

Results Of A 1-Year Clinical Study Of The Application Of Laser Stimulation Of The Acupuncture Points Used For Arthritis, Neuropathy, Intractable Pain, And Pain From Acute Strain And Sprain

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ABSTRACT

Background Laser acupuncture is part of the practice of acupuncture and has been shown in studies to reduce pain.

Objective To demonstrate the utility of laser acupuncture as an adjunct therapy for pain control and/or pain management.

Design, Setting, and Patients Prospective cohort study of 55 patients referred with uncontrolled pain for 4 well-documented conditions: arthritis, neuropathy, intractable pain, or pain from strain/sprain injury. Patients were treated each week (once or twice weekly) with a 500-mW laser at specific acupuncture points for 9 weeks. The study was performed at the Integrative Medicine Centre in Fairhope, Alabama, from September 2004 through February 2005.

Main Outcome Measures Patient-reported reduction and control of associated pain and discomfort of the condition on the McGill Pain Questionnaire and as determined by acupuncture diagnosis.

Results Initially, all patients rated their pain as 8-9 on the McGill questionnaire. There was a reduction of pain in all conditions after the first 3 weeks in all groups. There was further reduction after the next 3 weeks, but less during the last 3 weeks. A follow-up investigation after 6 months still found reduced pain in each group.

Conclusion Laser therapy may be a useful clinical therapeutic method for attenuating or eliminating pain and other symptoms in chronic and acute pain syndromes.

KEY WORDS

Acupuncture, Laser, Laser Acupuncture, Pain, Pain Management

INTRODUCTION

In addition to greater public awareness, clinical efficacy, low rates of adverse effects, low cost, and mounting clinical research evidence have helped enhance the popularity of acupuncture in the United States. A recent research innovation in acupuncture is the use of laser acupuncture, which involves the use of a laser in place of conventional needles.¹ Laser acupuncture is being touted by many scientific researchers as a viable and perhaps superior alternative to needle acupuncture in certain cases.

Needling in acupuncture dates back thousands of years and numerous studies have proven its effectiveness in pain relief.² Likewise, the laser has been used for more than 30 years in acupuncture clinical settings. There are many studies to support its effectiveness.³⁻⁵ Acupuncture and electroacupuncture have been widely used to relieve a variety of pain problems.⁶ In comparison with traditional acupuncture performed manually, laser acupuncture may offer convenience and a different stimulating effect to provide pain relief.⁵ Patients often seek alternative modalities, including laser therapy, when they do not achieve enough pain relief from conventional treatments.² We report patient response to selected acupuncture points and laser stimulation in this clinical study.

The authors were intrigued with the clinical question of laser pain control in chronic as well as acute conditions and sought to investigate the following research questions:

1. Is laser acupuncture as effective as needle acupuncture in given conditions?
2. Can pain relief be accomplished with laser acupuncture without the eliciting of De Qi?
3. Is there a difference in the effectiveness of the laser's application for acute pain vs chronic pain?

To investigate the questions above, some of the most medically resistant conditions were chosen for the study. Neuropathy, arthritis, chronic intractable pain, and acute pain from strain and sprain injury were selected as conditions to be investigated because optimal treatment parameters are not known. A sample of 55 patients were treated for 9 weeks with laser acupuncture. Both short-term and long-term results were recorded.

As a pilot study, a group of 25 patients (15 men, 10 women) who had been treated with needle acupuncture with limited success were treated with laser acupuncture. All 25 patients were being treated for a diagnosis of neck and back pain from a non-disk origin and ranged in age from 23-65 years. After 4 weeks of twice-weekly needle acupuncture, all patients reported pain of at least 6 on an adapted (1-no pain, 10-extreme pain) McGill Pain Questionnaire.

Pilot Study

After these patients' conditions proved resistant to needle acupuncture, laser acupuncture (500-mW laser) was administered. After 1 month of laser treatment, 80% of the patients reported pain of 3 or less on the pain scale. Thus, for this group of patients, laser acupuncture proved more effective than traditional needle acupuncture. The success of laser acupuncture for this group of patients led to the following larger study.

METHODS

This larger study was a clinical investigation performed at the Integrative Medicine Centre in Fairhope, Alabama, from September 2004 through February 2005. We studied 55 patients between the ages of 14 and 98 years. All patients experienced pain and were diagnosed by their physician with 1 of 4 conditions: arthritis, neuropathy, uncontrolled pain,

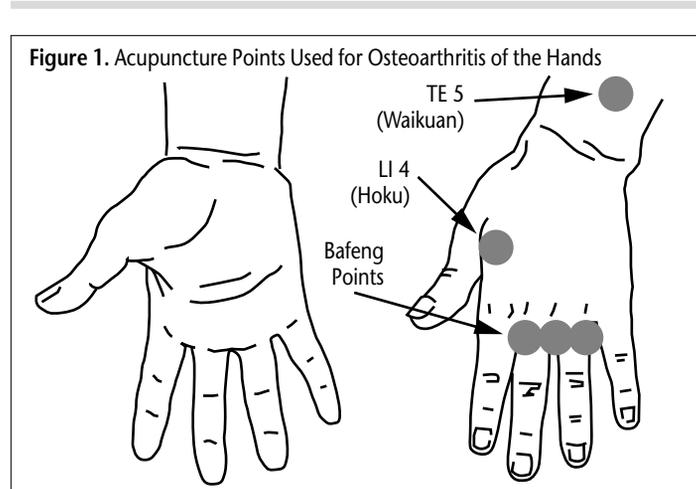
or strain/sprain. Patient informed consent was obtained before the start of the investigation and IRB approval was obtained.

Study selection criteria for the 3 chronic diagnoses required that patients have symptoms for more than 6 weeks and their condition proven resistant to other forms of medical intervention. For the acute strains/sprains, only 1 week was required. All required a medical diagnosis and a referral. Patients taking medication or not willing to discontinue medication were excluded from the study. No patients were accepted who were undergoing psychological treatment.

Patients were randomly placed in 1 of 2 groups: once- or twice-weekly treatments. Each diagnosis was assigned a pain score: 0 indicating absence of pain and 9, the most severe pain. All patients reported a score of 8-9 at the beginning of the study. Each patient's score was recorded before and after each treatment session all 9 weeks; the same procedure was used for the 6-month follow-up examination. Four patients dropped out of the study, leaving usable data for 51, with the distribution by diagnosis, sex, and age shown in Table 1.

We used an adapted visual analog scale (VAS) from the McGill Pain Questionnaire to determine the role of the laser in chronic and acute pain management.⁷ Patients were placed into groups depending on their diagnosis; each group was treated with laser for a total of 9 weeks at 1 or 2 times each week, depending on their time allotment. Each treatment consisted of 500 mW at 30 seconds at the selected acupuncture points.

Patients were positioned for treatment supine, sitting, or prostrate, depending on their condition and physical ability. The skin was prepared using an alcohol pad or cotton. The 500-mW laser was applied at the preselected sites of each diagnosis. The acupuncture points selected for each condition were based on the combined experience of a Traditional Chinese Medicine practitioner and a Japanese practitioner with more than 50 years' combined experience in acupuncture.^{8,9} Accuracy of the laser application was confirmed based on 30 years' acupuncture experience of the consultants. Stimulation intensity was at 30J per acupuncture point based on a random selection of 1 or 2 treat-



ments per week. Treatment was administered at the following bilateral points throughout the schedule (Table 2 and Figures 1-3).

RESULTS

The results for each diagnosis were analyzed to determine whether age, frequency, or sex had any significant effect. No significant relations was found.

The average result for each diagnosis is shown in Table 3 (in the row labeled Result 1). The best results were obtained for arthritis and strain. Patients with pain had the next best results, and neuropathy patients on average had the smallest improve-

ment. There was no statistically significant difference between the arthritis and strain results. There was a statistically significant difference between neuropathy and the arthritis groups, and between neuropathy and strain groups. This seems to indicate that laser treatment is most effective for treating arthritis and strain.

Patients' results 6 months after treatment were recorded in follow-up visits using the same pain scale. The average result for each diagnosis is shown in Table 3 (in the row labeled Result 6). The bottom row of the table shows the average change during the 6 months following treatment. Strain patients had the best results after 6 months, with an average of 1.67, which was significantly different from the other 3 diagnoses. There was no statistically significant difference among the other 3 groups.

A positive change value indicates that patients' conditions degraded over the 6-month interval but on average, these were very small. Only strain patients on average had improvement over the 6-month period, possibly because strain generally improves over time.

Arthritis

Age, sex, and frequency of treatment were not significant predictors of results after 6 months. However, the change of 1.4 (which is statistically significant) indicates that a patient's level of pain increased during the 6 months following treatment. In addition, there was a strong correlation between result 1 and result 6 for arthritis patients ($r=0.896$). This means that the patient's result immediately after treatment is a strong prediction of the patient's condition after 6 months.

Table 1. Distribution of Study Patients by Diagnosis, Sex, and Age

	Diagnosis				Total
	Arthritis	Neuropathy	Pain	Strain	
Sex					
Male	9	12	4	9	34
Female	1	7	6	3	17
Total	10	19	10	12	51
Age, y					
Mean	57.6	67.5	51.2	46.8	
Range	16-83	43-98	21-76	14-73	

Table 2. Acupuncture Treatment Points by Diagnosis

Diagnosis	Treatment Points
Arthritis	TE 5, LI 4, Bafeng points
Neuropathy	ST 36, SP 6, ST 42, LV 3, KI 1
Intractable Pain	PC 3, KI 10, ST 36, BL 10, TE 10, BL 54
Strain/Sprain	PC 6, LI 4, LV 4, SP 3, BL 60, GB 43

There was a slight indication that older patients experienced more degradation than younger patients during the 6 months following treatment, but it was not statistically significant.

Laser needles appear to be very effective in alleviating pain immediately for arthritis. In fact, this condition responded best of the 4 evaluated, reducing pain from 9 to 2.3 on average. By 6 months after treatment, a patient's pain level can be expected to increase by 1.4 on average.

Neuropathy

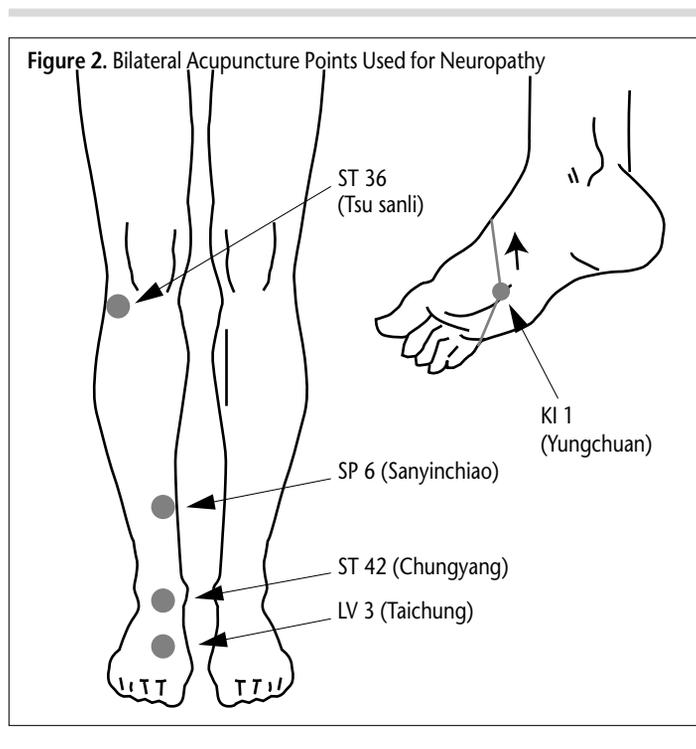
Similar to the results for arthritis, age, sex, and acupuncture frequency were not significant predictors of results after 6 months. On average, there was a small degradation (0.52) in the quality of results over the 6 months. However, this change was not statistically significant. The 2 sets of results were correlated ($r = 0.83$), which again means results immediately after treatment are a good predictor after 6 months.

Pain

Among pain patients, the average result immediately after treatment was 3.60, which increased to 4.10 after 6 months, an increase of 0.50. However, this change was not statistically significant. Unlike the previous 2 diagnoses, there was not a strong relation between the 2 results. Hence, a patient's results immediately after treatment were not necessarily a good predictor of results 6 months later. Yet there was a statistically significant relationship between the patient's age and the amount of change experienced from immediately after treatment until 6 months later. Older patients tended to experience deterioration over the 6 months while the youngest patients tended to experience improvement (Figure 4).

Strain

The strain/sprain diagnosis, which was the only acute condition, experienced one of the best responses to laser acupuncture with an average pain level immediately after treatment of 2.33. This was the only



diagnosis for which results on average improved over the 6 months. However, this improvement was not statistically significant. In fact, there were no significant relations among any of the variables for the strain diagnosis. Hence, laser acupuncture may be effective in treating this pain, and results will not be significantly different 6 months later.

DISCUSSION

The results of this study show that the laser is effective in reducing pain for all 4 of the diagnoses we treated: arthritis, neuropathy, intractable pain, and strain/sprain. In addition, the results were judged superior to those that would have been expected using traditional needle acupuncture on a similar sample of patients (based on a history of treating patients using traditional needle acupuncture).

Despite the fact that acupuncture has been widely used in treating both acute pain and chronic pain conditions for many years in different parts of the world, little is known about the underlying mechanism. Due to the inherent difficulty of study design and lack of scientific data, the use of acupuncture as a treatment modality has not been widely embraced in conventional pain management clinics.¹⁰ However, it has been noted that "more and more patients are finding that alternative medicine has a great deal to offer, especially for treating chronic conditions with which Western medicine has little success."¹¹

The stimulation of acupuncture points with laser light can evoke specific effects in the periphery of the nervous system and in the brain.¹²⁻¹⁴ These effects can be objectified and quantified using modern biomedical engineering techniques. Laser needle acupuncture represents a new, painless method for stimulation of acupuncture points. Laser needles are not inserted in the skin; the laser is simply applied to the acupuncture point. This method allows the simultaneous stimulation of individually combined points.¹⁵

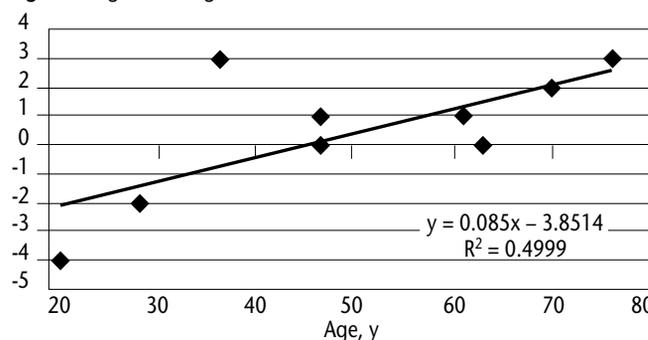
Several goals and limitations to the study existed. First, our goal was

Table 3. Pain Scale Results*

	Diagnosis				Average
	Arthritis	Neuropathy	Pain	Strain	
Result 1	2.30	4.11	3.60	2.33	3.24
Result 6	3.70	4.63	4.10	1.67	3.65
Change	1.40	0.52	0.50	-0.67	0.41

*Result 1 is immediately after treatment, result 6 is at 6 months' follow-up.

Figure 4. Age vs Change in Pain Score



to determine if pain control was available from this new technology; second, to determine if the laser could stimulate Qi flow without the benefit of De Qi stimulation. The shortfall of the study is that it was not a double-blind, randomized, controlled, cross-over study. Unfortunately, time and resources were not available to accomplish such a goal.

CONCLUSIONS

We report that laser acupuncture allows simultaneous stimulation of individual acupuncture point combinations that can reduce both chronic and acute pain. This study showed laser acupuncture to be at least as effective as needle acupuncture. Pain control can be accomplished without De Qi stimulation. Results for all 4 diagnoses were not affected by the frequency of treatment, the patient's age, or sex. Laser therapy may serve as an adjunctive tool in managing chronic and acute nonmalignant pain. The efficacy of specific treatments for different pain conditions and the corresponding underlying mechanism require more investigation for laser acupuncture to gain further acceptance in the scientific community.

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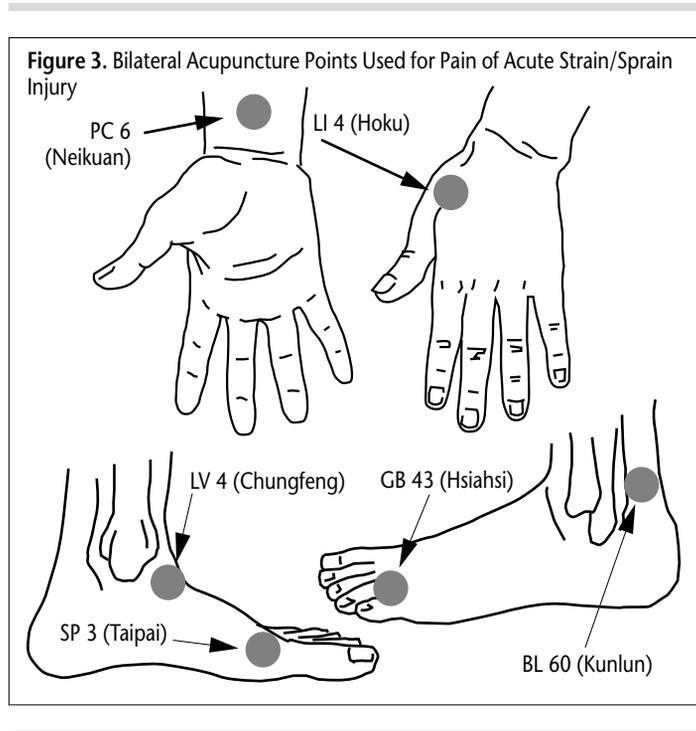


Figure 3. Bilateral Acupuncture Points Used for Pain of Acute Strain/Sprain Injury

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