Botulinum toxin injections in the treatment of musician’s dystonia

Abstract—The authors present the results of 84 musicians with focal task-specific dystonia treated with EMG-guided botulinum toxin injections. Treatment outcome was assessed by subjective estimation of playing before and after treatment and self-rating of treatment response. Fifty-eight (69%) of the musicians experienced improvement from the injections and 30 of 84 musicians (36%) reported long-term benefit in their performance ability.

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Focal task-specific dystonia (FTSD) in musicians presents as a loss of voluntary motor control in extensively trained movements.1 The condition affects around 1 in 200 professional musicians and often leads to the end of the musical career. A variety of treatment options, including retraining, biofeedback, oral medication, constraint-induced therapy, and limb immobilization, may be helpful, but it is unclear if they produce sustained benefit. Botulinum toxin has been efficacious in 67 to 93% of patients with focal task-specific dystonia, but many patients eventually discontinue injections, largely because the treatment fails to meet their expectations or needs.3 This is especially so in musicians, for whom even marked improvement in the dystonia can be inadequate if the ability to play professionally is not restored.4

Methods. Eighty-eight consecutive musicians treated with botulinum toxin injections of a total of 226 musicians with FTSD were recruited from a musician outpatient clinic in Germany between 1995 and 2002. A retrospective chart review was performed and the patients contacted by phone using a standardized questionnaire. Patients were asked to estimate their playing ability in percent before and during botulinum toxin treatment and to rate the cumulative treatment response using a six-step scale: worse, no improvement, mild, moderate, marked, or remission. Moderate or better improvement required that the musicians did not experience significant overshoot weakness or response fluctuations after injections, and indicated a noticeable benefit from the treatment in their performance ability. This could be either an improvement in their orchestra position, expansion of their musical repertoire, or increase in number of public performances. All patients received lyophilized botulinum toxin A powder (Dysport, Ipsen Ltd., Berkshire, UK) using an EMG-guided technique.5 All dose determinations and injections were performed by one neurologist (E.A.). The group of patients who underwent at least two treatments within a period of 12 months was used to determine differences in botulinum toxin dosage. Data were statistically analyzed using the χ² test for outcome measures, Wilcoxon paired rank test for change in playing estimation, and Student t test for differences in botulinum toxin dosage.

Results. Eighty-four of 88 patients, 74 men and 10 women, 64% of them orchestra musicians, responded to the telephone survey (95%, table 1). Mean age was 45.9 years, mean duration of symptoms 10.6 years, and first botulinum toxin injection on average 6.1 years after onset. The dystonia was rated as severe in 47 musicians, moderate in 28, and mild in 9 based on the Arm Dystonia Disability Scale. Seventeen patients (20%) had a complex dystonia with spread of dystonic symptoms to other nonmusical tasks. Sixty-five musicians (77%) were diagnosed with localized hand dystonia with involvement limited to one or two fingers. Thirty-nine musicians had tried trihexyphenidyl before undergoing botulinum toxin injections, but only 14 were still taking the medication.

The musicians estimated their playing ability compared to the skill level prior to onset of dystonic symptoms as 53 ± 23% before and 67 ± 23% during treatment with botulinum toxin (p < 0.005). In the self-rating of the cumulative treatment response, 26 of 84 felt that they played worse or had no response from the injections, among them all three patients with embouchure dystonia (figure). Fifty-eight (69%) of the musicians experienced benefit from the treatment, among them 38 musicians who indicated that the treatment led to noticeable improvement in their performance ability. There was no difference in response rate between patients with localized compared to nonlocalized as well as simple compared to dystonic hand cramps. Improvement was independent of initial severity rating, sex, age at onset, and duration of symptoms prior to first injection. Ninety-eight percent of patients experienced weakness and 56% reported excessive weakness after at least one injection preceding the period of maximum improvement by 1 to 4 weeks. Twenty-four musicians continued to receive treatment at the time of the study for a mean of 36 months.

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months (range 9 to 76) and an average number of 11.7
injections (range 3 to 29) and six patients indicated that
the dystonia had improved sufficiently after an average of
4.4 injections (range 3 to 7) and that they no longer require
treatment (see the figure).

A total of 56 musicians received more than one treat-
ment within a year (table 2). Mean duration of treatment
was 23 months (range 2 to 76 months), mean interval
between injections 3.8 months (range 1 to 7.7 months),
average number of injections per patient 7.4 (range 2 to
29). The muscle group most frequently injected was the
forearm flexors in 52 patients (93%). Average number of
muscles injected per treatment was 2.5 (range 1 to 6).
Average total dose per treatment was 126.9 units (range 5
to 420) at the initial visit and 112.2 units (range 3 to 1,000)
at the last visit. Average dose per muscle group at last
visit was 55 units for shoulder muscles (only 2 patients),
47.4 units for forearm flexors, 31.4 for forearm extensors,
and 17.7 for hand muscles. No statistical difference in
frequency, number of muscles, dose, and response rate
was seen among the four instrument groups. No differ-
ence in average dose per treatment and muscle was seen
related to sex.

Discussion. This study provides evidence that bot-
ulinum toxin offers long-term benefit for some in-
strumental musicians with playing-provoked, focal
limb dystonia. Fifty-eight of 84 musicians (69%) re-
sponded to the treatment, similar to the initial im-
provement rate seen in other forms of FTSD. More

Table 1 Patient characteristics

<table>
<thead>
<tr>
<th>Instrument group</th>
<th>N</th>
<th>Male sex</th>
<th>Age, y</th>
<th>Duration, y</th>
<th>Part affected</th>
<th>Improvement ≥ moderate (%)</th>
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</thead>
<tbody>
<tr>
<td>All</td>
<td>84</td>
<td>74</td>
<td>45.9</td>
<td>10.6</td>
<td>47 R, 30 L, 4 bilateral, 3 embouchure</td>
<td>38 (45)</td>
</tr>
<tr>
<td>String</td>
<td>12</td>
<td>11</td>
<td>47</td>
<td>11.3</td>
<td>3 R, 9 L</td>
<td>7 (58)</td>
</tr>
<tr>
<td>Keyboard</td>
<td>20</td>
<td>17</td>
<td>49</td>
<td>9.9</td>
<td>15 R, 4 L, 1 bilateral</td>
<td>7 (35)</td>
</tr>
<tr>
<td>Guitar</td>
<td>25</td>
<td>25</td>
<td>45</td>
<td>10.8</td>
<td>20 R, 5 L</td>
<td>13 (52)</td>
</tr>
<tr>
<td>Woodwind</td>
<td>25</td>
<td>19</td>
<td>45</td>
<td>10.6</td>
<td>9 R, 12 L, 3 bilateral, 1 embouchure</td>
<td>11 (44)</td>
</tr>
<tr>
<td>Brass</td>
<td>2</td>
<td>2</td>
<td>38</td>
<td>8.0</td>
<td>2 Embouchure</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2 Dosage of botulinum toxin A (Dysport)

<table>
<thead>
<tr>
<th>Muscle group</th>
<th>First injection, units (range)</th>
<th>Last injection, units (range)</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder</td>
<td>55* (40–70)</td>
<td>55* (40–70)</td>
<td>2</td>
</tr>
<tr>
<td>Forearm flexors</td>
<td>56.0* (10–160)</td>
<td>47.4* (5–250)</td>
<td>52</td>
</tr>
<tr>
<td>Forearm extensors</td>
<td>34.6* (4–100)</td>
<td>31.4* (4–100)</td>
<td>17</td>
</tr>
<tr>
<td>Hand</td>
<td>22.4* (4–100)</td>
<td>17.7* (1.5–100)</td>
<td>14</td>
</tr>
<tr>
<td>Total dosage</td>
<td>126.9 (5–420)</td>
<td>112.2 (3–1,000)</td>
<td>56</td>
</tr>
</tbody>
</table>

* Average dose per muscle.

Figure. Rating of treatment response.
References


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