

Mobilisation with movement and exercise, corticosteroid injection, or wait and see for tennis elbow: randomised trial

Leanne Bisset, Elaine Beller, Gwendolen Jull, Peter Brooks, Ross Darnell, Bill Vicenzino

Abstract

Objective To investigate the efficacy of physiotherapy compared with a wait and see approach or corticosteroid injections over 52 weeks in tennis elbow.

Design Single blind randomised controlled trial.

Setting Community setting, Brisbane, Australia.

Participants 198 participants aged 18 to 65 years with a clinical diagnosis of tennis elbow of a minimum six weeks' duration, who had not received any other active treatment by a health practitioner in the previous six months.

Interventions Eight sessions of physiotherapy; corticosteroid injections; or wait and see.

Main outcome measures Global improvement, grip force, and assessor's rating of severity measured at baseline, six weeks, and 52 weeks.

Results Corticosteroid injection showed significantly better effects at six weeks but with high recurrence rates thereafter (47/65 of successes subsequently regressed) and significantly poorer outcomes in the long term compared with physiotherapy.

Physiotherapy was superior to wait and see in the short term; no difference was seen at 52 weeks, when most participants in both groups reported a successful outcome. Participants who had physiotherapy sought less additional treatment, such as non-steroidal anti-inflammatory drugs, than did participants who had wait and see or injections.

Conclusion Physiotherapy combining elbow manipulation and exercise has a superior benefit to wait and see in the first six weeks and to corticosteroid injections after six weeks, providing a reasonable alternative to injections in the mid to long term. The significant short term benefits of corticosteroid injection are paradoxically reversed after six weeks, with high recurrence rates, implying that this treatment should be used with caution in the management of tennis elbow.

Introduction

Recent studies indicated that corticosteroid injections were more efficacious within three to six weeks than were wait and see or drugs for treating tennis elbow but that by three to 12 months injections were no better

than control.¹⁻³ A programme of massage, ultrasound, and exercise was also not different from control.¹ We recently identified preliminary evidence of beneficial initial effects of elbow manipulation and exercise.^{4,5} Recent systematic reviews report that poor quality of methods is a problem with much of the published research.^{5,6} The aim of this randomised controlled trial was to investigate the short term and long term efficacy of a physiotherapy intervention compared with corticosteroid injections and wait and see.

Methods

Participants—We did a single blinded randomised controlled trial in a community setting. Volunteers from the greater Brisbane region of Australia responded to advertisements. Inclusion criteria were pain over the lateral elbow that increased on palpation of the lateral epicondyle, gripping, resisted wrist, or second or third finger extension⁷ of at least six weeks' duration, and age 18-65 years.

Protocol—A blinded assessor recorded baseline measures. We randomised participants to physiotherapy, corticosteroid injections, or a wait and see group. Group allocation was concealed from study personnel throughout the study.

Assignment—We gave participants allocated to the wait and see group reassurance and instructions on modifying their daily activities to avoid aggravating their pain while remaining active and to use analgesic drugs, heat, cold, or braces as needed. One of two medical practitioners treated participants assigned to corticosteroid injections with a local injection, delivered to painful elbow points. We advised participants to return gradually to normal activities. A second injection after two weeks was allowed if necessary. Participants in the physiotherapy group received eight treatments of 30 minutes over six weeks, consisting of a programme of elbow manipulation and therapeutic exercise.⁴ Participants were taught home exercises and self manipulation.⁴ For all participants we discouraged additional treatment to that assigned, but we allowed the use of analgesics.

Editorial by Smidt and van der Windt

School of Health and Rehabilitation Sciences, University of Queensland, St Lucia, QLD 4072, Australia
Leanne Bisset
PhD candidate

Queensland Clinical Trials Centre, School of Population Health, University of Queensland
Elaine Beller
director of biostatistics

School of Health and Rehabilitation Sciences, University of Queensland
Gwendolen Jull
professor

Ross Darnell
statistician
Bill Vicenzino
associate professor

Faculty of Health Sciences, University of Queensland
Peter Brooks
executive dean

Correspondence to:
B Vicenzino
b.vicenzino@uq.edu.au

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Absolute event rates of successes, as measured by those participants who rated themselves as either much improved or completely recovered on the six point Likert scale of global improvement; relative risk reductions (RRR) and numbers needed to treat (NNT) for between group comparisons

Time (weeks)	No (%) successes			Mean (99%CI) differences in success between groups*					
	Wait and see	Injection	Physiotherapy	Injection–wait and see		Physiotherapy–wait and see		Injection–physiotherapy	
				RRR (99% CI)	NNT	RRR (99%CI)	NNT	RRR (99%CI)	NNT
3	9/57 (16)	47/63 (75)	15/64 (23)	0.7 (0.4 to 0.9)*	2	0.1 (-0.1 to 0.3)	13	0.7 (0.4 to 0.9)*	2
6	16/60 (27)	51/65 (78)	41/63 (65)	0.7 (0.4 to 0.9)*	2	0.5 (0.2 to 0.8)‡	3	0.4 (-0.2 to 0.9)	7
12	35/59 (59)	29/65 (45)	45/58 (76)	0.3 (-0.1 to 0.6)	7	0.2 (-0.05 to 0.5)	5	0.4 (0.1 to 0.7)‡	3
26	48/58 (83)	29/64 (45)	51/59 (86)	0.5 (0.2 to 0.7)†	3	0.04 (-0.2 to 0.3)	27	0.5 (0.2 to 0.7) ‡	2
52	56/62 (90)	44/65 (68)	59/63 (94)	0.3 (0.04 to 0.4)†	4	0.04 (-0.1 to 0.2)	30	0.3 (0.1 to 0.5)‡	4

*Between group differences in favour of corticosteroid injection.
 †Between group differences in favour of wait and see.
 ‡Between group differences in favour of physiotherapy.

Outcome measures—Primary outcome measures were global improvement, pain-free grip force, and assessor’s rating of severity. Global improvement was recorded on a six point scale (“completely recovered” to “much worse”). We considered “completely recovered” or “much improved” to be successes.¹ We calculated recurrence rates beyond six weeks as the number of cases that went from “successful” to “unsuccessful” on global improvement. For pain-free grip force, we used the mean of three efforts to calculate the ratio of affected side to unaffected side.^{1, 8} The blinded assessor rated severity of the elbow complaints on a visual analogue scale. The secondary outcome measures included severity of pain in the previous seven day period and elbow disability.⁹ We assessed outcomes at baseline and at 3, 6, 12, 26, and 52 weeks after randomisation.

Statistical analysis—We based analyses on intention to treat. The primary end points for the trial were six weeks and 52 weeks. We estimated all continuous outcome measures by using baseline values as covariates in linear models. We used 99% confidence intervals to compensate for multiple testing at each time point. We calculated the relative risk reduction and number needed to treat. We expressed continuous data as area under the curve as a means of comparing the overall effectiveness of the treatments.¹⁰

Results

Participant flow and follow-up

We enrolled all participants between March 2002 and May 2004. Across groups, participants were well matched for demographic and clinical characteristics.

Primary end points

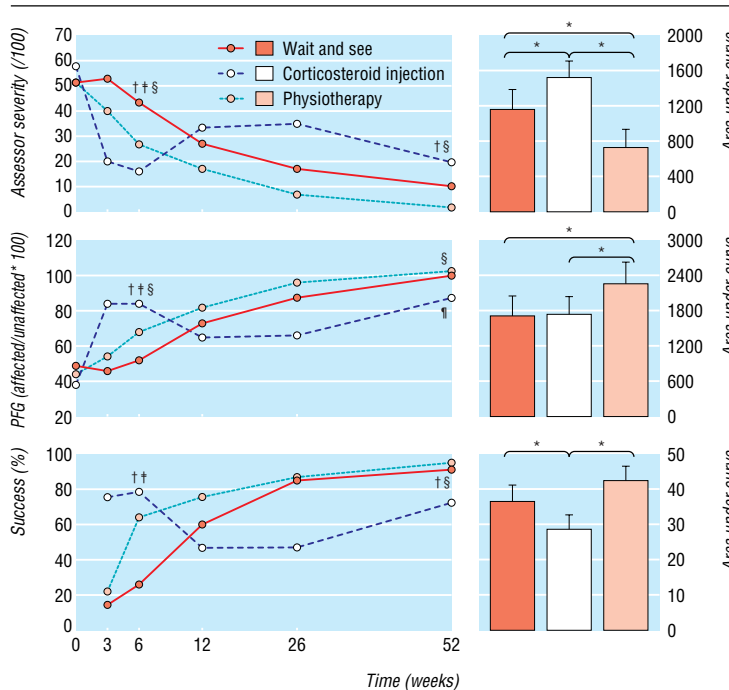
Participants’ characteristics and outcome measures at baseline did not significantly influence measures over time; we present unadjusted data. Significant time by group interactions for all outcome measures occurred in the omnibus analysis.

We found significant differences for all primary outcome measures at six weeks that favoured injection over wait and see; 51/65 (78%) participants reported success with injections compared with 16/60 (27%) with wait and see (relative risk reduction 0.7, 99% confidence interval 0.4 to 0.9), representing a number needed to treat of 2. Injection was also superior to physiotherapy on all outcome measures except global improvement (0.4, -0.2 to 0.9); 41/63 (65%) participants reported success at six weeks with physiotherapy (figure, table). At 52 weeks’ follow-up, the injection group participants were significantly worse on all outcomes compared with the physiotherapy group (0.3, 0.1 to 0.5; number needed to treat = 4) and on two out of three measures compared with wait and see (0.3, 0.04 to 0.4; 4).

Physiotherapy performed significantly better than wait and see at six weeks for all outcome measures (for example, success: 0.6, 0.2 to 0.9; number needed to treat = 3). However, by 52 weeks no difference existed on any primary outcome measure, as most participants had either much improved or completely recovered (wait and see 56/62; physiotherapy 59/63) (table, figure).

Overall benefit and clinical implications

Area under the curve analysis revealed a significant advantage in favour of physiotherapy over injection for all primary outcome measures, over wait and see for



Primary outcome measures: mean assessor’s rating of severity (visual analogue scale), mean pain-free grip (PFG—affected/unaffected, expressed as a percentage), and percentage success. *Significant differences between groups (P<0.01). Significant differences between study arms for 6 and 52 weeks: †corticosteroid injection v wait and see; ‡physiotherapy v wait and see; §corticosteroid injection v physiotherapy. ¶Significant difference between corticosteroid and wait and see on per protocol analysis. Bar graphs represent mean (99% confidence interval) area under curve (trapezium method¹⁰) analysis of assessor severity, PFG, and global improvement

pain-free grip (mean difference = 534, 99% confidence interval 3 to 1065) and assessor severity (447, 137 to 758), as well as for wait and see over injection for global improvement (-8.3, -15.0 to -1.5) and assessor severity (-337, -642 to -32) (figure).

Recurrences

The corticosteroid injection group had most reported recurrences; 47/65 (72%) participants deteriorated after three or six weeks. Recurrences after injection were significantly greater than recurrences after physiotherapy (5/66, 8%; relative risk reduction 0.9, 0.6 to 1.1) or wait and see (6/67, 9%; 0.9, 0.6 to 1.1), which were not significantly different from each other (relative risk reduction 0.2, -1.4 to 1.7).

Discussion

We found evidence to support the use of corticosteroid injections or physiotherapy over wait and see in the short term; in the long term, corticosteroid injection was inferior to both wait and see and physiotherapy, which were very similar in effect. This is the first long term study to show an overall beneficial effect of a physiotherapy intervention, as supported by area under the curve analyses.

Corticosteroid injection was initially superior to both wait and see and physiotherapy, but this effect was lost after six weeks, with a concomitantly high recurrence rate in the corticosteroid group (47/65), which did not occur with wait and see or physiotherapy. The high recurrence rate with corticosteroid may be due to the rapid improvement in pain, which may lead to increased activity levels. However, we gave all participants ergonomic and self care advice. Importantly, injection performed worst of all the interventions at 52 weeks and on area under the curve analysis. Furthermore, the poor outcome in the long term relative to wait and see suggests a delay in recovery after this treatment.

At 52 weeks, wait and see was superior to corticosteroid injection on global improvement, and physiotherapy was superior to injection for all outcome measures. Notably, the progress of the wait and see group seen in this study was not a function only of the natural history of the condition but also of the general advice that was given to all groups. The positive long term results seen here support the notion proposed by Smidt et al that given appropriate advice, tennis elbow is a self limiting condition at 52 weeks in most cases.¹ Medical practitioners need only advise four patients to wait and see or have physiotherapy in order to have one more successful outcome at 52 weeks than if they had given a corticosteroid injection instead.

A potential confounding factor in this study was the discrepancy in the number of treatment sessions between protocols; the physiotherapy participants needed eight treatment sessions compared with one or two sessions for the other protocols. None the less, the physical intervention studied by Smidt et al consisted of nine treatments and showed no significant benefit over wait and see.¹ We did not test for a non-specific placebo effect for physiotherapy or corticosteroid injection, and further investigation of this is needed. The time course for wait and see and corticosteroid injections seems to be similar across different countries, health systems, and population recruitment

What is already known on this topic

Corticosteroid injection is superior to wait and see or drugs for tennis elbow over the first six weeks after randomisation

Physiotherapy consisting of ultrasound, massage, and exercise is no better than a wait and see policy

Adopting a wait and see policy is as effective as any other treatment at 52 weeks after randomisation

What this study adds

Recurrence rates were higher and recovery delayed in the mid to long term after corticosteroid injection compared with physiotherapy or wait and see

Physiotherapy (mobilisation with movement and exercise) was superior to injection after six weeks and to wait and see at six weeks but not 52 weeks

Patients who received physiotherapy sought significantly less other treatment

strategies.^{1 2} This suggests that the results of our study may be generalisable across different patient populations with tennis elbow.

Conclusions

The high recurrence rates, general delay in recovery, and poor overall performance with corticosteroid injections should be taken into consideration in the management of tennis elbow. An approach combining elbow manipulation and exercise has a superior benefit to wait and see in the first six weeks and to steroid injections in the long term. However, patients with tennis elbow can be reassured that most cases will improve in the long term when given information and ergonomic advice.

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