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Acupuncture as Adjuvant Therapy for the Management of Cervical Dystonia

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ABSTRACT

Objectives: There are no curative treatments for cervical dystonia (CD), therefore conventional management is aimed at pain relief and muscle relaxation. Many patients with CD use complementary and integrative medicine interventions to manage symptoms, yet there are limited data on the use of acupuncture for CD. The aim of the current study was to determine the feasibility, safety, and efficacy of adjuvant acupuncture.
Materials and Methods: A pilot open-label study was conducted on acupuncture treatments as add-on therapy to botulinum-toxin injection sessions (3 months apart) in 5 subjects with chronic idiopathic CD. Six 1-hour acupuncture sessions were administered every other week over the 3-month period between consecutive botulinum-toxin sessions. Data from exploratory efficacy endpoints—including a visual analogue scale for pain, the Clinician Global Impression of Change, the Patient Global Impression of Change, the Toronto Western Spasmodic Torticollis Rating Scale, and the Short Form–36) Health Survey—were collected.
Results: Five subjects completed the study with only 1 acupuncture session missed by 1 subject, thereby meeting the study's predetermined adherence goal. All participants reported improvement from acupuncture. Only minor adverse events were reported, with self-resolved discomfort in 1 subject and self-resolved minor bruising in 2 subjects.
Conclusions: Acupuncture is feasible and safe as an adjunct treatment for chronic CD, and might be associated with subjective symptomatic benefits.

Keywords: neurologic disorders, pain management, complementary and alternative medicine

INTRODUCTION

Idiopathic cervical dystonia (CD)—the most common focal dystonia—is characterized by involuntary contractions of cervical muscles, leading to awkward and uncomfortable movements or postures of the neck. It is estimated that more than 90,000 people in the United States suffer from CD, with distress being related to tremors, spasms, reduced range of motion (ROM), and pain.[1,2] Neck pain in general is associated with a reduction in quality of life (QoL), substantial consumption of medical resources, absenteeism from work, and disability.[3]

There are no curative treatments for CD; therefore, conventional management is aimed at pain relief and muscle relaxation. Botulinum toxin is a first-line treatment for CD; the toxin blocks presynaptic release of acetylcholine into the neuromuscular junction, rendering the muscle less able to contract. Injections of the toxin into overactive muscles results in reduced muscle activation. Improvement following injections is reported in 60%–90% of cases, but benefits last only 10–12 weeks, necessitating repeated injections. Repeated injections are also associated with risk of developing neutralizing antibodies and the potential for adverse effects such as dysphagia and

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flulike symptoms. A 2004 survey of 180 patients showed that 84% of patients who had CD turned to complementary and integrative medicine (CIM) interventions for symptomatic relief.[4] Most of those surveyed had used botulinum toxin and felt the effects were positive, yet these patients still pursued CIM measures as replacement or adjunct options. Forty percent of these patients reported use of acupuncture and 19% of those reported positive responses to acupuncture.[4]

There are very limited data on the use of acupuncture to treat CD. Case reports have described benefit in terms of pain relief and improvements in neck ROM, in some cases lasting months or years after treatment.[1,5] Tani et al. reported improvement in Modified Tsui Scores in 35 of 48 patients after 10 weekly acupuncture sessions.[6] In a study of 18 patients with acute CD, a 20-minute acupuncture treatment resulted in significant improvement in angle of head rotation,[3] and, in a controlled study of chronic neck pain that included more than 13,000 patients, 56% of acupuncture recipients reported at least a 20% reduction in pain and disability, compared to only 21% in a control group.[7] In the later study, effects were reportedly maintained several months after treatment. None of the studies have raised any serious safety concerns, and, in the largest study fewer than 10% of participants reported minor bleeding or needling pain.

The current study was conducted to obtain pilot data on the feasibility and efficacy of acupuncture as an adjunct to routine care with botulinum toxin for patients with chronic CD. Due to the varied outcomes in the previous studies mentioned above, the current authors study hoped to explore the potential benefit of an adjunctive therapy—acupuncture—further

MATERIALS AND METHODS

Five participants with idiopathic CD were recruited to receive adjuvant acupuncture treatments between *Botulinum* toxin injection sessions. The open-label study was carried out at the Northwestern University Parkinson's Disease & Movement Disorders Center (NUPDMDC) and its affiliated Northwestern Medicine Osher Center for Integrative Medicine, both in Chicago, IL. Participants were all established patients of the NUPDMDC and had the diagnosis of idiopathic CD based on expert clinical impression of the treating movement-disorders neurologist. Subjects were eligible if they had chronic CD, defined by time from diagnosis of at least 6 months, and if they were on a stable treatment regimen of botulinum toxin, defined as no change in dosage or injection protocol for 2 consecutive injections, with injections received 2.5–4 months apart. At least 1 participant was required to be a ''short responder'' (one who has subjective wearing off within 10 weeks of the last botulinum-toxin injection). All participants had to be ≥18 years of age and able to provide informed consent. Participants also must never have had acupuncture for the treatment of cervical dystonia previously.

Typically, botulinum toxin takes ~5–6 days to take effect, has a peak effect at ~2–3 weeks after injection, and wears off by 3 months. Patients who agreed to participate in the study and met eligibility criteria had initial assessments performed on the day they received their toxin injection. Toxin injections were performed by each patient's treating neurologist who was a fellowship trained movement-disorders specialist. The muscle protocol and dosage was unchanged from prior injections. The participants then had individual consultations with a licensed acupuncturist within 1 week of botulinum-toxin injection; the acupuncturist determined an individualized protocol of Traditional Chinese Medicine (TCM) needling points based on the muscles injected by the neurologist and each patient's concerns. Acupuncturists reviewed the neurologists' notes in the electronic medical records (EMRs) and had access to the injection protocols. Participants received 6 acupuncture treatments in total—once each at weeks 1, 3, 5, 7, 9, and 11 of the study. Subjects were then reassessed at their 3-month botulinum-toxin follow-up visits. The baseline assessments reflecting 3-month post-treatments with botulinum toxin alone were then compared with the final assessment, reflecting treatment 3-months post-treatment with botulinum toxin with the addition of acupuncture therapy.

Outcome Measures

The primary aim was to assess adherence to the acupuncture treatment plan and satisfaction with the treatment. The predetermined adherence measure was for 4 of 5 participants to attend at least 5 of 6 sessions. Secondary outcomes included assessment of adverse events, and measures of comfort, motor function, and QoL. These measures included a visual analogue scale (VAS) for pain, Clinician Global Impression (CGI), and Patient Global Impression of Change (PGIC), as well as the Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS), and Short Form–36 (SF-36) Health Survey. The VAS and PGIC were used to assess reduction in discomfort and disruptive head movements. For the VAS, participants were asked to mark an ''X'' at the point along a 100-mm line to indicate their current pain levels, with 0 mm indicating ''no pain'' and 100 mm indicating ''pain as bad as it can possibly be.'' Adherence to treatment was assessed with an attendance log at each visit. Satisfaction was assessed with a postsession survey and the PGIC scale. Adverse events and patient impressions following each acupuncture session were ascertained via telephone calls between the participants and the study coordinator at weeks 2, 4, 6, 8, and 10. The results of the VAS, TWSTRS, and SF-36 were assessed at weeks 0 and 12.

Acupuncture Session Methods

Each participant had an initial consultation and evaluation prior to each acupuncture treatment with a licensed acupuncturist to obtain chief complaints and TCM pulse and tongue diagnosis, according to standard Eastern medicine practice. The acupuncturist developed a needling point protocol based on a review of the patient's EMR notes depicting muscles injected with botulinum toxin by the neurologist, with a combination of segmental points along with classical TCM points. Needle placements varied, depending on individual CD concerns, and were focused on relief of stress, tender points, ROM, and TCM meridian points.

Specific points were included in the acupuncture protocol based on the TCM meridian concept in which Qi flows along pathways through the body. Distal acupoints were included on the meridians running through the affected ipsilateral muscles as follows: Large Intestine (LI 4) when the sternocleidomastoid muscle is affected; Triple Energizer (TE 5) when the trapezius is affected; Small Intestine (SI 3) when the splenius capitis muscle is affected; Stomach (ST 42) when the trunk flexor muscles are affected or there is pain along the spine; Bladder (BL 60) when the trunk extensor muscles are affected; Governor Vessel (GV 20) on top of the head for excessive unintentional head movement; Gall Bladder (GB 34) for relaxation of muscles, tendons, and ligaments. Single-use sterile AcuZone 20×30 needles were inserted in acupoints at a depth of 5 mm. The needles were left in place for 30 minutes. All utilized acupuncture-point locations were recorded in the shared EMR along with the duration of insertion.

RESULTS

Five participants with chronic CD were enrolled in this trial, and all of them completed it. Their mean age was 65.4 years. There were 4 females and 1 male. All subjects were Caucasian and had college degrees. Four of the patients received onabotulinumtoxinA injections and 1 patient received incobotulinumtoxinA injections, with a mean dose of 201.5 units. One participant was a ''short-responder'' noting that the effects of the botulinum-toxin injection typically lasted only 8 weeks. Average baseline TWSTRS score (i.e., after botulinum toxin alone) was 28.5 for the cohort, with an average of 17 for a severity subscore, 5.2 for a disability subscore, and 6.3 for a pain subscore. Table 1 is a summary

Table 1. Acupuncture and Botulinum Toxin Protocols for Subjects

Subject #	*Age*	*Gender*	*Botulinum toxin injection scheme (units)*	*Acupuncture points*
1	51	Female	L SCM (20) R Spl (100)	*CD-specific:* LI 4; SI 3; GB 34; TE 5; GB 20; GB 21; R SCM×3; L SCM×2; R Spl×1; GV 14 *Auricular*: *Shenmen*; cervical area *Additional points*: ST 36; SP 6; R GB 30; *Ah Shi* on SI joint; BL 36; BL 40; BL 60; BL 62; LR 5
2	71	Female	L SCM (40) L Spl (50) L trapezius (30) R trapezius (30) R Spl (5)	*CD-specific:* GB 20; GB 21; GB 34; LI 4; SI 3; *Bai Lao*; GV 14; *Ah Shi* on L SCM×4, L Spl×2; R Spl×2 *Auricular:* cervical area *Additional points:* LR 5; SP 5; ST 36; SP 6; KI 3; TE 17; *Ah Shi* on rhomboids×4
3	60	Male	L SCM (20) L Spl (7.5) L levator scapulae (15) L trapezius (20) R Spl (15)	*CD-specific: Yintang*; GV 20; *An Mian*; GB 20; GB 21; GB 34; GB 41; SI 3; TE 5; LI 4; ST 42; LR 3; BL 62 *Auricular point: Shenmen* *Additional points*: BL 3; ST 36; ST 40; KI 3; *Ah Shi* points for left knee×3.
4	74	Female	L Spl (60) L levator scapulae (65) L trapezius (25) R trapezius (25) R SCM (45)	*CD-specific:* GV 20; Yintang; GB 20; GB 34; GB 41; TE 5; SI 3; LI 4; LR 3; LR 8; BL 62; KI 3; ST 42 *Auricular point: Shenmen* *Additional points*: N/A
5	71	Female	L Spl (165) L trapezius (40) R SCM (25) R Spl (135) R trapezius (25)	*CD-specific:* GB 20; GB 21; SI 14; LI 4; TE 5; GB 34; GV 14; R Spl×1; L Spl×3; L SCM×2; L trapezius×1; R trapezius×3 *Auricular: Shenmen*; muscle relaxation *Additional points*: N/A

L, left; SCM, sternocleidomastoid; R, right; Spl, splenius capitus; N/A, not applicable

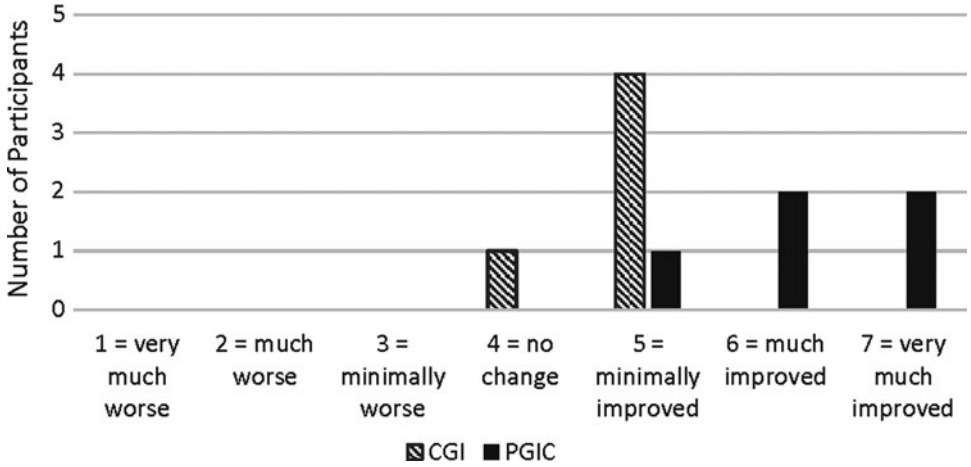

FIG. 1. Clinician Global Impression (CGI) and Patient Global Impression of Change (PGIC) outcomes.

of the injection points and the acupuncture points used on each subject.

All participants met the predetermined adherence goal. Four subjects attended all 6 sessions, and 1 subject missed a single session due to a death in the family. There were no dropouts or withdrawals. All participants reported having positive experiences, and 4 of the patients made plans to continue receiving acupuncture treatments on their own after the study was completed. None of the efficacy endpoints showed a clear response to treatment. This included the VAS (mean baseline/botulinum toxin alone = 11.6; mean endpoint/toxin + acupuncture = 19.7); TWSTRS (mean total baseline/toxin alone = 28.5; mean total endpoint/toxin + acupuncture = 24.15); SF-36 (mean baseline/toxin alone = 76.13; mean endpoint/toxin + acupuncture = 72.08); PGIC (mean = 6.2); and CGI (mean = 4.8). PGIC ratings at study completion were all positive with 1 subject reporting ''minimal improvement,'' 2 reporting ''much improvement,'' and 2 reporting ''very much improvement'' with respect to symptom reduction, compared to their pretreatment baselines. CGI ratings showed 1 subject having no change and 4 subjects having minimal improvements (Fig. 1). TWSTRS baseline mean severity = 17; mean disability = 5.2 mean pain = 6.3. TWSTR endpoint mean severity = 15; mean disability = 3.8; and mean pain = 5.35. TWSTR results in Fig. 2 show minimal decreases in severity in 4 subjects and decreased pain in 3 subjects. Only minor adverse events were reported, with self-resolved discomfort in 1 subject and minor bruising in 2 subjects. which was also self-resolved.

DISCUSSION

This pilot study demonstrated that acupuncture is feasible as an adjunct treatment for chronic CD, and that this modality might be associated with subjective symptomatic benefits. Acupuncture is becoming more widely adopted in Western medical settings and communities. The 2002

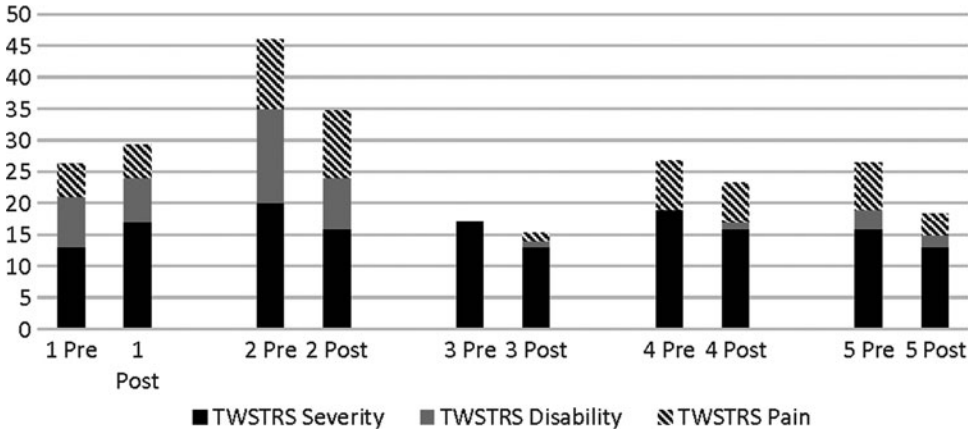

FIG. 2. Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS) Outcomes. Each total score is comprised of a severity, disability, and pain component. Pre- and postintervention scores are indicated for each individual subject, with lower scores indicating improvement and higher scores indicating worsening.

National Health Interview Survey (NHIS) reported that 1.1% (~ 2 million) of American adults had received acupuncture within the past 12 months[8]; in 2007, this number rose to 3 million—a 50% increase in 5 years.[9] Acupuncture is generally considered safe when performed by an experienced practitioner using sterile needles; it is an attractive option for patients suffering from chronic pain and chronic conditions that are not fully addressed through conventional Western treatment.

Acupuncture has been used to treat a variety of disorders as part of TCM for thousands of years. This modality is based on the premise that disease states are characterized by imbalances in the flow of Qi and that insertion of needles along various points within energy channels can restore balance and health. Western scientists have proposed that acupuncture works by stimulating nerve receptors and inducing autonomic, endocrine, and systemic behavioral responses.[10] Effects of acupuncture on brain activity and parasympathetic function have been demonstrated repeatedly.[7,11–14] For instance, acupuncture has been associated with increased parasympathetic activity and inhibitory effects on the dorsomedial prefrontal cortex, which may affect pain information-processing and reduce triggers for pain.[10]

While the pathophysiology of dystonia is complex and not fully understood, it is clearly linked to abnormal central motor processing in the basal ganglia and thalamus. Changes in cerebral blood flow in these regions have been reported after acupuncture treatment,[15] as well as reductions in oxyhemoglobin concentrations in the supplementary motor area, which, in turn, might suppress dystonia and pain signals. Furthermore, the importance of an afferent sensory loop is demonstrated by the well-described phenomenon of *geste antogoniste*, wherein a sensory trigger relieves the dystonic contraction temporarily.

While the efficacy endpoints did not point to a clear reaction to treatment, participant outcomes for all 5 participants were favorable. Given that the aim of the study was to determine satisfaction with the treatment and subjective symptomatic relief, and in reduction of discomfort and disruptive head movements, this pilot study's aims were supported. Further questions could be addressed following these results to clarify the inconsistency between subjective and objective outcomes.

There are limitations in these results. Given that this was a pilot study, the sample size was small. This population may not be, in fact, representative of the larger CD population, so the number of participants limited the generalizability of the results. The study was not a blinded trial, which could have induced bias in selection of the participants, thus, not being truly representative of the target population.

Finally, there is the limitation of predetermined treatment frequency. While the preset biweekly timeline might have been effective for some participants, it might not have been effective for others. This also could help explain why the objective measures did not produce definitive results. There is the chance that this pilot study did not yield clinically significant results due to treatments being too infrequent. Although the participants believed that they had improvements, objective clinical changes might only present when acupuncture is done more regularly; so, different frequencies of acupuncture sessions could be explored.

These data will be used to fuel a larger randomized study comparing the efficacy of botulinum toxin injection with acupuncture to botulinum toxin alone in patients with CD. Through this continuation, many limitations present in the pilot research presented could be addressed, and acupuncture as a treatment to CD may could be explored further in a larger population. The current authors specify the acupuncture points used in this study to aid in reproducibility, but future studies will also be important to determine optimal protocols to be used as guidelines based on muscles involved and symptoms experienced.

CONCLUSIONS

Acupuncture as an adjunctive therapy for CD might be a safe and effective alternative therapy, while decreasing subjective experiences of pain and discomfort. While the clinical presentations of the improvements were minimal, all subjects reported QoL and subjective comfort improvements. Further study in a larger sample will be necessary to explore the efficacy of acupuncture treatment for CD further as well as allowing potential exploration of the temporal indications of treatment.

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AUTHOR DISCLOSURE STATEMENT

D.B. has no relevant conflicts to disclose. He has received consultant/speaker fees from Teva Pharmaceuticals, ACADIA Pharmaceuticals, USWorldMeds, Neurocrine Biosciences, and Adamas Pharmaceuticals.

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REFERENCES

1. Deepak R, Hans M, Mathew K. Effectiveness of acupuncture in cervical dystonia. *Acupunct Med*. 2010;28(2):94–96.

2. Jankovic J, Tsui J, Bergeron C. Prevalence of cervical dystonia and spasmodic torticollis in the United States general population. *Parkinsonism Relat Disord*. 2007;13(7):411–416.
3. Witt C, Jena S, Brinkhaus B, Liecker B, Wegscheider K, Willich SN. Acupuncture for patients with chronic neck pain. *Pain*. 2006;125(1–2):98–106.
4. Junker J, Oberwittler C, Jackson D, Berger K. Utilization and perceived effectiveness of complementary and alternative medicine in patients with dystonia. *Mov Disord*. 2004;19(2): 158–161.
5. Li J. Acupuncture point *D'arsonval* electrotherapy and faradization in 42 cases of spasmodic torticollis. *Chin Med J (Engl)*. 1983;96(8):591–593.
6. Tani M, Takada A, Inoue H, Suzuki T. Acupuncture for cervical dystonia. *KAIM* 2006;4(1):13–18.
7. Samuels N. Acupuncture for acute torticollis: A pilot study. *Am J Chin Med*. 2003;31(5):803–807.
8. Barnes PM, Powell-Griner E, McFann K, Nahin RL. Complementary and alternative medicine use among adults: United States, 2002. *Adv Data*. 2004;343:1–19.
9. Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. *Natl Health Statist Report*. 2009;12:1–23.
10. Hori E, Takamoto K, Urakawa S, Ono T, Nishijo H. Effects of acupuncture on the brain hemodynamics. *Auton Neurosci* 2010;157(1–2):74–80.
11. Esch T, Guarna M, Bianchi, Zhu W, Stefano GB. Commonalities in the central nervous system's involvement with complementary medical therapies: Limbic morphinergic processes. *Med Sci Monit*. 2004;10:MS6–MS17.
12. Hui KK, Liu J, Marina O, et al. The integrated response of the human cerebro–cerebellar and limbic systems to acupuncture stimulation at ST 36 as evidenced by fMRI. *Neuroimage*. 2005;27(3):479–496.
13. Sakai S, Hori E, Umeno K, Kitabayashi N, Ono T, Nishijo H. Specific acupuncture sensation correlates with EEGs and autonomic changes in human subjects. *Auton Neurosci* 2007; 133(2):158–169.
14. Fang J, Jin, Z, Wang Y, et al. The salient characteristics of the central effects of acupuncture needling: Limbic–paralimbic–neocortical network modulation. *Hum Brain Mapp*. 2009; 30(4):1196–1206.
15. Ha-Kawa SK, Yoshida T, Yague T, Tani M, Suzuki T, Sawada S. Acupuncture-induced cerebral blood flow responses in dystonia. *Ann Nucl Med*. 2006;20(1):83–87.

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