# UNLOCKING PAIN RELIEF: THE IMPACT OF BOTULINUM TOXIN ON MUSCLE FUNCTION IN TEMPOROMANDIBULAR DISORDERS

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Objectives: Temporomandibular disorders (TMD) are common musculoskeletal conditions involving the temporomandibular joint and masticatory muscles. Botulinum toxin type A (BTX-A) has emerged as a promising treatment, especially in patients with bruxism, myofascial pain, and masseter hypertrophy. This study aimed to evaluate the short-term impact of BTX-A on muscle morphology and clinical symptoms using a standardized injection protocol under electromyographic (EMG) and ultrasonographic (USG) guidance.

Our study included patients diagnosed with various types of TMDs. Inclusion criteria were adults aged 18-65 years with a clinical diagnosis of TMD based on the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD). Exclusion criteria included, neuromuscular disorders, pregnancy, and contraindications to BTX-A.

Injections were administered under the guidance of EMG and USG to ensure precise targeting of the muscles

Assessments were conducted at baseline (T0) and one month post-treatment (T1).

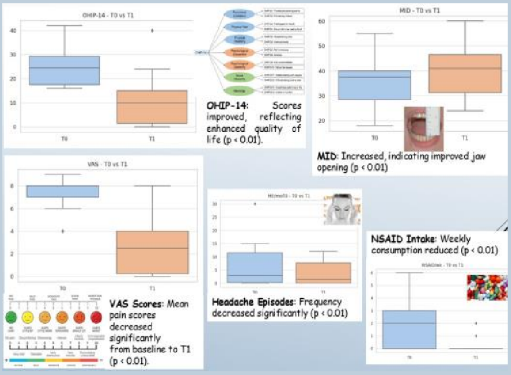
Each patient received a single session of BTX-A injections (IncobotulinumtoxinA) into the masseter (30U) and temporalis (20U) muscles per side.

The following outcome measures were evaluated:

- **Ultrasound Measurements**: Thickness of the right and left masseter muscles at rest (RMM-R, LMM-R) and during contraction (RMM-C, LMM-C), measured in centimeters.
- **Pain Intensity**: Visual Analog Scale (VAS) ranging from 0 (no pain) to 10 (worst pain imaginable).
- **Maximum Interincisal Distance (MID)**: Measured in millimeters to assess jaw opening.
- **Quality of Life**: Oral Health Impact Profile-14 (OHIP-14) questionnaire.
- **Headache Frequency**: Number of headache episodes per month.
- **NSAID Intake**: Number of nonsteroidal anti-inflammatory drug (NSAID) doses per week.

| Variable | Mean T0 | Std T0 | Mean T1 | Std T1 | N | p-value |
|---|---|---|---|---|---|---|
| MID | 36.901 | 9.928 | 42.143 | 10.638 | 22 | 0.000 |
| VAS | 7.424 | 1.294 | 4.095 | 3.100 | 22 | 0.000 |
| RMM-R | 1.004 | 0.137 | 0.885 | 0.143 | 22 | 0.000 |
| RMM-C | 1.386 | 0.233 | 1.144 | 0.182 | 22 | 0.000 |
| LMM-R | 1.000 | 0.137 | 0.893 | 0.146 | 22 | 0.000 |
| LMM-C | 1.398 | 0.210 | 1.152 | 0.191 | 22 | 0.000 |
| NSAID/wk | 2.583 | 4.405 | 0.420 | 0.815 | 20 | 0.019 |
| HE/mo | 8.100 | 9.263 | 3.300 | 4.473 | 21 | 0.010 |
| BRX | 0.816 | 0.370 | 0.579 | 0.466 | 20 | 0.011 |
| OHIP-14 | 24.759 | 9.129 | 12.500 | 10.626 | 19 | 0.000 |

Statistical analysis showed significant post-treatment improvements, including reduced pain, enhanced mandibular mobility, better quality of life, and decreased masseter muscle thickness. Reductions in headache frequency and NSAID use further indicate a meaningful clinical benefit.

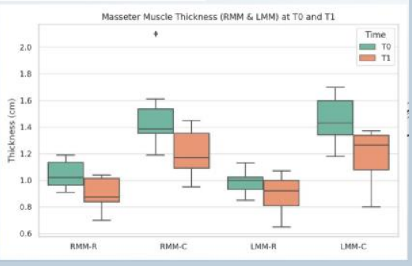



Ultrasound measurements revealed significant reductions in masseter muscle thickness during contraction post-treatment:

- **RMM-C**: Decreased by an average of 0.25 cm ($p < 0.01$).
- **LMM-C**: Decreased by an average of 0.25 cm ($p < 0.01$).

Reductions at rest were also observed but were less pronounced.




The results demonstrate that BTX-A effectively alleviates muscle hyperactivity and pain associated with TMD. Improvements in muscle thickness, pain scores, jaw function, and quality of life confirm its therapeutic value.

CONCLUSION BTX-A, when administered under EMG and USG guidance, appears to be a safe and effective treatment for TMD in the short term. It reduces muscular overactivity, relieves pain, enhances mouth opening, and improves quality of life, supporting its role in the clinical management of muscular TMD. These findings reinforce the role of a multimodal and multidisciplinary approach in managing TMD.

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