6. PELVIC GIRDLE

Unilateral stance and changes in pelvic tilt

CHANGES IN PELVIC TILT DURING THREE DIFFERENT RECIPROCAL STANCE POSITIONS IN PATIENTS WITH SACROILIAC JOINT REGIONAL PAIN

Michael T. Cibulka, PT, DPT, MHS, FAPTA, OCS1 Bradley Morr, DPT1 Justin Wedel, DPT1 Zachary Bohr, DPT1 Garrett Jones, DPT1 Cory Herman, DPT1 Michael J Strube, PhD2

The International Journal of Sports Physical Therapy | Volume 14, Number 6 | December 2019 | Page 967 DOI: 10.26603/ijspt20190967

Purpose: Essential to the successful management of patients with sacroiliac joint pain (SIJP) is understanding how these joints move. The innominates tilt together in the same direction with symmetrical activities (i.e. forwardbending) but move opposite of one another when performing asymmetrical activities (i.e. walking). How they move in patients with SIJP is unknown.

The purpose of this study was to examine inter-innominate movement (tilt) when assuming three different stance positions to describe how the innominate bones move in those with and without SIJP. Study type: Observational Cohort Study Methods: Twenty-eight participants were classified into two groups; SIJP with low back pain (LBP), and no SIJP or LBP. SIJP participants were further classified into groups with left or right pelvic tilt. Pelvic tilt was measured during neutral standing and in both left-sided and right-sided reciprocal stance, with a full-stride (one hip fully flexed the other fully extended) and in a half-stride position, which mimic the double-stance phase of gait. A repeated measure ANOVA assessed for differences between Groups (Level, Left or Right Pelvic Tilt), stance side position (left/right), and stride length (full/half).

Results: The was a significant Group main effect ($F [2, 25] = 130.2$, $p < 0.0001$), and a significant Side main effect ($F [1, 25] = 429.7$, $p < 0.0001$), qualified by a significant Side x Group interaction ($F [2, 25] = 19.9$ $p < .0001$). Follow-up comparisons showed that pelvic tilts for right and left stance were significantly different ($p < 0.05$) for each group (Level, left and right pelvic tilt). For the right stance condition, all groups were significantly different from each other ($p < 0.05$). For the left stance position, the right pelvic tilt and level pelvic tilt means were not different from each other ($p > 0.05$), but each was different from the mean for the left pelvic tilt group ($p < 0.05$).

Conclusions: When assuming an asymmetrical stance position, the innominates tilt opposite of each other in those without SIJP. In patients with SIJP they behave in the normal fashion in one asymmetrical stance position but not the other. Instead of tilting opposite, as expected, the innominates remain symmetrical, dependent on the side of the presenting pelvic tilt. Level of Evidence: 2b Keywords: Innominate tilt, low back pain, sacroiliac joint IJSPTO

7. PELVIC ORGANS/WOMAN'S HEALTH

Age of menopause impact walking speed

J Am Geriatr Soc. 2019 Nov 25. doi: 10.1111/jgs.16257.

Association of Reproductive History With Motor Function and Disability in Aging Women.

Canonico M[1], Artaud F[1], Tzourio C[2], Elbaz A[1].

BACKGROUND/OBJECTIVES:
The associations of reproductive history and motor function are controversial.

DESIGN:
Prospective cohort study with 10 years of follow-up.

SETTING:
Three French cities between 1999 and 2011.

PARTICIPANTS:
A total of 3043 community-dwelling women from the Three-City Dijon study population.

MEASUREMENTS:
We examined the cross-sectional and longitudinal association of age at menopause, artificial menopause, and parity with walking speed (WS) using linear regression and linear mixed models, respectively. Cox proportional models were used to examine the association of characteristics of reproductive life with disability.

RESULTS:
Mean baseline WS was 143.8 cm/s. Artificial menopause was associated with slower WS at baseline (β = -3.29; 95% confidence interval [CI] = -5.83 to -0.74; P = .01). Reproductive life characteristics had no effect on change in WS. Increasing age at menopause was associated with reduced disability risk (hazard ratio [HR] for 5-year increase = 0.92; 95% CI = 0.87-0.99; P = .02), while parity increased disability risk (HR for ≥3 vs 0 children = 1.53; 95% CI = 1.22-1.93; P < .01).

CONCLUSION:
These findings show that early age at menopause and higher parity have a deleterious effect on motor function that persists in older people.

8. VISCERA

Crohn’s disease identifier

Aliment Pharmacol Ther. 2019 Nov 26. doi: 10.1111/apt.15550.

A validated risk stratification tool for detecting high-risk small bowel Crohn's disease.

Shen EX[1,2], Lord A[1], Doecke JD[3], Hanigan K[1], Irwin J[1,4], Cheng RKY[1,4], Radford-Smith G[1,2,4].

BACKGROUND:
Delays in Crohn's disease (CD) diagnosis are positively associated with ileal location and an increased risk of complications.

AIM:
To develop a simple risk assessment tool to enable primary care physicians to recognise potential ileal CD earlier, shortening the delay to specialist investigation METHODS: Three cohorts were acquired for this study. Cohort 1 included 61 patients retrospectively identified with ileal CD between 2000 and 2010 and 78 matched controls drawn from a cohort referred for investigation of abdominal symptoms. Cohort 2 included 42 individuals diagnosed with ileal CD and 57 controls identified prospectively. Cohort 3 included an additional 84 individuals with ileal CD and 495 without CD referred for colonoscopy. Clinical symptoms and serological biomarkers were acquired and used to develop a risk prediction algorithm. The algorithm was trained independently on each of the three cohorts and tested on the latter two cohorts.

RESULTS:
Altered bowel habit with abdominal pain combined with derangements in white cell count (WCC), albumin and platelet counts were important features in predicting ileal CD (AUC = 0.92, 95% CI = 0.89-0.92). This was validated in cohorts 2 (AUC = 0.96, 95% CI = 0.95-0.98) and 3 (AUC = 0.94, 95% CI = 0.92-0.96). C-reactive protein was independently associated with ileal CD but non-signficant in a multivariate model.

CONCLUSION:
A web-based risk stratification tool for ileal CD has been developed from objective and symptom-based criteria. This tool enables primary care physicians to more confidently request urgent specialist assessment for patients identified as at high risk for ileal CD.

14. HEADACHES

Sphenopalatine ganglion stimulation helps

Lancet Neurol. 2019 Dec;18(12):1081-1090. doi: 10.1016/S1474-4422(19)30322-9.

Safety and efficacy of sphenopalatine ganglion stimulation for chronic cluster headache: a double-blind, randomised controlled trial.

Goadsby PJ[1], Sahai-Srivastava S[2], Kezirian EJ[2], Calhoun AH[3], Matthews DC[4], McAllister PJ[5], Costantino PD[6], Friedman DI[7], Zuniga JR[8], Mechtler LL[9], Popat SR[10], Rezai AR[11], Dodick DW[12].

BACKGROUND:
Chronic cluster headache is the most disabling form of cluster headache. The mainstay of treatment is attack prevention, but the available management options have little efficacy and are associated with substantial side-effects. In this study, we aimed to assess the safety and efficacy of sphenopalatine ganglion stimulation for treatment of chronic cluster headache.

METHODS:
We did a randomised, sham-controlled, parallel group, double-blind, safety and efficacy study at 21 headache centres in the USA. We recruited patients aged 22 years or older with chronic cluster headache, who reported a minimum of four cluster headache attacks per week that were unsuccessfully controlled by preventive treatments. Participants were randomly assigned (1:1) via an online adaptive randomisation procedure to either stimulation of the sphenopalatine ganglion or a sham control that delivered a cutaneous electrical stimulation. Patients and the clinical evaluator and surgeon were masked to group assignment. The primary efficacy endpoint, which was analysed with weighted generalised estimated equation logistic regression models, was the difference between groups in the proportion of stimulation-treated ipsilateral cluster attacks for which relief from pain was achieved 15 min after the start of stimulation without the use of acute drugs before that timepoint. Efficacy analyses were done in all patients who were implanted with a device and provided data for at least one treated attack during the 4-week experimental phase. Safety was assessed in all patients undergoing an implantation procedure up to the end of the open-label phase of the study, which followed the experimental phase. This trial is registered with ClinicalTrials.gov, number NCT02168764.

FINDINGS:
Between July 9, 2014, and Feb 14, 2017, 93 patients were enrolled and randomly assigned, 45 to the sphenopalatine ganglion stimulation group and 48 to the control group. 36 patients in the sphenopalatine ganglion stimulation group and 40 in the control group had at least one attack during the experimental phase and were included in efficacy analyses. The proportion of attacks for which pain relief was experienced at 15 min was 62·46% (95% CI 49·15-74·12) in the sphenopalatine ganglion stimulation group versus 38·87% (28·60-50·25) in the control group (odds ratio 2·62 [95% CI 1·28-5·34]; p=0·008). Nine serious adverse events were reported by the end of the open-label phase. Three of these serious adverse events were related to the implantation procedure (aspiration during intubation, nausea and vomiting, and venous injury or compromise). A fourth serious adverse event was an infection that was attributed to both the stimulation device and the implantation procedure. The other five serious adverse events were unrelated. There were no unanticipated serious adverse events.

INTERPRETATION:
Sphenopalatine ganglion stimulation seems efficacious and is well tolerated, and potentially offers an alternative approach to the treatment of chronic cluster headache. Further research is need to clarify its place in clinical practice.

30 A. HIP IMPINGEMENT

Single leg squat motor strategies

J Orthop Sports Phys Ther. 2019 Jul 23:1-33. doi: 10.2519/jospt.2019.8356.

Hip Biomechanics During a Single-Leg Squat: Five Key Differences Between People With Femoroacetabular Impingement Syndrome and Those Without Hip Pain.

Malloy P[1,2], Neumann DA[1], Kipp K[1,3].

STUDY DESIGN:
Cross-sectional, case-controlled, laboratory-based study.

BACKGROUND:
People with femoroacetabular impingement (FAI) syndrome have different hip joint biomechanics than hip-healthy people during a double-leg squat. However, information on biomechanics during a single-leg squat is limited.

OBJECTIVES:
To compare hip joint biomechanics between people with FAI syndrome and people without hip pain during double-leg and single-leg squats.

METHODS:
Fourteen people with FAI syndrome (cam, n=7; pincer, n=1; mixed, n = 6) and 14 people without hip pain participated in this study. Three-dimensional biomechanics data were collected while all participants performed a double-leg and a single-leg squat. Two-way mixed model analyses of variance (ANOVAs) were used to assess GROUP by TASK interactions for hip joint angles, thigh and pelvis segment angles, hip joint internal moments, and squat performance variables. Post-hoc analyses for all variables with a significant GROUP by TASK interaction were performed to identify between GROUP differences for each task.

RESULTS:
There were significant GROUP by TASK interactions for peak hip joint (P = 0.014, η^2 = 0.211) and thigh segment (P = 0.009, η^2 = 0.233) adduction angles, and for peak hip joint abduction (P = 0.002, η^2 = 0.308) and extension (P = 0.016, η^2 = 0.203) internal moments. There were no significant GROUP by TASK interactions for squat performance variables.

CONCLUSION:
Biomechanical differences at the hip between people with FAI syndrome and without hip pain were exaggerated during a single-leg squat compared to a double-leg squat task.

LEVEL OF EVIDENCE:
Diagnosis, level 4. *J Orthop Sports Phys Ther, Epub 23 Jul 2019. doi:10.2519/jospt.2019.8356*.

32 A. KNEE/ACL

Patellar vs Hamstrings

Athletes With Bone-Patellar Tendon Bone Autograft for ACL Reconstruction Were Months Slower to Meet Rehabilitation Milestones and Return to Sport Criteria Than Athletes With Hamstring Tendon Autograft or Soft Tissue Allograft: Secondary Analysis From the ACL-SPORTS Trial

Angela Hutchinson Smith, PT, DPT[1], Jacob Capin, PT, DPT[1,2], Ryan Zarzycki, PT, PhD[3], Lynn Snyder-Mackler, PT, ScD[1,2]

Published: *Journal of Orthopaedic & Sports Physical Therapy*, 2019 **Volume:**0 **Issue:**0 **Pages:**1–28 **DOI:** 10.2519/jospt.2020.911

Study Design
Retrospective cohort study.

Objective
Graft choices for athletes undergoing anterior cruciate ligament reconstruction (ACLR) include bone-patellar tendon-bone (BPTB) and hamstring tendon (HT) autografts, and soft tissue allografts (ALLO). The objective was to assess time to meet clinical milestones by graft type in athletes who completed a RTS program after ACLR.

Methods
79 athletes enrolled after ACLR (ALLO n=18, BPTB n=24, HT n=37). Time from surgery to meet 1) enrollment criteria (≥12 weeks post-op, ≥80% isometric quadriceps strength index (QI), minimal effusion and full knee range of motion (ROM), and 2) RTS criteria (≥90% QI, hop testing limb symmetry, and patient reported outcomes) was calculated. Quadriceps strength, hop performance and patient-reported outcomes were measured before and after training, and at one year post-operative. Descriptive statistics, Chi-square tests, and one-way ANOVAs (α=.05) were used to analyze differences among graft types.

Results
On average, the BPTB group (28.5±7.6 weeks) took longer to meet enrollment milestones than the HT (22.5±7.6, p=.007) and ALLO (18.9±5.8, p<.001) groups. The BPTB group (44.7±15.8 weeks) took longer from surgery to meet RTS criteria than the HT (32.5±9.9, p=.001) and ALLO (29.3±9.0, p<.001) groups. QI after training for the BPTB group (86.2±11.4) was lower than the HT (96.1±12.9, p=.004) and ALLO (96.9±5.9, p=.009) groups.

Conclusions
Athletes with a bone-patellar tendon-bone autograft may take longer than athletes with hamstring tendon autograft or a soft tissue allograft to complete post-operative rehabilitation, recover quadriceps strength and meet RTS criteria. *J Orthop Sports Phys Ther, Epub 27 Nov 2019. doi:10.2519/jospt.2020.9111*

38 A. FOOT AND ANKLE

Measuring Dorsi flexion

J Orthop Sports Phys Ther. 2019 Jul 23:1-29. doi: 10.2519/jospt.2019.8697.

How Much Does the Talocrural Joint Contribute to Ankle Dorsiflexion Range of Motion During the Weight-Bearing Lunge Test? A Cross-Sectional Radiographic Validity Study.

Smith MD[1], Lee D[1], Russell T[1], Matthews M[2], MacDonald D[3], Vicenzino B[1].

BACKGROUND:
Ankle dorsiflexion ROM is commonly measured during the weight-bearing lunge test (WBLT) as horizontal knee distance travelled or tibial inclination. These measures are assumed to represent talocrural dorsiflexion, yet have not been validated against radiographic images.

OBJECTIVES:
To determine the: a) contribution of the talocrural joint to tibial inclination during the WBLT; b) validity of inclinometer and photographic measures of tibial inclination compared to radiographic images; and c) association between tibial inclination and horizontal distance measures.

METHODS:
Tibial inclination using an inclinometer, horizontal distance via a ruler, radiographic and photographic images were recorded on 20 participants in standing and end-range WBLT. Two assessors used computer software to measure talar rotation and tibial inclination from digital radiographs and photographs. Limits of agreements (LoA) between photographic and inclinometer measures against radiograph measures, and correlation between measures were calculated.

RESULTS:
At end-range WBLT, 91.8% of motion occurred at the talocrural joint with 8.2% occurring distally. There were very strong correlations (all $r=0.88$, $p<0.001$) between end range radiographic and photographic measures, radiographic and inclinometer measures, and radiographic, inclinometer, photographic measures of tibial inclination and horizontal lunge distance. Calculation of LoA indicated unacceptable agreement between inclinometer and radiograph measures (-7.84, 5.92) and acceptable agreement between photographic and radiographic measures (-2.17, 2.49).

CONCLUSION:
Tibial inclination during the WBLT primarily occurs at the talocrural joint. While inclinometer and photographic measures of tibial inclination can reliably be used clinically to measures dorsiflexion ROM during the WBLT, inclinometer results will differ slightly than those obtained from radiographs. *J Orthop Sports Phys Ther, Epub 23 Jul 2019. doi:10.2519/jospt.2019.8697.*

41 A. ACHILLES TENDON AND CALF

PRP not helpful

Research

Platelet rich plasma injection for acute Achilles tendon rupture: PATH-2 randomised, placebo controlled, superiority trial

BMJ 2019; 367 doi: https://doi.org/10.1136/bmj.l6132 (

Objective To determine whether an injection of platelet rich plasma improves outcomes after acute Achilles tendon rupture.
Design Randomised, placebo controlled, two arm, parallel group, participant and assessor masked, superiority trial.
Setting Secondary care trauma units across 19 hospitals in the United Kingdom's health service.
Participants Recruitment commenced in July 2015 and follow-up was completed in March 2018. 230 adults aged 18 years and over were included, with acute Achilles tendon rupture presenting within 12 days of injury and managed with non-surgical treatment. Exclusions were injury at the insertion or musculotendinous junction, major leg injury or deformity, diabetes mellitus, platelet or haematological disorder, systemic corticosteroids, anticoagulation treatment, and other contraindicating conditions.
Interventions Participants were randomised 1:1 to platelet rich plasma (n=114) or placebo (dry needle; n=116) injection. All participants received standard rehabilitation care (ankle immobilisation followed by physiotherapy).
Main outcomes and measures Primary outcome was muscle tendon function at 24 weeks, measured objectively with the limb symmetry index (injured/uninjured×100) in maximal work done during the heel rise endurance test (an instrumented measure of repeated single leg heel rises until fatigue). Secondary outcomes included patient reported function (Achilles tendon rupture score), quality of life (short form 12 version 2®), pain (visual analogue scale), goal attainment (patient specific functional scale), and adverse events. A central laboratory analysed the quality and content of platelet rich plasma. Analyses were by modified intention to treat.
Results Participants were 46 years old on average, and 57 (25%) of 230 were female. At 24 weeks, 202 (88%) participants completed the heel rise endurance test and 216 (94%) the patient reported outcomes. The platelet rich plasma was of good quality, with expected growth factor content. No difference was detected in muscle tendon function between participants receiving platelet rich plasma injections and those receiving placebo injections (limb symmetry index, mean 34.7% (standard deviation 17.7%) *v* 38.5% (22.8%); adjusted mean difference −3.9% (95% confidence interval −10.5% to 2.7%)) or in any secondary outcomes or adverse event rates. Complier average causal effect analyses gave similar findings.
Conclusions There is no evidence to indicate that injections of platelet rich plasma can improve objective muscle tendon function, patient reported function, or quality of life after acute Achilles tendon rupture compared with placebo, or that they offer any patient benefit.

45 B. MANUAL THERAPY CERVICAL

Carotid plaque

Stroke. 2019 Nov 22:STROKEAHA119027272. doi: 10.1161/STROKEAHA.119.027272

Carotid Plaque With High-Risk Features in Embolic Stroke of Undetermined Source: Systematic Review and Meta-Analysis.

Kamtchum-Tatuene J[1], Wilman A[2], Saqqur M[3], Shuaib A[3], Jickling GC[3].

Background and Purpose- An ipsilateral mild carotid stenosis, defined as plaque with <50% luminal narrowing, is identified in nearly 40% of patients with embolic stroke of undetermined source and could represent an unrecognized source of atheroembolism. We aimed to summarize data about the frequency of mild carotid stenosis with high-risk features in embolic stroke of undetermined source.

Methods- We searched Pubmed and Ovid-Embase for studies reporting carotid plaque imaging features in embolic stroke of undetermined source. The prevalence of ipsilateral and contralateral mild carotid stenosis with high-risk features was pooled using random-effect meta-analysis.

Results- Eight studies enrolling 323 participants were included. The prevalence of mild carotid stenosis with high-risk features in the ipsilateral carotid was 32.5% (95% CI, 25.3-40.2) compared with 4.6% (95% CI, 0.1-13.1) in the contralateral carotid. The odds ratio of finding a plaque with high-risk features in the ipsilateral versus the contralateral carotid was 5.5 (95% CI, 2.5-12.0).

Conclusions- Plaques with high-risk features are 5 times more prevalent in the ipsilateral compared with the contralateral carotid in embolic stroke of undetermined source, suggesting a relationship to stroke risk.

50 A. MOTOR CONTROL

Ballerina motor strategies

J Orthop Sports Phys Ther. 2019 Aug 3:1-29. doi: 10.2519/jospt.2019.8577.

Individuals With and Without Low Back Pain Use Different Motor Control Strategies to Achieve Spinal Stiffness During the Prone Instability Test.

Sung W[1], Hicks GE[2], Ebaugh D[3], Smith SS[3], Stackhouse S[4], Wattananon P[5], Silfies SP[6].

BACKGROUND:
The prone instability test is used to identify individuals with low back pain (LBP) who would benefit from trunk stabilization exercises. Although activity from muscles during the leg raising portion of the prone instability test theoretically enhances spinal stiffness and reduces pain, evidence for this is lacking.

OBJECTIVES:
To compare and contrast: 1) pain and stiffness changes between prone instability testing positions, and 2) muscle activation patterns during the prone instability test leg raise in individuals with and without LBP.

METHODS:
Laboratory case-control design. Participants were 10 with and 10 without LBP. Spinal stiffness was measured using a bending beam model and 3-dimensional kinematic data. Stiffness changes were compared across the test positions and between groups. Surface EMG data were collected on trunk and limb musculature. Principal component analysis was used to extract muscle synergies.

RESULTS:
Spinal stiffness increased across testing positions in all participants ($P < .05$). Participants with LBP experienced reduced pain during the test ($P = .0001$). No between group difference was found in spinal stiffness during leg raising in the test ($P > .05$). Participants without LBP used 3 muscle synergies during the leg raise. Participants with LBP used 2 muscle synergies.

CONCLUSION:
Spinal stiffness increased in all participants; however, participants without LBP demonstrated a muscle synergy pattern where each synergy was associated with a distinct function of the prone instability test. Participants with LBP used a more global stabilization pattern which may reflect a maladaptive method of enhancing spinal stability. *J Orthop Sports Phys Ther, Epub 3 Aug 2019. doi:10.2519/jospt.2019.8577*.

Testing trunk coupling

2019 May 15:1-41. doi: 10.2519/jospt.2019.8756.

Reduced Trunk Coupling in Persons With Recurrent Low Back Pain Is Associated With Greater Deep-to-Superficial Trunk Muscle Activation Ratios During the Balance-Dexterity Task.

Rowley KM[1], Smith JA[2], Kulig K[1].

STUDY DESIGN:
Cross-sectional controlled laboratory study.

BACKGROUND:
Motor control dysfunction persisting during symptom remission in persons with recurrent low back pain (rLBP) may contribute to the recurrence of pain..

OBJECTIVES:
The purpose was to investigate trunk control in persons in remission from rLBP and back-healthy controls using a dynamic, internally-driven balance task. No differences in task performance were expected between groups, but it was hypothesized persons with rLBP would exhibit greater trunk coupling consistent with a trunk stiffening strategy.

METHODS:
Persons with and without rLBP (n=19/group) completed the Balance-Dexterity Task, which involved balancing on one limb in standing while compressing an unstable spring with the other. Task performance measures included center-of-pressure velocity under the stance limb and vertical force variability under the spring. Trunk coupling was quantified with the coefficient of determination (R^2) of an angle-angle plot of thorax-pelvis frontal-plane motion. Fine-wire and surface electromyography captured activations of paraspinals and abdominals.

RESULTS:
There were no differences between groups for any task performance measure. The group in remission from rLBP exhibited reduced trunk coupling, or more dissociated thorax and pelvis motion, compared to back-healthy controls (p=0.024). Trunk coupling in this group was associated moderately with lumbar multifidus-to-erector spinae activation ratio (R=0.618, p=0.006) and weakly with internal-to-external oblique ratio (R=0.476, p=0.046).

CONCLUSION:
The Balance-Dexterity Task is a submaximal, internally-driven unstable balance task during which more dissociated trunk motion was observed in persons in remission from rLBP. Findings underscore the task-dependent nature of trunk control research and assessment in persons with rLBP. *J Orthop Sports Phys Ther, Epub 15 May 2019. doi:10.2519/jospt.2019.8756*.

50 B. PNF

Patterns and scapula muscle function

Int J Sports Phys Ther. 2011 Dec;6(4):322-32.

Electromyographic activity of scapular muscles during diagonal patterns using elastic resistance and free weights.

Witt D[1], Talbott N, Kotowski S.

PURPOSE/BACKGROUND:
Abnormalities in glenohumeral rhythm and neuromuscular control of the upper trapezius (UT), middle trapezius (MT), lower trapezius (LT) and serratus anterior (SA) muscles have been identified in individuals with shoulder pain. Upper extremity diagonal or proprioceptive neuromuscular facilitation (PNF) patterns have been suggested as effective means of activating scapular muscles, yet few studies have compared muscular activation during diagonal patterns with varying modes of resistance. The purpose of this study is to determine which type of resistance and PNF pattern combination best elicits electromyographic (EMG) activity of the scapular muscles.

METHODS:
Twenty one healthy subjects with no history of scapulohumeral dysfunction were recruited from a population of convenience. Surface electrodes were applied to the SA, UT, MT and LT and EMG data collected for each muscle as the subject performed resisted UE D1 flexion, UE D1 extension, UE D2 flexion and UE D2 extension with elastic resistance and a three pound weight.

RESULTS:
No significant differences were found between scapular muscle activity during D1 flexion when using elastic resistance and when using a weight. UT, MT and LT values were also not significantly different during D2 flexion when using elastic resistance vs. using a weight. The activity of the SA remained relatively the same during all patterns. The LT activity was significantly greater during D2 flexion with elastic resistance than during the D1 flexion and D1 extension with elastic resistance. MT activity was significantly greater during D2 flexion with elastic resistance as compared to all other patterns except D2 flexion with a weight. UT activity was significantly greater during flexion patterns than extension patterns.

CONCLUSIONS:
The upper extremity PNF pattern did significantly affect the mean UT, MT and LT activity but was not found to significantly affect SA activity. The type of resistance did not significantly change muscle activity when used in the same diagonal patterns.

51. CFS/BET

Foam rolling

Int J Sports Phys Ther. 2015 Nov; 10(6): 827–838. PMCID: PMC4637917
PMID: 26618062

THE EFFECTS OF SELF-MYOFASCIAL RELEASE USING A FOAM ROLL OR ROLLER MASSAGER ON JOINT RANGE OF MOTION, MUSCLE RECOVERY, AND PERFORMANCE: A SYSTEMATIC REVIEW

Scott W. Cheatham, PT, DPT, OCS, ATC, CSCS,[1] Morey J. Kolber, PT, PhD, OCS, CSCS*D,[2] Matt Cain, MS, CSCS,[1] and Matt Lee, PT, MPT, CSCS[3]

Background Self-myofascial release (SMR) is a popular intervention used to enhance a client's myofascial mobility. Common tools include the foam roll and roller massager. Often these tools are used as part of a comprehensive program and are often recommended to the client to purchase and use at home. Currently, there are no systematic reviews that have appraised the effects of these tools on joint range of motion, muscle recovery, and performance.

Purpose The purpose of this review was to critically appraise the current evidence and answer the following questions: (1) Does self-myofascial release with a foam roll or roller-massager improve joint range of motion (ROM) without effecting muscle performance? (2) After an intense bout of exercise, does self-myofascial release with a foam roller or roller-massager enhance post exercise muscle recovery and reduce delayed onset of muscle soreness (DOMS)? (3) Does self-myofascial release with a foam roll or roller-massager prior to activity affect muscle performance?

Method A search strategy was conducted, prior to April 2015, which included electronic databases and known journals. Included studies met the following criteria: 1) Peer reviewed, english language publications 2) Investigations that measured the effects of SMR using a foam roll or roller massager on joint ROM, acute muscle soreness, DOMS, and muscle performance 3) Investigations that compared an intervention program using a foam roll or roller massager to a control group 4) Investigations that compared two intervention programs using a foam roll or roller massager. The quality of manuscripts was assessed using the PEDro scale.

Results

A total of 14 articles met the inclusion criteria. SMR with a foam roll or roller massager appears to have short-term effects on increasing joint ROM without negatively affecting muscle performance and may help attenuate decrements in muscle performance and DOMS after intense exercise. Short bouts of SMR prior to exercise do not appear to effect muscle performance.

Conclusion

The current literature measuring the effects of SMR is still emerging. The results of this analysis suggests that foam rolling and roller massage may be effective interventions for enhancing joint ROM and pre and post exercise muscle performance. However, due to the heterogeneity of methods among studies, there currently is no consensus on the optimal SMR program.

To flex or not to flex

To Flex or Not to Flex? Is There a Relationship Between Lumbar Spine Flexion During Lifting and Low Back Pain? A Systematic Review With Meta-Analysis

Nic Saraceni, PT[1], Peter Kent, PhD[1,2], Leo Ng, PhD[1], Amity Campbell, PhD[1], Leon Straker, PhD[1], Peter O'Sullivan, PhD[1,3]
Published: *Journal of Orthopaedic & Sports Physical Therapy*, 2019 **Volume:**0 **Issue:**0 **Pages:**1–50 **DOI:** 10.2519/jospt.2020.9218

Study Design
Prognosis systematic review with meta-analysis.

Objective
To evaluate whether lumbar spine flexion during lifting is a risk factor for low back pain (LBP) onset/persistence, or a differentiator of people with and without LBP.

Literature Search
Database search of Proquest, CINAHL, Medline and EMBASE until August 2018.

Study Selection Criteria
We included peer-reviewed articles, investigating lumbar spine position during lifting as a risk factor for LBP onset or persistence, or as a differentiator of people with and without LBP.

Data Synthesis
Lifting task comparison data were tabulated and summarised. For meta-analysis, we calculated an n-weighted pooled mean (SD) of the results for each of the LBP and no LBP groups. Where a study contained multiple comparisons (i.e. different lifting tasks that used various weights or directions), only one result for each study was included in the meta-analysis.

Results
Four studies (one longitudinal study and three cross-sectional studies) measured lumbar flexion with intra-lumbar angles and found no differences in peak lumbar spine flexion when lifting (longitudinal 1.5 degree (95%CI -0.7 to 3.7), p=0.19 and cross-sectional -0.9 (95%CI -2.5 to 0.7), p=0.29). Seven cross-sectional studies measured lumbar flexion with thoraco-pelvic angles and found people with LBP lifted with 6.0 degrees less lumbar flexion than people without LBP (95%CI -11.2 to -.89, p<0.01). Most (9 of 11) studies reported no between-group differences in lumbar flexion during lifting. The included studies were low quality.

Conclusion
There was low quality evidence that greater lumbar spine flexion during lifting was not a risk factor for LBP onset/persistence, nor a differentiator of people with and without LBP. *J Orthop Sports Phys Ther, Epub 28 Nov 2019. doi:10.2519/jospt.2020.9218*

56. ATHLETICS

Landing mechanics with added heel lift

Int J Sports Phys Ther. 2013 Feb; 8(1): 1–8. PMCID: PMC3578428 PMID: 23439490

THE INFLUENCE OF HEEL HEIGHT ON VERTICAL GROUND REACTION FORCE DURING LANDING TASKS IN RECREATIONALLY ACTIVE AND ATHLETIC COLLEGIATE FEMALES

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Purpose:

To determine if heel height alters vertical ground reaction forces (vGRF) when landing from a forward hop or drop landing.

Background:

Increased vGRF during landing are theorized to increase ACL injury risk in female athletes.

Methods:

Fifty collegiate females performed two single-limb landing tasks while wearing heel lifts of three different sizes (0, 12 & 24 mm) attached to the bottom of a athletic shoe. Using a force plate, peak vGRF at landing was examined. Repeated measures ANOVAs were used to determine the influence of heel height on the dependent measures.

Results:

Forward hop task- Peak vGRF (normalized for body mass) with 0 mm, 12 mm, and 24 mm lifts were 2.613±0.498, 2.616±0.497 and 2.495±0.518% BW, respectively. Significant differences were noted between 0 and 24 mm lift ($p<.001$) and 12 and 24 mm lifts ($p=.004$), but not between the 0 and 12 mm conditions ($p=.927$). *Jump-landing task*- No significant differences were found in peak vGRF ($p=.192$) between any of the heel lift conditions.

Conclusions:

The addition of a 24 mm heel lift to the bottom of a sneaker significantly alters peak vGRF upon landing from a unilateral forward hop but not from a jumping maneuver.

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Autonomic responses and pain

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Perceptual and motor responses directly and indirectly mediate the effects of noxious stimuli on autonomic responses.

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Autonomic responses are an essential component of pain. They serve its adaptive function by regulating homeostasis and providing resources for protective and recuperative responses to noxious stimuli.

To be adaptive and flexible, autonomic responses are not only determined by noxious stimulus characteristics, but likely also shaped by perceptual and motor responses to noxious stimuli. However, it is not fully known how noxious stimulus characteristics, perceptual responses, and motor responses interact in shaping autonomic responses.

To address this question, we collected perceptual, motor, and autonomic responses to brief noxious laser stimuli of different intensities in 47 healthy human participants. Multilevel 2-path mediation analyses revealed that perceptual, but not motor responses mediated the translation of noxious stimuli into autonomic responses. Multilevel 3-path mediation analyses further specified that motor responses indirectly related to autonomic responses through their close association with perceptual responses.

These findings confirm that autonomic responses are not only a reflexive reaction to noxious stimuli, but directly and indirectly shaped by perceptual and motor responses, respectively. These effects of motor and perceptual processes on autonomic responses likely allow for the integration of contextual processes into protective and regulatory autonomic responses, aiding adaptive and flexible coping with threat.

PTSD and chronic pain

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Evaluation of Candidate Items for Severe PTSD Screening for Patients With Chronic Pain: Pilot Data Analysis With the IRT Approach.

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OBJECTIVES:
Post-traumatic stress disorder (PTSD) commonly co-occurs with chronic pain. Although PTSD symptoms are associated with negative health outcomes in patients with chronic pain, PTSD is typically under-detected and under-treated in outpatient pain settings. There is a need for rapid, brief screening tools to identify those at greatest risk for severe PTSD symptoms. To achieve that goal, our aim was to use item response theory (IRT) to identify the most informative PTSD symptoms characterizing severe PTSD in patients with chronic pain.

METHODS:
Fifty-six patients (71% female, 61% White) with mixed etiology chronic pain completed the PTSD Checklist-Civilian Version (PCL-C) as part of their appointment with a pain psychologist at a tertiary outpatient pain clinic. We used an IRT approach to evaluate each item's discriminant (a) and severity (b) parameters.

RESULTS:
Findings revealed that "feeling upset at reminders" (a = 3.67, b = 2.44) and "avoid thinking or talking about it" (a = 3.61, b = 2.17) as being highly discriminant for severe PTSD.

CONCLUSIONS:
We identified 2 candidate items for a brief PTSD screener as they were associated with severe PTSD symptoms. These 2 items may provide clinical utility in outpatient pain treatment settings to identify those suffering from severe PTSD, enabling physicians to refer them to trauma-specific evaluation or therapy. Future research is needed to further validate and confirm these candidate PTSD items in a larger clinic sample.

LAY SUMMARY:
The current study used the IRT approach to identify candidate items for a brief screener for severe PTSD. We examined 17 items of the PCL-C, and identified 2 items that were highly discriminant for severe PTSD. The 2 items were "feeling upset at reminders" and "avoid thinking or talking about it." These 2 items may provide clinical utility, since they may enable physicians to screen and make a referral for further assessment or treatment for PTSD.

Placebo open label

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Effects of open-label placebo on pain, functional disability, and spine mobility in patients with chronic back pain: a randomized controlled trial.

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Abstract
Chronic back pain (CBP) is a major global health problem, while its treatment is hampered by a lack of efficacy and restricted safety profile of common frontline therapies.

The present trial aims to determine whether a 3-week open-label placebo treatment reduces pain intensity and subjective and objective functional disability in patients with CBP. This randomized controlled trial, following a pretest-posttest design, enrolled 127 patients with CBP (pain duration >12 weeks) from the Back Pain Center, Neurology, University Hospital Essen, Germany. Patients randomized to the open-label placebo group received a 3-week open-label placebo treatment. Patients in the treatment as usual (TAU) group received no intervention. Both groups continued TAU. Primary outcome was the change in pain intensity. Secondary outcomes included patient-reported functional disability and objective measures of spine mobility and depression, anxiety, and stress.

One hundred twenty two patients with CBP were randomized to the open-label placebo group (N = 63) or TAU group (N = 59). Open-label placebo application led to a larger reduction of pain intensity (-0.62 ± 0.23 vs 0.11 ± 0.17, all M ± SE, P = 0.001, d = -0.44) as well as patient-reported functional disability (3.21 ± 1.59 vs 0.65 ± 1.15, P = 0.020, d = -0.45) and depression scores (-1.07 ± 0.55 vs 0.37 ± 0.39, P = 0.010, d = -0.50) compared with TAU only. Open-label placebo treatment did not affect objective mobility parameters, anxiety and stress.

Our study demonstrates that a 3-week open-label placebo treatment is safe, well tolerated and reduces pain, disability, and depressive symptoms in CBP. Trial registration: German Clinical Trials Register, DRKS00012712.

Spouses influence in catastrophizing

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Daily and bidirectional linkages between pain catastrophizing and spouse responses.

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Pain catastrophizing has been shown to predict greater pain and less physical function in daily life for chronic pain sufferers, but its effects on close social partners have received much less attention. The overall purpose of this study was to examine the extent to which pain catastrophizing is an interpersonal coping strategy that is maladaptive for patients and their spouses. A total of 144 older knee osteoarthritis patients and their spouses completed baseline interviews and a 22-day diary assessment.

Multilevel lagged models indicated that, on days when patients reported greater catastrophizing in the morning, their spouses experienced more negative affect throughout the day. In addition, a higher level of punishing responses from the spouse predicted greater pain catastrophizing the next morning, independent of patient pain and negative affect. Multilevel mediation models showed that patients' morning pain catastrophizing indirectly impacted spouses' negative affect and punishing responses through patients' own greater negative affect throughout the day. T

here was no evidence that spouses' empathic or solicitous responses either followed or preceded patients' catastrophizing. These findings suggest that cognitive-behavioral interventions that reduce pain catastrophizing should be modified for partnered patients to address dyadic interactions and the spouse's role in pain catastrophizing.