# Botulinum Toxin Injection for Treatment of Spasmodic Dysphonia: Experience at Srinagarind Hospital

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***Background:*** *Spasmodic dysphonia (SD) is a focal dystonia and adductor SD is the most common form. The standard treatment for adductor SD is EMG-guided, transcutaneous injections of botulinum toxin into the thyroarytenoid muscle.*
***Objective:*** *Report the clinical presentation of SD, treatment with botulinum toxin injection, injection technique, results, and adverse effects.*
***Material and Method:*** *A reviewed of clinical records of patients diagnosed with SD at the Voice Clinic between April 1999 and December 2004 at Srinagarind Hospital, Khon Kaen University, Thailand. Thirty-seven patients were identified but only twenty-five were treated with EMG-guided botulinum toxin injection to the thyroarytenoid muscle*
***Results:*** *In the presented 37 patients, SD was more common in women (89%) than men (11%). The median duration of symptoms prior to diagnosis was 12 months: all were the adductor type. The average age at onset was 46 years. The presenting symptoms included influence to the voice (84%), hoarseness (70%), strained or strangled voice (65%), decreased loudness (27%), and breathy voice (22%). A vocal tremor coexisted with dystonia in 60% of the presented patients. Treatment with botulinum toxin injection was carried out on 25 patients for 78 injections (mean, 3 per patient). The time for botulinum toxin to take effect averaged 2.3 days (peak effect, 7 days). The patients received substantial relief from their SD symptoms, an average functional improvement of 39.2% (37.6% initially* vs. *76.8% finally). Patients' best voice was achieved within one week and persisted for an average of 13.6 weeks. Side effects from the injections included mild breathiness (68%) and mild choking on fluid (56%). After injection, decreased potential for volume was a common complaint, but since all of the patients experienced increased fluency, they were satisfied. Almost all of the patients returned for repeat injections when the benefit diminished.*
***Conclusion:*** *Botulinum toxin therapy has become the standard care for the treatment of SD. An acceptable and flexible treatment plan to produce a balance between decreased spasms and loss of function must be developed for each patient.*

***Keywords:*** *Botulinum toxin, Spasmodic dysphonia*

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Spasmodic dysphonia (SD) is a chronic neurological disorder of central motor processing, characterized by task-specific, action-induced muscle spasms. Adductor SD is the most common form of SD and is characterized by vocal cord hyper-adduction leading to strained, strangled, effortful speech with breaks in pitch and phonation[1]. Abductor spasmodic dysphonia, by contrast, causes inappropriate glottal opening that produces hypophonia and breathy breaks[2]. In some patients, a mixture of both adductor and abductor SD coexist, though one predominates[3].

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The diagnosis is based on a careful history and examination of the glottis during a variety of laryngeal tasks[4]. Many patients with SD experience fluctuations in the severity of their symptoms often with specific aggravating and relieving factors[5]. SD may occur in isolation as a focal dystonia or coexist with dystonia in other regions of the body as segmental, multifocal, or generalized dystonia[5].

A variety of treatments for adductor spasmodic dysphonia exist, including speech therapy, psychotherapy, biofeedback, systemic medicine, nerve section, botulinum toxin injection, and thyroplasty[6]. EMG-guided botulinum toxin injection to the laryngeal muscle has become the treatment of choice. Herein the authors report the clinical presentation of SD, treatment with botulinum toxin injection, injection technique, the results and adverse effects of this treatment at Srinagarind Hospital, Khon Kaen, Thailand.

**Material and Method**

The authors reviewed the clinical records of patients diagnosed with SD at the Voice Clinic between April 1999 and December 2004 at Srinagarind Hospital, Khon Kaen University, Thailand. Thirty-seven patients were identified but only twenty-five were treated with EMG-guided botulinum toxin injection to the thyroarytenoid muscle. Data were reviewed for age, sex, occupation, duration of symptoms, presenting symptoms, aggravating and relieving factors, dosing of botulinum toxin, number of injections, results of treatment, complications, and benefit duration.

***Injection Technique***

Injection of botulinum toxin into the thyroarytenoid muscle is accomplished with a mono-polar, hollow, Teflon-coated EMG needle connected to an EMG recorder. The patient is placed in a nearly supine position with a pillow underneath the upper back and with the neck extended. The thyroid and cricoid cartilages are palpated, and the midline of cricothyroid membrane identified. The skin and subcutaneous tissues are injected with 0.3-0.5 $cm^3$ of 1% xylocain with adrenaline. The EMG needle is placed into the thyroarytenoid muscle through the cricothyroid membrane. The needle is advanced at ~30 up and 30 laterally. Having the patient say /i/ augments the EMG response while listening for the muscle interference pattern as the needle advanced.

Patients are instructed not to cough or swallow after the needle is inserted (in the airway or the thyroarytenoid muscle). For patients with an unusually sensitive gag or cough reflex, 0.1-0.3 $cm^3$ of 1% xylocain can be injected into the airway. The patient should then cough to ensure the anesthetic solution coats the laryngeal mucosa. Although this technique can interfere with the EMG interference pattern, it enables the patient to better tolerate the procedure.

All of the presented patients were initially injected with 10 units into the left or right thyroarytenoid muscle. The authors then monitored patient-response according to the percentage of normal function, and compared pre- and post-treatment (day 14). The next injected dose was adjusted following the symptomatic response of the patient.

**Results**

Thirty-seven patients were diagnosed as having SD at the Voice Clinic at Srinagarind Hospital. It was more common in women (89.2%) than men (10.8%). The median duration of symptoms prior to diagnosis of SD was 12 months: all were the adductor type. The average age at onset was 46 years. The onset of symptoms occurred after upper respiratory tract infection and after prolonged talking in 29.7 and 13.5 percent, respectively. Farmers (27%) and teachers (24.3%) were most commonly affected.

The presenting symptoms included influence on voice (83.8%), hoarseness (70.3%), strained or strangled voice (64.9%), decreased loudness (27.0%) and breathy voice (21.6%). A tremor coexisted with the dystonia in 59.5% of patients. Difficulty in breathing was experienced by three patients (8.1%).

The specific aggravating factors were stress (18.9%), emotional change (16.2%), and prolonged talking (5.4%). Some patients found that their voice functioned satisfactorily in the morning (16.2%) and that singing and laughing sometimes improved fluency (in 5.4 and 16.2 percent, respectively). Four patients in the present series had psychological problems and one had a family history of SD.

Treatment with botulinum toxin injection was carried out in 25 patients. Overall, the authors made 78 injections (mean, 3.12 per patient). The average time to effect after the injection was 2.3 days (peak effect, 7 days). The mean duration of benefit was 13.6 weeks (range 8-24 weeks).

The patients' initial rating was satisfactory (37.6%) and functional (range, 10-70%), which improved an average 39.2% after injection to 76.8% for functional (range, 50-90%). The side-effects from the injections included mild breathiness (68%), mild choking on fluid (56%), local pain (12%) and dysphagia (12%). Paralytic

aphonia occurred in one patient but she recovered within one month. The frequent complaint after injection was decreased voice volume (64%).

## Discussion

The standard treatment for adductor SD is EMG-guided transcutaneous injections of botulinum toxin into the thyroarytenoid muscle[4]. Botox paralyzes the thyroarytenoid muscle by blocking the release of acetylcholine from the pre-synaptic nerve terminals of the recurrent laryngeal nerve[6]. The success of botox as a treatment for dystonias, SD among them, may be the result of the specificity, repeatability, and reversibility of the chemodenervation[4].

In the present series, the average age at onset was 46 years, the midpoint of reported means (39[1] and 55[7] years). Female predominance corresponded with other reports[1-7], as did the median duration of symptoms before treatment[5]. A striking finding was that the onset of SD was preceded by upper respiratory tract infection or after prolonged talking in 29.7 and 13.5 percent of cases, respectively.

The clinical presentations included influence of voice (83.8%), hoarseness (70.3%), strained or strangled voice (64.9%), decreased loudness (27.0%), and breathy voice (21.6%). Vocal tremor may coexist with dystonia in as many as one-third of patients[2], but in the present series vocal tremor presented in 59.5% of patients.

The authors used the Blitzer's technique[8] and the initial dose was ~10 units on only one side then the authors adjusted the dose on the next injection, depending on the patient's symptom, side effects, and patient-satisfaction.

The patients received substantial relief from their SD symptoms, an average improvement of 39.2% (37.6% initially; 76.8% finally). Patients' best voice was achieved within one week and persisted for an average of 13.6 weeks. Blitzer et al [1] reported mild breathiness in 35% of patients and mild choking on fluid in 15%. Mild breathiness and choking in the present study were frequently found (68% and 56%, respectively) but lasted less than one week.

Decreased volume was a common complaint after injection, but all of the patients experienced increased fluency so were satisfied with the overall result. Most of the patients have since returned for new injections after the first round affect diminished.

Two cases were not satisfied with the treatment: one developed right, true vocal cord paralysis - perhaps by migration of the toxin to the lateral cricoarytenoid muscle[6] or to the posterior cricoarytenoid muscle; and the other experienced dysphagia, decreased loudness of voice. These side effects completely recovered in 2 months after the injection.

Dysphagia occurred in 12% of the presented patients, probably related to some of the toxin's diffusing into the inferior constrictor muscle[8]. These side effects were transient, as they resolved within 1 week.

In the present series, three patients needed psychological consultations about their disease because they needed to repeat the botulinum toxin injections every three months. These patients were, therefore, very worried about their respective diseases.

It is important to recall that SD is a disorder of the central nervous system. The fact that its end organ lies within the expertise of otolaryngologists is incidental. It is, therefore, no surprise that manipulation of the larynx, whether by toxin or surgery, does not yield a cure[2].

## Conclusion

Botulinum toxin therapy has become the standard care for the treatment of SD. Clinical features of dystonia vary between patients and the physician must individualize treatment by adjusting doses and varying the frequency of injections. There is often a balance between decreased spasms and loss of function, and the physician and patient must work together to arrive at an acceptable and flexible treatment plan.

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## *การฉีดโบทูลินุมทอกซินรักษาโรคเสียงแหบแบบชักกระตุกประสบการณ์ในโรงพยาบาลศรีนครินทร์*

***สุภาภรณ์ ศรีร่มโพธิ์ทอง, พัชรีพร แซ่เซียว, รัตนา ทวีแสงสุขสกุล, เสมอเดือน คามวัลย์, สมชาย ศรีร่มโพธิ์ทอง***

*โรคเสียงแหบแบบชักกระตุกเป็นเฉพาะที่ ชนิด adductor จะพบบ่อยที่สุด การรักษาหลักได้แก่ การฉีดโบทูลินุม ทอกซินเข้าไปในกล้ามเนื้อ thyroarytenoid โดยใช้ EMG-guided*

*ได้รายงานผู้ป่วย 37 ราย ส่วนใหญ่เป็นเพศหญิง(89 เปอร์เซ็นต์) มีอาการก่อนการวินิจฉัยเฉลี่ย 12 เดือน และทั้งหมดเป็นชนิด adductor อายุเฉลี่ยขณะเริ่มมีอาการ 46 ปี อาการเริ่มแรกได้แก่ ปัญหาเรื่องเสียง 84 เปอร์เซ็นต์ เสียงแหบ 70 เปอร์เซ็นต์ พูดเกร็งหรือเค้นเสียง 65 เปอร์เซ็นต์ พูดเสียงเบาลง 27 เปอร์เซ็นต์ พูดเสียงลมรั่ว 22 เปอร์เซ็นต์ พบมีภาวะเสียงสั่นร่วมด้วยถึง 60 เปอร์เซ็นต์*

*มีผู้ป่วย 25 รายที่ได้รับการรักษาด้วยการฉีดโบทูลินุม ทอกซิน รวมฉีดทั้งหมด 78 ครั้ง (ค่าเฉลี่ย 3 ครั้ง/คน) อาการเริ่มดีขึ้นหลังฉีดยาเฉลี่ย 2.3 วันและมีผลสูงสุด 7 วัน โดยเสียงของผู้ป่วยดีขึ้นเฉลี่ย 39.2 เปอร์เซ็นต์ (จากเสียง 37.6 เปอร์เซ็นต์ เป็นเสียง 76.8 เปอร์เซ็นต์) ผู้ป่วยจะมีเสียงดีที่สุดภายใน 1 สัปดาห์ และเสียงดีอยู่นานประมาณ 13.6 สัปดาห์*

*ผลข้างเคียงจากการฉีดได้แก่ พูดเสียงลมรั่ว 68 เปอร์เซ็นต์ สำลักน้ำเล็กน้อย 56 เปอร์เซ็นต์ โดยหลังฉีดผู้ป่วยมักจะบ่นว่าพูดได้เสียงเบาลงแต่ก็พอใจเพราะพูดได้คล่องขึ้น และผู้ป่วยส่วนมากจะกลับมาขอฉีดยาซ้ำเมื่ออาการกลับเป็นซ้ำอีก*