

Effect of Acupuncture on Knee Function in Advanced Osteoarthritis of the Knee: A Prospective, Non-Randomised Controlled Study

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Summary

We report a prospective controlled trial, comparing acupuncture with no treatment, in patients with advanced osteoarthritis of the knee awaiting total knee replacement. Knee function was assessed at the beginning of study and at the end of two months, using four parameters: HSS score, time to walk 50 metres, time to climb 20 steps, and degree of pain. Acupuncture was given at four local points around the knee and at one distal point. The acupuncture group improved in all parameters, whereas the control group deteriorated, a finding that was highly statistically significant ($p < 0.0002$). Further randomised-controlled trials with longer follow-up are required to confirm these findings.

Keywords

Acupuncture, knee arthritis.

Introduction

Osteoarthritis is second only to cardiovascular diseases in producing chronic disability.¹ As life expectancy rises, there are more and more patients being referred with advanced osteoarthritis of the knee. For many the treatment of choice is total knee replacement. Of those considered, some may be unfit for major surgery, and those that are fit inevitably spend months on a waiting list.

Acupuncture has been shown to be effective in relieving pain in advanced cases of osteoarthritis of knee.^{2,4} There have been no large trials, however, comparing acupuncture with a non-acupuncture group. The null hypothesis of the present study is that acupuncture is not effective in the treatment of advanced cases of osteoarthritis of the knee.

Method

Approval from the local ethics committee was obtained. Seventy-five consecutive patients on the waiting list for a total knee replacement were contacted by letter and asked to participate in the study.

Exclusion criteria for the study were arthroscopic washout within six months of the study, intra-articular steroid injection to the knee within three months, acupuncture treatment within one year, and inflammatory arthritis.

Baseline knee function of all patients was assessed by one of the authors (ST) prior to commencing treatment, using the Hospital for Special Surgery (HSS) knee score,⁵ time taken to walk 50 metres, time taken to climb 20 steps, and a visual analogue pain score (VAS). The HSS knee score comprises marks for pain, functional ability, range of motion, muscle strength, flexion deformity and knee instability; the maximum score is 100. The pain score was measured on a visual analogue scale with a grading from 0 to 10, where 0 represents no pain and 10 worst possible pain. Patients were then divided into two groups: 37 consecutive patients were allocated to group A, and the next 38 to B. Group A received acupuncture, and group B acted as a control group receiving no treatment. Acupuncture was carried out by a trained medical acupuncturist (AT), using sterile disposable one-inch needles, inserted deeply, in a standard manner, at four local points and one distal point. The four local points around the knee were Spleen 9 (Yinlingquan, 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 1st ipsilateral web space. Only extra-articular points around the knee joint were selected, to reduce the chance of infection. All of the needles were

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manually stimulated 4 times during 15 minutes of treatment. All patients received acupuncture treatment at weekly intervals for six weeks.

The same author (ST) reassessed all patients two months after the baseline assessment, measuring the same parameters.

Statistical Methods

Data recorded were baseline measurements and measurements after two months; relative change was calculated. The data were not normally distributed; therefore non-parametric methods were used (Mann-Whitney U test). This was analysed using the SPSS and StatXact statistical packages.

Results

Of the 75 patients approached, 68 were willing to participate in the trial, four were excluded according to criteria stated, two discontinued the treatment due to needle phobia, and two failed to attend the final assessment. A total of 60 patients successfully completed the trial - 30 in each group. No major side effects were reported after acupuncture treatment. Three patients reported minor bruising at needle insertion sites.

Allocation of patients achieved a successful balance of age, sex and numbers in each group (see table 1). In the acupuncture group at two months follow-up, the time to walk 50 metres, climb 20 steps, and the pain scores, fell, and the HSS scores increased (see table 2). The converse was found in the control group. When the intra-

group changes were compared the results were highly significant for all measures (see table 3). Symptoms in three patients in the acupuncture group improved to the extent that they requested suspension from the waiting list.

Discussion

Current popular options for non-surgical palliation for advanced osteoarthritis of the knee include intra-articular steroid injections, non-steroidal anti-inflammatory drugs, and physiotherapy. Steroid injections act for a limited duration and there is a risk of introducing infection into the joint. Non-steroidal anti-inflammatory drugs are effective in controlling pain but have significant side effects.⁶ Physiotherapy, in the form of local heat and exercise, is beneficial but time consuming.⁷ New treatments, such as intra-articular hyaluronic acid injections and cartilage transplants, are beneficial, but only in mild to moderate cases of knee osteoarthritis.^{8,9}

Table 1 Baseline characteristics of two groups, median (IQR – interquartile range).

	Acupuncture	Control
N	30	30
Female %	60%	55%
Age	73.6 (8.63)	74.6 (8.59)
HSS	60 (17)	54.5 (11)
Walk	41 (20)	43 (21)
Climb	27 (20)	32 (27)
Pain	5.1 (2)	5.7 (3.3)

Table 2 Median (IQR) of scores by group before and after treatment; p values are for intra-group comparison using Wilcoxon Signed Rank test.

Variable	Acupuncture			Control		
	Before	After	p-value	Before	After	p-value
HSS	60.0 (17.0)	70.0 (18.0)	<0.001	54.5(11.0)	53.5 (13.0)	0.03
Walk	41.0 (20.0)	35.5 (14.0)	0.02	43.0(21.0)	45.5 (22.0)	<0.001
Climb	26.5 (20.0)	21.0 (17.0)	0.02	31.5(27.0)	33.5 (27.0)	0.002
Pain	5.1 (2.0)	3.1 (3.6)	0.002	5.7 (3.3)	6.0 (3.9)	0.01

Table 3 Median (IQR) change in baseline scores of two groups; p values are for inter-group differences.

Variable	Acupuncture	Control	Mann-Whitney U
HSS	9.5 (10)	-2.0 (4)	p<0.0001
Walk	2.5 (10)	-3.0 (3)	p<0.0001
Climb	2.0 (6)	-2.0 (3)	p=0.0002
Pain	1.0 (2.6)	-0.2 (0.6)	p=0.0001

There are weaknesses of this study: the trial was not randomised, patients were not blinded to the treatment, the assessments were not performed blind, and follow up time was short. It may be argued that traditional Chinese methods of acupuncture, and other acupuncture points that may be more effective in osteoarthritis of the knee, were not used; our acupuncture points were chosen to minimise the risk of infection and to standardise treatment.

Our study confirms there is a significant improvement in HSS score, time to walk 50 metres, climb 20 steps and pain score in the acupuncture group - findings supported by Christensen et al, Petrou et al and Berman et al.²⁻⁴ We suggest that acupuncture may be used as a treatment tool in the management of the advanced osteoarthritis of the knee. This may be particularly important in those patients unfit for, or reluctant to undergo, major surgery, as well as for palliation of symptoms in those awaiting total knee replacement. This has major cost implications in terms of reducing waiting lists, and improvement of quality of life.

Reference list

1. Kelsey JL. Epidemiology of musculoskeletal disorders. New York: *Oxford University Press*; 1982. p. 78-86.
2. Christensen BV, Juhl IU, Wilbek H, Bulow HH, Dreijer N, Rasmussen HF. Acupuncture treatment of severe knee osteoarthritis: A long-term study. *Acta Anaesthesiol Scand* 1992;36(6):519-25.
3. Petrou P, Winkler V. Double-blind trial to evaluate the effect of acupuncture treatment on knee osteoarthritis. *Scand J Acupuncture* 1988;3(3):113-6.
4. Berman BM, Singh BB, Lao L, Langenberg P, Li H, Hadhazy V et al. A randomised trial of acupuncture as an adjunctive in osteoarthritis of the knee. *Rheumatology (Oxford)* 1999;38(4):346-54.
5. Ranawat CS, Insall J, Shine J. Duo-condylar Knee arthroplasty. *Clin Orthop* 1976;120:76-82.
6. Griffith MR, Piper JM, Daugherty JR, Snowden M, Ray WA. Non steroidal anti inflammatory drug use and increased risk of peptic ulcer disease in elderly persons. *Ann Intern Med* 1991;114(4):257-63.
6. Puett DW, Griffen MR. Published trials of non-medicinal and non-invasive therapies for hip and knee osteoarthritis. *Ann Intern Med* 1994;121(2):133-40.
7. Altman RD, Moskowitz R, Borenstein D, Brandt K, Caldwell J, Deal C et al. Intra-articular sodium hyaluronate in the treatment of patients with osteoarthritis of the knee: a randomized clinical trial. *J Rheumatol* 1998;25(11):2203-12.
8. Mankin HJ. Chondrocyte transplantation: one answer to an old question *N Engl J Med* 1994;331(14):940-1.