done by various functional movements of lip, cheek and tongue which mold the material into proper shape thereby producing the polished surface of denture in harmony with the peri oral musculature.

Conclusion:

The ultimate goal of any prosthodontic treatment is to restore the form, function and aesthetics of the patient. All oral functions, such as speech, mastication, swallowing, smiling, and laughing, involve the synergistic 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. Positioning artificial teeth in the neutral zone achieves two objectives. First, the teeth will not interfere with the normal muscle function, and second, the forces exerted by the musculature against the dentures are more favorable for stability and retention.

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