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Comparative study between Autologous Blood Injection and Botulinum toxin in the treatment of Chronic Recurrent Temporomandibular Joint Dislocation

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Abstract:

Introduction: The term "dislocation" refers to an excessive forward displacement of the condyle beyond the articular eminence.Injecting botulinum toxin type A (BTX-A) is a more recently described treatment aimed at changing the musculature with the goal of weakening the lateral pterygoid muscle (LPM) .TMJ autologous blood injection should be assessed for its stability. **Purpose:** To evaluate the efficacy of injection of BTX-A and autologous blood injection for patients with chronic TMJ dislocation not responding to conservative line of treatment.

Materials and methods: A comparative study was conducted on a total of 20 patients complaining of recurrent episodes of chronic TMJ Group 1: included 10 patients underwent bilateral autologous blood injection while Group 2: included 10 patients were treated with bilateral botulinum toxin A injections (Dysport)

Results: All of the patients had no dislocations of their TMJs on clinical examination. In the pre-injection, unilateral or bilateral TMJ dislocations were observed on MRIs in all patients. One month after the injection. group A revealed that injecting autologous blood in the patients prevents the TMJ dislocation and reduced pain caused by the movement of the LPM.

Keywords: Temporomandibular joint; Dislocation; Botulinum toxin type A ; autologous blood injection, Lateral pterygoid muscle

Introduction:

Dislocation of the temporomandibular joint (TMJ) happens when the condyle moves ahead of the articular prominence and stays there. Chronic recurring TMJ dislocation can happen from routine motions like laughing or yawning, or from situations where opening the mouth for extended periods of time is necessary, such getting dental work done. The discomfort and disruption it causes to everyday tasks make chronic recurrent TMJ dislocation upsetting. Consequently, this illness could have a negative impact on a person's life. [1]

The most common treatment approaches involve weakening or opposing the strength of the mandibular abductor muscles, decreasing the ligament apparatus's elasticity, blocking the mandibular head path, making room for the mandible's head to help realign the dislocation, and replacing the affected joint with a prosthesis. For isolated or infrequently recurring dislocations, immobilization and repositioning are employed.

There are two possible methods for stabilizing the chin: intraoral elastic fixation using dental or bone anchorage, and external stabilization using an elastic bandage or cervical collar. [2] [3]

Numerous conservative, minimally invasive, and surgical methods have been used to treat TMJ dislocations that occur repeatedly over time (CRTMJD) [4].The conservative methods include applying a local anesthetic and limiting mandibular movement in addition to prescribing muscle relaxants and following a soft diet. The injection of sclerosing agents, autologous blood injection (ABI) into the TMJ, and botulinum toxin injection into the masticatory muscles are examples of minimally invasive procedures. Surgical techniques will be considered for patients with repeated TMJ dislocations when nonsurgical modalities prove ineffective. These methods include condylectomy, lateral pterygoid myotomy, scarification of the temporalis tendon, capsular plication, and reduction or augmentation of the articular eminence [5] .after managing the dislocation, removing the etiological and predisposing factors will stop luxation from developing further.

One of the highest known biological toxicities is the botulinum toxin, which is produced by the anaerobic bacterium Clostridium botulinum. At neural synapses, this toxin inhibits the release of acetylcholine. The parasympathetic nervous system's supply of smooth muscles and skeletal muscle results in paralysis due to the ensuing neuromuscular blockade. When cholinergic sympathetic nerves are blocked, hypohydrosis or anhydrosis occurs. Because intraneural proteolysis occurs after approximately three months, the non-cytotoxic botulinum toxin inactivates and restores nerve function. There have not been any reports of long-lasting morphological alterations or muscle atrophy brought on by botulinum toxin treatment [6].

Aim:

The aim of this study was to compare between the effect of autologous Blood Injection and Botulinum toxins in the treatment of Chronic Recurrent Temporomandibular Joint Dislocation by using magnetic resonance imaging (MRI).

Methodology:

Twenty patients were included in this study according to the sample size calculation selected from the Oral Surgery clinic at the Faculty of Dentistry, Cairo University and the dental clinics of the National Research Center, Giza, Egypt. They were diagnosed with chronic recurrent TMJ dislocation based on the clinical and radiographic criteria. The patients' maximal mouth opening (just before dislocation) measured between maxillary and mandibular incisal edges, ranged from 36 to 48 mm, with an average of 41 mm. All of these patients complained of dislocation of their joints at least twice a week. No patients had other TMJ disorders such as disc displacement or osteoarthritis.

The patients were randomly divided into two groups;

Group 1: included 10 patients underwent bilateral autoglus blood injection while Group 2: included 10 patients were treated with bilateral botulinum toxin A injections (Dysport) into the lateral pterygoid muscle. (Fig.1)

(Fig.1): A photograph showing the vial of the Botox

Preoperative measurements of all patients included: bilateral TMJ and muscles of mastication palpation and measurement of the distance between maxillary and mandibular incisal edges (MIO).

Local anesthesia was given to the auriculatemporal nerve. The articular fossa was assumed as located at a point 10mm anterior to the tragus of the ear and 2 mm inferior to the tragal-canthal line.

Group (A): Five mL blood was withdrawn from the patients. Four mL blood with a 21- gauge needle was injected in the articular cavity and 1 mL was injected in the pericapsular tissue. (Fig.2)

(Fig .2): A photograph showing autologous blood injection.

Group (B): patients received 35U of Botulinum Toxin Type A (Allergan) injected at the insertion of the lower head of the lateral Pterygoid muscle under audible electromyographic guidance

The BTX vial was unpacked and 2 ml saline added slowly along the walls of the vial to obtain a 5 unit/0.1 ml solution. The solution was swirled to ensure complete mixing and 0.7 ml of the solution containing 35 U was drawn into an insulin syringe. The audible Electromyogram device (EMG) was used during injection to confirm the needle position into the target muscle. Two surface electrodes were placed, one on the patient's cheek and the other on the neck near the sternocleidomastoid muscle and the EMG needle attached to the insulin syringe The lateral pterygoid muscle was approached intraorally from the opposite side and advanced lateral to the maxillary tuberosity with the needle directed towards the neck of the condyle where the lateral pterygoid inserts. Once at the needle reached the target position, the patient was asked to move his mandible laterally to activate the muscle; causing the EMG to produce a distinct loud sound. After negative aspiration, the solution was injected slowly over a period of 5-10 seconds.

After the completion of the injection for 2 groups, an elastic bandage was applied and left for 24 hours to constrain the joint movements. . All of the patients were scanned before and 1 month after the therapy with a 1.5 T MRI scanner (Achieva; Philips Medical Systems, Best, The Netherlands) using a multichannel head coil. (Fig.3-4)

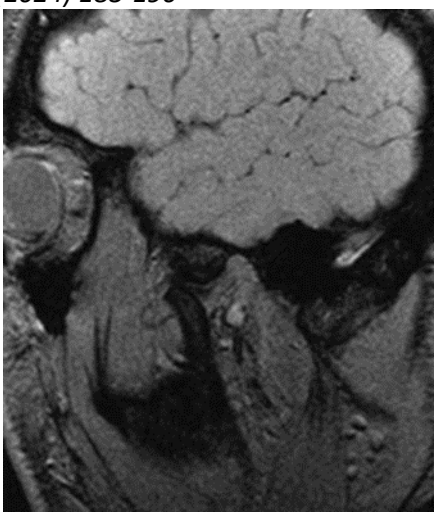

Fig.3: MRI images of TMJ in open position before injection of autologous blood

Fig.4: MRI images of TMJ in Open position after injection of autologous blood

Results:

Every patient responded favorably to the operation. None of the patients experienced any infections or other problems. All patients experienced manageable post-operative pain, which subsided within a few days of the treatment. None of the patients had osteoarthritis, disc displacement, or articular cartilage degeneration according to the pre-injection MRI assessment. The patients' unilateral or bilateral condyles anterior to the prominence were found to have their mouths open prior to the injection being given. All patients' MRIs obtained in the open-mouth posture during the first month following the injection showed that the condyle was either posterior to or near the peak of the eminence. Nevertheless, no structural change, such as fibrosis in MRI

data, explained the prevention of the dislocations. The hematoma vanished without causing any changes to the joint tissues.

In the four weeks following the procedure, none of the patients experienced any TMJ dislocations.

Table 1: comparison between two studied groups according to mouth opening

	Mouth opening		
	Pre injection	1 Week	1 Months
Group (A) Min.-max. Mean±SD. Median	 45-58 50.4±4.3 50.2	 39-53 45.3±4.4 45.3	 33-44 36.1±3.5 35.1
P1		<0.001	<0.001
Group (B) Min.-max. Mean±SD. Median	 45-58 50.3±4.2 50.0	 40-54 47.2±4.3 47.0	 43-56 49.2±4.5 49.5
P1		<0.001	<0.001
t	0.0	0.923	7.556
p	1.000	0.368	<0.001

P1: p value for post hoc test for (ANOVA) with repeated measures for comparison between pre injection periods with each other period t: student t-test

A statistical analysis revealed a clear reduction in mouth opening between the pre- and post-operative periods.one week after the two groups treatments, there was a noticeable improvement in their mouth openings. After that, there was a continuous decline in mouth opening, and patients particularly in the first group were able to open their mouths less than they had before treatment. Before receiving the injectable therapy

Discussion:

TMJ hypermobility can result in damage to the disk, capsule, and ligaments, which can worsen internal derangement over time [7] [8]. A long-standing, chronic, or repeated dislocation of the TMJ can be defined as an acute dislocation lasting more than four weeks. [9] [10]. A few effective nonsurgical therapy methods, including injecting an alcohol, sodium psylliate, and iodine tincture into the joint cavity, have been documented in the literature. Unfortunately, a number of adverse effects as well as the potential for traumatic arthritis or facial paralysis have prevented it from being widely used. [11] [12]Consequently, presuming prior findings from clinical trials regarding the efficacy of BTX-A and autologous blood injection in treating temporomandibular joint

disorders (TMD) Twenty patients were selected from the Oral Surgery clinic at the Faculty of Dentistry, Cairo University and the dental clinics of the National Research Center, Giza, Egypt. Suffering from chronic recurrent TMJ dislocation

BTA is a potent neurotoxin that is only absorbed by cholinergic nerve terminals. There, it damages SNAP-25, a protein that is necessary for the fusion of vesicles with the cell membrane, preventing the release of acetylcholine. The dosage (dose-dependent impact), the injection method, and the mass (size) of the injected muscle all affect the reaction to BTA. The lowest effective dose is advised, and dose selection is currently empirical. [13] [14]

According to Machon et al. [9], Brachmann was the first to report the use of (autologous Blood Injection) ABI for chronic TMJ dislocation in German literature in 1964. He had used this technique to treat sixty patients, and he reported positive outcomes. When Schulz treated sixteen patients in 1973, he immobilized them for four weeks by using intermaxillary fixation after administering an ABI twice a week to the afflicted TMJ.

For Daif's study. Thirty patients with persistent recurrent TMJ dislocation were randomly assigned to two equal groups (15 patients each) Group B received 2 cc of ABI to the superior joint space (SJS) and 1 cc in the pericapsular tissues (PT), while Group A only received 2 cc of autologous blood injection into the (SJS). Following the injection procedures, an elastic bandage was placed and kept in place for the first twenty-four hours. The study's results demonstrated that the ABI to the SJS and PT had a greater success rate (80%) than its injection alone into the SJS (60%), at the conclusion of the follow-up period of one year. [15]

References

[1] L. JP, "Orofacial Pain: From Basic Science to Clinical Management.," *Carol Stream, Quintessence Publishing Co, Inc, ,* 2001.

[2] S. Chhabra, N. Chhabra and P. M. D. i. G. P. Gupta, "Treatment and Prevention by a Simple and Non-Invasive Technique.," *J. Maxillofac. Oral Surg,* 14,p. 231–234, 2015.

[3] P. Aquilina, R. Vickers and G. McKellar, "Reduction of a Chronic Bilateral Temporomandibular Joint Dislocation with Intermaxillary," *fixation and Botulinum Toxin A. Br. J. Oral Maxillofac. Surg.,* vol. 42, p. 272–273, 2004.

[4] A. M. Ahmed SS, "treatment of chronic recurrent dislocation of tempromandibular joint by autologus blood injection," *Plast Aesthet Res.,* 3, p. 121-125, 2016.

[5] B. B. Varedi P, "Autologous blood injection for treatment of chronic recurrent TMJ dislocation:Is it successful ?Is it safe enough? A systematic review," *Oral Maxillofac Surg.,* 19, p. 243-252, 2015.

[6] H. H. H. F. Naumann M, "Dysport. Clinical use of botulinum toxin. Uni-Med, Bremen," 1999.

[7] D. ET, "Autologous blood injection as a new treatment modality for chronic recurrent temporomandibular joint dislocation," *Oral Surg Oral med Oral Pathol Oral Radiol Endod,*109, p. 31-36, 2010.

[8] R. A. V. V. Gupta D, " Treatment of recurrent TMJ dislocationin geriatric patient by autologous blood–A technique revisited.," *J Oral Biol Craniofac Res* , 3, p. 39-41, 2013.

[9] A. S. P. J. D. M. Machon V, " Autologous blood injection for the treatment of chronic recurrent temporomandibular joint dislocation.," *J Oral Maxillofac Surg* , 67, p. 114-119, 2009.

[10] P. M. I. M. Marqués-Mateo M, "temporomandibular chronic dislocation: The long-standing condition.," *Med Oral Patol Oral Cir Bucal,* 21, pp. 776-783, 2016.

[11] A. S. P. J. D. M. Machon V, *J Oral Maxillofac Surg* , vol. 67, pp. 114-119, 2009.

[12] S. T. N. D. K. T. H. N. K. I. Kato T, "Autologous blood injection into the articular cavity for the treatment of recurrent temporomandibular joint dislocation:a case report.," *J Oral Sci,* 49, p. 237-239, 2007.

[13] M. A. Hambleton P, "Botulinum neurotoxins :Origin, structure,molecular actions and antibodies. In:Moore AP (ed). Handbook of Botillinum toxin Treatment.," *Oxford, England: Blackwell Scientific,* p. 16-27, 1995.

[14] B. MF., "Botulinum toxin therapy: Basic sciences and overview of other therapeutic applications in:Blitzer A,Binder WJ, Boyd JB (eds). Management of facial linesand Wrinkles. Philadelphia, PA: Lippincottwilliams and Wilkins," , p. 279-302, 1999 .

[15] D. ET., " Autologous blood injection as a new treatment modality for chronic recurrent temporomandibular joint dislocation.," *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* , 109,p.31-36, 2010.