

PAROXYSMAL BUILDING PHENOMENA AFTER MASSETER BOTOX INJECTIONS; CASE SERIES AND REVIEW OF THE LITERATURE¹

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ABSTRACT

Aim: The temporomandibular joint (TMJ), also known as the mandibular joint; is a nearby the synovial joint that connects the mandible to the temporal bone the external auditory canal. Although TMJ disorders are frequently seen; they can be caused by many reasons such as disorders caused by masticatory muscles, condyle and articular disc incompatibility, inflammatory joint diseases, chronic mandibular hypomobility, and congenital or acquired muscle and bone disorders.

Case reports: In our study, the diagnosis and treatment process of 4 patients who applied to the Gazi University Faculty of Dentistry Department of Oral and Maxillofacial Surgery clinic with complaints of TMJ pain were presented. All of the cases had masseter hypertrophy due to bruxism. Botulinum toxin-A (BTA) was injected to the masseter muscles bilaterally after written informed consents were obtained from each patients before the procedure. In the control examinations an unexpected paradoxical masseteric bulging was detected. A more superficial BTA injection was applied to the superficial lobe of the masseter muscles that was not affected by BTA in presented patients and the complaints were dissolved in ten days.

Conclusions: The cases presented in our article have a rare complication of BTA injections and can be treated easily after a correct diagnosis by the physician. Physicians who perform BTA injections for bruxism and masseter hypertrophy should be aware of the possible complications and should have sufficient knowledge and experience to overcome it.

Keywords: Temporomandibular joint, botox, masseteric swelling, paradoxical masseteric bulging, bruxism.

MASSETER BOTOKS ENJEKSİYONU SONRASI GELİŞEN PARADOKSAL BULĞİNG FENOMENİ; VAKA SERİLERİ VE LİTERATÜR DERLEMESİ

ÖZ

Amaç: Mandibular eklem olarak da bilinen temporomandibular eklem (TME); dış kulak yolunun önünde mandibulayı temporal kemiğe bağlayan sinoviyal bir eklemdir. TME rahatsızlıkları toplumda sıklıkla görülmekle beraber; çiğneme kaslarından kaynaklanan bozukluklar, TME’de kondil ve disk uyumsuzlukları, inflamatuvar eklem hastalıkları, kronik mandibular hipomobilité, konjenital ya da kazanılmış kas ve kemik rahatsızlıkları gibi birçok nedenden kaynaklanabilmektedir.

Vaka raporları: Çalışmamızda eklem ağrısı şikayetleri ile Gazi Üniversitesi Diş hekimliği Fakültesi Ağız, Diş ve Çene Cerrahisi Kliniğine başvuran 4 hastanın teşhis ve tedavi süreci sunulmuştur. Olguların hepsinin bruksizme bağlı masseter hipertrofisinin olduğu tespit edildi. İşlem öncesi hastalardan yazılı olarak alınan aydınlatılmış onam sonrasında, botulinum toksin-A (BTA) uygulaması yapıldı. Uygulamanın sonrası yapılan kontrol muayenelerinde 4 olguda da paradoksal masseterik şişlik tespit edildi. Çalışmamızda sunulan hastaların botokstan etkilenmeyen masseter kaslarının yüzeyel loblarına daha yüzeyel bir botoks enjeksiyonu yapıldı, ortalama on gün içerisinde bütün hastalarda şikayetlerin ortadan kalktığı görüldü.

Sonuç: Masseter botoksu sonrası paradoksal şişlik fenomeni nadir görülmekte olup, hekim tarafından doğru konulan teşhis sonrasında kolaylıkla tedavi edilebilmektedir. Bruksizm ve masseter hipertrofisi için botoks uygulamalarını yapan hekimlerinin ortaya çıkabilecek olası komplikasyonlarla ilgili bilgili sahibi olması ve gerekli çözümleri sunabilmesi gerekmektedir.

Anahtar sözcükler: Temporomandibular eklem, botoks, masseterik şişlik, paradoksal masseterik şişlik, bruksizm.

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INTRODUCTION

The temporomandibular joint (TMJ), known as the mandibular joint, is a type of synovial joint with bicondylar articulation (1). The term temporomandibular disorder (TMD) is used for disorders in the joint, muscle and bone structure in the TMJ region. Among the most common TMJ disorders; pain dysfunction syndrome, internal diseases of the joint, arthritis and traumas (2-4).

Masseter muscle hypertrophy; is defined as a rare clinical phenomenon characterized by a local swelling in the area close to the angulus of the mandible, the exact etiology of which is unclear, but often caused by causes such as bruxism, TMD, and malocclusion. Treatment options such as non-invasive pharmacological treatment and invasive surgical reduction are available for patients diagnosed with masseter hypertrophy. Botulinum toxin type A (BTA) injection, a less invasive technique, is a toxin produced by the anaerobic organism *Clostridium botulinum*. It causes temporary paraesthesia and muscle atrophy after injection (5, 6).

BTA has been used frequently in the treatment of masseter hypertrophy in recent years and is considered to be safe compared to surgical treatment (7, 8). In the anatomical and clinical studies carried out since the beginning of its use in treatment; Various complications such as swelling, bruising, muscle weakness, and undesirable changes in facial muscles have been reported (9, 10).

It has been reported that the cause of paradoxical masseteric swelling, which is among the low complications that may

occur after BTA injection, is due to the thickness of the deep inferior tendon located between the two superficial and deep lobes of the masseter muscle as a result of anatomical studies (11).

CASE REPORTS

Case-1

A 34-year-old female patient with no systemic disease applied to the Gazi University Faculty of Dentistry Department of Oral and Maxillofacial Surgery clinic with a complaint of pain in TMJ. The clinical examination, it was determined that she had bruxism and hypertrophy in the bilateral masseter muscles. It was also observed that the patient had abrasions on the occlusal surfaces of her teeth. Written informed consent was obtained from the patient before clinical examination and interventional procedure. The BTA was injected into the masseter muscles bilaterally (25 Units). Bilateral paradoxical masseteric swelling was detected in the control examinations performed one week later (Figure 1). A more superficial BTA injection was made into the superficial muscle lobes of the masseter muscles that were not affected by botox (10 Units). The patients were informed and followed up. After 10 days, it was determined that the bulging was completely solved.

Figure 1: Bilateral paradoxical masseteric bulging detected on extraoral examination in first patient.



Case-2

A 28-year-old female patient with no systemic disease, was referred to the Gazi University Oral and Maxillofacial Surgery clinic with complaints of discomfort in TMJ and limitation of mouth opening, especially in the morning. On clinical examination, she was found to be a bruxism patient. In the clinical examination, it was determined that she had bruxism and hypertrophy in the bilateral masseter muscles. Written informed consent was obtained from the patient before clinical examination and interventional procedure. The BTA was injected into the masseter muscles bilaterally (25 Units). Bilateral paradoxical masseteric bulging was detected in the control examinations performed one week later (Figure 2).

Figure 2: Bilateral paradoxical masseteric bulging during muscle contraction in the second case



A more superficial BTA injection was made into the superficial muscle lobes of the masseter muscles that were not affected by botox (10 Units). The patients were informed and followed up. After 7 days, it was determined that the bulging was completely solved.

Case-3

A 30-year-old healthy female patient applied to the Gazi University Oral and Maxillofacial Surgery clinic with a complaint of clenching. The patient was found to be a bruxist. In the clinical examination, it was determined that she had bruxism and hypertrophy in the bilateral masseter muscles. Written informed consent was obtained from the patient before clinical examination and interventional procedure. The BTA was injected into the masseter muscles bilaterally (25 Units). Bilateral paradoxical masseteric bulging was detected in the control examinations performed one week later (Figure 3). A more superficial BTA injection was made into the superficial muscle lobes of the masseter muscles that were not affected by botox (10 Units). The patients were informed and followed up. After 10 days, it was determined that the bulging was completely solved.

Figure 3: In the third case, bilateral paradoxical masseteric bulging ten days after injections

**Case-4**

A 25-year-old female patient who have no general health problem, applied to the Gazi University Oral and Maxillofacial Surgery clinic with a complaint of clenching. On clinical examination, the patient was found

to have masseter hypertrophy bilaterally. Written informed consent was obtained from the patient. The BTA was injected into the masseter muscles bilaterally (20 Units). Bilateral paradoxical masseteric bulging was detected in the control examinations performed one week later (Figure 4). A more superficial BTA injection was made into the superficial muscle lobes of the masseter muscles that were not affected by botox (15 Units). The patients were informed and followed up. After 12 days, it was determined that the bulging was completely solved.

Figure 4: Bilateral paradoxical masseteric bulging of superficial muscle lobes of fourth patient



DISCUSSION

BTA injection, which is widely used in the treatment of masseter muscle hypertrophy, is a popular technique due to its optimal therapeutic effect (12). Paradoxical masseteric swelling is defined as an unexpected swelling of the masseter muscle as a result of BTA injections. According to recent studies, it is rarely seen and its incidence is between 0.5% and 18.8% (13). It usually occurs within 2-4 weeks after injection, but it has been reported that it can start within 24 hours (14). According to recent studies, it is rarely seen and its incidence is between 0.5% and 18.8%. It is thought to be induced by contractions of

unaffected muscle bundles distant from the BTA injection area (11).

The technique has been described in a large body of literature on BTA injection sites. Among them; There are injections applied to the most protruding part that is palpated when the masseter muscle is contracted from a single point, injections made from two points, and injections made from 3-4 points (15-17). In the cases we present, for the area planned to be injected into the masseter muscle; The imaginary line extending from the corner of the lip to the earlobe and the lower edge of the mandible was determined as the superior and inferior borders, and the borders of the masseter muscle as the anterior and posterior borders. An equal 10-15 Units injection of BTA was applied to each region from three points in the most protruding region of the masseter muscle, within 1 cm of the edges of this imaginary quadrangular area.

In the cadaveric study of Lee et al. to investigate the mechanism of paradoxical masseteric swelling; they found that the deep inferior tendon localized in the superficial aponeurosis of the masseter muscle prevented the spread of the toxin to all of the superficial muscle fibers (18). We think that in all of the cases presented in this study, the deep inferior tendon prevented the spread of the toxin to the superficial layer.

In the treatment of paradoxical masseteric swelling, more superficial injections into the same area are recommended (12, 19). Biphasic injection techniques, injections at equal distances both superior and inferior to the deep inferior tendon, and using ultrasonography imaging technique during

the procedure will prevent possible complications (12, 13, 20).

CONCLUSION AND RECOMMENDATIONS

There are many methods for the treatment of bruxism and BTA injections are very popular recently. However, physicians who perform this procedure should be aware of the possible complications. The presence of the deep lower tendon is an important anatomical structure that should not be ignored in BTA injections. To avoid complications such as paradoxical masseteric bulging, we think that injections should be made concerning at least 3 points and both deep and superficial parts of masseter muscle.

LIMITATIONS

The number of cases we presented and the fact that all cases were female are limitations of our study. In future studies, the number of cases should be increased and research should be conducted on patient groups of different genders.

INFORMED CONSENT

Written informed consent was obtained from all participants who participated in this study.

AUTHOR CONTRIBUTIONS

Concept – M.E.T., O. K.; Design – M.E.T., O. K.; Supervision – M.E.T.; Materials – M.E.T., O.K.; Data Collection and/or Processing – M.E.T., O.K.; Analysis and/or Interpretation – M.E.T., O.K.; Literature Review – O.K.; Writing – M.E.T., O.K.; Critical Review – M.E.T.

DECLARATION OF INTERESTS

The authors declare that they have no competing interest.

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