Effect of Interocclusal Distance on speech sounds in complete denture wearers

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Introduction

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The primary goal of prosthetic dentistry is to provide what is missing in term of patient suffering, however introduction of a new prosthesis often precipitate new oral physiology. Speech difficulties as a sequel of oral rehabilitation with complete dentures are very common but generally are a transient problem.

Articulatory deficits may be generally classified into three categories: omission of a phoneme, substitutions and distortions. The later is the most usual consequence after prosthodontics treatment.

Fortunately, the phonetic problems that arise when speaking with new dentures rarely pose serious difficulties .Because most patients ability to adapt is good, initially experienced speech disturbances will be transient. Nevertheless, the treatment objectives are to make complete dentures conform to the individual patient existing neuromuscular patterns, rather than depend too much on the patient's ability to adapt.

The established vertical dimension of occlusion of the denture and speech are strongly correlated, as speech can be used as a guide when establishing the correct vertical dimension. On the other hand, impaired speech in complete denture wearer is multi-factorial with numerous etiological factors

currently mentioned in the dental literature, among these factors is the vertical dimension of occlusion.

Although long term studies have been conducted to evaluate the effect of tooth position and contour and thickness of the denture base on speech in denture wearers, the effect of interocclusal distance on speech in denture wearers is lacking in the literatures.

Review of Literature

Mechanism of Speech

Phonetics is defined as "the scientific study of speech sounds, their formation (articulations), substance (acoustic properties), perception, and the application of this study to reach a better understanding and improvement of their linguistic expression."[(1)]

The word phonetics is derived from the word phone, which is a term for any sound that can be produced by the human vocal tract. A phone is not a speech, although, it could be, When a phone becomes a speech sound in a particular language, it is called a phoneme.[(2)]

Speech is the observable behavior involving the production of articulated sounds.[(3)]Speech is a very sophisticated ,autonomous ,unconscious activity .Its production involves : Neural ,muscular ,mechanical ,aerodynamic ,acoustic ,and auditory factors. Speech sounds are regulated human noises, which have linguistic and communicative significance.[(4)]

Speech production:

The analysis of speech sounds production in prosthodontic practice is based on some understanding of the nature of the speech sounds themselves, how they are made, and the anatomic and physiologic structures involved.

Speech mechanism is divided into six components: Respiration, phonation, resonation, articulation, neurologiocal integration, and audition.[5]

Speech begins with a relatively brief inspiration followed by an extended expiration during which pulmonary air interacts with resonating tubes and chambers in the throat, mouth, nose and cranium to produce an audible speech signal.The muscles primarily responsible for inspiration to support speech are the diaphragm and the external intercostals. Whenever inspiration of a greater volume of air is necessary (such as for long or loud utterances), accessory muscles may become active. The inspiratory muscles enlarge the thorax and consequently decrease alveolar pressure to create a pressure gradient that favor the inward flow of air.[6]

The outward flow of air from the lungs during expiration is the power supply for speech. For unvoiced sounds, air from the lungs passes through an open larynx and is modified by downstream articulatory structures to produce speech sounds that are periodic in nature. For voiced sounds, air from the lungs sets adducted vocal folds into vibration, which creates a periodic sound wave that is selectively resonated and filtered within the vocal tract.[6]

Sound produced at the level of the vocal folds is not the final acoustic signal that is perceived as speech. This sound is modified by the chambers and structures above the level of the glottis. The pharynx, oral cavity and nasal cavity are resonating chambers by selectively filtering some frequencies and damping others, thus refining tonal quality.[6]

Articulation for speech sounds occur at the oral cavity. There, the sound waves are converted into meaningful speech by the action of the movable articulatory structures including the mandible, tongue, lips and soft palate against an immovable articulatory structure including the hard palate, alveolar ridge and teeth. If oral structures such as the tongue, adjacent soft tissues, jaws or lips are altered surgically and/or neurologically, articulation may be compromised. Structural alteration in the oral cavity that allows leakage of air induces compensatory respiratory responses to maintain adequate oral air pressures for speech.[6]

Speech is integrated by the central nervous system both at the peripheral and central levels. Neurologic impairments may compromise a specific component of the speech mechanism such as the vocal folds, soft palate or tongue, or it may indirectly affect the entire speech system. A cerebrovascular accident may compromise the ability of the patient to