

# COMPARISON BETWEEN THE EFFICACY AND DURATION OF COSMETIC BOTULINUM TOXIN TYPE A INJECTION WITH AND WITHOUT ELECTROMYOGRAPHIC GUIDANCE

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## INTRODUCTION

Botulinum toxin type A for the treatment of facial rhytids is one of the most common aesthetic procedures used in the medical field. Up until now, Botulinum toxin injection using palpation method is the most commonly used technique. A much less used technique is electromyography-guided injection.

Electromyography is a technique that measures and records the electrical activity within muscles. It is usually used as a diagnostic tool to assess health of the muscular tissue and its neural supply. Alternatively, we can also utilize it to guide intramuscular drug administration and measure the amplitude of muscle activity and contraction.

## AIM OF THE WORK

The aim of this study was to compare between the conventional palpation method of botulinum toxin type A injection and the electromyography-guided method using clinical parameters and electromyography analysis.

## SUBJECTS

The study was conducted on 15 healthy-looking female subjects with visible glabellar rhytids when frowning. All participants were recruited from the outpatient clinic of Dermatology Department, Main University Hospital, Faculty of Medicine, Alexandria University. The mean age was  $46.27 \pm 6.31$  with a range from 33 to 59 years. All 15 subjects completed the study.

Each subject provided a right and left corrugator supercilii muscles to the study. Each muscle was divided into a body and a tail, each part injected separately (n=60).

## METHODS

The study subjects were subjected to the following:

- 1.Full history taking, general and local examination.
- 2.Neurotoxin injection into the corrugator body and tail by palpation method on one side and under EMG-guidance on the other.
- 3.Photographs were taken both at rest, and while frowning at each visit: pre-operatively, after 2 weeks and after 3 months.
- 4.Clinical grading according to static and dynamic Merz glabellar frown line scales and EMG analysis was done at each visit: pre-operatively, after 2 weeks and after 3 months.

## RESULTS

Table (1): Comparison between the Palpation-guided method (right) and EMG-guided method (left) for the corrugator muscles according to the Muscle Activity percentage (MAp) at follow-up periods (2 weeks and 3 months).

Muscle side, part and Injection method	Corrugator's Muscle Activity percentage (MAp)	
	2 Weeks	3 Months
<b>Rt. body Mean <math>\pm</math> SD</b> <b>(Palpation-guided)</b>	$34.5 \pm 21.8 \%$	$28.3 \pm 12.5 \%$
<b>Lt. body Mean <math>\pm</math> SD</b> <b>(EMG-guided)</b>	$17.2 \pm 9.5 \%$	$18.6 \pm 5.9 \%$
<b><i>P</i>*</b>	<b><math>\leq 0.001</math></b>	<b><math>0.005</math></b>
<b>Rt. tail Mean <math>\pm</math> SD</b> <b>(Palpation-guided)</b>	$27.1 \pm 15.5 \%$	$30.1 \pm 20.8 \%$
<b>Lt. tail Mean <math>\pm</math> SD</b> <b>(EMG-guided)</b>	$18.3 \pm 10.8 \%$	$20.8 \pm 8.4 \%$
<b><i>P</i>*</b>	<b><math>0.037</math></b>	<b><math>0.075</math></b>

***P*: P-values** for comparing the MAPs of the side injected under EMG-guidance (left) and the side injected by palpation-guidance (right) at each of the two follow-up periods (2 weeks and 3 months).

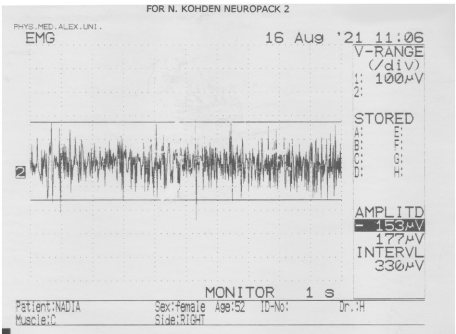
**\***: statistically significant at ***P* $\leq 0.05$**

- The Muscle Activity percentage (MAp) for the corrugator muscle parts injected under Electromyography-guidance was lower than that of the counterparts injected by the conventional palpation method at all follow-up visits (2 weeks and 3 months). This indicated more decrease in muscle activity when using EMG-guidance, and more efficacies. This was statistically significant in all instances except for the corrugator tails at 3 months (***P*-value = 0.075**).
- The static and dynamic glabellar Merz scores were variable but not favoring any intervention group.

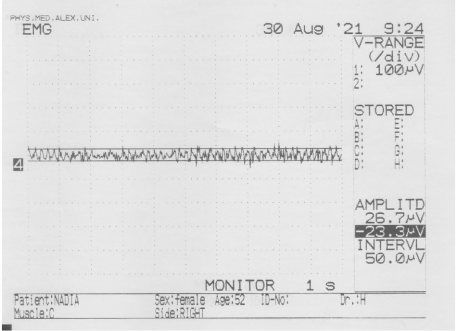
## CONCLUSION

The use of Electromyography in guiding facial cosmetic Botulinum toxin injection and in assessing its effect is a less convenient, yet a useful tool to achieve more reduction in muscle activity EMG readings and perhaps avoid possible complications. It is useful in affirming the health of the targeted muscular tissue prior to the procedure and objectively assesses the response of the targeted muscles to neurotoxin injection.

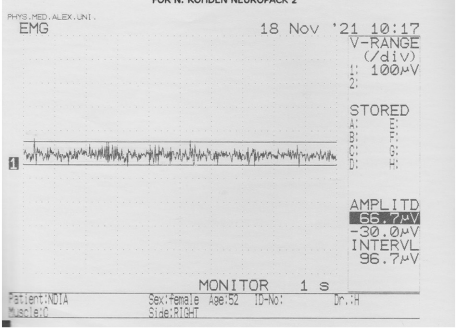
Clinical Merz scale does not clearly favor using Electromyography-guided injection over unassisted method.



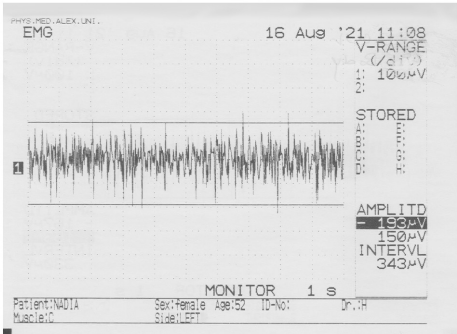
A) Pre-operative (Palpation Method)



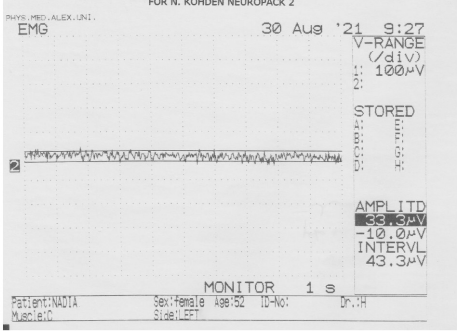
B) 2 Weeks (Palpation Method)



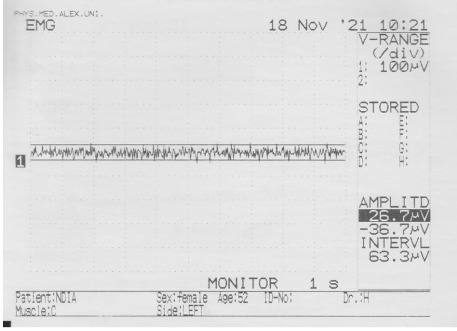
C) 3 Months (Palpation Method)



D) Pre-operative (EMG-Guided)



E) 2 Weeks (EMG-Guided)



F) 3 Months (EMG-Guided)

Figure (1): The figure compares between the EMG waveforms for the side injected by Palpation method and the EMG-guided bodies throughout the study timeline for the same subject. The side injected by the EMG-guided method showed more reduction in EMG readings post-operatively compared to the side injected by Palpation method.