Efficacy of Laryngeal Botulinum Toxin Injection: Comparison of Two Techniques

Susan L. Fulmer, MD¹; Albert L. Merati, MD²; Joel H. Blumin, MD¹

¹ Department of Otolaryngology and Communication Sciences, Medical College of Wisconsin, Milwaukee, WI
² Department of Otolaryngology-Head & Neck Surgery, University of Washington, Seattle, WA

ABSTRACT

Objective: It is hypothesized that there is no difference in the effectiveness of botulinum toxin (BTX) injection between electromyography (EMG) guided and non-EMG guided ‘point-touch’ techniques in treatment of adductor spasmodic dysphonia (AdSD).

Study Design: Retrospective chart review.

Methods: Patients selected for evaluation underwent sequential treatment by one or both of the senior authors utilizing two different injection techniques with similar BTX dilution & preparation. Data gathered included dose injected, injection effect, presence and duration of breathiness and dysphagia after injection. Statistical analysis was performed using a generalized estimating equations model.

Results: Four hundred seventeen injections in sixty-four patients were analyzed. There was no difference in the rate of successful injections between the EMG guidance group and the non-EMG guidance group (94.4% and 93.2%, respectively; p = 0.7).

Conclusions: This unique study demonstrates that efficacy of BTX does not necessarily depend on the method of injection utilized. In experienced hands, excellent clinical results can be achieved with either EMG or non-EMG guided injection techniques.

Level of Evidence: 3b

INTRODUCTION

Spasmodic dysphonia (SD) is an idiopathic focal dystonia that results in irregular, uncontrolled contraction of the laryngeal musculature during phonation. It is task-specific and affects connected speech. AdSD is the most common form, consisting of 80-90% of those with SD, and is characterized by a strained-strangled voice with phonatory breaks occurring during utterance of phonemes weighted with voiced consonants.¹

Currently, the preferred treatment modality for AdSD is the injection of BTX type A into the intrinsic adductor muscle compartment of the larynx, including the thyroarytenoid and lateral cricoarytenoid muscle.² BTX type A inhibits the release of acetylcholine at the neuromuscular junction and thus results in flaccid paralysis of the injected laryngeal musculature.

There are several different techniques used to deliver BTX into the intrinsic laryngeal adductor compartment. No particular technique has been shown to be superior to another. The target muscle can be approached either percutaneously or perorally; appropriate placement of the needle within the body of the target muscle may be guided by electromyography (EMG) or by visualization with flexible nasopharyngoscopy or indirect laryngoscopy.³⁻⁶

At our institution, two laryngologists routinely treat AdSD with percutaneous BTX type A injections, one under EMG guidance⁷ and one using the ‘point-touch’ technique,⁵ a non-EMG based technique solely on laryngeal anatomy. Our observation has been that of overall stability in dose and dose effect between practitioners; it is hypothesized that there is no clinically significant difference in efficacy between the BTX injection techniques as determined by patient report of injection response.

MATERIALS AND METHODS

This study was designed as a retrospective chart review of patients treated with BTX type A injection, by one of two laryngologists, for AdSD from June 2001 to June 2009. In Group 1, BTX was injected using a percutaneous, point-touch technique, without endoscopic or EMG guidance, relying solely on the external anatomy for placement of the injection. In Group 2, BTX was injected percutaneously using EMG guidance. Each group was treated by a different fellowship-trained laryngologist.

RESULTS

Sixty-four subjects, undergoing a total of 417 BTX injections for AdSD were identified and included in this study. Twenty-one of these subjects were treated by both physicians and sequentially underwent injections using both techniques. Demographics and distribution of injections are shown in Table I. There was no statistically significant differences in the average doses injected (Table II).

There were no statistically significant differences in the rate of effective injections, need to alter dose, or breathiness between study groups. Dysphagia was analyzed descriptively as only four subjects reported this side effect. These data are displayed graphically in Figure 1.

<table>
<thead>
<tr>
<th>Table I. Subject characteristics. Data was analyzed from 64 patients. Twenty-one patients underwent treatment with both techniques and are thus included in each group for the data analysis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Subjects</td>
</tr>
<tr>
<td>Female Subjects</td>
</tr>
<tr>
<td>Male Subjects</td>
</tr>
<tr>
<td>Median Age</td>
</tr>
<tr>
<td>Mean Age</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table II. Descriptions of BTX injections. A Student’s t-test was used to compare the two groups. There was no significant difference in dosing between groups.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of Injections</td>
</tr>
<tr>
<td>Bilateral injection</td>
</tr>
<tr>
<td>Unilateral injection</td>
</tr>
<tr>
<td>Avg max dose for all injections</td>
</tr>
<tr>
<td>p-value</td>
</tr>
<tr>
<td>Avg dose per side for bilateral injections</td>
</tr>
<tr>
<td>p-value</td>
</tr>
<tr>
<td>Avg dose per side for unilateral injections</td>
</tr>
<tr>
<td>p-value</td>
</tr>
</tbody>
</table>

SUCCESSFUL INJECTIONS BETWEEN GROUPS

The four outcome measures analyzed in the study are patient report of beneficial effect (presence and duration of fluent speech), negative effect (presence of breathiness for greater than one week), an alteration or modification of dose compared to the prior injection, and dysphagia. Typically, a change in dose was made after discussion between patient and physician and would be made to either improve the beneficial effects or reduce the negative effects of a prior BTX injection. A change in dose was defined as either a change from bilateral to unilateral, unilateral to bilateral injection, or change in the quantity of BTX delivered.

CONCLUSIONS

Both point-touch and EMG guided delivery of BTX are effective techniques of treatment for AdSD. There seems to be no significant difference in patient outcome based on technique of injection, utilized in this cohort, treated by experienced clinicians.

REFERENCES