



SHORT COMMUNICATION

Intramuscular injection of botulinum toxin as an adjunct to arthrocentesis of the temporomandibular joint: preliminary observations

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INTRODUCTION

Temporomandibular disorders (TMD) are often treated in a step-wise fashion. Initially conservative treatment is used, consisting of a regimen of anti-inflammatory and muscle relaxing drugs. This is often coupled with physiotherapy and orthotic devices. Depending on response more aggressive interventions may be necessary to relieve the discomfort and dysfunction of the joints. This usually takes the form of arthrocentesis with or without the instillation of a steroid or hyaluronate into the joint. If this fails to improve the condition, operation may be indicated. In centres where arthroscopic techniques are not available, or if the disease is severe, open arthrotomy may be the only option left. Operations on the joint are rarely curative and in many cases patients may ultimately require several procedures.

We have combined two potentially useful forms of therapy: injections of botulinum toxin-A (BTX-A) to control the masticatory musculature and arthrocentesis in a small group of subjects with TMD and present our preliminary observations.

PATIENTS AND METHODS

We retrospectively assessed 15 patients in general practice with a 3- to 5-year history of pain, dysfunction of the jaws and limitation of opening of the mouth because of internal derangement of one temporomandibular joint (TMJ). In an attempt to select subjects with comparable disease, a mean (SD) pain score on a Visual Analogue Scale (VAS) of 8 (1) (out of a maximum pain score of 10), and a mean (SD) subjective functional VAS (based on the research diagnostic criteria) of 8 (1) out of 10 were part of the inclusion criteria.¹

All subjects had been treated with muscle relaxants and had anti-inflammatory drugs orally, and intra-oral orthotics for at least 6 months and all subsequently had unilateral arthrocentesis. Arthrocentesis entailed inserting

two 18-gauge needles into the superior joint space, which allowed the joint to be flushed with normal saline 150 ml. Eight of the 15 subjects were simultaneously injected with 20 units (5 units/0.1 ml normal saline) of BTX-A (BOTOX[®], Allergan) into the masseter and temporalis muscles bilaterally. Five injection sites in each muscle were selected based on the bulk of the muscle. Monthly assessments of pain, function, and range of opening were made. Subjects could request an arthrotomy at any time for deteriorating joint function and pain. Surgical intervention was chosen as the end point. No statistical analysis is presented to avoid giving the pretence of a scientific study and because there were too few patients.

RESULTS

Eleven subjects were female, age range 24–56 years (mean 31). Of the eight subjects treated with arthrocentesis and BTX-A, two elected to have an arthrotomy at 11 and 16 months, respectively (mean 13.5 months), after arthrocentesis. In the arthrocentesis alone group, four of the seven subjects elected to have an arthrotomy between 0 and 18 months, at a mean of 7.5 months (range 6–9 months).

DISCUSSION

Arthrocentesis has been used successfully for the past decade to treat cases of chronic TMJ pain that are not associated with severe internal derangements.² Conceptually, the flushing out of inflammatory mediators and lysis of adhesions within the superior joint space should relieve pain and improve the range of movement of the joint. Clinically, this has been our experience. However, a review of 180 cases of TMD treated with arthrocentesis in our centre over the past 5 years showed that 85 (47%) of these patients went on to require a further operation within 18 months. This is a somewhat higher failure rate than reported by others, perhaps because of the overall reduction

in the use of arthrocentesis in all but the most recalcitrant cases in our practice since we adopted BTX-A for treatment of TMD.

The relation between muscle activity and disease in the joint has not yet been exactly defined. Many cases of TMD are associated with hyperactivity or aberrant activity in the muscles, which increases loading of the joints. This overloading, if chronic, may have a role in promoting inflammation and internal derangements of the joint. Reducing the maximum contractile force of the masticatory muscles with BTX-A does result in a reduction in overall pain, an improvement in function, and improved range of movement. It seems, however, that relaxing the masticatory muscles with BTX-A was less effective in controlling signs and symptoms in joint-centred TMD than in muscle-centred TMD. Dealing with both the musculature and the joint simultaneously, therefore, when the diagnosis warranted, seemed appropriate.

BTX-A is produced by the anaerobic organism *Clostridium botulinum* and is considered to be a pre-synaptic neurotoxin. It causes a dose-dependent weakness in skeletal muscle by blocking the release of acetylcholine from motor nerve endings,³ as well as lowering muscle resting tone. Function is restored in 1–4 months, initially by neural sprouting followed by regeneration of the acetylcholine vesicle docking proteins.

The mechanism by which BTX-A reduces pain in myofascial conditions is not clear, but may involve direct action on muscular contraction,⁴ as well as a dose-dependent anti-inflammatory effect.⁵

Preliminary observations from this study suggest that BTX-A injections into the masticatory muscles as an adjunct to TMJ lavage is more effective at prolonging an improvement in symptoms than arthrocentesis alone. Two of eight subjects given combined treatment elected to have an arthrocentesis at a mean of 13.5 months after arthrocentesis.

In the arthrocentesis-only group, four of seven subjects at a mean of 7.25 months elected to have an arthrocentesis. The difference in outcome between the two groups could be explained by selection bias and subjective outcome measures. The trend, however, suggests that a synergy may exist between arthrocentesis and BTX-A. Whether this is strictly the result of mechanical unloading of the joints or whether it may be caused by the anti-inflammatory properties of the toxin is unknown. These results suggest that a properly designed clinical trial is warranted.

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