Outcomes of Botulinum Toxin Treatment for Patients With Spasmodic Dysphonia

Michael S. Benninger, MD; Glendon Gardner, MD; Cynthia Grywalski, CCC-SLP

Background: Spasmodic dysphonia (SD) is a focal dystonia of the larynx. Although individuals with SD have variable degrees of difficulty in everyday communication and speaking, many report significant impairments. The impact of SD on the quality of life of people with the disorder has not been well measured.

Objectives: To assess the impact of SD using a voice-specific, validated outcomes instrument, the Voice Handicap Index (VHI), and to evaluate the effect of botulinum toxin treatment on quality of life.

Methods: The VHI measures 3 subscales (physical, functional, and emotional) of impact of a voice disorder as well as a total impact score. The VHI was completed by 30 consecutive patients with SD before receiving botulinum toxin injection and 2 to 4 weeks after injection. Pretreatment scores on the VHI were compared with post-treatment scores.

Results: Pretreatment scores on the VHI showed significant impairment in all 3 subscales (physical, 25.5; functional, 21.4; and emotional, 20.4) and the total score (67.6). Statistically significant improvements occurred in all 3 subscale scores and the total score ($P=.001$) for the 22 patients who completed the posttreatment survey.

Conclusions: Spasmodic dysphonia has a significant impact on patients’ perception of quality of life as measured by the VHI. Significant improvements in all 3 subscale scores and the total score on the VHI occur after treatment with botulinum toxin.


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PASMODIC dysphonia (SD) is a focal dystonia of the larynx with characteristic interruptions in voice and visible true and false vocal fold spasms when the larynx is visualized during running speech. Spasmodic dysphonia spasms can result in forceful adduction of the vocal folds during phonation (adductor SD), abduction (abductor SD), or both adduction and abduction during phonation (mixed SD). Adductor SD is much more common than abductor SD, accounting for about 80% of cases. A familial association has been identified in some cases with the isolation of a specific gene in these clusterings.

Many treatments have been advocated for SD, including voice therapy, recurrent laryngeal nerve section, laryngeal framework surgery, and selective denervation. Over the past decade, the treatment of choice for most patients has been botulinum toxin injections into the muscles of the larynx. This temporarily weakens or paralyzes these muscles, which reduces or eliminates the spasms. The procedure is simple and easily accomplished in the office setting, and has had predictably good results.

Several studies have attempted to show the efficacy of botulinum toxin injections through a variety of objective and subjective tests. Blitzer and Brin used a scale of 0% (no voice or full disability) to 100% (normal voice) to assess patients’ responses to treatment and found that a mean rating of 90% was attained following injection. Murray et al used the State-Trait Anxiety Inventory, the Self-rating of Depression Scale, and the Somatic Complaints Checklist to evaluate patients before and after treatment with botulinum toxin. Scores on these tests reflected significant improvement both 1 week and 2 months after injection. Aronson et al also showed a significant improvement in patients’ self-ratings of voice after injections, but found that the course of voice change was not predictable, uniform, or equal among patients. Truong et al found that patients who received botulinum toxin injections had significant improvement in their perception of voice and in their treatment team’s overall ratings of speech and specific vocal characteristics.
PATIENTS AND METHODS

Thirty consecutive patients treated with botulinum toxin injection for adductor SD in the Department of Otolaryngology—Head and Neck Surgery at Henry Ford Hospital, Detroit, Mich, were asked to participate in the study. The diagnosis of SD was made through a thorough history and characteristic perceptual voice analysis, confirmed by flexible laryngoscopy showing intermittent episodes of spasm that occurred during running speech. Characteristic quality of voice was determined by both a voice-language pathologist and a laryngologist.

The VHI is used routinely in the Henry Ford Hospital voice clinics to assess the impact of the voice disorder and the response to treatment. The 30-item VHI asks questions in 3 domains: physical, functional, and emotional, using a 5-point equally appearing scale (never, almost never, sometimes, almost always, always). The maximum score is 120. An 18-point change in pretreatment to posttreatment total scores or an 8-point change in scores for each domain is considered statistically significant.11 All patients completed the VHI before injection and were sent home with a follow-up VHI and self-addressed envelope to be returned at the time of their perception of maximal benefit, which was typically 1 to 3 weeks after injection. Patients were also asked to rate their voice as normal, mildly, moderately, or severely affected. If no follow-up questionnaire was returned, the patient was contacted and a second form was sent. Ten of the 30 patients were being treated for the first time.

The VHI was evaluated on patients with SD before and after treatment with botulinum toxin. The change in index due to treatment was evaluated with a paired t test. The 3 subscales of the VHI—functional, physical, and emotional—were also evaluated with paired t tests. The set of 3 P values were evaluated for significance using the Hochberg method for multiple comparisons. This ensured a family-wise P value of .05. A secondary analysis comparing the changes observed in the VHI total and subscale measures by patient sex was also examined using 2-sample t tests. The Hochberg method was again used to evaluate the 3 subscale P values.

Laboratory evaluations have also been used to assess the impact of botulinum toxin treatment for SD. Zwirner et al10 evaluated acoustic measures, mean airflow rates, and videolaryngoscopic findings 1 week before injection and 1 week and 1 month after treatment. They found that mean airflow rates and videolaryngoscopic findings returned nearly to normal at 1 month after treatment. They also noted significant improvements in acoustic parameters, although abnormal characteristics remained.6

There has been a recent effort to evaluate a patient’s perception of outcome to an intervention through objective, validated, patient-focused outcomes instruments. In 1997, Jacobson et al11 reported their development and validation of the Voice Handicap Index (VHI). The VHI is a 30-question instrument that objectively evaluates the physical, emotional, and functional impact of voice disorders and their treatment. It has been used to assess the impact of a number of voice disorders, including dysphonia caused by vocal fold paralysis, mass lesions, functional disorders, edema, and neurologic disorders (including SD).12 Since there is no generally agreed-upon objective test to serve as a “gold standard” for the assessment of voice disorders, the VHI may serve as a key tool in assessing the impact of the disorder on patients’ quality of life and evaluating the outcome of treatment.

The purpose of this study was to assess the outcome of botulinum toxin treatment for SD from the patients’ perspectives using the VHI as the objective tool.

Table 1. Patient Responses on Voice Handicap Index Before and After Treatment

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Pretreatment</th>
<th>Posttreatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N = 30)</td>
<td>(n = 22)</td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>25.5 (5.2)</td>
<td>8.1 (5.0)</td>
</tr>
<tr>
<td>Functional</td>
<td>21.4 (5.9)</td>
<td>7.4 (4.9)</td>
</tr>
<tr>
<td>Emotional</td>
<td>20.4 (6.6)</td>
<td>6.5 (5.5)</td>
</tr>
<tr>
<td>Total</td>
<td>67.6 (14.7)</td>
<td>22.0 (14.3)</td>
</tr>
</tbody>
</table>

Of the 30 patients who completed the initial evaluation, 22 completed the posttreatment questionnaire. There were 24 women and 6 men in the study, with 17 women and 5 men completing the posttreatment survey. There were no sex differences. Seven of the 10 patients being treated for the first time and 13 of the 20 previously treated patients completed the posttreatment questionnaire; there was no statistical difference between these groups. The ages of the patients were stratified by decade: 20 to 29 years, 1 patient; 30 to 39 years, 4 patients; 40 to 49 years, 9 patients; 50-59 years, 10 patients; 60 to 69 years, 3 patients; and 70 to 79 years, 3 patients. The mean age was 51 years. When stratified by age, there was no statistical difference in performance of the survey by decade or when comparing patients 49 years or younger with those 50 years or older.

The responses of the 30 patients on the pretreatment survey and the 22 patients on the posttreatment survey are noted in Table 1. The mean pretreatment total score was 67.6 (range, 36-101). The mean posttreatment total score was 22.0 (range, 1-44).

The difference between the pretreatment and posttreatment scores for the 3 subscales and total scale are noted in Table 2. The 22 patients who completed both surveys showed significant improvements (decreases in scores) in all 3 subscales of the VHI and in the total score. The physical subscale score decreased by 17.8 points, the most of the 3 subscales. The total score declined 46.3 points. This decrease is highly significantly different from zero, and is also significantly different from a decrease of 18, which is the specified clinically significant decrease originally reported in validating the VHI.11

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The 22 patients with pretreatment and posttreatment information on the self-evaluation rating all showed improvement. The 18 moderately affected patients reported improvement to mild dysfunction (n=8) and normal function (n=10). The 4 who were severely affected reported improvement to mild (n=1) and normal (n=3). Of the 8 patients who did not complete the posttreatment survey, 4 rated their impairment as severe and 4 as moderate.

TABLE 2. Differences in Voice Handicap Index Scores Before and After Botulinum Toxin Injection (n = 22)

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Mean (SD) Difference (After − Before)</th>
<th>95% Confidence Interval</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>−17.8 (7.0)</td>
<td>−20.9 to −14.7</td>
<td>.001</td>
</tr>
<tr>
<td>Functional</td>
<td>−13.9 (7.8)</td>
<td>−17.4 to −10.5</td>
<td>.001</td>
</tr>
<tr>
<td>Emotional</td>
<td>−14.1 (7.8)</td>
<td>−17.6 to −10.7</td>
<td>.001</td>
</tr>
</tbody>
</table>

In conclusion, patients with adductor SD have significant disability as measured by the VHI in the physical, functional, and emotional subscales and total scores. This is true whether or not they had been previously injected with botulinum toxin. Their VHI scores are worse than those in a heterogeneous cohort of patients with voice disorders, including paralysis, benign masses, and edema. Significant improvements in patient perception of quality of life occur after injection with botulinum toxin. Botulinum toxin injections are effective in improving patients' perceptions of dysfunction.

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REFERENCES