EVALUATION OF THE EFFECTS OF INTRA-ARTICULAR INJECTION OF MORPHINE PLUS METHYLPREDNISOLONE AFTER TEMPOROMANDIBULAR JOINT ARTHROCENTESIS

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DEDICATION

To the candles who lightened my life….

To my Family

Your love, encouragement, support and understanding made all things possible.

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ABSTRACT

Arthrocentesis is recognized increasingly as the first line surgical intervention in patients who do not respond to conservative management. Arthrocentesis was thought to break down adhesions within the joint and remove inflammatory mediators that responsible for chronic pain with the subsequent relief of TMJ pain and improvement of TMJ function. Intra-articular injection of various drugs such as corticosteroids, local anesthetic agents, morphine, sodium hyaluronate and macrolide antibiotic has been used in conjunction with the TMJ arthrocentesis to enhance its outcome with varying degrees of success.

Despite the reported long-term palliative effects of arthrocentesis with intra-articular injection of either corticosteroid or morphine on signs and symptoms of ID of TMJ, the clinical response of arthrocentesis with intra-articular injection of a combination of morphine and methylprednisolone in relation to the synovial level of TNFα in patients with TMJ derangement has not yet identified. This point of investigation was selected for the present study.

Key Words: Arthrocentesis - Morphine and methylprednisolone- TNFα

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LIST OF ABBREVIATIONS

TMJ: Temporomandibular joint.

TMD: Temporomandibular disorders

ID: Internal derangement

MRI: Magnetic resonance imaging

TNF: Tumor necrosis factor

IL: Interleukin

SF: Synovial fluid

CL: Closed lock

MIO: Maximum interincisal opening

MMO: Maximum mouth opening

M: Morphine

C: Cortisone

MC: Morphine &Cortisone

VAS: Visual analogue scale

UJC: upper joint compartment

ml: milliliter

mm: millimeter

cm: centimeter

Pg/ml: pictograms (one trillionth of gram) per milliliter

INTRODUCTION

Internal derangement (ID) of the temporomandibular joint (TMJ) has been established as a therapeutic challenge in the oral and maxillofacial clinics. This could be attributed to the lack of complete knowledge regarding their definite causes and pathogenesis with the subsequent evolution of numerous concepts, theories and treatment methods leading to confusion in an already complicated field of study.

Despite the prevalence of ID, its exact etiology and pathogenesis are still unknown. The wide variety of treatment modalities that have been used for management of this health problem indicates the misunderstanding of its pathogenesis with the subsequent empirical treatment. Synovial fluid (SF) analysis has recently provided valuable information about joint pathology and associated pain. Substantial concentrations of inflammatory and pain mediators such as prostaglandins, serotonin and proinflammatory cytokines {Tumor necrosis factor alpha (TNFα), Interleukin-1,6(IL-1, IL-6) and cyclooxygenase-2} have been found in SF in patients with painful dysfunctional TMJs.[1-4] The levels of inflammatory mediators were also found to be increased in the SF of patients with TMJ pain compared to controls and correlated positively with local pain.[5] TNFα was believed to be one of the most important members of the inflammatory cascade.[6] It was also thought to be a critical modulator of bone resorption. TMJ pain on palpation was found to correlate positively with the preoperative levels of TNFα in SF of patients with ID.[7]

Being a painful and incapacitating condition, ID requires early diagnosis and treatment. A wide variety of conservative and surgical approaches for its treatment have been proposed [8-13] The adoption of conservative treatment

modalities is based on the assumption that irreversible and invasive therapies are not indicated to treat symptoms in the absence of a well identified pathogenesis pathway.[14-15] For this reason, surgical interventions are reserved for a minority of cases, and are usually used with caution as well. Considering these premises, in the case that non-surgical treatments fail to alleviate the symptoms, minimally invasive surgical procedures were proposed with encouraging results.[16-18]

The introduction of TMJ arthroscopy was a turning point in the treatment of ID. Numerous studies have since proved the value of arthroscopy for the management of symptomatic TMJs with ID.[19-23] Arthrocentesis is a natural consequence to arthroscopic lysis and Lavage. The physical action of this technique was thought to be responsible for its success.[24,25] It has been proved to be simple and relatively less invasive alternative.[19-21]

Arthrocentesis is recognized increasingly as the first line surgical intervention in patients who do not respond to conservative management. Arthrocentesis was thought to break down adhesions within the joint and remove inflammatory mediators that responsible for chronic pain with the subsequent relief of TMJ pain and improvement of TMJ function.[22] Intra-articular injection of various drugs such as corticosteroids,[26] local anesthetic agents, morphine,[27] sodium hyaluronate[28,29] and macrolide antibiotic[30] has been used in conjunction with the TMJ arthrocentesis to enhance its outcome with varying degrees of success.

Despite the reported long-term palliative effects of arthrocentesis with intra-articular injection of either corticosteroid or morphine on signs and symptoms of ID of TMJ, [31,32] the clinical response of arthrocentesis with intra-articular injection of a combination of morphine and methylprednisolone in relation to the synovial level of TNFα in patients with TMJ derangement has not

yet identified. Therefore, this point of investigation was selected for the present study.

REVIEW OF LITERATURE

The challenges posed by temporomandibular joint disorders (TMDs) span the research spectrum, from causes to diagnosis through treatment and prevention. Researchers throughout the health sciences are working together not only to gain a better understanding of the TMJ and muscle disease process, but also to improve quality of life for people affected by these disorders.

Anatomy of the TMJ:

TMJ is the site of articulation between the cranial base and mandible. It is the most active joint in the body as it needs to open and close up to 2000 times/day to account for a full day's worth of chewing, talking, breathing, swallowing, yawning, and snoring.[33,34] It is composed of articular disc, condyle, glenoid fossa, articular eminence, articular capsule and temporomandibular ligaments. The TMJ differs from other joints by having the articular surfaces as well as the central portion of the articular disk composed of fibro cartilage instead of hyaline cartilage.[35]

The disc is an oval fibrous plate between the condyle and glenoid fossa. It divides the intrarticular space into an upper and a lower joint compartment. It is a firm but flexible structure that changes in position during condylar movement. The shape of the superior surface of the disc is congruent to the glenoid fossa while its inferior surface is congruent to the surface of the mandibular condyle.

Anatomically the disc is biconcave and can be divided into three regions as viewed from the lateral view: the anterior band, the central intermediate zone, and the posterior band. The intermediate zone is thinnest and is generally the area

of function between the mandibular condyle and the temporal bone.[36]Posteriorly the disc continues into a thick double layer of vascularized connecting tissue called the bilaminar zone (the retrodiscal tissue). Laterally and medially the disc is not directly attached to the capsule but fused to the medial and lateral poles of the condyle.

Both the superior and inferior joint compartments drop inferiorly around the condyle to reach its lateral and medial poles. Thus they have a semilunar shape, both in an antero-posterior and medio-lateral aspect. The disc is believed to have several roles, such as, cushioning and distributing joint loads, promoting joint stability during chewing.[37] The disc, fossa and condyle are surrounded by an articular fibrous capsule and ligaments.The capsule limits the movement in the joint during mandibular articulation and thus prevents luxation.[38,39]

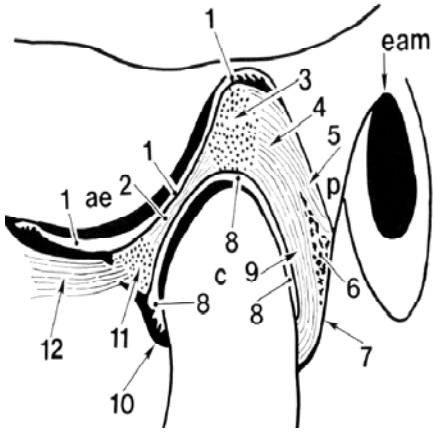

Fig.1: Anatomy of the TMJ.

Parasagittal section of the TMJ : Mandibular condyle (c), post glenoid process (p), external auditory meatus (eam), articular eminence (ae), upper joint compartment (1), the intermediate zone (2), the posterior band (3), the bilaminar zone (4), upper portion of bilaminar zone (5) spongy tissue with a profuse nerve and blood supply (6), posterior portion of joint capsule (7), lower joint compartment (8), lower portion of bilaminar zone (9), anterior portion of joint capsule (10), anterior band (11), small portion of the superior head of the lateral pterygoid muscle (12). ***Reprinted from*:** Hylander W: Functional anatomy. In Laskin D, Sarnat B: The temporomandibular joint. A basis for clinical practice, 4th ed. Philadelphia, W.B. Saunders Company 1992: page 62.

The synovial membrane is composed of a thin layer of vascularized connective tissue. It lines the inner surfaces of the joint capsule and all the

surfaces not under shearing or compressive load. Its main function is to produce synovial fluid. This fluid is composed of a plasma ultra filtrate, sodium-hyaluronate and a few cells. Synovial fluid participates in the nutrition of the avascular articular tissue and also lubricates the components within the joint during movement.[35]

Biomechanics of the TMJ

The TMJ is the only joint with a rigid end point of closure, which is defined by the occlusal surfaces of the teeth. The mandible connects the left and right TMJs into one functional unit (diarthriodal joint).[40] It is generally considered to be load-bearing during masticatory function.[41]

Three motions occur at the mandible, depression (during mouth opening), protrusion/retrusion (or protraction/retraction) and lateral excursion (right and left).[42] TMJ provides for hinging movement in one plane which occurs in the inferior joint compartment and therefore can be considered a ginglymoid joint. It also provides for gliding movements which occurs in the superior joint compartment and classifies it as an arthrodial joint. Thus it has been technically considered a ginglymoarthrodial joint.[43] The positioning of the condyle and disc within the fossa, as well as the constant contact between the condyle, disc, and eminence, is maintained by continuous activity of the muscles of mastication, particularly the supramandibular group. [36]

Internal Derangement

The term TMD is an umbrella term that actually encompasses two groups of patients: those with true pathology of the TMJ (TMJ problems) and those with