

Speech Comprehension (Prosthetic contemplation)

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Abstract : Fabrication of complete denture is an art but through understanding of science behind its each aspect is utmost important. Complete denture not only restores the lost tissues and function but also speech. Each step in making of complete denture has a significant effect on speech and patients overall personality in society. This article describes these aspects of complete denture construction and their effect on speech production.

Keywords - Speech, Denture thickness, Phonetic, Pronunciation, Posterior palatal seal, Vertical dimension.

I. Introduction

It is the prosthodontists' responsibility to develop a complete denture which not only provide esthetics, and function but also provide the opportunity to the patient to speak in a similar manner as he/she was speaking earlier. Rehabilitation of edentulous patient with Complete denture with correct speech demands not only proper skill but also thorough understanding of speech science and factors affecting it.^{1,2}

Speech adaptation to new complete dentures normally takes place within 3 to 4 weeks after insertion in most of the individuals but few suffers a lot. The reason may be many, but improper denture fabrication is major cause. Variation in thickness and or volume of denture, changed vertical and horizontal dimension of occlusion new position of teeth etc may result in unpredictable changes to the voice and patient suffer throughout the life till he can develop a new way of speaking same old words.¹⁻³

II. Discussion

There are various design considerations which should be kept the mind during denture fabrication as they affect final outcome specially in sense of speech.

1.Denture Thickness and Peripheral Outline

Intraoral articulators and structures plays important role in speech production . The volume of the air make the major part of the speech, when denture is in mouth the total intraoral cavity space is reduced resulting in incorrect phonation. This is due to the decrease of air volume, and loss of space for the tongue because of unduly thick denture bases.

Allen,Wright and others (1949)⁴ found that the level of the natural or optimal position of the tongue is most cases seem to be controlled by the vault of the palate. Extremely sensitive tongue becomes retracted after the insertion of the artificial palate. The borders of the denture should not be overextended so as to obstruct the movement of the oral tissues. Any interference will result in improper speech, especially if the functional movement of the lips and tongue is hampered. If the thickness of the denture base covering the palatal area is more, then lisping of the sounds will occur.

Martone (1957)⁵ coluded that (1) front vowels were more affected by palates than back vowels. (2) Consonants are affected by artificial palates more than twice as much as vowels. (3) Speech deteriorated in direct proportion to the thickness of the palate. Allen⁴ (1958) found that an additional thickness of 1mm in the anterior palatal area made speech uncomfortable and indistinct.

The denture base thickness in the postdam area will annoy the dorsum of the tongue which will hamper the speech and there is a likelihood of feeling of nausea and denture may be unseated during sounds. The upper denture base in posterior region must be kept thin and the posterior border should be merge with soft tissues.

If the lingual flange of the lower denture is too thick in the anterior region, will encroach the space needed by the tongue and this results in faulty production of 's' sound. It can be corrected by arranging the artificial teeth, in same position as the natural teeth will occupy and shaping the lingual flange so that there will be enough tongue space to establish⁶.

2. Vertical Dimension

Fymbo (1936) pointed out that defective speech is most frequently associated with increased vertical dimension which may result in difficulty in pronouncing sounds like 'b, m, p, f, v'. Landa⁷ (1947) recommended various phonetic tests to determine proper vertical dimension using sounds such as 's, c, z'.

Silverman (1956)⁸⁻¹⁰ stated that sibilant sound 's' as a mean for determining the correct vertical dimension. He established the "closest speaking space" and used this as clearance area between the dentures.

The bilabial sounds like 'm' is useful in determining the vertical dimension, when this sound is pronounced there will be passive contact between the upper and the lower lip, which aid in obtaining the correct vertical dimension.

Seifert E, Runte C, Riebandt M, Lamprecht - Dinnesen A, Bollmann F (2000)¹¹ concluded that variations of thickness and or volume of dentures and of the vertical and horizontal dimension of occlusion may result in unpredictable audible changes to the voice. Patients should be informed about possible effects of modified or new dentures on their voice.

3. The Occlusal Plane¹²⁻¹⁴

If upper anteriors are too short of occlusal plane the word 'v' will more likely pronounce as 'f'. If upper anteriors are arranged below the occlusal plane the word 'f' will be pronounced like 'v'. The labiodental sounds like 'f', 'v' are helpful in determining the anteroposterior positioning of the upper incisors and the occlusal plane. If the occlusal plane is set too high the correct positioning of the lower lip may be difficult, if on the other hand the plane is too low, the lip will overlap the labial surfaces of the upper teeth to a greater extent than is required.

4. The Antero posterior Position of the Incisors¹³⁻¹⁷

In setting the maxillary anterior teeth consideration of their labiopalatal position is necessary for the correct formation of the labiodental F, V and Ph.. The change in any direction will result in improper execution of /s/ sound. The labial angulation seem to have greater effect than palatal angulation. If the lower anterior teeth are arranged too lingually, the tongue is forced to arch itself upto a higher position and the airway is to be too small and there will be faulty pronunciation in 's' and 'z' sounds.

5. The PPS Area¹⁷⁻²⁰

One of the most important area which will affect the vowels I and E –and the palate velar consonants K, G. Increased thickness in the postdam area results in irritation of the dorsum of the tongue, impeding speech and possibly producing a feeling of nausea.

6. Width Of Dental arch

If the arch is narrow, which will crumple the tongue which affects the size and shape of the air channel results in faulty articulation of the consonants like 't, d, l, n, s, t' where lateral margins of the tongue makes contact with palatal surfaces of the upper posterior teeth. Every effort should be made, consistent with the general mechanical principles, to place the lingual and palatal surfaces of the artificial teeth in the position previously occupied by the natural dentition.^{18,20,21}

7. Relationship Of Upper Anterior to Lower Anterior teeth

The S sound requires near contact of the upper and lower incisors so that the air stream is allowed to escape through a slight opening between the teeth. In abnormal protrusive and retrusive jaw relationships, some difficulty may be experienced in the formation of this sound, and it will probably necessitate adjustment of the upper and lower anterior teeth antero posteriorly, so that approximation can be brought about successfully.^{17,22,23} The consonants Ch, J and Z require a similar air channel in their formation. Silverman^{9,10} (1967) stated that the Whistle and Swish sounds are produced during speech due to air abnormally passing over the tongue and through the interincisal space. These sounds may be caused due to decreased overjet.

III. Conclusion

Replacement of missing dentition with complete denture is a major event in patient's life. This brings drastic change to his/her activities. The denture should be such that the patient get along with it very comfortably and the most essential facet of this is speech. In complete dentures the impressions, accurate periphery, vertical dimension, arch form, position of the anterior teeth etc should be such that they allow natural articulators such as tongue, lips to work efficiently with the morphological changes in the oral cavity thus results in pronunciation of each word to its fullest perfection. This article reveals all the steps of denture fabrication with its effect on speech which help in construction of a perfect complete denture.

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