

# EFFICACY OF BOTULINUM TOXIN-A (BTX-A) VERSUS TRANSCUTANEOUS ELECTRIC NERVE STIMULATION (TENS) IN TREATMENT AGAINST TEMPOROMANDIBULAR DISORDERS: A CLINICAL STUDY

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## ABSTRACT:

The aim of this study is to evaluate the efficacy of botulinum toxin-A (BTX-A) therapy compared with Transcutaneous Electric Nerve Stimulation (TENS) in treatment against temporomandibular disorders- clinically study, and to investigate

The role of functional occlusal adjustment in Definitive Treatment.

Twenty patients with temporomandibular disorder symptoms and signs were enrolled in this study. The patients were randomly assigned into two groups. Patients in group 1 were injected with BTX-A in the affected masseter muscles, whereas patients in group 2 were treated with (TENS). Patients were evaluated after 4 weeks using:

1- the visual analog scale (VAS) for pain of muscles, 2- measurement of improvement in mouth opening. The modifications of functional occlusal had been done in patients whom have a significant relief of pain after a month, then the Patients have been evaluated after a year using the same measurements and scales.

The result demonstrated that BTX-A injection is more advantageous than TENS, Study can be detected that treatment by BTX-A and TENS are extrinsic and not permanent so it rather to be supported by occlusal correction for long last treatment.

**Keywords:** Botulinum toxins type A, Functional Occlusion, Temporomandibular disorders. Transcutaneous Electric Nerve Stimulation (TENS)



## INTRODUCTION:

Temporomandibular disorders (TMD) may be associated with headache, per auricular pain, neck pain, decreased jaw excursion, locking episodes, and noisy joint movement. Although clinical findings such as joint clicks, palpation tenderness, and dental malocclusion can suggest a diagnosis of TMD. (Brister et al, 2006) (ISSA, 1989)

Temporomandibular disorders may be divided into two primary groups – those related to the muscles themselves (myofascial) and those related to the temporomandibular joint (TMJ); arthrogenic TMD-associated pain may arise from the joint itself or may be secondary to hyper function of the muscles of mastication resulting in chronic inflammation and pain (Ohrbach and Stohler, 1992).

Over the past several years, botulinum toxin (BTX-A), has been increasingly utilized as an adjuvant treatment, for head and neck pain, such as tension type headaches and migraine headaches. (PC. SONG et al, 2007).

Presynaptic BTX-A is an effective form of treatment for paradoxical activity of the jaw elevator muscles, and oromandibular dystonia (TAN EK and JANKOVIC J. 1999), mediated by a reversible, dose-dependent chemical denervation of skeletal muscles with reduction in muscle contractility. (Borodic GE, 2001). Its effect peaks within the first 2 months and generally lasts about 4 months. BTX-A is now

being used for pain relief as a primary treatment goal in conditions such as myofascial pain and migraine (Binder et al, 1998),

As a Physical therapy modalities for TMD treatment, there is a Transcutaneous electrical nerve stimulation (TENS) is an example of the nonpainful cutaneous stimulation (R.H. Sternback, et al, 1976), and it is produced by the continuous stimulation of cutaneous nerve fibers at a subpainful level. (P.D. Wall, 1978) When a TENS unit is placed over the tissues of a painful area, the electrical activity decreases pain perception.

When the intensity of a TENS unit is increased to the point that motor fibers are activated, the TENS unit becomes an electrogalvanic stimulation unit which is no longer used for pain control but instead for muscle relaxation. (S. Marchand, et al, 1993)

The aim of this study was to evaluate the efficacy of (BTX-A) therapy compared with (TENS) in treatment of temporomandibular disorders clinically analysis and investigation the role of the occlusal adjustment in Definitive Treatment.

## MATERIAL AND METHODS

The study was conducted in Tishreen University in clinics of Faculty of dentistry Dept. of Fixed prosthodontics.

1-Patients were classified, . interrogated using a **patients file** which **contains**: personal identity of a-the patient.

b- pathological story.

c- main complaint.d- Limited jaw movement (measurement of improvement in mouth opening )  
f- functional occlusal examination, or occlusal contact (centric relation (CR) position, Functional movements ).  
g-pain as patient select ,or feeling on a Visual Analogue Scale. (VAS)

0---1----2--3---4--5--6--7--8--9--- 10  
( WEWERS M.E. & LOWE N.K. 1990 )  
2- Refinex botulinum toxin-A.Each vial contains 100 U of BTX-A ,and requires dilution with 0.9% saline.And we dilute each vial with 2 ml of saline to prepare a 5.0 U per 0.1 ml.

3- Insulin syringe. 4-saline  
10-TENS unit (Beurer) .

Twenty patients diagnosed to have TMD, according to the research they have a muscle injuries of temporomandibular disorders, or (MSD) masticatory system disorder.

The patients were randomly assigned into two group, patients in group 1 were injected with BTX-A in the affected masseter muscles, whereas patients in group 2 were treated with (TENS).

Every patient Recorded his pain at Visual Analogue Scale (VAS) before treatment and after a month and a year

Measure of mouth opening had been recorded before treatment and after a month and a year

In group 1we injected Botulinum toxin for TMD primarily targets the masseter muscles in a fixed position, technique depending upon the pain type and physical examination. For TMD, we favor targeting muscles based on our physical examination and patient symptoms, 20Uof Botulinum toxin had been injected to the masseter muscles depending on

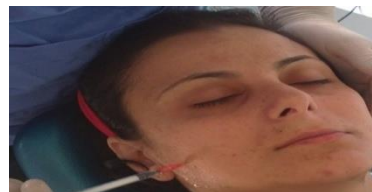
the part of muscle tenderness and sites of pain that the patient reports. We generally favor 20U for the masseter muscles in Superficial head in the skin or front part in intra oral. (see Figure 1-2)

The needle is inserted transcutaneously into the areas of maximal muscle tenderness..

Side effects are often mild or transient, and can usually be minimized through proper injection technique.



(Figure 1 ) BTX-A injection in front part of masseter muscle.



((Figure 2 ) BTX-A injection in the inferior border of masseter muscle)

In group 2 TENS electrodes were placed over the tissues of a painful area at masseter muscle ,using program number 20 , Frequency Pulse 100 hz , Pulse width 250 us, Pulse intensity according to patients feeling of current , time of stimulation about 30s ,3perweek for 4 week (see Figure 3)



After a month patients have to come to evaluate the pain at VAS , and development in mouth opening.

The adjustment of occlusion were carried out on teeth of patient who has got an improvement after treatment. if improvement of patient was nonsignificant we won't do a occlusal correction .

The last evaluation was after a year. (see Figure -4 5).

(Figure 4) posterior contact in balance side



( Figure 5) Occlusal correction



(Figure 3) electrodes application on masseter muscle

**RESULTS:**

**Table 1 : result of VAS in groups with improvement percentage**

Treatment therapy	Average of pain on VAS Pretreatment 1	Average of pain on VAS After a month 2	Average of pain on VAS After a year 3
BTX-A with occlusion correct	8.1	1.5 %81.4	0.3 %96.2
BTX-A without occlusion correct	8.1	1.5 %81.4	5 %38.2
TENS with occlusion correct	5.8	3 %48.2	1.25 %78.4
TENS without occlusion correct	5.8	3 %48.2	4.3 %25.8

The results showed that the best improvement after a month was in Botox group 81.4%, greater than the improvement achieved in TENS group, which amounted to 48.2%. The results showed that after one year was the best improvement for Botox with the occlusion correct which increased to 96.2%, then the TENS with the

occlusion correct which increased to 78.4% then improvement in Botox without occlusal modification group, which decreases to 38.2% and then the TENS without occlusal modification which decreases to 25.8%. The correction of occlusion had a role in raising the rate of improvement and achieved a final treatment

**table(2) LSD Comparisons for VAS**

(I) treatment therapy	(J) treatment therapy	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
BTX- A therapy						
	TENS	-1.014*	.463	.030	-1.93	-.10

The mean difference is significant at the 0.05 level **between BTX- A treatment and TENS therapy (0.03 <0.05).**

**Table (4)improvement in measuring of mouth opening**

Treatment therapy	the average of mouth opening before treatment( mm) (1)	the average of mouth opening after treatment (mm) (2)	improvement value (mm) (3)	improvement percentage %
BTXA Treatment	44.4	48.9	4.5	%10.13
TENS Treatment	46.9	46.9	0	%0

**The table appears in column 3 that the improvement in measuring of mouth opening in the Botox group is higher than in TENS group**

**Table (5)LDS Comparisons for mouth opening**

(I) treatment therapy	(J) treatment therapy	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
BTX A therapy	TENS therapy	4.50000*	1.88091	.019	.7615

The mean difference is significant at the 0.05 level ( $0.019 < 0.05$ ).

BTX A therapy where better than TENS therapy in decreasing the general pain increasing the measure of mouth opening

## DISCUSSION:

The precise differentiation of the relevant etiology of TMD is often difficult. Thus, there are no generalized treatment approaches to TMD. To our knowledge, no other study comparing the effect between BTX-A and TENS therapy has been published in the dental literature. Two homogenous groups with TMD symptoms were selected. Thus, the treatment outcome could be well established. Randomization in patients' grouping was essential for establishing reliable comparisons regardless of the severity of TMD or the type of treatment.

Few clinical trials have evaluated the efficacy of BNT-A, especially for TMD.

This study is in agreement with other studies like study of (PC Song, J Schwartz and A Blitzer 2007)

Botulinum toxin, through poorly understood path ways, provides significant relief from facial pain in many of the patients, and reduces intensity, frequency, and duration of recurrent episodes when properly administered. Injection protocols, And most patients require re-injection during the period of 3-4 months and has been observed to have a longer rest periods after the re-injection

But in our study we have done an occlusal adjustment and this was a alternative treat from re injection .

This study is in agreement with study of (Muhammad. Shanavas, et al 2014), that was undertaken to evaluate the effectiveness of TENS therapy in controlling pain in temporomandibular disorder (TMD)

patients. They justifies the use of TENS therapy as an adjuvant modality in controlling pain associated with TMDs. The most important factor that has to be borne in mind by the clinician is that TENS therapy is only an initial symptomatic approach and not a definite or radical means of managing the TMDs.

## CONCLUSION:

The result demonstrated that BTX-A injection is more advantageous than TENS, Study can be detected that treatment by BTX-A and TENS are extrinsic and not permanent so it rather to be supported by occlusal correction for long last treatment .

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