

# Unilateral versus Bilateral Acupuncture on Knee Function in Advanced Osteoarthritis of the Knee – A Prospective Randomised Trial

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## Summary

We report a prospective randomised trial of acupuncture given to 44 patients with advanced osteoarthritis (OA) of the knee awaiting total knee joint replacement. Patients were randomly allocated into two groups, group A receiving acupuncture to the most affected knee only and group B receiving acupuncture to both knees. Acupuncture was given to four local points around the knee and one distal point. The local points were Spleen 9 (Yinlquan, SP9), Spleen 10 (Xuehai, SP10), Stomach 34 (Liangqui, ST34), and Stomach 36 (Zusanli, ST36). The distal point was Large Intestine 4 (Hegu, LI4) on the first web space of the ipsilateral hand. A blinded observer assessed knee function before starting treatment, and at the end of two and six months. Analysis of the results showed a significant reduction in symptoms in both groups, and this improvement was sustained for six months. There was no statistically significant difference between the groups.

In conclusion, unilateral acupuncture is as effective as bilateral acupuncture in increasing function and reducing the pain associated with OA of the knee. This trial is not able to distinguish the specific from the non-specific effects of the treatment.

## Keywords

Acupuncture, knee osteoarthritis, comparative trial.

## Introduction

Acupuncture has been shown to be beneficial in relieving pain in osteoarthritis (OA) of the knee.<sup>1-3</sup>

Most of the acupuncture meridians are bilateral and it is a common belief that bilateral acupuncture is more effective than unilateral. The null hypothesis of this trial was that there is no difference between bilateral and unilateral acupuncture in the treatment of advanced cases of OA of the knee.

## Methods

Approval from the local ethics committee was obtained before commencing the trial. Sixty consecutive patients waiting for total knee replacement at Bedford Hospital were contacted by letter and asked to participate in the trial.

Exclusion criteria for the trial were as follows:

1. acupuncture treatment within one year;
2. intra-articular injection of steroid to the knee within three months;
3. non-idiopathic arthritis such as sero-negative arthritis, neuropathic arthritis and rheumatoid arthritis.

Knee function of all patients was assessed by the author (CR) prior to commencing treatment, using the HSS knee score (Hospital for Special Surgery knee score),<sup>4</sup> time taken to walk 50 metres, time taken to climb 20 steps and a visual analogue pain score (VAS). The HSS knee score comprises scores for pain, functional ability, range of knee motion, muscle strength, flexion-deformity and knee instability; the maximum score being 100 for a perfect knee. VAS was measured on a scale from 0 to 10, where 0 represents no pain and 10 represents the worst possible pain. Patients were divided into two groups with the use of randomised envelopes. This was done by opening the next of a series of opaque numbered envelopes

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containing random codes derived from a random number list.

Group A received acupuncture to the most symptomatic knee (unilateral) and group B received acupuncture to both knees (bilateral). Acupuncture was carried out by a trained acupuncturist with 10 years experience (AT). Sterile disposable one-inch needles were inserted at four local points and one distal point. The four local points around the knee were Spleen 9 (Yinlinquan, SP9), Spleen 10 (Xuehai, SP10), Stomach 34 (Liangqui, ST34) and Stomach 36 (Zusanli, ST36). The distal point used was Large Intestine 4 (Hegu, LI4) on the 1st ipsilateral web space. All the needles were inserted deeply in a standard manner. Needling sensation was sought and achieved in most of the cases. All the needles were manually stimulated four times during 15 minutes of treatment. All patients received six acupuncture treatments at weekly intervals.

The same observer reassessed knee function at the end of two and six months from the

commencement of treatment. As data recorded were baseline readings and readings after two and six months, change from baseline scores were calculated. The data were normally distributed so parametric statistical analysis was used. Parametric data were expressed as a mean and compared within groups by paired sample *t* test and between groups by independent sample *t* test.

### Results

Forty-eight replies were received from patients willing to participate in the trial. Of the 48 replies, three patients were excluded due to the above criteria and one patient discontinued treatment after one session due to needle phobia. Forty-four patients completed the treatment course and attended for re-assessment at two months. The female to male ratio was 18:4 in group A and 17:5 in group B. In group A the mean age was 72 years, range 53-90, and in group B, the mean age was 73, range 64-92. No major side effects were reported after acupuncture treatment although three patients

<b>Table 1a Unilateral Acupuncture</b>		Number of subjects: 44 (Analysis at 2 months)	
<i>Parameter</i>	<i>Initial value mean (SD)</i>	<i>Value at 2 months mean (SD)</i>	<i>P value</i>
HSS Score	55.2 (12.1)	65.2 (12.5)	0.001
Time to walk 50m (sec)	41.9 (11.0)	39.7 (11.7)	0.046
Time to climb 20 steps (sec)	28.7 (15.7)	24.6 (11.3)	0.05
VAS	5.6 (2.1)	4.2 (2.7)	0.001

<b>Table 1b Unilateral Acupuncture</b>		Number of subjects: 38 (Analysis at 6 months)	
<i>Parameter</i>	<i>Value at 2 months mean (SD)</i>	<i>Value at 6 months mean (SD)</i>	<i>P value</i>
HSS Score	68.6 (10.1)	68.3 (11.8)	0.905
Time to walk 50m (sec)	39.5 (10.5)	40.8 (11.6)	0.570
Time to climb 20 steps (sec)	22.9 (9.7)	24.3 (8.4)	0.330
VAS	6.5 (1.7)	5.8 (2.8)	0.211

<b>Table 2a Bilateral Acupuncture</b>		Number of subjects: 44 (Analysis at 2 months)	
<i>Parameter</i>	<i>Initial value mean (SD)</i>	<i>Value at 2 months mean (SD)</i>	<i>P value</i>
HSS Score	56.1 (11.8)	61.5 (16.1)	0.006
Time to walk 50m (sec)	46.8 (20.4)	42.6 (16.2)	0.048
Time to climb 20 steps (sec)	29.9 (11.1)	26.1 (8.6)	0.017
VAS	5.5 (2.2)	4.4 (2.6)	0.009

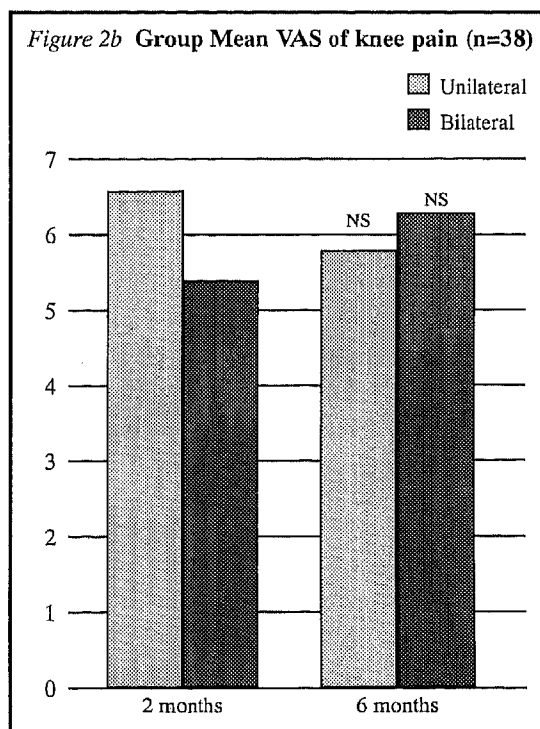
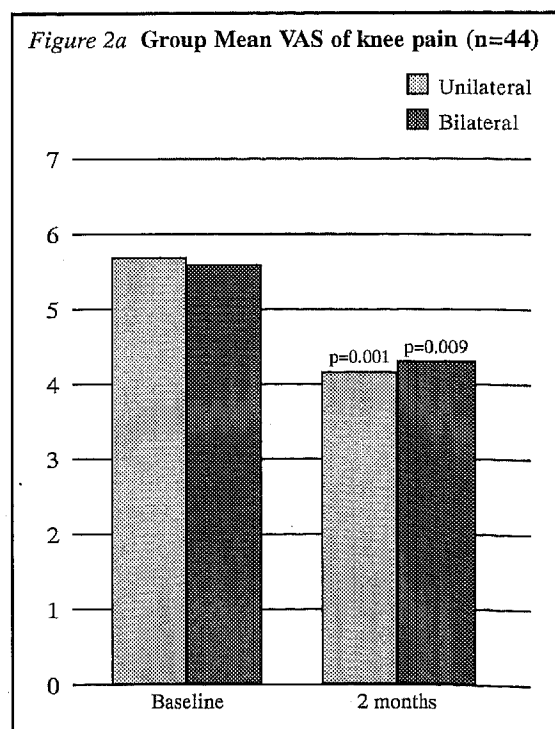
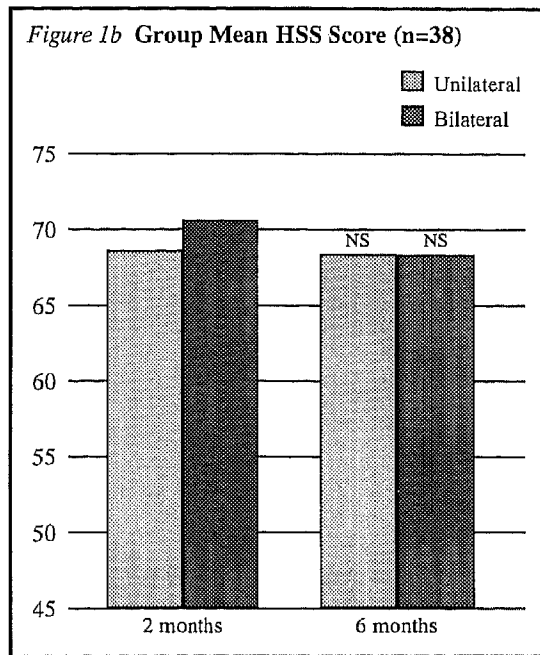
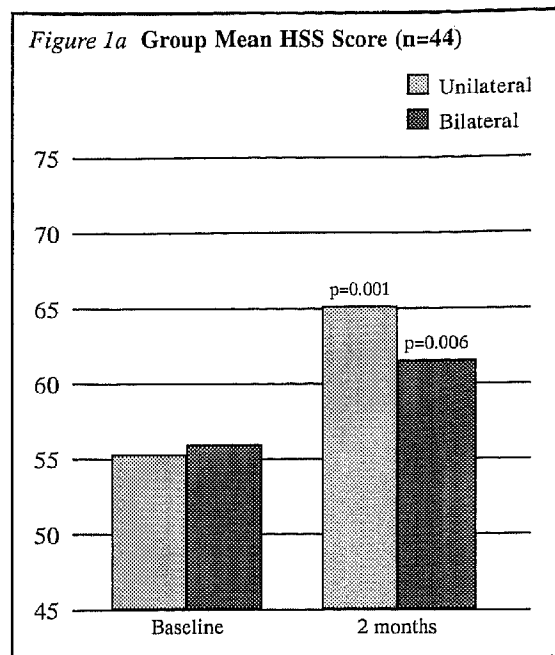
<b>Table 2b Bilateral Acupuncture</b>		Number of subjects: 38 (Analysis at 6 months)	
<i>Parameter</i>	<i>Value at 2 months mean (SD)</i>	<i>Value at 6 months mean (SD)</i>	<i>P value</i>
HSS Score	70.4 (13.7)	68.3 (14.1)	0.344
Time to walk 50m (sec)	38.3 (11.3)	38.2 (10.2)	0.933
Time to climb 20 steps (sec)	29.0 (17.2)	28.4 (13.8)	0.708
VAS	5.4 (2.5)	6.3 (2.8)	0.498

reported minor bruising at needle insertion sites.

There was a statistically significant improvement in both subjective and objective parameters at the end of two months in both the unilateral and bilateral acupuncture groups (see tables 1a & 2a). This was marked in HSS and VAS scores ( $p < 0.01$ ) (see figures 1a & 2a).

Improvements in times to walk 50m and climb 20 steps were of borderline significance ( $p \leq 0.05$ ).

At six months 38 patients attended for re-assessment. Two out of the six patients did not continue the trial as illness prevented them attending the six-month review, and four patients had their operations. Of the six patients who left



**Table 3 Comparison of unilateral vs. bilateral acupuncture**

Parameter		Levene's test	t-test
		F value	P value
HSS Score	2 month	0.179	0.407
	6 month	0.700	0.526
Time to walk 50m	2 month	0.476	0.525
	6 month	0.704	0.574
Time to climb 20 steps	2 month	0.749	0.397
	6 month	0.562	0.328
VAS	2 month	0.690	0.780
	6 month	0.239	0.586

the trial four were from the unilateral group and two were from the bilateral group. There was no statistically significant difference between the results at two and six months, suggesting that the benefits they had gained from the acupuncture had lasted for six months from the date of starting acupuncture treatment (see tables 1b & 2b, and figures 1b & 2b).

There was no statistically significant difference between the bilateral and the unilateral groups at the end of two or six months (see table 3). These results support our null hypothesis.

There were some unexpected benefits from the acupuncture treatment. One patient felt that her backache had improved, ten patients reported better sleep at night, one patient noticed an improvement in circulation in the affected limb, and three patients were able to discard their walking stick.

Patients' subjective improvement was graded as A (no improvement), B (up to 25% improvement), C (25-50% improvement) and D (> 50% improvement). At two months, 10 were grade A (23%), two were grade B (4%), 13 were grade C (30%) and 19 were grade D (43%). Of the latter, four (9% of the total) felt so much better that they requested suspension of their names from the waiting list. Their names remained suspended at 12 months after completion of trial. Three of these patients have required top-up acupuncture after completion of the trial.

### Discussion

The prevalence of advanced OA of the knee is increasing. At present the treatment of choice is

total knee replacement. For some patients total knee replacement is not possible for medical reasons, and others do not wish to consider it. Studies published in the western literature show acupuncture to be effective in the relief of pain in advanced OA of the knee, although the benefits over sham acupuncture are conflicting. Berman et al and Christensen et al showed that acupuncture is effective in the treatment of severe OA of the knee.<sup>1,2</sup> Petrou et al showed real acupuncture to be significantly better than sham acupuncture in their trial of 31 patients.<sup>3</sup> Takeda et al did not show acupuncture to be more effective than sham in OA of the knee, although both real and sham acupuncture significantly reduced pain, stiffness, and physical disability.<sup>5</sup> The sham acupuncture points selected in this trial were around the knee. The needles were inserted very superficially, just piercing the skin, which can still result in stimulation of A $\delta$  fibres and produce pain relief. These results are similar to those of Gaw et al.<sup>6</sup>

In conclusion, unilateral acupuncture is as effective a bilateral acupuncture in increasing function and reducing pain associated with OA of the knee. This trial is not able to distinguish the specific from the non-specific effects of the treatment.

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