The Use of Acupuncture to Decrease Chronic Neuralgia in Patients with Spinal Cord Injuries

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Pacific University
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Abstract

Background: Individuals who sustain a spinal cord injury (SCI) often experience chronic neuralgia that is poorly remedied by modern medicine. When pharmaceutics are used to treat the pain, the patient usually suffers from a high percentage of side effects. Individuals who already are dealing with a life changing event such as an SCI can become highly frustrated with a new onset of poorly understood pain. The purpose of this review is to search available literature in order to understand what part acupuncture can play to alleviate some of this pain.

Methods: An exhaustive literature search using CINAHL, Medline-OVID, EMR Multifile and Web of Science was conducted that used the specific search terms: spinal cord injury, neuralgia and acupuncture therapy. Eligibility criteria included English language only articles, studies conducted within the last 15 years and studies only conducted on humans. Of the pertinent articles found in the above search engines, bibliographies were examined and any studies that directly looked at the use of acupuncture as treatment for chronic nerve pain in SCIs were included.

Results: Two studies met inclusion criteria and were included in this systematic review. A within-subjects study with 22 individuals showed a 46% improvement in pain after treatment, however 27% of the study’s participants experienced pain increase at follow up. A sequential controlled design study involving 30 participants showed 40% of the acupuncture patients and 7% of the massage patients reporting a positive outcome at follow up.

Conclusion: Acupuncture is not a dependable treatment for chronic neuralgia in individuals who have sustained an SCI. Some evidence supports its use for up to moderate pain relief in a fair portion of individuals. However, due to the lack of adverse side effects and high compliance rates associated with acupuncture, it is a reasonable option for pain management either on its own or partnered with a pharmaceutical treatment without worrying about drug interactions. More research needs to be conducted on what causes chronic neuralgia as well what can be effective treatments.

Keywords: Spinal cord injury, neuralgia, acupuncture therapy

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Spinal cord injury, neuralgia, acupuncture therapy

Subject Categories
Medicine and Health Sciences

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Clinical Graduate Project Coordinator: Annjanette Sommers, PA-C, MS

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Biography

[Redacted for privacy]
Abstract

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**Conclusion:** Acupuncture is not a dependable treatment for chronic neuralgia in individuals who have sustained an SCI. Some evidence supports its use for up to moderate pain relief in a fair portion of individuals. However, due to the lack of adverse side effects and high compliance rates associated with acupuncture, it is a reasonable option for pain management either on its own or partnered with a pharmaceutical treatment without worrying about drug interactions. More research needs to be conducted on what causes chronic neuralgia as well what can be effective treatments.

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Table 1: GRADE Characteristics of Studies

List of Abbreviations

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADL</td>
<td>Activities of Daily Living</td>
</tr>
<tr>
<td>ASIA</td>
<td>American Spinal Injury Association</td>
</tr>
<tr>
<td>CAM</td>
<td>Complementary and Alternative Medicine</td>
</tr>
<tr>
<td>GRADE</td>
<td>Grading of Recommendations, Assessment, Development and Evaluations</td>
</tr>
<tr>
<td>GWB</td>
<td>General Well-Being Schedule</td>
</tr>
<tr>
<td>NRS</td>
<td>Numeric Rating Scale</td>
</tr>
<tr>
<td>PGIC</td>
<td>Patients’ Global Impression of Change</td>
</tr>
<tr>
<td>SCI</td>
<td>Spinal Cord Injury</td>
</tr>
<tr>
<td>TCA</td>
<td>Tri-Cyclic Antidepressants</td>
</tr>
<tr>
<td>TENS</td>
<td>Transcutaneous Electrical Nerve Stimulation</td>
</tr>
<tr>
<td>VAS</td>
<td>Visual Analogue Scale</td>
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</table>
The Use of Acupuncture to Decrease Chronic Neuralgia in Patients with Spinal Cord Injuries

BACKGROUND

Approximately 12 000 people suffer spinal cord injuries every year in the United States with a current approximate count of up to 327 000 currently living in the US with a spinal cord injury (SCI) as of February 2012. One meta-analysis on the presence of chronic pain after a spinal cord injury states that approximately 65% of individuals who sustained an SCI suffer from chronic pain, though there are ranges from 26% to 96% with one third of that group suffering from severe pain. This can be severely debilitating with respect to daily living and psychological well being. The effects of suffering from chronic pain can range anywhere from decreased work hours to a two to six times national level increased risk of suicide.

Chronic pain comes from many sources following an SCI. One source splits the type of pain into two categories: nociceptive pain and neuropathic pain. Nociceptive pain is defined as pain caused by damage to non-neural tissue. It includes mechanical instability of the spine as well as muscle spasms. Neuralgia (or neuropathic pain) is defined as “damage to or dysfunction of the nervous system,” and includes secondary overuse or pressure syndromes, visceral pain, nerve root entrapment, syringomyelia, transitional zone pain, allodynia, central dysesthesia syndrome and finally cognitive, affective and environmental pain syndromes.

Neuralgia is treated with a variety of medications and alternative treatments including tricyclic antidepressants (TCAs), antiepileptics, opioids, local anesthetics, intrathecal pain pumps, visual illusions, trans electrical nerve stimulation (TENS), osteopathic manipulation, acupuncture and massage. The recommended pharmalogical treatment traditionally is TCAs and antiepileptics such as pregabalin and gabapentin but these come with many side effects and high dropout rates in clinical trials. Patients are warned that it is highly unlikely that they can reach a
state that is completely pain free. Because there does not seem to be a miracle drug to alleviate neurogenic pain, 63% of patients with SCI have tried non-pharmacological treatments.

In a recent systematic review of literature on treatments for chronic pain after an SCI, only three out of 44 studies looked at the use of acupuncture for pain relief, with two of those studies focusing on musculoskeletal shoulder pain rather than on neuropathic pain that came directly from the damaged nerves. In the few studies found that involve acupuncture to treat chronic neuralgia, the dropout rates are much lower than with pharmacological studies as are the side effects suffered. Any opportunity to lower neurogenic pain would be highly beneficial in allowing people to have an increased quality of life. Is acupuncture an effective treatment for chronic neuralgia in people who have SCIs?

METHODS

An exhaustive literature search using CINAHL, Medline-OVID, EMR Multifile and Web of Science was conducted that used the specific search terms: spinal cord injury, neuralgia, and acupuncture therapy. Eligibility criteria included studies in the English language only, conducted within the last 15 years and only performed on humans. Of the pertinent articles found in the above search engines, bibliographies were examined and any studies that directly looked at the use of acupuncture as treatment for chronic nerve pain in SCIs were included. Only articles that specifically addressed the clinical question were then evaluated using the GRADE criteria (Grading of Recommendations, Assessment, Development and Evaluation).

RESULTS

The initial search produced six articles available for review. Of these six, two met the inclusion criteria and showcased primary data. The first article is a within-subjects study design with the second one being a sequential control study.
Nayak et al

Nayak et al\textsuperscript{4} conducted a within-subjects study with the intent to examine the usefulness of acupuncture treatment for chronic pain in individuals with SCI. There was no blinding or placebo used as reference. Included in this study were twenty-two individuals who had sustained a traumatic SCI and were former inpatients of the Kessler Institute for Rehabilitation in New Jersey, USA. The study’s primary outcome was to assess pain intensity throughout the course of treatment as well as at a point three months after treatment stopped. Secondary outcomes for this study included general health, pain interference, mood and psychological well being.\textsuperscript{4}

The participants in this study met certain criteria. They had to be at least 18 years of age, must have had a traumatic SCI at least six months before the start of the study, had to have chronic pain that lasted a minimum of six months that came on after the traumatic injury and had to have pain that was at least a five out of 10 on a numeric rating scale (NRS). Patients with other neurological issues besides damage to the spinal cord (Parkinson’s, traumatic brain injury, multiple sclerosis, epilepsy and diabetic neuropathy), anyone who had a history of bleeding disorders, patients with artificial heart valves, pregnant women, patients with pre-SCI psychiatric disorders and patients who had used acupuncture before were excluded.\textsuperscript{4}

All participants went through the same procedure of having a comprehensive physical exam and had their pain classified into one of six categories: mechanical, radicular, cauda equine, central, visceral or musculoskeletal. Patients were asked to stay on the same medication throughout the study that they had been on when they entered the study. A neurological exam was also performed that was based on American Spinal Injury Association (ASIA) standards. Participants then filled out questionnaires to help evaluate secondary endpoints. The tools used for this included: the NRS for pain intensity, individualized symptom rating scale for general
health, an activity scale ranging from zero to 10 to rate pain impaction and interference on their activity, Center for Epidemiologic Studies-Depression scale, Spielberger State Anxiety Inventory, General Well-Being schedule (GWB) for psychological well-being and Vincent’s Credibility Scale for expectations.4

Patients completed all assessments a total of four times. Once at start of the study, then again after 7.5 weeks in a no-acupuncture baseline period, then again at the end of 7.5 weeks of acupuncture treatment and finally at a post-treatment period three months after completion of acupuncture. Individuals received 15 acupuncture sessions within a 7.5 week-time allotment. Six to 14 areas were needled and the needles left in for 20 minutes. Six areas were needled as a constant across the group with other points that were used for individualized pain. Needling was allowed to vary between sessions depending on the patient’s pain and changes from the previous visit.4

At the post-treatment mark, 46% of participants experienced definite pain relief, meaning that their pain decreased by two points on the NRS. At the three-month follow up, 41% acknowledged continued pain relief. Individuals were more likely to experience pain relief from acupuncture if they suffered from musculoskeletal pain versus central pain, 42% and 80% respectively. Patients with incomplete injuries responded 60% of the time to treatment, whereas patients with complete injuries responded just 33% of the time. The investigators also noticed that the individuals who reported sustained pain relief at the three-month follow-up were the ones suffering from a moderate amount of pain initially (7.83 +/- .75) while those who had more severe pain were not as likely to experience sustained pain relief (9.67 +/- .58). At post-treatment, 18% of the patients reported increased pain, however, 27% of patients reported increased pain at the three-month follow-up.4
Addressing the secondary outcomes, researchers found that there was a statistically significant improvement in general health \((F = 11.70, p < .01)\). Pain interference was statistically significant for improving activities of daily living (ADLs) \((F = 4.67, p < .05)\). Depression and anxiety changes were not statistically significant \((F = 1.01 \text{ and } F = 1.28)\). The GWB showed a significant improvement in overall psychological well being \((F = 4.22, p < .05)\) but this was not maintained at the three-month follow up.\(^4\)

The authors acknowledged some limitations to the study including the lack of a control/placebo group, the need for a larger study, the non-traditional approach in acupuncture treatment (15 sessions with no tapering of treatment) and not being able to fully customize acupoints to each individual. The authors recommend that acupuncture may be an effective treatment for chronic pain in certain individuals with an SCI, mainly those suffering from a moderate amount of musculoskeletal pain over those with severe amounts of pain that tend to be more central.\(^4\)

**Norrbrink and Lundeberg**

A sequential controlled design study\(^7\) was carried out to discover if acupuncture and/or massage therapy could adequately reduce neuropathic pain in patients who have had a SCI. The participants all came from a spinal institution in Stockholm, Sweden through the use of mailings and advertisements. The primary outcome of this study looked at significant pain reduction (considered 1.8+ units on an NRS score) on a visual analogue scale (VAS) of 0-100 consisting of 18+ units. Secondary outcomes looked at depression, anxiety, psychological consequences of pain, sleep quality, life satisfaction, spasticity and ability to cope with pain.\(^7\)

This study’s inclusion criteria stated that the SCI had to be at least two years old, with neuropathic pain at or below the level of injury and this pain had to have been present for a
minimum of six months. Patients were asked to continue with the current medication as they had been taking it and not change it for the duration of the study. The first 15 individuals that responded to the advertisements were allocated to the western acupuncture group. The second 15 were allocated to the massage group. The participants answered a questionnaire before the start of treatment, at the end of the six weeks of treatment and finally at a two month follow-up post treatment through the mail. The patients also completed the Patient Global Impression of Change Scale (PGIC) to rate their overall pain relief. Both treatment modalities were conducted two times a week for six weeks. Individuals receiving acupuncture had a western approach taken with only areas of preserved sensation needled. After the first three to four sessions, electroacupuncture at 80 Hz was utilized in four of the points during the sessions. All acupuncture points together totaled 13-15 points. The massage group had light pressure effleurage and petrissage performed on them. Massage was only performed in areas with pain and preserved sensation. It was a goal of the massage to not cause any more pain to the patients.

Basic demographics showed the two groups were balanced according to age, time since injury and level of injury. Two individuals dropped out, one in each group, though the reason for the dropouts was not related to treatment.

In the acupuncture group, 8/15 participants stated their pain had decreased a significant amount (using the PGIC). It was the same for 9/15 participants in the massage group. However, in follow-up 6/15 participants in the acupuncture group were still reporting significant decrease in pain as opposed to 1/15 in the massage group. At post treatment, general pain, present pain and pain unpleasantness were significantly lower after acupuncture treatment compared to massage. This, however, was not seen at the two-month follow up. The most effect seen in this
study was the use of acupuncture and how it correlated with pain unpleasantness. There was a median decrease of 23/100 on the VAS noted right after the acupuncture sessions.\(^7\)

The authors recognize that the study was of limited quality because of the small sample size, no placebo control and no randomization.\(^7\) They noted that the benefit of this type of study was that it was safe and compliance was high whereas compliance for pharmaceutical trials surrounding SCIs have had very high drop out rates.\(^9,10,12,13\) The authors recommend acupuncture and massage to help with neuropathic pain following SCI as well as recognize the need for large randomized controlled trials.\(^7\)

**DISCUSSION**

Acupuncture is a very understudied treatment for chronic neuralgia. Evaluation of these two studies gives an inconclusive but hopeful attitude regarding how helpful acupuncture can be in alleviating some neuralgia for individuals who have an SCI. Evidence for a clear clinical course is muddied by numerous forms of neuropathic pain, numerous ways acupuncture can be administered and the subjectivity an individual has on their pain.\(^4,7\)

There appears to be some component of acupuncture that is more effective in musculoskeletal pain than in central pain as demonstrated by Nayak et al.\(^4\) It is convenient, however, that acupuncture can work holistically on an individual and therefore on several types of pain at once. A reduction in overall pain an individual is experiencing is welcome; however, it is again hard to categorize exactly what pain mechanisms acupuncture works on in the body. In future studies of acupuncture in SCIs, it might be beneficial to single out either a specific type of neuralgia or specific type of musculoskeletal pain to treat.

Moreover, it is a challenge to standardize the way in which people get acupuncture treatments in these studies. There are different methods of performing it; there are different
abilities of providers to consistently needle every individual every time. Introducing electroacupuncture also adds a new dimension to treatment as was performed in Norrbrink and Lundeberg.\textsuperscript{7} Perhaps isolating electroacupuncture from traditional acupuncture can clear some of the confounding contributions of acupuncture in neurogenic pain relief. Pain is also hard to assess objectively and have a static and universal measurement associated with every level of pain for every patient.

Partly because of the relative lack of side effects associated with acupuncture, acupuncture is recommended as a possible solution to the undertreated nerve pain commonly following SCI.\textsuperscript{4,7} Because there is no literature that shows harm coming to the patient, acupuncture should be presented as a viable option to the individual. If a placebo effect or psychological component of receiving acupuncture can lessen an individual’s evaluation of their own pain, then perhaps its treatment effect is even larger than what is currently presented.

**Limitations of Study**

Both studies\textsuperscript{4,7} have stark areas of limitations. Nayak et al\textsuperscript{4} is largely limited by the fact that it is a within-subjects design and had no placebo group. In addition, this study has a limited number of participants along with a 10\% drop out rate. Another limitation is the non-traditional administration of the study’s acupuncture treatment. It was generally standardized to all participants with a maximum of 14 points needled. Needing to have a consistency between participants in treatment takes away from the individuality that acupuncture can usually encompass\textsuperscript{4} and the potential benefit it might be able to give each participant. Each participant received 15 sessions of acupuncture, which might be considered a rather short course for such a chronic condition. Another area of limitation is that while the researchers of Nayak et al\textsuperscript{4} requested that the participants not change their pre-treatment pain medication regimen, several
participants still did change them although it was usually to a lower dose. Finally, it is unknown how many physiatrists administered the acupuncture to the Nayak et al patients. The level of competency of these physiatrists is assumed in this study but never discussed.

The study conducted by Norrbrink and Lundberg\(^7\) had major limitations, namely the study’s design (sequential control), the limited number of participants, and the lack of randomization to either group. Acupuncture points were based on a western medical perspective, not standardized and only put in places of preserved sensation unlike Nayak et al. A major difference between the two studies is that Norrbrink and Lundberg\(^7\) decided to administer high frequency (80 Hz) electroacupuncture during some of the participant’s treatments to some of theneedled points. Both studies\(^4,7\) were limited by the fact that blinding was very difficult to perform.

**CONCLUSION**

Treatment of neuralgia in SCIs is poorly understood, studied or treated. Acupuncture is one treatment option that has the potential to work in some of these patients. The evidence supports its use for up to moderate pain relief in a fair portion of individuals. The overall GRADE criteria for the studies looked at is very low. However, due to the lack of adverse side effects and high compliance rate associated with acupuncture, it is a reasonable option for those interested to use either on its own or partnered with a pharmaceutical treatment without worrying about drug interactions. Further research into what causes neuropathic pain post SCI is needed along with randomized controlled trials to further evaluate what part acupuncture plays in decreasing chronic neuropathic pain in those individuals suffering from chronic neuralgia.
References


Table I: GRADE Characteristics of Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th># Of Subjects</th>
<th>Starting GRADE</th>
<th>Decrease GRADE</th>
<th>Increase GRADE</th>
<th>GRADE</th>
<th>Overall GRADE of evidence</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Study Quality</td>
<td>Consistency</td>
<td>Directness</td>
<td>Precision</td>
</tr>
<tr>
<td>Nayak et al</td>
<td>Within-Subjects</td>
<td>22</td>
<td>Low</td>
<td>0</td>
<td>-1(^a)</td>
<td>0</td>
<td>-1(^b)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Study Quality</td>
<td>Consistency</td>
<td>Directness</td>
<td>Precision</td>
</tr>
<tr>
<td>Norrbrink and Lundeborg</td>
<td>Sequential Controlled</td>
<td>30</td>
<td>Low</td>
<td>-1(^c)</td>
<td>-1(^d)</td>
<td>0</td>
<td>-1(^b)</td>
</tr>
<tr>
<td></td>
<td>Design</td>
<td></td>
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</table>

\(^a\) Inconsistency due to subjectivity in pain measurement (utilizing a NRS) and individualized acupoints

\(^b\) Lack of precision due to total sample size

\(^c\) Lack of randomization

\(^d\) Inconsistency due to subjectivity in pain measurement (utilizing a VAS and PGIC scale) and individualized acupoints