Evaluation of Hard Occlusal Splint Thickness on Muscular Activity for Temporomandibular Joint Dysfunction Patients Using Electromyogram (EMG)

A thesis submitted to
Faculty of Dentistry, Ain Shams University
In partial fulfillment of the requirement
For master degree in removable prosthodontics

By
Eman Mahmoud Ahmed Elshewy
B.D.S, 2004
Cairo University

Ain Shams University
2012

Supervisors

Dr. Magdy Eid Mohamed

Associate Prof. of Prosthodontics
Faculty of Dentistry, Ain Shams University

Dr. Sahar Fathi Ahmed

Associate Prof. of Physical Medicine, Rheumatology and Rehabilitation
Faculty of Medicine, Ain Shams University

Ain Shams University
2012

Acknowledgment

*I am thankful to **ALLAH** who gave us the knowledge and science and gave me the strength to accomplish this work.*

*I would like to express my deepest appreciation and gratitude to **Dr. Magdy Eid Mohammad,** Associate Professor of Prosthodontics, Ain Shams University, who kindly and generously gave much of his effort, continuous guidance and precious experience that helped me through this work.*

*My great appreciation and thanks to **Dr. Sahar Fathi,** Associate Professor of Physical medicine, rheumatology and rehabilitation.*

I would like also to thank Mr. Abdullah Hassan Ramzy the technician who helped me a lot in finishing the lab steps of this work.

Dedication

I dedicate this work to my parents who gave me support and encouragement to finish this work.

I dedicate this work also to my small family, my husband and son for pushing me all the time.

A very special dedication to my mother, the unknown solider in my life, without her I couldn't have done anything.

Contents

Page

List of Figures

List of Tables

Review of Literature

Temporomandibular Joint Anatomy

Temporomandibular joint lies between head of the mandible (below) and articular fossa and eminence of zygomatic process of temporal bone (above).

It has a capsule which is attached to margins of articular fossa and eminence(above) and to neck of the mandible(below), the capsule is very weak except laterally where it is by temporomandibular ligamanet.[1]

The joint cavity is divided by an articular disc into two joint cavities each one is lined by a separate synovial membrane. The upper joint cavity is concavo-convex while the lower is concave.[1]

Muscles of mastication

Several pairs of muscles attached to the mandible for producing the movements necessary to suckle, ingest and masticate food, swallow and produce speech.[1]

Masseter muscle

It is quadrilateral in shape, it consists of 2 heads; superficial head which originates from zygomatic process of

maxilla and lower border of zygomatic arch, while the deep head originates from the inner surface of zygomatic arch.Both heads are inserted in the outer surface of the ramus of mandible.[1]It acts as a powerful muscle for elevation and protraction of the mandible.[2][3]

Temporalis muscle

It is fan shaped. It consists of three groups of fibers, anterior fibers which are vertical, posterior fibers which are horizontal and middle fibers which are oblique. It originates from inferior temporal line, floor of temporal fossa and temporal fascia while all fibers are inserted at tip, anterior border and medial surface of coronoid process.[1] It acts primarily for elevation of the mandible and posterior are responsible for retraction of the mandible.[2][3]

Medial pterygoid muscle

It is rectangular in shape. It has two heads; superficial head which originates from maxillary tuberosity and the deep head which originates from medial surface of lateral pterygoid plate. It runs laterally, posteriorly and inferiorly to be inserted onto the medial surface of mandibular angle.[1] On contraction, it helps to elevate and protrude the mandible and also helps it for side to side movement.[2][3]

Lateral pterygoid muscle

It is a short, thick conical muscle. It has two heads; the upper head arises from infra temporal surface and infra temporal ridge of greater wing of sphenoid, while the lower head arises from lateral surface of lateral pterygoid. The whole muscle is inserted onto the front of neck of mandible, the capsule and articular disk of temporomandibular joint.[1] On contraction, it helps to protrude the mandible and side to side movement when acts with medial pterygoid of the same side. Also both lateral pterygoids help to depress the mandible.[2][3]

Temporomandibular disorder

Temporomandibular joint disorder is a collective term embracing a number of clinical problems that involve temporomandibular joint, masticatory mandibular or both. Other terms include facial arthromayalgia, temporomandibular joint pain, dysfunction syndrome, masticatory pain syndrome and myofacial pain syndrome. Temporomandibular joint disorders are cluster of related disorders in the masliscatery system that have many common features.[4] Temporomandibular disorder is any disorder that affects or is affected by deformity, disease, misalignment or dysfunction of the tempromandibular articulation. This includes occlusal deflection of the temporomandibular joints and the associated responses the

musculature.[5] Over the years functional disturbances of the masticatory system have been identified by a variety of terms; Costen (1936) [7] described a group of symptoms around the ear and temporomandibular joint. He was the first to associate ear pain with functional disturbances of the masticatory system.

He believed that the loss of posterior teeth causes increased ear pressure that led to these symptoms and the name Costen's syndrome developed.[7]

As temporomandibular disturbances became popular, the term temporomandibular joint dysfunction syndrome had been introduced. Later Ramfjord and Ash described it as functional temporomandibular joint disturbances. [6]

Some terms described the suggested etiologic factors such as; occlusomandibular disturbance and myoarthropathy of the temporomandibular joint, while others stressed on pain, such as pain dysfunction syndrome, myofacial pain dysfunction syndrome and temporomandibular joint dysfunction syndrome.[6]

A broader more collective term which is craniomandibular disorders is also used. The American Dental Association adopted the term temporomandibular disorder which does not merely suggest problems that are isolated to the joints only but also includes all disturbances associated with the

function of and so temporomandibular joint and the masticatory muscles.[6]

Causes of Temporomandibular disorder

- **Loss of posterior teeth**

Costen(1936)[7] stressed on the role of vertical dimension in relation to joint pain and he described Costen syndrome consisting of joint pain, muscle tenderness, joint sound and limitation of jaw movement. These symptoms occurred as a result of mandibular over closure due to loss of posterior teeth which leads to distal displacement of the condyle and so causing pressure on the auriculotemporal nerve and ear structures.[7] But Writter et al concluded that after 6 years follow up of patients with absence of posterior teeth, the risk of temporomandibular disorder does not increased [8], while Tallent et al found a positive association between missing lower teeth and the presence of disk displacement.[9]

- **Muscle hyperactivity and muscle spasm**

Many authors agree on multifactorial etiology for the temporomandibular joint dysfunction syndrome, but muscle hyperactivity was considered as one of the main causes. Whether this hyperactivity has a central (stress or emotional