

Can Elbow Manipulation and Exercise Change the Classic Poorer Long-Term Recovery Trajectory of Chronic Lateral Epicondylalgia Following Corticosteroid Injections?

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anatomical sites. The participants were instructed to step down from a height of 25 cm at a standard rate of 2 seconds. Ankle dorsiflexion and hip adduction and internal rotation were measured for the supporting leg at a point just prior to toe touch by the leading leg. The step-down was repeated with the supporting heel placed on a 35-mm platform, which prevented the ankle from requiring dorsiflexion range during the step-down. **RESULTS:** Decreased ankle dorsiflexion of the supporting leg during the step-down was associated with increased medial collapse (Pearson; $P = .06$). Participants who achieved less than 16° of dorsiflexion during the step-down showed improved lower-limb alignment (indicated by hip adduction/internal rotation) during the elevated heel step-down (t test; $P = .008$). **CONCLUSION:** An association between a loss of ankle dorsiflexion and an increase in medial collapse during a functional loading test has been shown. **IMPLICATIONS:** Ankle dorsiflexion should be taken into account when assessing patients with aberrant frontal and transverse plane alignment. The elevated heel step-down should be further investigated as a clinical test to differentiate between a primary hip or ankle dysfunction.

INJURED TENDONS CONTINUE TO ATTEMPT TO HEAL, EVEN AFTER PROLONGED DAMAGE

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PURPOSE: To evaluate the gene transcript profile for extracellular matrix remodeling of tendon specimens from people with greater trochanteric pain syndrome (GTPS), compared to an age- and sex-matched reference group.

RELEVANCE: Tendinopathy is a difficult condition to treat successfully. Better understanding of the underlying cell processes may lead to more successful interventions.

METHODS: Tendon specimens were collected from 7 participants undergoing gluteal tendon reconstruction for longstanding (mean duration, 41 months) GTPS, and 8 participants from an age-matched reference group of hip OA patients asymptomatic for GTPS. Specimens were collected using sterile technique and placed in RNase free plastic molds and frozen in OCT on dry ice at the time of surgery. Specimens were stored at -80°C. RNA was isolated via laser capture microdissection of areas of tendon that typified the specimen. These were identified using light microscopy and H&E staining. Specimens were tested using the SABiosciences array (PAHS-013). Immunohistochemistry was used to confirm the site of a subset of the expressed genes.

RESULTS: In the GTPS group, genes that control cell adhesion (ITGAV and NCAM1), noncollagenous constituent of basement membrane (LAMC1), cell interaction regulatory peptides (CTNNA1, ITGB3), and various collagens were up-regulated by at least 5-fold in the GTPS compared to the reference group. Genes that control extracellular matrix modeling (MMP3) and basement membrane ECM proteins (LAMB3, VTN) were down-regulated at least 6-fold.

CONCLUSIONS: These results suggest that there is increased cell activity and collagen production, suggesting that the tendon is actively remodeling even when the damage is longstanding.

IMPLICATIONS: Evidence of ongoing active tendon remodeling suggests that by providing the appropriate advice regarding tendon loading and compression, exercises to strengthen the musculotendinous unit, and ongoing support to patients, recovery from tendinopathy may be possible, even in longstanding cases.

EFFECT OF GLENOHUMERAL FORWARD FLEXION ON UPPER-LIMB MYOELECTRIC ACTIVITY DURING SIMULATED MILLS MANIPULATION: RELATIONS TO PERIPHERAL NERVE BIOMECHANICS AND SPECIFICITY OF MILLS MANIPULATION

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PURPOSES: (1) To investigate muscle responses with the Mills manipulation for lateral epicondylalgia. (2) To establish whether upper extremity muscle responses are influenced by a position that is likely to reduce mechanical tension in the local peripheral nerves, 65° forward flexion of the shoulder (varied position) compared to the usual technique (standard position; 90° abduction in frontal plane).

RELEVANCE: Clinical relevance is provided by quantitative data supporting the modification of the technique.

METHODS: End-range premanipulative stretch was used to simulate the effects of Mills manipulation. Eight asymptomatic subjects were tested bilaterally ($n = 16$). Study design was a controlled laboratory study using single-group, within-subjects comparison. Electromyographic (EMG) signals were recorded with a 16-channel portable EMG unit and processed offline. To reconstruct and verify accuracy of body movements, joint positions were measured using 3 charge-coupled device (CCD) adjustable cameras sensitive to 10 mm reflective passive markers applied at specific locations on the subjects' bodies, and these data were correlated with the EMG parameters.

RESULTS: Compared with the standard position, the varied position produced significantly reduced EMG activity ($P < .001$) in all test muscles (brachioradialis, biceps brachii, upper trapezius, triceps brachii, pectoralis major). Therefore, the effects of these potentially protective muscles may be mediated by mechanical tension in the local peripheral nerves. Subjective data support this phenomenon, as the premanipulative stretch was reported to be considerably less painful in the varied position.

CONCLUSIONS: Changes in myoelectric activity during Mills manipulation suggest integration of muscle and neural mechanisms. Therefore, the addition of neural detensioning movements to the standard Mills manipulation is advised.

IMPLICATIONS: Sixty-five degrees of forward flexion of the shoulder may be used to reduce both mechanical stresses in the peripheral nerves and extraneous muscle activity, making the Mills manipulation potentially safer and more specific.

CAN ELBOW MANIPULATION AND EXERCISE CHANGE THE CLASSIC POORER LONG-TERM RECOVERY TRAJECTORY OF CHRONIC LATERAL EPICONDYLALGIA FOLLOWING CORTICOSTEROID INJECTIONS?

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PURPOSE: To investigate if the higher recurrence rates and success rates of corticosteroid injection in the long term: (a) can be ameliorated by addition of a multimodal physiotherapy program of manipulation and exercise, and (b) are not a placebo response.

RELEVANCE: Corticosteroid injections and multimodal physiotherapy for lateral epicondylalgia proffer short-term advantage in recovery beyond adoption of a wait-and-see policy. Corticosteroid injection, although superior early, has substantially higher prevalence of recurrences.

METHODS: A randomized placebo control trial with concealed allocation to 1 of 4 groups (corticosteroid injection [$n = 43$], placebo injection [$n = 41$], corticosteroid injection plus physiotherapy [$n = 40$], or placebo injection plus physiotherapy [$n = 41$]) was used to evaluate the addition of multimodal physiotherapy to injection, as well as the placebo effect of injection. Multimodal physiotherapy consisted of elbow mobilization with movement treatments plus an exercise program over 8 weeks; 165 patients with lateral epicondylalgia were recruited for the study and fol-

lowed up for 12 months. Analysis was on an intention-to-treat basis with significance set at .01.

RESULTS: Long-term success or recurrence rates were not altered by the addition of multimodal physiotherapy, despite the latter being superior to the placebo injection. Corticosteroid injections resulted in a 42% higher recurrence rate over the 12 months and 30% lower success rate (6 months), after exhibiting a 45% superiority in success at 4 weeks.

CONCLUSION: Multimodal physiotherapy added to corticosteroid injection does not ameliorate the trajectory following corticosteroid injection, which is substantially different from the trajectory of a placebo injection. The steroid medication appears responsible for the corticosteroid injection effects.

IMPLICATIONS: Patients ought to be made aware that for every 2 patients who have a corticosteroid injection, 1 will experience a recurrence within 12 months. This is no different with the addition of a multimodal physiotherapy program.

MANUAL THERAPY AND EXERCISES IN PATIENTS WITH SHOULDER IMPINGEMENT SYNDROME: A RANDOMIZED CONTROLLED TRIAL

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PURPOSE: To investigate the effectiveness of individualized manual therapy and supervised exercises compared with supervised exercises alone in patients with clinical signs of shoulder impingement syndrome (SIS).

RELEVANCE: This randomized controlled trial adds evidence to the knowledge about the effect of individualized manual therapy and supervised exercises in patients with SIS.

METHODS: Ninety patients with a clinical pattern of SIS of at least 4 weeks' duration were recruited through physiotherapists working in outpatient practices in Germany. Eligible participants were randomly allocated to groups using central randomization. The control group performed a standardized exercise protocol, supervised by a physiotherapist. The intervention group additionally received individualized examination-based manual therapy. Both groups had 10 sessions within 5 weeks. All participants continued their exercises at home for another 7 weeks. SPADI and the patient's global impression of change, rated on an ordinal scale from 1 (much worsened) to 5 (much better), were assessed at baseline, 5 weeks, and 12 weeks. Descriptive statistics were used for demographic and clinical baseline characteristics, and for baseline results of the outcomes and possible confounding variables. Differences between groups were calculated on the intention-to-treat principle. Linear regression analysis was used to adjust for the influence of covariates on outcomes. Additionally, mixed models for the long-term follow-up were used.

RESULTS: Groups did not differ on the most important factors at baseline. No significant differences could be detected after the intervention between groups. An influence of disability at baseline could be found but did not change results to a significant level.

CONCLUSIONS: Our results show no additional benefit of manual therapy when added to a supervised exercise regimen.

IMPLICATIONS: Patients with SIS should mainly be treated with supervised exercises.

THE COMBINED EFFECT OF UTILIZING MANUAL THERAPY AND MOTOR CONTROL TRAINING FOR 2 RECREATIONAL THROWERS WITH CHRONIC SHOULDER PAIN

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PURPOSE: To present the results of utilizing manual therapy and motor control training in 2 throwers with chronic shoulder pain.

RELEVANCE: Supervised exercise with manual therapy has been shown to reduce shoulder pain and disability. A motor control training program based on movement system impairment (MSI) diagnosis has been reported helpful in a patient with subacute shoulder pain. However, minimal evidence exists to support the use of the MSI model (with or without manual therapy) in throwers with chronic shoulder pain.

CASE DESCRIPTION: Case 1 was a 50-year-old male softball player with an 8-month history of shoulder pain during throwing activities. Shoulder Pain and Disability Index (SPADI) score at intake was 34 of 130 (26%). Case 2 was a 28-year-old male recreational football thrower with shoulder pain for 6 months. SPADI score at intake was 24 of 130 (18%). MSI diagnosis for both patients was anterior humeral glide syndrome. Therefore, interventions selected for both patients involved motor control training of precise humeral internal rotation (IR) in supine and centered humeral external rotation (ER) in prone, progressing to standing ER and IR exercises with resistive bands and finally to sport-specific throwing. In addition, manual therapy was also used to address cervical spine and/or shoulder mobility deficits (2 visits).

RESULTS: Both patients achieved their athletic goal: return to softball for case 1 (4 visits) and return to football for case 2 (6 visits). SPADI at discharge was 3 of 130 (2%) and 4 of 130 (3%) for case 1 and case 2, respectively (greater than MDC/MCID). Follow-up SPADI score was 0 of 130 (0%) and 4 of 130 (3%) for case 1 (4.5 months) and case 2 (1.5 months), respectively.

CONCLUSION: Motor control training with manual therapy was effectively applied in 2 recreational throwers with chronic shoulder pain.

IMPLICATION: Retraining the quality of functional motion may be a useful adjunct to manual therapy in managing chronic shoulder pain.

THE EFFECTIVENESS OF A MANUAL PHYSICAL THERAPY APPROACH VERSUS CORTICOSTEROID INJECTION FOR THE TREATMENT OF SHOULDER IMPINGEMENT SYNDROME: SHORT-TERM RESULTS FROM A RANDOMIZED CONTROLLED TRIAL

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PURPOSE: To assess short-term effects of 2 common interventions, manual physical therapy (MPT) and corticosteroid injections (CSI), for patients with shoulder impingement-related pain.

RELEVANCE: Shoulder impingement is a common limiting disorder with a point prevalence between 20% and 33%. Two common interventions are MPT and CSI, but their effectiveness has never been directly compared.

METHODS: Of 415 consecutive patients referred to PT with shoulder pain, 97 satisfied eligibility criteria and agreed to participate. Mean age of 41 years (range, 19-64) and symptom duration of 56 days (range, 3 days-3 years). Subjects were randomized to a CSI from a physician or 6 sessions of MPT from a manual physical therapist, and re-evaluated at 4 weeks. The primary and secondary outcome measures were the Shoulder Pain and Disability Index (SPADI) and the global rating of change (GRC), respectively. A linear mixed model with repeated-measures ANOVA was used to analyze data. The hypothesis of interest was the group-by-time interaction.

RESULTS: Baseline mean SPADI scores were not significantly different between groups (MPT, 47.8% and CSI, 45.1%; $P = .33$). There was no interaction effect between time and group. At 4 weeks, there was a significant improvement in both groups (MPT, 20.5%; 95% CI: 13.8%, 27.1% and CSI, 21.6%; 95% CI: 16.1%, 27.1%). Mean GRC scores were +3 (somewhat better) in both groups, with no significant difference between groups ($P = .78$).