

Acupuncture Treatment in Epicondylalgia: A Comparative Study of Two Acupuncture Techniques

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Abstract: The purpose of this study was to compare the pain-alleviating effect of classical acupuncture with superficial needle insertion in 82 patients suffering from lateral epicondylalgia. Sessions were 20 min long, two to three times weekly with 10 treatments in all. Five acupuncture points were treated: LI 10, 11, 12, Lu 5, and SJ 5. After 10 treatments significant differences were observed between the groups favoring the classical acupuncture technique in relation to subjective and objective outcome. No such differences could be observed at the follow-ups after 3 months and 1 year. This study showed that classical "deep" acupuncture is superior to superficial needle insertion in the short-term symptomatic treatment of lateral epicondylalgia, but not at 3- and 12-month follow-up. **Key Words:** Acupuncture—Epicondylalgia—Lateral elbow syndrome—Tennis elbow.

Tennis elbow, lateral humeral epicondylalgia (1,2) or lateral elbow syndrome (3), is a painful condition at the lateral aspect of the elbow. There is no general agreement about the etiology but it appears to be multifactorial in origin, and the clinical picture is often fairly uniform (1,3,4-7).

Since Runge first described this condition in 1873 (8), many different methods of treatment have been tried. During the last few years there has been a growing interest in the use of acupuncture as a method of pain relief (9-20). In a study of acupuncture treatment of tennis elbow, Brattberg (1983) found that acupuncture could serve as a treatment alternative to steroid injections (10).

Few studies have investigated different acupuncture techniques (17-19). In 1983 MacDonald suggested that superficial needle insertion might be as effective as classical acupuncture when treating low

back pain (19). In a recent study it was shown that the pain-relieving effect of classical acupuncture was superior to that of superficial acupuncture when treating patients suffering from head and neck pain of varying origins (18). The purpose of this study was to compare the pain-alleviating effect of two acupuncture techniques in patients suffering from lateral epicondylalgia: (a) classical "deep" acupuncture, in which the needles are inserted and manipulated to evoke the sensation of *Teh Chi*, and (b) superficial needle insertion, where the needles are merely inserted subcutaneously with no sensation of *Teh Chi*.

PATIENTS AND METHODS

Patients

One hundred and twelve patients suffering from lateral elbow pain were examined and evaluated at the clinic during a period of 10 months. The patients were either self-referred or referred by their physician or physiotherapist. Patients included in the study were those who experienced pain over the

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lateral epicondyle, produced by two or more of the following four tests and a duration of pain of at least 1 month. The diagnostic criteria were as follows:

(a) Palpation of the lateral epicondyle.

(b) Resisted wrist extension. Position: shoulder flexion 60°, elbow extended (not supported), forearm pronated, wrist extended about 30°. Pressure is applied on the dorsum of the second and third metacarpal bones to prove involvement of the extensor carpi radialis brevis and longus. (Fig. 1.)

(c) Passive stretching of the extensor muscles of the forearm. Position: elbow extended, forearm pronated, maximal wrist palmar flexion.

(d) Resisted finger extension. Position: 60° of shoulder flexion, elbow extended, forearm pronated, fingers extended. Resisted extension was applied manually on digits II-V to prove involvement of the extensor indicis, the extensor digitorum and the extensor digiti minimi. Resistance applied on digit III = Middle finger test. (Fig. 2.)

Those excluded were patients demonstrating (a) dysfunction in the shoulder, neck, and/or thoracic region; (b) local arthritis, generalized polyarthritis; (c) neurological abnormalities; and (d) radial nerve entrapment (21,22).

Eighty-six patients suffering from lateral epicondylalgia were initially enrolled in the study. Four patients dropped out during the first 2 weeks because of illness unrelated to the elbow, one claiming the treatments were too time-consuming, and one giving no reason. Eighty-two patients (52 men and 30 women) completed the study. They were between 25 and 70 years of age (mean 47) and had had pain between 1 and 120 months. Details were reported of profession, work load, and involvement in monotonous and repetitive movements.

Seventy-nine patients were right-handed and 70 were affected in the right elbow. Twenty-nine patients attributed their symptoms to sport, 27 to work, and 20 to other activities; one had experienced trauma and five did not attribute their symptom to any specific cause. Only 19 patients had not tried any prior treatment; 47 had been given steroid

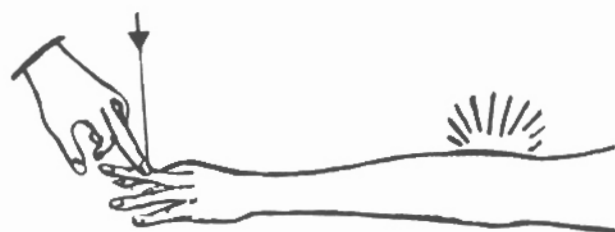


FIG. 2. Test 4. Middle finger test.

injections, 31 ultrasound, and 42 other treatments, including medication transcutaneous electrical nerve stimulation (TENS), and so forth.

All the patients were informed that two different acupuncture techniques were to be tried and that no fee was to be charged. No other treatment or drugs were to be used during the month before the trials began, and that condition also applied throughout the study. However, they were instructed to "use the arm but avoid painful movements."

Method of assignment

Consecutive cases were randomly assigned to two groups.

Group A: 44 patients (28 men and 16 women) with a mean age of 47.5 years (25-68) and a median duration of pain of 7 months (1-60).

Group B: 38 patients (24 men and 14 women) with a mean age of 46.3 years (28-70) and a median duration of pain of 10 months (1-120) (Table 1).

Members of the two groups were similar regarding afflicted arm, cause of pain, and previous treatment (Table 2).

Method of treatment

Group A: Acupuncture needles were inserted at five sites corresponding to traditional Chinese acupuncture points related to the elbow (23). The



FIG. 1. Test 2. Resisted wrist extension.

TABLE 1. Patients included in the study

	No. of patients	M/F	Mean age (yr)	Duration of pain (mo)
Classical	44	28/16	47.5 (25-68)	7 (1-60)
Superficial	38	24/14	46.3 (28-70)	10 (1-120)
Total	82	52/30	47.0 (25-70)	9 (1-120)

Because of the wide range in the duration of pain the median values were calculated.

TABLE 2. Affected arm, cause, and previous treatments

	A + B	A	B
Group			
Affected arm—right	69	37	32
Dominant arm—right	78	42	36
Cause			
Sport	29	14	15
Work	27	13	14
Trauma	1	1	0
Other activities	20	11	9
Unknown	5	5	0
Previous treatments			
Steroids	47	26	21
Ultrasound	31	12	19
TENS	12	4	8
Medications	9	4	5
Other treatments	21	10	11
Untreated	19	13	6

N = 82.

A, classical deep acupuncture group; B, superficial needle insertion group.

points used were LI 10, 11, 12, Lu 5, and SJ 5 (Fig. 3). All the points are partly innervated by the radial nerve. The needles were inserted and rotated to elicit the sensation of *Teh Chi*. This sensation can be described as varying feelings of tension, numbness, tingling, and tenderness, sometimes radiating from the point of insertion, and is usually obtained on depths of 1.25–2.5 cm (23). The sensation of *Teh Chi* was elicited every 5 min during a 20-min period (18,23). Seirin-one-time needle, B-type No. 8 (0.30 mm diameter, 30 mm long) was used. The procedure used was according to traditional Chinese medicine (TCM).

Group B received superficial needle insertion. The needles were merely inserted subcutaneously at the same points as used in group A and left there

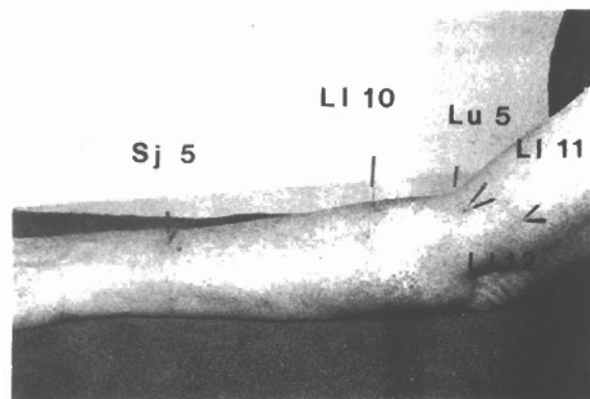


FIG. 3. Acupuncture points used in the study.

for 20 min. *Teh Chi* was not obtained. Seirin-one-time needle No. 3 (0.20 mm diameter, 15 mm long) was used. The patients were treated two to three times weekly, 10 treatments in all (one course) (23). Follow-ups were done at the clinic at the end of the treatment, after 3 and 12 months.

Patients were treated singly to avoid influencing each other. Both groups were treated under the same conditions by the author (E.H.), who received her training in acupuncture at the Institute of Acupuncture and Moxibustion, Academy of Traditional Chinese Medicine, Beijing, China, in 1985.

Method of evaluation

A physician (T.L.) not aware of the treatment schedule examined the patients before the first treatment and at the follow-ups after 3 and 12 months.

In addition to the four diagnostic criteria (tests 1–4), the patients were evaluated in another four tests.

Test 5 and 6: The patients were tested as to whether pain could be produced at the lateral aspect of the epicondyle by isometric pronation and supination of the forearm. Test position: elbow flexed 90° and supported, forearm between pronation and supination.

Test 7: The Vigorimeter test. Grip strength can be measured by a vigorimeter. Thorngren and Werner used the Martin vigorimeter to determine the ratio dominant/nondominant hand to 1.07 ± 0.11 (24). According to this result the value of the unaffected arm can serve as a parameter in evaluating the pain-free grip strength. Consequently, we used the Martin vigorimeter to measure grip strength in the unaffected arm, and the pain threshold when gripping in the affected arm. The vigorimeter is a dynamometer with a rubber balloon to be compressed in the hand. The air pressure within the balloon is registered in kilopounds per square centimeter ($1 \text{ kp/cm}^2 = 98.1 \text{ kPa}$) on a manometer connected with a rubber tube. In our study a medium sized balloon was used.

The patient was seated comfortably, shoulder 60° between flexion and abduction, elbow extended, forearm pronated with 20° dorsiflexion of the wrist, holding the balloon with the connecting tube protruding between thumb and index finger. The patients were instructed to squeeze the balloon, and to stop pressure when any kind of pain was experienced over the lateral epicondyle (= positive vigo-

rimeter test) (Fig. 4). The reading was not observable to the patient. If the mere position of the arm caused such pain, this was noted as zero, and no pressure was exerted. Otherwise, the mean value of three consecutive estimations was calculated in kPa.

Test 8: Lifting test. Sitting in the position described above, the patient was also required to lift four different weights of 1, 2, 3, and 4 kg, and pain over the epicondyle was recorded as present or absent.

All of the tests were performed bilaterally, and the number of patients positive (reporting pain) at the different tests are presented in Table 3.

After the tenth treatment and at the follow-ups all eight clinical tests were repeated, and moreover, a subjective assessment completed the clinical examination. A scale of 1–5 was shown to the patients (1, excellent; 2, good; 3, improved; 4, slightly improved; 5, unchanged/worse) and they were asked "How do you assess your pain today compared with the pretreatment condition?" The patient indicated and described the parameter that most adequately reflected his or her present condition.

Statistical analyses

Correlation analysis, the Mann-Whitney U test of two independent samples, and χ^2 test were used for the statistical analyses.

RESULT

Eighty-two patients completed the study. After the tenth treatment, one patient in group A and three in group B withdrew and after the 3-month follow-up another three patients in group A and two

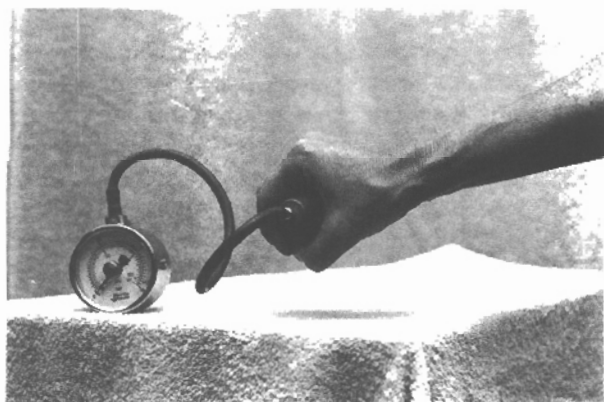


FIG. 4. The Martin Vigorimeter.

TABLE 3. Test schedule

	No. of patients ^a
1. Pain at epicondyle	82
2. Resisted wrist extension	69
3. Passive stretching of the extensor muscle	14
4. Middle Finger test	64
5–6. Resisted pronation/supination	59/64
7. Vigorimeter test	79
8. Lifting test (1, 2, 3, 4 kg)	36/49/57/64

^a Denotes number of patients positive at the different tests.

in group B withdrew. Because of continuing elbow pain, they wished to try a different treatment.

Subjective outcome

After the tenth treatment, 22 patients of the 44 in group A and eight of the 38 in group B reported excellent or good results (1–2 on the scale). Seventeen patients in each group reported an improvement (three on the scale), whereas five in group A and 13 in group B reported slight improvement, or unchanged or worse condition (5 on the scale). A comparison between the groups showed a significant difference ($p < 0.01$). No statistical differences between the groups were found at the 3-month or the 1-year follow-ups (Mann-Whitney) (Fig. 5).

Evaluation of the vigorimeter test

The pain threshold on gripping (see Methods) was noted before and after the 10 treatments and at the follow-ups. The posttreatment values were compared with those obtained at the pretreatment evaluation and then the median values of the differences were calculated. After 10 treatments, the pain threshold on gripping the balloon had significantly increased in group A compared with group B ($p < 0.05$). No significant differences were observed at the follow-ups (Mann-Whitney). The two groups were in a similar condition before the first treatment (Table 4).

In order to assess the outcome of treatment, separate signs as well as a combination of clinical signs were analyzed. After 10 treatments a smaller number of patients in the classical acupuncture group suffered pain than the superficial needle insertion group when lifting 3 kg ($p < 0.05$). This was the only separate clinical sign showing a difference between the groups (χ^2 analysis). Combining the two tests of pain at resisted wrist extension and local tenderness on palpation of the lateral epicondyle, which are

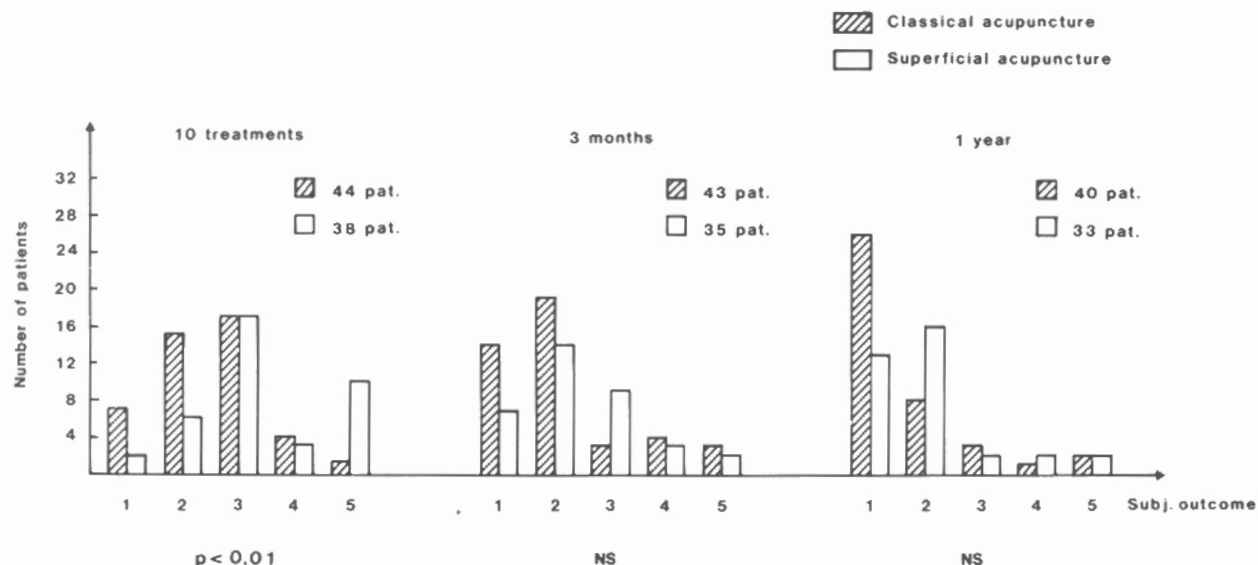


FIG. 5. Subjective outcome after 10 treatments, 3 months and 1 year. 1, excellent; 2, good; 3, improved; 4, slightly improved; 5, unchanged or worse; NS, nonsignificant.

considered to be the classical signs of lateral epicondylalgia, the analysis showed no statistical difference between the groups. No significant differences related to any of the separate signs or combination of clinical signs could be observed at the follow-ups (χ^2 analysis).

A weak correlation (r) between the subjective and objective (the vigorimeter test) outcome was found in group A at the tenth treatment, after 3 months and 1 year, $r = 0.35, 0.53,$ and $0.35,$ respectively. In group B the corresponding values were $r = 0.52, 0.39,$ and $0.28.$ Considering the effect of previous treatment on the outcome, neither the steroid injections nor any other of the previous treatments had a correlation to the result. Finally, no correlation between the subjective outcome or the vigorimeter test on one hand and the preduration of pain on the

other could be detected (correlation analysis). No side effects were reported during or after the treatment period.

DISCUSSION

In this study we have shown that patients treated with classical "deep" acupuncture reported significantly less pain after 10 treatments than those treated with superficial needle insertion (subjective outcome); the classical acupuncture group also had significantly increased pain-free grip strength. Finally, significantly fewer patients in the classical acupuncture group demonstrated pain at the lateral epicondyle when lifting 3 kg, which may indicate a critical load level. The patients in both groups reported further reduction of pain during the follow-up period. However, the difference between the groups was not significant.

The pretreatment condition was similar in both groups, and for that reason the improvement seen in the two groups after 3 and 12 months probably reflects the spontaneous recovery known to occur. However, explanation of the difference after 10 treatments requires reference to classical acupuncture procedure and/or the placebo effect. Pain alleviation obtained with acupuncture is generally attributed to activation of spinal and central pain inhibitory mechanisms (9,20,25,26). In provoking the sensation of *Teh Chi* during classical acupuncture, a

TABLE 4. Evaluation of the vigorimeter test (kPa)

	Pretreatment ^a	D1 ^b	D2 ^b	D3 ^b
Classical deep	32	32	47	62
Superficial	33	10	37	55
	NS	$p < .05$	NS	NS

^a The median values of the vigorimeter test of the two groups were calculated before the first treatment. Because of the wide range, the median values were used.

^b The differences between the posttreatment and pretreatment values were calculated and the median values obtained were compared: D1, difference at the tenth treatment; D2, difference at the 3-month follow-up; D3, difference at the 1-year follow-up.

larger number and possibly a different set of receptors are activated compared with superficial needle insertion. By this means, classical acupuncture produces more powerful activation of pain-inhibitory systems (27) and the efficacy may depend on the intensity of *Teh Chi* (12). It is also possible that the differences in outcome between the two techniques are a reflection of the changes in blood flow. Classical deep acupuncture increases blood flow, which is not the case with superficial needle insertion (27,28). A third alternative might be that classical acupuncture blocks the sympathetic activity, thereby reducing the inflammatory reaction (29) that might be seen in lateral epicondylalgia (1).

Finally, the distinction in outcome might be attributed to a placebo effect (30). To minimize the specific putative effect while maintaining the psychological impact of acupuncture, the needles were inserted at the same points either superficially or during classical acupuncture. However, it is possible that the provocation of *Teh Chi*, which is a strong sensation, makes the patients feel more properly treated. "Like cures like" is deeply rooted and may strengthen the expectations. Therefore, it is reasonable to assume that the differences seen between the groups are related to a combination of the placebo effect and the therapeutic effects of classical deep acupuncture.

Taken together, the results of the present study show that, even if there was no difference between the groups at the follow-ups, classical deep acupuncture is superior to superficial needle insertion in the short-term symptomatic treatment of lateral epicondylalgia. Because no correlation was found between the preduration of pain (1-120 months) and the result, classical deep acupuncture can be recommended as well for acute as for chronic pain.

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