CLINICAL ASSESSMENT OF THE EFFICACY OF BOTULINUM TOXIN TYPE A IN THE TREATMENT OF CHRONIC RECURRENT TEMPOROMANDIBULAR JOINT DISLOCATION.

THESIS

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بسم الله الرحمن الرحيم

قالوا سبحانك لا علم لنا الا ما علمتنا انك أنت العليم الحكيم

صدق الله العظيم

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Dedication

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TMJ	Temporomandibular Joint
TMDs	Temporomandibular Disorders
BTX-A	Botulinum Toxin Type A
FDA	Food Drug Administration
LD50	Lethal Dose to50% female Webster mice
EMG	Electromyogram
VAS	Visual Analogue scale
MH	Masseteric Hypertrophy
RT	Right
LT	Left
U	Unit

Introduction

Temporomandibular Joint Disorders is a collective term bracing a broad spectrum of clinical joint and muscle problems, in the orofacial area.

These disorders are characterized primarily by pain, joint sounds and irregular or limited jaw function.

Chronic recurrent dislocation of the mandibular condyle is characterized by unilateral or bilateral locking of the condyle anterior to the articular eminence and can cause functional impairment, facial deformity, and pain. The overall incidence is reported to be between 3% and 7% in the general population. [(1)]

Chronic recurrent dislocation is commonly associated with poor development of the articular fossa, laxity of temporomandibular ligament or joint capsule and excessive activity of lateral pterygoid and suprahyoid muscles. [(2)]

Chronic recurrent TMJ dislocation is distressing because it is painful and because it interferes with daily activities. As a result, this condition may adversely affect an individual's life.

The treatment modalities for this disorder differ in their therapeutic and operative approaches and are controversial.

There are several noninterventional methods used to treat patients with chronic recurrent TMJ dislocation such as physiotherapy, occlusal splints, and avoiding activities such as biting into a large sandwich or prolonged dental visit that cause a large mouth opening. [(3)]

Minimally invasive methods include injections of sclerosing agents intra-articularly [(4)] injection of autologus blood into the articular cavity. [(3)] [(5)] [(6)]

Variety of surgical techniques have been introduced to treat recurrent dislocation which includes: capsular plication [7], lateral pterygoid muscle myotomy [8], eminectomy [9], augmentation of the articular eminence by down fracture of the zygomatic arch [10] augmentation with autogenous bone [11], cartilage [12], hydroxyapatite [13], and fixation of a miniplate to the anterior wall of the glenoid fossa. [14]

However, these invasive procedures often require arthrotomy (open surgery) and have their own drawbacks, such as the necessity for general anesthesia and hospitalization, obligatory preauricular incision and resultant scar formation, otological complications and facial or trigeminal nerve damages can be encountered. [2]

A new conservative method for treatment of this disorder has been introduced recently which is the injection of Botulinum Toxin Type A into the lateral pterygoid muscle. [15] [16] [17] [18] [19]

Review of Literature

The Temporomandibular joint (TMJ) is one of the most complex joints in the body and is the area in which the mandible articulates with the cranium. It provides for hinging movement in one plane and transulatory gliding movement in another plane so it is considered as a ginglymoarthroidal joint.

The TMJ is formed by the mandibular condyle fitting into the glenoid fossa of the temporal bone. Separating the two bones from direct articulation is the articular disc. The lack of direct articulation of the two bones allows free movement, which is dictated by muscles and limited by ligaments.

The articular disk divides the joint into two compartments. The lower compartment permits hinge motion or rotation and hence is termed ginglymoid. The superior compartment permits Sliding (or transulatory) movements and is therefore called arthroidal. Hence the TMJ as a whole can be termed ginglymoarthroidal. [20]

TMJ Disorders is a collective term bracing a broad spectrum of clinical joint and muscle problems in the orofacial area.

These disorders are characterized primarily by pain, joint sounds and irregular or limited jaw function.

TMJ Disorders are considered a distinct subgroup of muscular, skeletal and rheumatologic disorders. They are very common within the population, with an incidence reaching to 28-40 %. [21]

Physiologic maximal translation of the mandibular condyle is defined as the point where the greatest convexity of the condyle meets the greatest convexity of the articular eminence. [22]

In practice as many as 60% of normal subjects translate more anterior than that point without any symptoms. [22] This radiological finding is called 'Elapsio prearticularis' and is viewed as a variant of normal by ***Nevakari***. [23]

A more differentiated description of physiologic translation of the condyle is given by ***Johansson & Isberg*** [24] who limits the normal range of condylar movement to the insertion of the anterior TMJ capsule. When condylar Translation exceeds this site; the joint is classified as hypermobile.

Hypertranslation of the condyle anterior and superior to the articular eminence can also be a symptom in different disorders of the TMJ.

Hypertranslation can occur as subluxation, acute or chronic recurrent dislocation.

Temporomandibular joint (TMJ) dislocation is defined as an excessive forward movement of the condyle beyond the articular eminence with complete separation of the articular surfaces and fixation in that position. [25]

Temporomandibular joint dislocation may be classified as acute, chronic, recurrent (habitual), and long-standing. Acute dislocation of the TMJ is a condition where the condyle moves suddenly ventral to the articular eminence and becomes locked in front of it. The term chronic, chronic recurrent or habitual should be reserved for repeated episodic dislocations. The term long-standing is applicable to those in whom it has lasted for longer than a month.

Subluxation is defined as self reducing partial dislocation of the TMJ during which the condyle passes anterior to the articular eminence. [26]

Undt et al. defined acute mandibular dislocation as displacement of the condyle anterior to the articular eminence with complete separation of the articulating surfaces and fixation in that position. [25]

Chronic recurrent dislocation is characterized by a condyle that slides over the articular eminence catches briefly beyond the eminence and then returns to the fossa. [27]

Chronic recurrent dislocation is uncommon with an incidence of 1.8% in patients with symptomatic TMJ disorders. [28]

It is found in patients with general joint laxity, in patients with internal derangement of the TMJ or occlusal disturbances and can be associated with neurologic diseases which are characterized by muscular hyperactivity. [28]

Etiological factors of TMJ dislocation

The etiology of mandibular dislocation includes the following factors: [1]

- Hyper function of lateral pterygoid muscle.
- Laxity of the TMJ ligaments , weakness of the TMJ capsule.
- Abnormal joint anatomy as an unusual eminence size or projection.
- Degeneration of TMJ ligaments and capsule secondary to disease (rheumatoid arthritis, psoriatic arthritis).
- Neuromuscular dysfunction (epilepsy, Parkinson's disease, stroke).
- Familial joint laxity (Ehlers-Danlos syndrome).

- Intrinsic or extrinsic trauma with rupture, tearing, or stretching of the TMJ ligaments and capsule, with or without disk injury.
- Drug-induced reaction, causing extrapyramidal reactions.
- psychogenic disorders.

The laxity of mandibular and TMJ capsule ligaments will permit the condyle to go far anterior during mandibular opening, transpassing the articular eminence. Some patients will present an inferiorly extended articular eminence, which will function as a mechanical barrier.

Once the condyle transpasses the eminence, muscle spasm between protractor muscles, which will continue to push the condyle forward while the elevator muscles try to push the mandible back, will keep the condyle anterior to the eminence, thus creating the open-lock condition. (5)

Hagberg et al found on a study on Ehler Danlos syndrome patients that permanent dislocations may occur at almost half of the joints and could be handled by the person him or herself and experienced hypermobility of the joint during mouth opening. (29)

Kalaykova et al studied the hypothesis that condyles of the hypermobile joints are positioned more anterosuperiorly to the crest of the eminence during maximum mouth opening than those of persons without TMJ hypermobility. They found that the condyles of all hypermobile joints travel beyond the eminence however so were the condyles of nearly half of the non hypermobile joints. They concluded that the large overlap between both groups suggesting that condylar position alone is not a good predictor for symptomatic TMJ hypermobility but the combination of condylar location and action of masticatory muscles gives rise to functional signs of hypermobility. (30)