Lincolnshire Knowledge and Resource Service

This search summary contains the results of a literature search undertaken by the Lincolnshire Knowledge and Resource Service librarians in;

March 2014

All of the literature searches we complete are tailored to the specific needs of the individual requester.

If you would like this search re-run with a different focus, or updated to accommodate papers published since the search was completed, please let us know.

We hope that you find the information useful. If you would like the full text of any of the abstracts listed, please let us know.

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Enquiry: Botulinum toxin injection for masseter hypertrophy / temporomandibular dysfunction/ myofascial pain TMJ /

Completed by: Alison Price, 6th March 2014

Search History:

Each element searched separately, first using the thesaurus and backed up with a keyword 'title/abstract' search where no dedicated thesaurus term is available.

Exp refers to exploding the term to include all subheadings.

I do not use the ‘main heading’ function on the thesaurus search option for initial searches as this potential excludes relevant abstracts.

A = Masseter Hypertrophy / Masseter muscle hypertrophy
No exact thesaurus term for this condition:
1. MEDLINE; MASSETER MUSCLE/ OR exp MASTICATORY MUSCLES/; 11276 results.
2. MEDLINE; exp HYPERTROPHY/; 61525 results
3. MEDLINE; "masseter hypertrophy".ti,ab; 32 results.
4. MEDLINE; "masseter muscle hypertrophy".ti,ab; 47 results.

n.b. EMBASE also has the thesaurus term MASTICATORY MUSCLES/ which was combined on the database.

A = Combined as ((1 AND 2) OR (3 OR 4))

B = Temporomandibular Dysfunction

1. MEDLINE; TEMPOROMANDIBULAR JOINT DYSFUNCTION SYNDROME/; 4631 results.
2. MEDLINE; TEMPOROMANDIBULAR JOINT DISORDERS/
3. MEDLINE; "temporomandibular dysfunction".ti,ab; 328 results.
4. MEDLINE; "temporomandibular joint dysfunction".ti,ab; 1621 results.

B = Combined as (1 OR 2 OR 3 OR 4)

Myofascial Pain
C = MEDLINE; exp MYOFASCIAL PAIN SYNDROMES/; 5745 results.

Botulinum Toxin
D = MEDLINE; exp BOTULINUM TOXINS/

Combined as (A OR B OR C) AND D

Limits applied in Medline - [Limit to: (Publication Types Systematic Reviews)]

As the number of papers retrieved overall was less than 150 I also scrolled through the abstracts to select any RCTs.
Title: Botulinum toxin for masseter hypertrophy.
Citation: Cochrane Database of Systematic Reviews, 2009 – revised 2013, vol./is./1(CD007510)
Author(s): Al-Muharraqi MA, Fedorowicz Z, Al Bareeq J, Al Bareeq R, Nasser M

Abstract:
BACKGROUND: Benign masseter muscle hypertrophy is an uncommon clinical phenomenon of uncertain aetiology which is characterised by a soft swelling near the angle of the mandible. The swelling may on occasion be associated with facial pain and can be prominent enough to be considered cosmetically disfiguring. Varying degrees of success have been reported for some of the treatment options for masseter hypertrophy, which range from simple pharmacotherapy to more invasive surgical reduction. Injection of botulinum toxin type A into the masseter muscle is generally considered a less invasive modality and has been advocated for cosmetic sculpting of the lower face. Botulinum toxin type A is a powerful neurotoxin which is produced by the anaerobic organism Clostridium botulinum and when injected into a muscle causes interference with the neurotransmitter mechanism producing selective paralysis and subsequent atrophy of the muscle.
OBJECTIVES: To assess the effects of botulinum toxin type A in the management of benign bilateral masseter hypertrophy.
SEARCH STRATEGY: We searched the following databases in August 2008: the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2008, issue 3); MEDLINE (via PubMed) (1950 to August 2008); EMBASE (via embase.com) (1980 to August 2008); and LILACS via BIREME. We searched two bibliographic databases of regional journals which may be expected to contain relevant trials (IndMED and Iranmedex) using free text terms appropriate for this review.
SELECTION CRITERIA: Randomised controlled clinical trials (RCTs) and controlled clinical trials (CCTs) comparing intra-masseteric injections of botulinum toxin versus placebo administered for cosmetic facial sculpting in individuals of any age with bilateral benign masseter hypertrophy, which had been self-evaluated and confirmed by clinical and radiological examination. We excluded participants with unilateral or compensatory contralateral masseter hypertrophy resulting from head and neck radiotherapy.
DATA COLLECTION AND ANALYSIS: Two review authors conducted screening of studies in duplicate and independently, and although no eligible trials were identified, the two authors had planned to extract data independently and assess trial quality using standard Cochrane Collaboration methodologies.
MAIN RESULTS: We retrieved 167 references to studies, none of which matched the inclusion criteria for this review and all of which were excluded.
AUTHORS’ CONCLUSIONS: We were unable to identify any randomised controlled trials on the efficacy of intra-masseteric injections of botulinum toxin for people with bilateral benign masseter hypertrophy. The absence of high level evidence for the effectiveness of this intervention emphasises the need for well-designed, adequately powered, randomised controlled clinical trials (RCTs) and controlled clinical trials (CCTs).
Title: Botulinum toxin for myofascial pain syndromes in adults.
Citation: Cochrane Database of Systematic Reviews, 2012, vol./is. 4/(CD007533)
Author(s): Soares A, Andriolo RB, Atallah AN, da Silva EM
Abstract:
BACKGROUND: Myofascial pain syndrome (MPS) is a regional muscular pain syndrome characterised by the presence of trigger points, which are painful points in one or more muscles. The pain can be felt at the site where the trigger point is located or it can be felt away from that place when the muscle is pressed (referred pain). Botulinum toxin is a protein produced by the bacterium Clostridium botulinum and is a potent neurotoxin that eventually inhibits muscle contractions. It is capable of selectively weakening painful muscles and interrupting the pain cycle.
OBJECTIVES: To assess the effectiveness and safety of botulinum toxin in treating MPS, excluding MPS in neck and head muscles.
SEARCH METHODS: The search strategy was composed of terms for myofascial pain and botulinum toxin. We searched the Cochrane Pain, Palliative and Supportive Care (PaPaS) Review Group's Specialised Register until December 2011, CENTRAL (Cochrane Database of Systematic Reviews 2011, Issue 4), PUBMED (from 1966 to 2011), EMBASE (from 1980 to 2011) and LILACS (from 1982 to 2011). There was no language restriction.
SELECTION CRITERIA: We included randomised controlled trials (RCTs) involving botulinum toxin for treating participants with MPS. We excluded studies with MPS of the neck and head from this review, as they have already been assessed in existing systematic reviews. We considered a diagnosis of MPS to be based on the identification of trigger points in the taut band through palpation of sensitive nodules, local twitch response and specific patterns of referred pain associated with each trigger point.
DATA COLLECTION AND ANALYSIS: Two review authors independently screened identified studies, extracted data, assessed trial quality and analysed results using the Cochrane PaPaS Review Group criteria.
MAIN RESULTS: Four studies with a total of 233 participants, comparing botulinum toxin A (BTXA) with placebo, met the inclusion criteria. In one study with 145 participants, a significant improvement rate of pain intensity scores, as shown by the mean difference (MD) of -0.23 (95% confidence interval (CI) -0.26 to -0.20; P value < 0.00001) and duration of daily pain (MD -1.11; 95% CI -1.37 to -0.85; P value < 0.00001), was demonstrated when comparing BTXA with placebo. The three other studies showed that there was no statistically significant difference between BTXA and placebo in pain intensity.
AUTHORS' CONCLUSIONS: There is inconclusive evidence to support the use of botulinum toxin in the treatment of MPS based on data from four studies with a total of 233 participants, which we considered adequate to be included in this review. Meta-analyses were not possible due to the heterogeneity between studies. We suggest that in future studies the same methodology to assess pain, a standardised dose of treatment, follow-up of at least four months (to observe the maximum/minimum curve of the drug effect) and appropriate data presentation should be used. More high-quality RCTs of botulinum toxin for treating MPS need to be conducted before firm conclusions on its effectiveness and safety can be drawn.
**Title:** Botulinum toxin A for myofascial trigger point injection: a qualitative systematic review.

**Citation:** European Journal of Pain, July 2007, vol./is. 11/5(519-27), 1090-3801; 1090-3801

**Author(s):** Ho KY, Tan KH

**Abstract:** Botulinum toxin injection is used to treat various pain conditions including muscle spasticity, dystonia, headache and myofascial pain. Results are conflicting regarding the use of Botulinum toxin for trigger point injection in terms of improvement in pain. The aim of this study was to carry out a systematic review to assess the evidence for efficacy of Botulinum toxin A (BTA) compared with placebo for myofascial trigger point injection. Electronic databases on Medline, Cochrane Library, Scopus, CINAHL were queried using key words such as "botulinum toxin", "myofascial pain", "trigger point", "chronic pain" and "musculoskeletal pain". Relevant published randomized controlled trials that described the use of BTA as injection therapy for trigger points were considered for inclusion. The five-item 0-16 point Oxford Pain Validity Scale (OPVS) was used as a selection criteria for suitable clinical trials. Trials were also assessed based on quality using the Oxford Rating Scale. Data extracted from qualified trials included outcome measures such as pain intensity and pain pressure threshold. All studies were ranked according to the OPVS and the authors’ conclusions were compared. Five clinical trials met the inclusion criteria. One trial concluded that BTA was effective, and four concluded that it was not effective for reducing pain arising from trigger points. OPVS scores ranged from 8 to 14 with the negative studies corresponding with higher validity scores. The current evidence does not support the use of BTA injection in trigger points for myofascial pain. The data is limited and clinically heterogeneous.
Title: Botulinum toxin treatment of myofascial pain: a critical review of the literature.
Citation: Current Pain & Headache Reports, October 2012, vol./is. 16/5(413-22), 1534
Author(s): Gerwin R
Abstract: This is a review of literature relevant to the treatment of myofascial pain syndrome by botulinum injections. The objective is to critically review the studies to see if they are appropriately designed, conducted, and interpreted to provide guidance in the management of myofascial pain. The intent is to better understand the mixed results that these studies have provided. A search was made utilizing PubMed for literature relevant to the use of botulinum toxin in the treatment of myofascial pain. All identifiable series were reviewed, including open label, single-blinded and double-blinded studies, randomized and controlled, or not. In general, small case series of only a few patients were not included unless they made a relevant point and there were no available randomized studies or larger studies. Single case reports were not included. This is not a meta-analysis. The studies were evaluated according to their design and the selection of outcome measurements, and the interpretation of results. The studies were individually critiqued, and an overall assessment and commentary was made of the studies in the field as a whole. Problems that were common to the studies were robust placebo responders, incomplete treatment of a regional myofascial pain syndrome, inappropiate or confounding control populations or treatments, and inappropriate time periods for assessment of outcomes, or misinterpretation of the time-frame of action of botulinum toxin. The studies of the effect of botulinum toxin treatment of myofascial trigger points have had mixed results. However, few studies have been designed to avoid many of the pitfalls associated with a trial of botulinum toxin treatment of trigger points. Better-designed studies may give results that can be used to guide practice based on reliable evidence. At the present time, one must conclude that the available evidence is insufficient to guide clinical practice.

Title: Botulinum toxin assessment, intervention and aftercare for paediatric and adult niche indications including pain: international consensus statement.
Citation: European Journal of Neurology, August 2010, vol./is. 17 Suppl 2/(122-34)
Author(s): Rawicki B, Sheean G, Fung VS, Goldsmith S, Morgan C, Novak I, Cerebral Palsy
Abstract: Evidence is emerging for the use of botulinum neurotoxin type-A (BoNT-A) for niche indications including pain independent of spasticity. Pain indications such as chronic nociceptive back pain, piriformis syndrome, chronic myofascial pain, pelvic pain, complex regional pain syndrome, facial pain and neuropathic pain are outlined in this paper. Of these, class I evidence is available for the treatment of chronic nociceptive low back pain, piriformis syndrome, myofascial pain, facial pain, neuropathic pain and plantar fasciitis. Peri-operative use of BoNT-A is emerging, with indications including planning for surgery and facilitating surgery, as well as healing and improving analgesia post-operatively. Evidence is limited, although there are some reports that clinicians are successfully using BoNT-A peri-operatively. There is class I evidence showing pre-operative use of BoNT-A has a beneficial effect on outcomes following adductor-release surgery. The use of BoNT for treatment of tremor, other than neck tremor in the setting of cervical dystonia, including evidence for upper limb tremor, cranial tremor and non-dystonic neck tremor is reviewed. The evidence is variable at this stage, and further study is required to develop definitive recommendations for the clinical utility of BoNT-A for these indications.
Title: The therapeutic use of botulinum toxin in cervical and maxillofacial conditions: an evidence-based review.

Citation: Oral Surgery Oral Medicine Oral Pathology Oral Radiology & Endodontics, August 2007, vol./is. 104/2(e1-11)

Author(s): Ihde SK, Konstantinovic VS

Abstract:
INTRODUCTION: The role of botulinum toxin as a therapeutic agent for several conditions is expanding. We sought to determine if botulinum toxin is safe and effective in treating patients with cervical dystonia and maxillofacial conditions. Our purpose was to establish a safety and efficacy profile to determine whether or not this treatment may be used prophylactically in patients undergoing dental implant therapy.

METHODS: We performed a systematic search of the literature to identify randomized clinical trials evaluating patients treated with botulinum toxin as an adjunct to dental implant therapy, maxillofacial conditions including temporomandibular disorders (TMD), and cervical dystonia.

RESULTS: Four randomized controlled trials (RCTs) met our search criteria in the area of cervical dystonia and chronic facial pain. No RCTs were identified evaluating dental implant therapy. Patients with cervical dystonia exhibited significant improvements in baseline functional, pain, and global assessments compared to placebo. Adverse events were mild and transient with numbers needed to harm (NNH) ranging from 12 to 17. Patients with chronic facial pain improved significantly from baseline in terms of pain compared to placebo. Rates of adverse events were less than 1%.

CONCLUSION: Botulinum toxin appears relatively safe and effective in treating cervical dystonia and chronic facial pain associated with masticatory hyperactivity. No literature exists evaluating its use in dental implantology. Randomized clinical trials are warranted to determine its safety and efficacy in dental implantology and other maxillofacial conditions such as bruxism.

Title: A critical review of the use of botulinum toxin in orofacial pain disorders.

Citation: Dental Clinics of North America, January 2007, vol./is. 51/1(245-61, ix)

Author(s): Clark GT, Stiles A, Lockerman LZ, Gross SG

Abstract: This article reviews the appropriate use, cautions, and contraindication for botulinum neurotoxin (BoNT) and reviews the peer-reviewed literature that describes its efficacy for treatment of various chronic orofacial pain disorders. The literature has long suggested that BoNT is of value for orofacial hyperactivity and more recently for some orofacial pain disorders; however, the results are not as promising for orofacial pain. The available data from randomized, double-blind, placebo-controlled trials (RBCTs) do not support the use of BoNT as a substantially better therapy than what is being used already. The one exception is that BoNT has reasonable RBCT data to support its use as a migraine prophylaxis therapy. The major caveat is that the use of BoNT in chronic orofacial pain is "off-label".
Title: Myofascial pain of the jaw muscles: comparison of short-term effectiveness of botulinum toxin injections and fascial manipulation technique.

Citation: Cranio, April 2012, vol./is. 30/2(95-102), 0886-9634;0886-9634 (2012 Apr)

Author(s): Guarda-Nardini L, Stecco A, Stecco C, Masiero S, Manfredini D

Abstract: A randomized controlled trial was performed to compare the short-term effectiveness of botulinum toxin injections and physiatric treatment provided by means of Fascial Manipulation techniques in the management of myofascial pain of jaw muscles. Thirty patients with a Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) diagnosis of myofascial pain were randomized to receive either single-session botulinum toxin injections (Group A) or multiple-session Fascial Manipulation (Group B). Maximum pain levels (VAS ratings) and jaw range of motion in millimeters (maximum mouth opening, protrusion, right and left laterotrusion) were assessed at baseline, at the end of treatment, and at a three-month follow-up. Both treatment protocols provided significant improvement over time for pain symptoms. The two treatments seem to be almost equally effective, Fascial Manipulation being slightly superior to reduce subjective pain perception, and botulinum toxin injections being slightly superior to increase jaw range of motion. Differences between the two treatment protocols as to changes in the outcome parameters at the three-months follow-up were not relevant clinically. Findings from the present investigation are in line with literature data supporting the effectiveness of a wide spectrum of conservative treatment approaches to myofascial pain of the jaw muscles. Future studies on larger samples over a longer follow-up span are needed on the way to identify tailored treatment strategies.

Title: Efficacy of botulinum toxin type A for treatment of persistent myofascial TMD pain: a randomized, controlled, double-blind multicenter study.

Citation: Pain, September 2011, vol./is. 152/9(1988-96), 0304-3959;1872-6623 (2011 Sep)

Author(s): Ernberg M, Hedenberg-Magnusson B, List T, Svensson P

Abstract: Evidence of an effect by botulinum toxins is still lacking for most pain conditions. In the present randomized, placebo-controlled, crossover multicenter study, the efficacy of botulinum toxin type A (BTX-A) was investigated in patients with persistent myofascial temporomandibular disorders (TMD). Twenty-one patients with myofascial TMD without adequate pain relief after conventional treatment participated. A total of 50 U of BTX-A or isotonic saline (control) was randomly injected into 3 standardized sites of the painful masseter muscles. Follow-up was performed after 1 and 3 months, followed by a 1-month washout period, after which crossover occurred. Pain intensity at rest was the primary outcome measure, while physical and emotional function, global improvement, side effects, and clinical measures were additional outcome measures. There was no main difference between drugs (ANOVA; P=.163), but there was a significant time effect (P<.001), so BTX-A reduced mean (SD) percent change of pain intensity by 30 (33%) after 1 month and by 23 (30%) after 3 months compared to 11 (40%) and 4 (33%) for saline. The number of patients who received a 30% pain reduction was not significantly larger for BTX-A than after saline at any follow-up visit. The number needed to treat was 11 after 1 month and 7 after 3 months. There were no significant changes after treatment in any other outcome measures, with the exception of pain on palpation, which decreased 3 months after saline injection (P<.05). These results do not indicate a clinical relevant effect of BTX-A in patients with persistent myofascial TMD pain.
Title: Efficacy of botulinum toxin in treating myofascial pain in bruxers: a controlled placebo pilot study.

Citation: Cranio, April 2008, vol./is. 26/2(126-35), 0886-9634;0886-9634 (2008 Apr)

Author(s): Guarda-Nardini L, Manfredini D, Salamone M, Salmaso L, Tonello S, Ferronato

Abstract: The present investigation is a preliminary double-blind, controlled placebo, randomized clinical trial with a six month follow-up period. The study aimed to assess the efficacy of type A botulinum toxin (Botox, Allergan, Inc. Irvine, CA) to treat myofascial pain symptoms and to reduce muscle hyperactivity in bruxers. Twenty patients (ten males, ten females; age range 25-45) with a clinical diagnosis of bruxism and myofascial pain of the masticatory muscles were enrolled in a double-blind, controlled placebo, randomized clinical trial, with a treatment group (ten subjects treated with botulinum toxin injections- BTX-A) and a control group (ten subjects treated with saline placebo injections). A number of objective and subjective clinical parameters (pain at rest and during chewing; mastication efficiency; maximum nonassisted and assisted mouth opening, protrusive and laterotrusive movements; functional limitation during usual jaw movements; subjective efficacy of the treatment; tolerance of the treatment) were assessed at baseline time and at one week, one month, and six months follow-up appointments. Descriptive analysis showed that improvements in both objective (range of mandibular movements) and subjective (pain at rest; pain during chewing) clinical outcome variables were higher in the Botox treated group than in the placebo treated subjects. Patients treated with BTX-A had a higher subjective improvement in their perception of treatment efficacy than the placebo subjects. Differences were not significant in some cases due to the small sample size. Results from the present study supported the efficacy of BTX-A to reduce myofascial pain symptoms in bruxers, and provided pilot data which need to be confirmed by further research using larger samples.
Additional Research

Title: Botulinum injection for the management of myofascial pain in the masticatory muscles. A prospective outcome study.
Citation: British Journal of Oral & Maxillofacial Surgery, 2013, vol./is. 51/3(199-205)
Author(s): Sidebottom AJ, Patel AA, Amin J
Abstract: We prospectively analysed the outcome after botulinum injection in patients who did not recover after conservative measures to manage masticatory myofascial pain, and who were not willing to take low dose tricyclic antidepressants as a muscle relaxant. We prospectively 62 patients were assessed with visual analogue scores (VAS) for pain on the affected side before, and 6 weeks after botulinum injection(s) (50 units Dysport in up to 3 sites), and measured mouth opening in mm. Of those treated 49 (79%) showed at least some improvement (pain reduced by more than 25%). Patients reported more than a 90% reduction in the VAS for 25 (30%) of the 84 sides of the face treated. Only 22 of the 62 patients had more than one course of treatment to the same side. Interincisal distance improved by a mean/median of 0.9 mm (p<0.03) after treatment. Side effects included 3 cases of temporary weakness of a facial muscle. Ranking the VAS pain scores using the Wilcoxon test before and after injection showed a significant reduction in pain (median change -29.5, interquartile range -53 to -16, p<0.0001). The treatment significantly improved patients’ pain scores and the overall mean/median reduction in pain was 57%. Botulinum injection does not guarantee complete resolution of myofascial pain, but it usually has some beneficial effect in improving the symptoms, and should be considered as an alternate treatment for masticatory myofascial pain if conservative methods have failed.

Title: Botulinum toxin versus fascial manipulation technique in the treatment of chronic facial pain
Citation: PM and R, September 2011, vol./is. 3/10 SUPPL. 1(S292), 1934-1482
Author(s): Stecco A., Manfredini D., Masiero S.
Abstract: Design: Thirty patients with a diagnosis of chronic facial pain associated with myofascial syndrome were randomly divided in 2 groups. Participants: 22 women, 8 men; age range, 23-69 years. Interventions: 15 subjects (11 women, 4 men; mean age, 44 years) were treated with botulinum toxin injections (group A) and 15 subjects (11 women, 4 men; mean age, 45 years) were treated with 4 sessions of fascial manipulation technique (group B). Main Outcome Measures: All the patients were assessed with the Research Diagnostic Criteria for Temporomandibular Disorders axis II (intensity of facial pain, limitation of activities of daily living). Results: The group A showed a decrease in pain (from 7.0 to 4.8 of the visual analog scale) and in the masticatory pain (from 3.4 to 1.6). Moreover, botulinum toxin injections permit quitting habits of tooth grinding and clenching. There are no adverse effects with botulinum, further, a “fixed” smile for about 6-8 weeks. In group B, a reduction of pain intensity was evident (from 6.0 to 2.1). Significant differences were found in rest pain between preintervention and both postintervention and 1-month follow-up periods. Besides, all the participants reported reductions in headache frequency and intensity over time, although only in the group B was this improvement statistically significant (88.5%). Surface electromyography measured a decrease of frequency (muV) and amplitude of muscle activity in both groups but higher in group A. Conclusions: Results from the present study support the efficacy of BTX-A and fascial manipulation technique to reduce myofascial pain symptoms in bruxism, and it is probably that using both the methods could further improved the outcomes. A larger definitive trial will be needed to confirm this hypothesis.
Title: Botulinum toxin type A for the treatment of hypertrophy of the masseter muscle.
Citation: Plastic & Reconstructive Surgery, June 2010, vol./is. 125/6(1693-705), 1529-4242
Author(s): Kim NH, Park RH, Park JB
Abstract:
BACKGROUND: The authors investigated retrospectively the long-term treatment effects of botulinum toxin by analyzing the follow-up data of masseter hypertrophy patients at the Gyalumhan Plastic Aesthetic Clinic, located in Seoul, Korea, from March of 2001 to September of 2007. This is a second follow-up study following the previous study report in 2005.
METHODS: A total of 121 patients treated for more than 1 year with injection of botulinum toxin type A were included in this analysis. At every patient's visit, masseter muscle thickness was measured using ultrasonography. The dose of injection was 100 to 140 U of Dysport for each side based on the muscle thickness.
RESULTS: Of a total 121 patients, six patients received two injections, 28 patients received three injections, 41 patients received four injections, 23 patients received five injections, 16 patients received six injections, six patients received seven injections, and one patient received eight injections. Overall masseter muscle size was reduced from 13.32 mm at the baseline visit to 9.94 mm at the last visit on average. As the number of visits increased through two to eight visits, the mean muscle size was decreased. According to the increase in the number of visits, the mean dose was decreased. There was no significant difference in muscle reduction effect analyzed by age subgroup. The muscle reduction effect after botulinum toxin treatment was better in patients with thicker masseter muscles.
CONCLUSIONS: Botulinum toxin type A injections have a long-term effect on masseter muscle hypertrophy. A positive correlation was found between the number of injections and the decrease of muscle volume.

Title: Type A botulinum toxin in the treatment of chronic facial pain associated with masticatory hyperactivity.
Citation: Journal of Oral & Maxillofacial Surgery, July 2003, vol./is. 61/7(774-8), 0278-
Author(s): von Lindern JJ, Niederhagen B, Berge S, Appel T
Abstract:
PURPOSE: Chronic hyperactivity of the masticatory muscles is a common functional disorder associated with chronic facial pain and headache. The positive therapeutic effect of botulinum toxin type A on functional disorders and pain symptoms has been known in connection with the treatment of cervical dystonia. The purpose of this report is to assess whether the targeted reduction of masticatory muscular hyperactivity by local injection treatment with botulinum toxin type A can improve facial pain headache symptoms in the event that other treatment methods prove ineffective. Materials and Methods: In an randomized blinded placebo-controlled study, 90 patients (60 verum and 30 placebo) with chronic facial pain were treated with botulinum toxin type A (Botox; Allergan, Ettingen, Germany) injections into masticatory muscles.
RESULTS: Ninety-one percent of patients who received botulinum toxin improved by a significant mean reduction of approximately 3.2 on a visual analog pain scale. By comparison with t test and chi(2) test, there was a significant difference compared with the placebo group (P <.01).
CONCLUSIONS: The local injection of botulinum toxin type A constitutes an innovative and adequately efficient treatment method for chronic facial pain associated with hyperactivity of the masticatory muscles. An improvement in the painful symptoms can be expected in up to 90% of patients who do not respond to conservative treatment methods.
**Title:** Treatment of recurrent temporomandibular joint dislocation with intramuscular botulinum toxin injection.

**Citation:** Clinical Oral Investigations, March 2003, vol./is. 7/1(52-5), 1432-6981;1432-6981

**Author(s):** Ziegler CM, Haag C, Muhling J

**Abstract:** Recurrent dislocation of the mandibular condyle poses a difficult problem for affected patients. In the course of time, dislocations often become more frequent and more difficult to avoid. Even with good patient compliance, conservative treatment is often not sufficient. Operative procedures have also been described for the treatment of temporomandibular joint dislocation. However, these interventions are invasive, involving open arthrotomy with possible complications, and cannot safely guarantee a successful outcome. On the other hand, botulinum toxin injections into the lateral pterygoid muscles offer the option of a predictable and prolonged period without renewed dislocation. We present the results of this treatment carried out in 21 patients with recurrent temporomandibular joint dislocation. Four patients were treated following unsuccessful physical therapy and the use of occlusal splints. The remaining 17 patients were treated for a number of conditions resulting in dislocation, including some with senile dementia and mental impairment in whom compliance with conservative measures was poor or completely absent. Injections were given on a 3-month basis in order to have a sustained effect. Within the study period of 6 months to 3 years, only two of the 21 patients suffered further dislocation. There were no side effects recorded as a result of treatment.

**Title:** Botulinum toxin: new treatment for temporomandibular disorders.

**Citation:** British Journal of Oral & Maxillofacial Surgery, October 2000, vol./is. 38/5(466-71)

**Author(s):** Freund B, Schwartz M, Symington JM

**Abstract:**

BACKGROUND: Temporomandibular disorders (TMDs) affect the face and jaws, and cause chronic pain and dysfunction in many people. As in other conditions involving the musculoskeletal system, controlling the myogenous component is an integral part of treatment. In this study, we evaluated subjective and objective responses to treatment with botulinum toxin A (BTX-A) in a group of 46 patients with TMDs.

METHODS: 46 subjects with TMD were enrolled in this uncontrolled study and treated with BTX-A 150U. Both masseter muscles were injected with 50 U each and both temporalis muscles with 25 U each under electromyographic guidance. Subjects were assessed at two-week intervals for eight weeks. Outcome measures included subjective assessment of pain by visual analogue scale (VAS), measurement of mean maximum voluntary contraction (MVC), interincisal oral opening, tenderness to palpation, and a functional index based on multiple VAS. Medians of the data were taken for each outcome measure at each time point and subjected to Duncan's multiple range test.

RESULTS: There were significant (P<0.05) differences in all median outcome measures between the pre-treatment assessment and the four follow-up assessments except for MVC. Although MVC was significantly reduced midway through the study, it had returned to pretreatment values by the final two assessments. All other outcome measures remained significantly different from the pretreatment findings. Paired correlation of variables including age, sex, diagnosis, depression index, and time of onset showed no significant differences.

CONCLUSIONS: BTX-A injections produced significant improvements in pain, function, mouth opening, and tenderness to palpation. MVC initially diminished then returned to the initial values. Although the study was uncontrolled, the results strongly suggest that BTX-A reduces severity of symptoms and improves functional abilities for patients with TMD and that these extend beyond its muscle-relaxing effects.