Evaluation of Chewing Efficiency and Electromyography Activity of Muscles of Mastication of Patients wearing Complete Denture Lined by Flexible Acryl

(Randomized Clinical Trial)

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Dedication

I dedicate this work to

My Father's Soul,

My Wife

&and my

Children

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Introduction

Edentulism, is one of the major problems that has an impact on both patient and dentist. Completely edentulous patients have problems concerning function such as impaired chewing ability, problems with pronunciation of certain words in addition to the social impact which might lead to a decrease in quality of life. This all puts a lot of pressure on dentists to try to satisfy such patients and achieve the main goal of impaired functions ***(Lovely, 2005).***

Complete denture prosthesis involves full mouth rehabilitation, replacing missing teeth with their supporting structures. An important goal that must be achieved is to construct a retentive and stable prosthesis that subsequently enhances both function and esthetic ***(Goiato, 2008).***

There are several methods that has been advocated to improve retention of complete dentures; one of such methods is relining the fitting surface of the denture. Many materials could be used, as plasticized acrylic resin, silicone rubbers, tissue conditioner and thermoplastic material. ***(Chladek et al., 2014)***

Flexible acrylic resin is a material that was introduced in 1950, to overcome most of the limitations of the conventional acrylic resin. Providing better denture adaptation as well as denture retention due to its light weight and engaging more desirable undercuts. Not only esthetics was provided by this material but also patient satisfaction. This material could be used as a lining material ***(Kikuchi, 1999).***

A question now arises if the Chewing efficiency and the Muscle activity of completely edentulous patients improve when using a flexible acrylic resin as a relining material?

Review of Literature

Loss of natural teeth would have serious effects on the masticatory function. Completely edentulous patients would suffer from bone resorption, tempromandibular disorders and hypotoncity of the muscles of mastication which would damage the masticatory process ***(Goiato et al., 2010).***

The masticatory apparatus would perform the chewing action. The masticatory apparatus consists of the teeth, jaws, muscles of mastication, and tempor-mandibular joint that would all be used in chewing. In completely edentulous patients, due to loss of teeth the muscles of mastication would play a major role in determining the chewing ability and efficiency of the patient ***(Goiato et al., 2008).***

There are four important muscles of mastication's; masseter, temporalis, medial pterigoid and lateral pterigoid, another group of musculature as in the tongue, cheek and hyoid bone are described as accessory muscles of mastication (muscles of deglutition and speech**)** ***(Virag-Srivastava et al., 2012).***

All mandibular muscles are made up of two or some of these muscle types. The masseter muscle, for example, is considered a short muscle, as well as, a bipennate muscle. The most prevalent muscles fibers in the muscle determine its movement and its type of work ***(Adhikari et al., 2011).***

The muscle fibers are bounded together to make functional units called motor units, that vary in size. The muscles that perform intricate operations usually have the fewest fibers while, those performing the mental tasks usually have many fibers ***(Esmat et al., 2010).***

Each motor unit has its own blood and nerve supply. The nerve supply is a motor nerve which transmits impulses to the muscle from the brain. These impulses activate the muscle fibers to contract yielding a small quantity of the electrical energy. This energy is called electric action potential. When this action potential has large amplitude, many motor units are contracting and vice versa ***(Gill, 2009).***

Muscles of mastication are mainly divided according to their function into elevators and depressors.

Elevator muscles are the muscles that in contraction elevate or close the mandible **(*The Academy of Prosthodontics, 2005)***

a. **Masseter Muscle:** is a powerful muscle that provides the ability to chew efficiently, the masseter is elevating the jaw, and its deep portion acts as a retractor to the mandible ***(Lilian A.Z et al., 2010).***

b. **Temporalis muscle:** The temporal muscle raises the mandible and retracts it after protraction ***(Sicher H. and Loyd-Dubrul E, 2005).***

c. **Medial pterigoid Muscle:** Its attachment to the maxillary tuberosity could affect the posterior extension of the denture border in the pterygomaxillary notch. The principal function of this muscle is the elevation and lateral position of the mandible. It is also active during protrusion ***(Murray et al., 2004).***

d. **Superior head of lateral pterigoid:** the superior head of the muscle appears to be active during mandibular closing ***(Murray et al., 2004).***

Depressor Muscle: are the muscles that in contraction depress or open the mandible ***(The Academy of Prosthodontics, 2005).***

Infetrior head of the lateral pterigoid: The inferior head assists in the translation of the condyle downwards ***(Murray et al., 2004).***

Masseter Muscle:

It originates from the inferior border and deep surface of the zygomatic arch. This attachment may extend anteriorly to the zygomatic process of the maxilla and hence, during contraction may exert some influence on the border and denture flange in that area. The origin posteriorly extends to the anterior aspect of the capsule of the tempromandibular joint (anterior to the articular eminence).

The superficial part inserts into the lower half of the lateral surface of the ramus. The deep portion is inserted into the superior half of the lateral surface of the ramus and the coronoid process. Thus, the deep fibers have a more nearly vertical component to their line of force while the superficial fibers have a relatively greater oblique component. The upper third of its outer surface is covered by tendons' fibers, but the muscle itself is formed by intricate arrangement of the tendons and fleshy bundles, the net effect of this bundles contraction is to make the muscle very powerful. Contraction of the masseter muscle may also affect the distobuccal corner of the lower denture border. It was found that the masseter is a powerful muscle that provides the ability to chew efficiently. The main function of the masseter is elevation of the jaw, and its deep portion acts as a retractor to the mandible ***(Lilian A.Z., et al., 2010).***

Temporalis Muscle:

It is a large fan-shaped muscle that originates in the temporal fossa and the temporal fascia of the side of the skull. The fibers converge antero-inferiorly to form a heavy bundle which passes deep to the zygomatic arch. The temporalis muscle inserts into the superior border and medial surface of the coronoid process of the mandible. The fibers and tendon extend down the anterior surface of the ramus and along the temporal crest nearly to the retromolar triangle. Part of the temporal tendon may be incorporated into the retromolar pad. In the area of the maxillary tuberosity, the temporal muscle is attached to the medial surface of the coronoid process when lateral protrusive movement is incorporated, the above structures will force the buccinator and the overlying mucosa to encroach on the buccal vestibule. The temporal muscle raises the mandible and retracts it after protraction ***(Sicher H. and Loyd-Dubrul E, 2005).***

Medial pterygoid Muscle:

It originates from the medial surface of the lateral pterygoid plate, from the pterygoid fossa and the tuberosity of the maxilla. Its fibers are directed downwards and laterally, to insert on the medial surface of the mandible near the angle.

This muscle, together with the masseter muscle from outside, forms a sling which attach the mandibular ramus, the attachment to the maxillary tuberosity could affect the posterior extension of the denture border in the pterygomaxillary notch. The principal function of this muscle is the elevation and lateral position of the mandible. It is also active during protrusion ***(Murray et al., 2004).***