Botulinum Toxin Type A Injection for the Management of Myofascial Temporomandibular Pain Disorder

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Abstract

Objective: To evaluate the effect of botulinum toxin type A injection on pain in myofascial temporomandibular disorder.

Patients and Methods: Six patients with temporomandibular myofascial pain were treated with injection of botulinum toxin type A into the painful muscles. The effect was evaluated clinically and by questionnaires completed pre- and postinjection.

Results: All patients showed clinical remission of pain symptoms without any adverse effects during the follow-up period (range, 5 to 12 months).

Conclusions: Botulinum toxin type A injection appears to be effective for the treatment of temporomandibular myofascial pain. This pilot study provides the basis for a large-scale prospective study with a longer follow-up to confirm the findings and conclusions.

Key words: Botulinum toxin type A, Myofascial pain syndromes, Temporomandibular joint disorders

Introduction

Temporomandibular joint (TMJ) disorder is one of the most difficult clinical problems to diagnose and manage in the field of oral and maxillofacial surgery. The aetiology is multifactorial and often complicated by symptoms of chronic head and neck pain.1 TMJ disorder is also well known as a stress-related psychosomatic disorder,2,3 and there is much controversy about the treatment because the condition is often refractory to conventional therapy. There are various classifications of TMJ disorder. The classification of the disorder into myofascial pain dysfunction, true internal derangement, and osteoarthrosis is useful. In the authors’ experience, the majority of patients who present with acute or chronic myofascial pain have myofascial pain dysfunction. Although internal derangement such as disc displacement or perforation does occur, it is relatively less common, and myofascial pain may be superimposed. True osteoarthrosis that is related to systemic diseases such as rheumatoid arthritis is rare.

Botulinum toxin is a potent bacterial neurotoxin produced by the anaerobic bacterium Clostridium botulinum. Botulinum toxin acts by blocking neuromuscular conduction and produces muscle paralysis, atrophy, and weakness. The toxin has been used extensively for the control of involuntary muscle spasm and for cosmetic treatment.4 Recently, botulinum toxin has also been used for the treatment of hyperfunctional muscles or muscle spasm.5-7 In this study, the effectiveness of intramuscular injections of botulinum toxin for the management of patients who present with temporomandibular myofascial pain dysfunction was examined.

Patients and Methods

Patients with TMJD who were referred to the Temporomandibular Joint Clinic at the Tideman Maxillofacial Centre, Hong Kong, were screened for entry into this prospective study. All patients had a panoramic X-ray as initial screening for abnormal bone pathology and a thorough medical and dental history was taken. The patients completed a specially designed questionnaire, and a full clinical examination of the TMJ was performed. The clinical examination of the TMJ included an examination of the range
of movement of the lower jaw vertically and in lateral excursions. A measurement of the maximum incisal opening was carried out, and any evidence of joint clicking or locking was recorded. The joints were palpated for local tenderness and pain at rest and during opening. Joint sounds during movement of the mandible were recorded with the assistance of a stethoscope, when indicated. The presence of muscle tenderness was ascertained by careful palpation of the muscles of mastication — the masseter, temporalis, and accessory muscles. The lateral pterygoid and the medial pterygoid muscles were not included in the clinical examination, as they are anatomically difficult to palpate and the results of palpation of these muscles are unreliable. Trigger points for pain in the muscles that were palpated were recorded. Intraoral evidence of bruxism, faceting, and attrition of dentition was noted. Further imaging of the TMJ by magnetic resonance imaging was performed if internal derangement of the joints was suspected.

Patients with bony pathology and osteoarthrosis related to systemic disease were excluded from the study. Six patients with temporomandibular myofascial pain dysfunction, diagnosed by clinical and radiological findings, were identified and included in this pilot study.

**Botulinum toxin type A** 100 units/vial was used for injection (Figure 1). Dilution of the toxin was undertaken with normal saline at 5 units per 0.1 mL. The toxin was administered percutaneously in divided doses using a 1.0-mL syringe and a 30-gauge needle (Figure 2) and was injected into trigger points in the muscle if they had been identified clinically. If no trigger points were identified, injection into the thickest part of the muscle was done (Figure 3). The patients were reviewed at 2- to 3-week intervals to assess the effect of the injections. Postinjection questionnaires were completed at the follow-up appointments. A second injection was given if clinically indicated.

**Results**

There were 4 women and 2 men enrolled in the study, with an age range of 21 to 65 years. All patients had been previously treated with various conservative approaches without success. Before injection, all patients in this series had pain in the masseteric and temporalis muscle groups. All except 1 patient had limited mouth opening. The minimum dose of the toxin given was 60 units and the maximum dose was 100 units. All patients responded well to the
injections, showed a quick response to treatment, and remained pain-free at the end of the follow-up period, except for 1 patient who had a relapse after 4 months. The other 5 patients had improved mouth opening and no pain symptoms throughout the follow-up period, which ranged from 5 months to 1 year.

**Discussion**

TMJ disorder is difficult to diagnose and may be confused with other causes of chronic orofacial pain. Misdiagnosis and inappropriate treatment are not uncommon, and some treatments such as full mouth occlusal rehabilitation and endodontic therapy can exacerbate and perpetuate pain symptoms and lead to irreversible damage. Similarly, surgery is only rarely required. Only a relatively small percentage of patients present with a surgically correctable condition that will benefit from open joint surgery.

Pain is the most common symptom that causes patients to seek treatment. Chronic microtrauma to, and hyperactivity of, the muscles of mastication are often found to be the cause of pain. Muscle splinting with limited mouth opening and disturbance of masticatory function is common. Conservative treatment, such as the use of non-steroidal anti-inflammatory analgesics, muscle relaxants, and splint therapy, are usually the mainstay of any treatment plan. However, unwanted sleepiness that accompanies the use of muscle relaxants such as diazepam often makes their use unacceptable to many patients. Conditions such as bruxism and paraoral habits that are often superimposed with psychological factors such as depression and anxiety often make the pain refractory to conventional therapy. Surgical management of patients with these conditions is mostly ineffective and often damaging.

Botulinum toxin has been used as a local muscle relaxant for the treatment of focal dystonia and pain. The direct injection of botulinum toxin into muscles with hyperfunction has shown promising clinical effects in patients with myofascial pain in the low back and control of muscle spasticity in patients with cerebral palsy. The use of botulinum toxin for the treatment of myofascial pain of the TMJ has not been well documented. In this study, 6 patients were treated with botulinum toxin injections, and all experienced pain relief. Only 1 patient experienced a recurrence of the pain symptoms during the review period.

As there is no documented dosage for the use of botulinum toxin for relief of myofascial pain, small

<table>
<thead>
<tr>
<th>Patient number</th>
<th>Age (years)</th>
<th>Sex</th>
<th>Presenting symptoms</th>
<th>Previous treatment</th>
<th>Muscle groups affected</th>
<th>Botulinum toxin treatment</th>
<th>Outcome</th>
<th>Follow-up period</th>
<th>Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65</td>
<td>M</td>
<td>Pain and limited mouth opening</td>
<td>Non-steroidal anti-inflammatory drugs, splint</td>
<td>Masseter, temporalis</td>
<td>50 units each side 4 injections</td>
<td>Pain-free Normal mouth opening</td>
<td>12 months</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>F</td>
<td>Pain and clicking joints</td>
<td>Non-steroidal anti-inflammatory drugs, muscle relaxant, splint</td>
<td>Masseter</td>
<td>40 units each side 3 injections</td>
<td>Pain-free Unchanged clicking joints</td>
<td>12 months</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>42</td>
<td>F</td>
<td>Head and neck pain</td>
<td>Midazolam, muscle relaxant</td>
<td>Masseter</td>
<td>50 units each side 2 injections</td>
<td>Pain-free</td>
<td>7 months</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>F</td>
<td>Pain and limited mouth opening</td>
<td>Non-steroidal anti-inflammatory drugs, muscle relaxant</td>
<td>Masseter</td>
<td>30 units each side 1 injection</td>
<td>Pain-free Normal mouth opening</td>
<td>4 months</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>47</td>
<td>M</td>
<td>Acute pain and limited mouth opening</td>
<td>Non-steroidal anti-inflammatory drugs</td>
<td>Masseter</td>
<td>35 units each side 2 injections</td>
<td>Pain-free Normal mouth opening</td>
<td>8 months</td>
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</tr>
<tr>
<td>6</td>
<td>36</td>
<td>F</td>
<td>Pain and clicking joints, limited mouth opening</td>
<td>Splint</td>
<td>Masseter</td>
<td>50 units each side 2 injections</td>
<td>Pain-free for 4 months Unchanged clicking joints Normal mouth opening</td>
<td>5 months</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 1. Results of treatment with botulinum toxin for patients with temporomandibular myofascial pain dysfunction.
multiple doses were given to the first patient. The patient showed a decrease in pain, and pain was abolished completely after 4 injections containing a total dose of 50 units to each side. Three other patients were given similar doses (40 to 50 units per side) and 2 were given slightly lower doses (Table 1). The effect of botulinum toxin injection appears to be dose-related and cumulative, and a minimum dose is required to achieve the therapeutic goal. Muscle atrophy was noted clinically in all 6 patients, but no patient complained of a change of facial profile. The pain relief was quick in onset, and was experienced approximately 2 weeks after injection on average. No side effects were seen in our series of patients. The potential adverse effects of botulinum toxin include intravascular injection, facial nerve palsy, painful injection site, and haematoma formation after injection. With careful control of the sites of injection and the use of a 30-gauge needle with aspiration, these adverse effects can be minimised. Postinjection use of an ice pack may help to soothe the discomfort of injection, although no patients in this series complained of postinjection discomfort.

The pain experienced by patients occurred mainly in the masseteric muscles, although 1 patient had trigger points in the temporalis muscle. Injections into these 2 muscle groups were relatively easy because of their superficial anatomical location. Injection into the pterygoid muscles would be more difficult to manage, and the treatment of relatively less accessible muscle groups may require image-guided injections.

Overall, botulinum toxin injections in this small group of patients led to an improvement in clinical response when compared with that expected after conventional therapy. However, the long-term effectiveness and the need for repeated injections were not studied in this series. Further study of a larger number of patients with a longer follow-up period should be performed to further evaluate this new approach to the management of temporomandibular myofascial pain.

Acknowledgement
We would like to express our gratitude to our mentor, Professor Henk Tideman, Emeritus Professor of Oral and Maxillofacial Surgery, The University of Hong Kong, Hong Kong, for his guidance and advice for this pilot study.

References