CASE REPORT

USE OF PHONETICS IN NEUTRAL ZONE - A CASE REPORT

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ABSTRACT

Increasing life expectancy, age-related reduction in adaptability and progressive severe mandibular resorption, all add to the difficulty in achieving prosthetic success. The conventional mandibular denture is usually less stable than the maxillary one and successful treatment involves the development of stable mandibular denture. Several methods considering physiologic function with an objective to enhance denture retention, stability and comfort during mastication have been developed since many decades. Piezography method is a neutral zone technique that utilizes phonetics to record the potential denture space. It is because a person swallows up to 2400 times per day and during the entire swallowing teeth comes into contact less than second which can be sum up to less than 17.5 minutes per day. Since, a person speaks more than he involves swallowing, we can follow phonation method to fabricate dentures for more stable denture prosthesis.

KEY WORDS

Neutral zone, Stability, Phonetics

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INTRODUCTION

With the increase in life expectancy, decrease in adaptability and continuous bone resorption there is a requirement of an approach that would overcome such a situation. Size and position of denture teeth and the contours of polished surface play a crucial role in denture's stability. Techniques that incorporates the above mention factors must be considered while fabricating a denture to improve retention and stability in severely atrophic ridge cases. Which would lead to harmonizing of forces exerted by the tongue, lips, cheeks, and floor of the mouth with the denture fabricated.

One of the methods to overcome such an unstable denture is neutral zone technique. This concept was developed by Wil-ford Fish[1] and Russell Tench[2].

When all-natural teeth are lost there exist a void called potential denture space. Neutral zone is that area of the void where the force exerted by lips and cheeks is neutralized by the force exerted by the tongue. Hence there is a requirement of recording neutral zone as they are different for different individual in order to properly position the denture teeth and contour the polished surface.[3]

There are various methods of recording this neutral zone. Both conventional and functional methods have certain flaws. So, in 1974 Klein introduced a method called the piezography method which utilizes speech for recording the potential denture space for arrangement of denture teeth. It is a technique where the pressure generated during oral function (i.e. speech) is used to record the shape of the potential denture space. As it is a shape formed by pressure which in Greek term is denoted as peizography.[4]

This technique can be used in fabricating denture in all completely edentulous patient but it is particularly important in elderly patient with long period of edentulousness and severely resorbed ridge. As phonation is used for recording the neutral zone the patient can easily practice before the record is made. The procedure could be very easily explained to the elderly patient. It can be easily scrutinized for proper oral function as the patient pronounce the phonemes which allows for proper placement of artificial teeth.

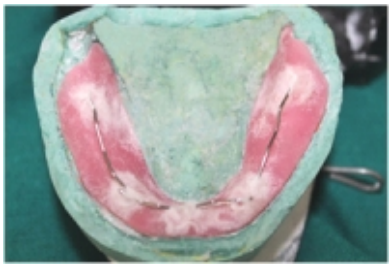

Fig 1: Record base with retentive tag

Fig 2: Peizographic record

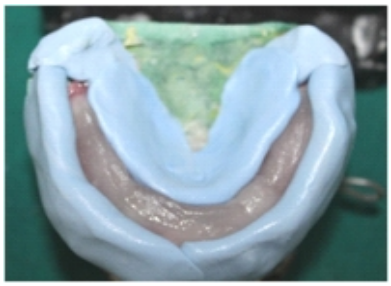

Fig 3: Record placed on the articulator

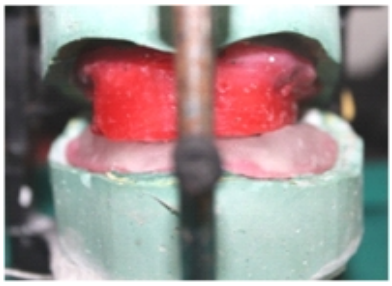

Fig 4: Putty index of neutral zone record

Fig 5: Teeth arrangement with in the recorded zone

Fig 6: Occlusion in lateral view

Fig 7: Smiling patient

CASE REPORT

A 70-year-old male patient had come to the Department of Prosthodontics and crown and bridge, Haldia Institute of Dental Sciences and Research, with the chief complaint of loose denture. So, he wanted to make a new denture in order to improve speech, aesthetic, and mastication. On oral examination it was found that the patient had highly resorbed, flat mandibular ridge (Atwood VI), loss of vertical dimension and loss of muscle tonicity. In this case due to highly resorbed ridge it was decided to record neutral zone using piezographic technique to fabricate complete denture rather than conventional one in order to increase stability of the denture.

Initial steps up to jaw relation were same as during conventional complete denture fabrication. After this step neutral zone was recorded using piezographic method. A silicone based soft liner was used. The maxillary rim was placed in the mouth.

Since, piezographic method requires phonation for recording neutral zone, the patient was made to practice certain phoneme before it was implemented. The patient was asked to say "SIS"4 times followed by strong "SO" for recording posterior mold. For anterior piezography, the patient was asked to say "T, D, M, P" in sequence 5 times (fig 2). Once the speech is cleared then next step is done.

Next, on the mandibular cast another stabilize

base plate was fabricated using self cure acrylic resin. For adhering moldable material we placed a retentive wire tags upto vertical height on the record base using self-cure acrylic resin (fig 1). In this technique it uses soft liners (Silicone based) which has more desirable viscoelastic property, working time and setting time, it can be applied in increments upto the vertical height determined for the patient during jaw relation which makes it easy to handle and work on patients. The final mold was kept on the mandibular cast and inspected (fig 3). Excess was removed with a knife and the height was adjusted.

After recording the neutral zone space, the main objective was to convert this record into usable space for arranging teeth. In order to convert this record into a usable space for arranging teeth a silicone index (fig4) was fabricated on the mandibular cast before that grooves were placed on the land area of the mandibular cast (two right and left and one anteriorly) so that index can be repositioned on the cast. Silicone material was mixed, and index was made by adapting around the piezography on the outer and inner side.

After the mold was removed, the void was filled with molten wax to obtain a new wax rim. The wax rim was adjusted to predetermined vertical dimension and placed in the articulator. The teeth were now arranged on newly obtained space (fig 5). The waxed-up teeth arrangement was tried in patient mouth, esthetics, occlusion and speech were checked and corrected. Denture were finally fabricated and inserted in patient mouth after correction of processing error (fig6). Occlusion was satisfactory. Facial profile improved drastically, and denture was stable in function.

RESULT

On follow up of the patient after 3 months, it was found the patient was satisfied with the function of the denture he can speak, and chew properly and comfortably.

DISCUSSION

Fahamy et.al.[5] have found in their study that teeth arranged over the centre of alveolar ridge had better mastication ability. However, all the subject had higher sense of comfort and speech ability with the denture fabricated using neutral zone. The concept behind arranging teeth in neutral zone has 2 objectives. First objective is that teeth will not interfere with the oral function and second objective is that the forces exerted by the musculature on the denture will be more favourable for stability. Piezography helps to record neutral zone. The denture fabricated using this technique is more stable than any other neutral zone technique.[6]

A person swallows up to 2400 times a day and during entire swallowing sequence teeth comes into contact for less than a second.[7] So, it can be concluded that the teeth come into contact with each other to direct occlusal forces to the periodontal tissues in an entire day is around 17.5 minutes during function.[8] Since a person speaks more than he swallows so the phonation method used in fabricating a denture would be more stable.[6]

Ikebe K found in his study found that teeth arranged using piezography technique was slightly buccal to the residual alveolar ridge.[9] So, by observing different studies it can be said that the longer the period of edentulousness more buccally is the neutral zone is located from the crest of the ridge.

CONCLUSION

Denture fabricated using piezographic method of neutral zone record provided comfort and confidence to the patient. Thus, it can be said that by recording the neutral zone using this technique provided greater stabilization and retention by utilizing surrounding musculature in function.

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