

## ABSTRACTS

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## LUMBAR SPINE

## LBP

## Cognitive behavioral therapy and LBP

Spine (Phila Pa 1976). 2015 May 15;40(10):725-33. doi: 10.1097/BRS.0000000000000830.

**Cost-utility of cognitive behavioral therapy for low back pain from the commercial payer perspective.**

Norton G<sup>1</sup>, McDonough CM, Cabral H, Shwartz M, Burgess JF.

Author information

Abstract

**STUDY DESIGN:**

Markov cost-utility model.

**OBJECTIVE:**

To evaluate the cost-utility of cognitive behavioral therapy (CBT) for the treatment of persistent nonspecific low back pain (LBP) from the perspective of US commercial payers.

**SUMMARY OF BACKGROUND DATA:**

CBT is widely deemed clinically effective for LBP treatment. The evidence is suggestive of cost-effectiveness.

**METHODS:**

We constructed and validated a Markov intention-to-treat model to estimate the cost-utility of CBT, with 1-year and 10-year time horizons. We applied likelihood of improvement and utilities from a randomized controlled trial assessing CBT to treat LBP. The trial randomized subjects to treatment but subjects freely sought health care services. We derived the cost of equivalent rates and types of services from US commercial claims for LBP for a similar population. For the 10-year estimates, we derived recurrence rates from the literature. The base case included medical and pharmaceutical services and assumed gradual loss of skill in applying CBT techniques. Sensitivity analyses assessed the distribution of service utilization, utility values, and rate of LBP recurrence. We compared health plan designs. Results are based on 5000 iterations of each model and expressed as an incremental cost per quality-adjusted life-year.

**RESULTS:**

The incremental cost-utility of CBT was \$7197 per quality-adjusted life-year in the first year and \$5855 per quality-adjusted life-year over 10 years. The results are robust across numerous sensitivity analyses. No change of parameter estimate resulted in a difference of more than 7% from the base case for either time horizon. Including chiropractic and/or acupuncture care did not substantively affect cost-effectiveness. The model with medical but no pharmaceutical costs was more cost-effective (\$5238 for 1 yr and \$3849 for 10 yr).

**CONCLUSION:**

CBT is a cost-effective approach to manage chronic LBP among commercial health plans members. Cost-effectiveness is demonstrated for multiple plan designs.

**LEVEL OF EVIDENCE: 2. PMID: 25950282**

**Pain classification system**

Pain Physician, 05/26/2015

**Low Back Pain: Guidelines for the Clinical Classification of Predominant Neuropathic, Nociceptive, or Central Sensitization Pain  
Comprehensive Review**

Jo Nijs, PhD, Adri Apeldoorn, PhD, Hank Hallegraeff, PhD, Jacqui Clark, MSc, PT, Rob Smeets, MD, PhD, Annaleen Malfliet, MSc, PT, Enrique L. Girbes, MSc, PT, Margot De Kooning, MSc, and Kelly Ickmans, PhD

**BACKGROUND:** Low back pain (LBP) is a heterogeneous disorder including patients with dominant nociceptive (e.g., myofascial low back pain), neuropathic (e.g., lumbar radiculopathy), and central sensitization pain. In order to select an effective and preferably also efficient treatment in daily clinical practice, LBP patients should be classified clinically as either predominantly nociceptive, neuropathic, or central sensitization pain.

**OBJECTIVE:** To explain how clinicians can differentiate between nociceptive, neuropathic, and central sensitization pain in patients with LBP.

**STUDY DESIGN:** Narrative review and expert opinion **SETTING:** Universities, university hospitals and private practices

**METHODS:** Recently, a clinical method for the classification of central sensitization pain versus neuropathic and nociceptive pain was developed. It is based on a body of evidence of original research papers and expert opinion of 18 pain experts from 7 different countries. Here we apply this classification algorithm to the LBP population.

**RESULTS:** The first step implies examining the presence of neuropathic low back pain. Next, the differential diagnosis between predominant nociceptive and central sensitization pain is done using a clinical algorithm.

**LIMITATIONS:** The classification criteria are substantiated by several original research findings including a Delphi survey, a study of a large group of LBP patients, and validation studies of the Central Sensitization Inventory. Nevertheless, these criteria require validation in clinical settings.

**CONCLUSION:** The pain classification system for LBP should be an addition to available classification systems and diagnostic procedures for LBP, as it is focussed on pain mechanisms solely.

## DISC

## Bacterial infections

Spine (Phila Pa 1976). 2015 May 15;40(10):E587-92. doi: 10.1097/BRS.0000000000000832.

**Can bacterial infection by low virulent organisms be a plausible cause for symptomatic disc degeneration? A systematic review.**

Ganko R<sup>1</sup>, Rao PJ, Phan K, Mobbs RJ.

Author information

Abstract

**STUDY DESIGN:**

Systematic review and meta-analysis.

**OBJECTIVE:**

To review and assess the current evidence from the literature on the potential association between disc infection with the development of symptomatic degenerative disc disease.

**SUMMARY OF BACKGROUND DATA:**

The potential relationship between disc infection- and disc degeneration-related symptoms remains controversial, with contradictory evidence available in the literature. Several studies have demonstrated the presence of infected extruded nucleus tissue from first-time disc herniations, implicating the role of disc microbial infection as a pathway for disc degeneration. In contrast, other studies reported very low prevalence of bacterial infection in samples from patients with sciatica, quoting contamination as the predominant source. To summarize the available evidence to date, a systematic review and meta-analysis was conducted.

**METHODS:**

A comprehensive search from 6 electronic databases was performed for studies investigating the potential relationship between disc infection as a cause for degenerative disc disease and symptomatic neck/back pain or radiculopathy. Random-effects meta-analysis of proportions and odds ratio with 95% confidence intervals was used to pool the available evidence.

**RESULTS:**

Nine relevant studies involving 602 patients with degenerative disc disease or pain were identified. From 6 studies supporting the role of infection in the pathophysiology of disc degeneration, the pooled infection prevalence was 45.2% (34.5%-56.0%). Overall pooled prevalence in all studies was 36.2% (24.7%-47.7%). Proportion of disc infections was higher in patients with symptomatic disc disease than in patients without (37.4% vs. 5.9%; odds ratio, 6.1; 95% confidence intervals, 1.426-25.901). The majority of infections were due to *Propionibacterium acnes* in 59.6% (43.2%-76.1%).

**CONCLUSION:**

From the limited evidence available, the possibility that disc infection may be linked with disc degeneration should not be ruled out. There is a need to investigate this further through larger, adequately powered multi-institutional studies with contaminant arm to control for specimen contamination.

**LEVEL OF EVIDENCE: 2.PMID: 25955094**

## INJECTIONS

## Epidurals with sacralization

Pain Pract. 2015 May 27. doi: 10.1111/papr.12315

**The Impact of Lumbosacral Transitional Vertebrae on Therapeutic Outcomes of Transforaminal Epidural Injection in Patients with Lumbar Disc Herniation.**

Son KM<sup>1</sup>, Lee SM<sup>2</sup>, Lee GW<sup>1</sup>, Ahn MH<sup>3</sup>, Son JH<sup>4</sup>.

Author information

Abstract

**BACKGROUND:**

Although some studies have evaluated the clinical impact of lumbosacral transitional vertebrae (LSTV), few have attempted to determine an effective conservative treatment method for lumbar disc herniation (LDH) presenting concurrently with LSTV.

**METHODS:**

We prospectively enrolled 291 consecutive patients who were followed-up for at least one year after transforaminal epidural injection (TFEI) for LDH. We confirmed the presence of LSTV with Paik et al.'s method, the Castellvi classification, and the Southworth and Bersack method. Clinical outcomes were evaluated with a visual analogue scale (VAS) for pain intensity and the Oswestry Disability Index (ODI) for functional status.

**RESULTS:**

Of the 291 patients, 47 (16.2%) had LSTV, including 33 with sacralization and 14 with lumbarization, while 244 (83.8%) did not have LSTV. Patients in both groups improved significantly after TFEI in terms of the VAS ( $P < 0.001$ ) and ODI ( $P < 0.001$ ) scores. However, LDH patients with LSTV had a worse clinical outcome after six months of TFEI than did those without LSTV, with a significant difference between groups for both the VAS ( $P < 0.01$ ) and ODI ( $P = 0.01$ ) scores. LDH patients with sacralization had worse post-treatment clinical outcomes than LDH patients with lumbarization ( $P < 0.001$ ) or LDH patients without LSTV ( $P < 0.001$ ).

**CONCLUSIONS:**

Sacralization can reduce the improvement after TFEI among LDH patients, while lumbarization appears to have no direct effect on TFEI outcomes. The presence of sacralization should be identified before TFEI, and if present, patients should be informed that the outcomes of TFEI may not be as good as they would be if sacralization was not present.

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**KEYWORDS:**

disc herniation; epidural injection; lumbar spine; lumbosacral transitional vertebrae; transforaminal

PMID: 26013430

**SURGERY****Depression and failure rates with fusion**

Spine (Phila Pa 1976). 2015 May 15;40(10):748-56. doi: 10.1097/BRS.0000000000000863.

**Clinical depression is a strong predictor of poor lumbar fusion outcomes among workers' compensation subjects.**

Anderson JT<sup>1</sup>, Haas AR, Percy R, Woods ST, Ahn UM, Ahn NU.

Author information

Abstract

**STUDY DESIGN:**

Retrospective cohort study.

**OBJECTIVE:**

Determine how psychosocial factors, particularly depression, impact lumbar fusion outcomes in a workers' compensation (WC) setting.

**SUMMARY OF BACKGROUND DATA:**

WC patients are less likely to return to work (RTW) after fusion. Few studies evaluate risk factors within this clinically distinct population.

**METHODS:**

A total of 2799 Ohio WC subjects were identified who underwent lumbar fusion between 1993 and 2013 using Current Procedural Terminology (CPT) procedural and International Classification of Diseases, Ninth Revision (ICD-9) diagnosis codes. A total of 123 subjects were diagnosed with depression before fusion. Subjects with a smoking history, prior lumbar surgery, permanent disability, and failed back syndrome were excluded. The primary outcome was whether subjects returned to work within 2 years of fusion and sustained this RTW for more than 6 months of the following year. To determine the impact depression had on RTW status, we performed a multivariate logistic regression analysis. We also compared time absent from work and other secondary outcomes using  $\chi$  and t tests.

**RESULTS:**

Subjects with preoperative depression had significantly higher rates of legal representation, degenerative lumbar disease, and higher medical costs, and used opioid analgesics for considerably longer before and after fusion ( $P < 0.001$ ). Depression group (10.6% [13/123]) and controls (33.0% [884/2676]) met our RTW criteria ( $P < 0.001$ ). Preoperative depression was a negative predictor of RTW status ( $P < 0.001$ ; odds ratio [OR]: 0.38). Additional predictors included working during same week as fusion (OR: 2.15), age more than 50 years (OR: 0.58), chronic preoperative opioid analgesia (OR: 0.58), and legal representation (OR: 0.64). After surgery, depression subjects were absent from work 184 more days compared with controls ( $P < 0.001$ ).

**CONCLUSION:**

Overall, RTW rates after fusion were low, which was especially true for those with pre-existing depression. Depression was a strong negative predictor of postoperative RTW status. Psychological screening and treatment may be beneficial in these subjects. The poor outcomes in this study may highlight a more limited role for fusion among WC subjects with chronic low back pain where RTW is the treatment goal.

**LEVEL OF EVIDENCE: 3.MID:25955092**

## Smoking and poor outcomes

cta Neurochir (Wien). 2015 May 6.

**Does daily tobacco smoking affect outcomes after microdecompression for degenerative central lumbar spinal stenosis? - A multicenter observational registry-based study.**

Gulati S<sup>1</sup>, Nordseth T, Nerland US, Gulati M, Weber C, Giannadakis C, Nygaard ØP, Solberg TK, Solheim O, Jakola AS.

Author information

Abstract

**BACKGROUND:**

There are limited scientific data on the impact of smoking on patient-reported outcomes following minimally invasive spine surgery. The aim of this multicenter observational study was to examine the relationship between daily smoking and patient-reported outcome at 1 year using the Oswestry Disability Index (ODI) after microdecompression for single- and two-level central lumbar spinal stenosis (LSS). Secondary outcomes were the length of hospital stays, perioperative and postoperative complications.

**METHOD:**

Data were collected through the Norwegian Registry for Spine Surgery (NORspine).

**RESULTS:**

A total of 825 patients were included (619 nonsmokers and 206 smokers). For the whole patient population there was a significant difference between preoperative ODI and ODI at 1 year (17.3 points, 95 % CI 15.93-18.67,  $p < 0.001$ ). There was a significant difference in ODI change at 1 year between nonsmokers and smokers (4.2 points, 95 % CI 0.98-7.34,  $p = 0.010$ ). At 1 year 69.6 % of nonsmokers had achieved a minimal clinically important difference ( $\geq 10$  points ODI improvement) compared to 60.8 % of smokers ( $p = 0.008$ ). There was no difference between nonsmokers and smokers in the overall complication rate (11.6 % vs. 9.2 %,  $p = 0.34$ ). There was no difference between nonsmokers and smokers in length of hospital stays for either single-level (2.3 vs. 2.2 days,  $p = 0.99$ ) or two-level (3.1 vs. 2.3 days,  $p = 0.175$ ) microdecompression. Smoking was identified as a negative predictor for ODI change in a multiple regression analysis ( $p = 0.001$ )

**CONCLUSIONS:** Nonsmokers experienced a significantly larger improvement at 1 year following microdecompression for LSS compared to smokers. Smokers were less likely to achieve a minimal clinically important difference. However, it should be emphasized that considerable improvement also was found among smokers.

PMID: 25943982

## VISCERA

## Probiotics

World J Gastroenterol. 2015 May 21;21(19):5985-94. doi: 10.3748/wjg.v21.i19.5985.

**Effectiveness of probiotic therapy for the prevention of relapse in patients with inactive ulcerative colitis.**

Yoshimatsu Y<sup>1</sup>, Yamada A<sup>1</sup>, Furukawa R<sup>1</sup>, Sono K<sup>1</sup>, Osamura A<sup>1</sup>, Nakamura K<sup>1</sup>, Aoki H<sup>1</sup>, Tsuda Y<sup>1</sup>, Hosoe N<sup>1</sup>, Takada N<sup>1</sup>, Suzuki Y<sup>1</sup>.

Author information

Abstract

**AIM:**

To evaluate the effectiveness of probiotic therapy for suppressing relapse in patients with inactive ulcerative colitis (UC).

**METHODS:**

Bio-Three tablets, each containing 2 mg of lactomin (*Streptococcus faecalis* T-110), 10 mg of *Clostridium butyricum* TO-A, and 10 mg of *Bacillus mesentericus* TO-A, were used as probiotic therapy. Sixty outpatients with UC in remission were randomly assigned to receive 9 Bio-Three tablets/day (Bio-Three group) or 9 placebo tablets/day (placebo group) for 12 mo in addition to their ongoing medications. Clinical symptoms were evaluated monthly or on the exacerbation of symptoms or need for additional medication. Fecal samples were collected to analyze bacterial DNA at baseline and 3-mo intervals. Terminal restriction fragment length polymorphism and cluster analyses were done to examine bacterial components of the fecal microflora.

**RESULTS:**

Forty-six patients, 23 in each group, completed the study, and 14 were excluded. The relapse rates in the Bio-Three and placebo groups were respectively 0.0% vs 17.4% at 3 mo ( $P = 0.036$ ), 8.7% vs 26.1% at 6 mo ( $P = 0.119$ ), and 21.7% vs 34.8% ( $P = 0.326$ ) at 9 mo. At 12 mo, the remission rate was 69.5% in the Bio-Three group and 56.6% in the placebo group ( $P = 0.248$ ). On cluster analysis of fecal flora, 7 patients belonged to cluster I, 32 to cluster II, and 7 to cluster III.

**CONCLUSION:**

Probiotics may be effective for maintaining clinical remission in patients with quiescent UC, especially those who belong to cluster I on fecal bacterial analysis.

**KEYWORDS:**

Cluster analysis; Inflammatory bowel disease; Probiotics; Ulcerative colitis

PMID: 26019464



**CERVICAL SPINE**

Fusion and reoperation rates. 22%

Spine (Phila Pa 1976). 2015 May 15;40(10):E571-7. doi: 10.1097/BRS.0000000000000846.

**Adjacent segment pathology requiring reoperation after anterior cervical arthrodesis: the influence of smoking, sex, and number of operated levels.**

Lee JC<sup>1</sup>, Lee SH, Peters C, Riew KD.

Author information

Abstract

**STUDY DESIGN:**

A retrospective study.

**OBJECTIVE:**

The purpose of this study was to determine, using survivorship analysis, the rate of adjacent segment pathology (ASP) development and to identify the risk factors for reoperation.

**SUMMARY OF BACKGROUND DATA:**

The study of Hilibrand defined "adjacent segment disease" as symptomatic radiculopathy or myelopathy due to an adjacent segment documented on 2 consecutive office visits. In addition to being somewhat subjective, their criterion is not as practical as identifying the rate of adjacent pathology by the need for reoperation.

**METHODS:**

This was a retrospective analysis of 1038 consecutive patients who underwent primary anterior cervical spine arthrodesis for radiculopathy and/or myelopathy by 1 surgeon. Annual incidence and prevalence of ASP requiring surgery were calculated and survivorship was determined. We used the Cox regression for risk factor analysis.

**RESULTS:**

Secondary surgery on adjacent segments occurred at a relatively constant rate of 2.4% per year (95% confidence interval, 1.9-3.0). The Kaplan-Meier analysis predicted that 22.2% of patients would need reoperation at adjacent segments by 10 years postoperatively. Factors increasing the risk were smoking, female sex, and the number of arthrodesis segments. One or 2-segment arthrodesis had an 1.8 times greater risk than arthrodesis involving 3 or more segments. Age, neurological diagnosis, diabetes, Klippel-Feil syndrome, and noncontiguous segmental-type ossification of posterior longitudinal ligament were not significant risks.

**CONCLUSION:**

Patients treated with 1- or 2-segment anterior cervical arthrodesis are more likely to develop ASP than those treated with arthrodesis involving 3 or more segments. Smokers and women had a higher ASP reoperation rate. Our series, the largest in the literature, predicts that 22.2% of patients will require reoperation for ASP within 10 years, substantially higher than the Hilibrand study.

**LEVEL OF EVIDENCE: 3.**

PMID: 25705959

**TP's in hand interossi duplicate symptoms of cervical radiculopathy****Referred Pain Patterns of the Third and Fourth Dorsal Interosseous Muscles  
Prospective Evaluation**

Tae Woong Choi, MD, Hyeun Jun Park, MD, Ah Ry Lee, MD, and Yoon Kyoo Kang, MD, PhD

Pain Physician, 05/26/2015

**BACKGROUND:** Myofascial pain (MP) is a common disorder that can involve any skeletal muscle in the human body. There are no published reports of the referred pain patterns of the third and fourth dorsal interosseous muscles.

**OBJECTIVE:** To investigate the referred pain patterns of the third and fourth dorsal interosseous muscles. **STUDY DESIGN:** Prospective evaluation. **SETTING:** Academic medical center.

**METHODS:** Twenty healthy adults participated in the study. Needle placement and injection of 0.2 mL 6% hypertonic saline solution into the midpoint of the interosseous muscles were performed under ultrasonographic (US) guidance. After the injections, the participants were instructed to wait until they felt the most pain and then draw a pain diagram. This drawing was transferred to the computer for analysis.

**RESULTS:** The referred pain distributions for the third dorsal interosseous muscle were as follows: the interdigital space of the third and fourth fingers, 80%; the distal phalanx of the third and fourth fingers, 45%; and the ulnar side of the palm, 55%. Three and 6 participants reported pain on the volar side of the wrist and in the fifth finger, respectively. The referred pain distributions for the fourth dorsal interosseous muscle were as follows: the interdigital space of the fourth and fifth fingers, 80%; the hypothenar area, 65%; and the distal phalanx of the fourth and fifth fingers, 60%. Seven and 3 participants also reported pain on the ulnar side of the wrist and the ulnar side of the forearm, respectively. **LIMITATION:** This study is limited by its small sample size.

**CONCLUSION:** Referred pain patterns of the third and fourth interosseous muscles resemble the pain experienced in C7 or C8 radiculopathies or the ulnar neuropathy. Thus, identification of the third and fourth interosseous muscle trigger point should be considered when patients experience pain on the ulnar aspect of the hand and wrist.

## UPPER C SPINE

## Arterial dissection

**Risk Factors and Clinical Presentation of Cervical Arterial Dissection: Preliminary Results of a Prospective Case Control Study**

**Authors:** Lucy C. Thomas, PhD, MMedSc (Physiotherapy)<sup>1,5</sup>, Darren A. Rivett, PhD, MAppSc (ManipPhy)<sup>2</sup>, John R. Attia, MD, PhD<sup>3</sup>, Christopher Levi, BMedSc, MBBS, FRACP<sup>4</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, Ahead of Print **Pages:** 1-27 doi:10.2519/jospt.2015.5877

**Study Design** Cross-sectional case-control study.

**Objectives** To identify risk factors and clinical presentation of individuals with cervical arterial dissection.

**Background** Cervical arterial dissection is a common cause of stroke in young people and has in rare cases been associated with cervical manipulative therapy. The mechanism is considered to involve pre-existing arterial susceptibility and a precipitating event such as minor trauma. Identification of individuals at risk or early recognition of a dissection in progress could help expedite medical intervention and avoid inappropriate treatment.

**Methods** Participants were individuals 55 years of age or less from the Hunter region of New South Wales, Australia with radiologically confirmed vertebral or internal carotid artery dissection and an age and gender matched comparison group. Participants were interviewed about risk factors, preceding events, and clinical features of their stroke. Physical examination of joint mobility and soft tissue compliance was undertaken.

**Results** Twenty-four participants with cervical arterial dissection and 21 matched comparisons with ischaemic stroke but not dissection entered the study. Seventeen (71%) of the 24 participants with dissection reported a recent history of minor mechanical neck trauma or strain, with 4 of these 17 reporting being recently treated with neck manipulative therapy. Cardiovascular risk factors were uncommon with the exception of diagnosed migraine. Among the participants with dissection, 67% reported transient ischaemic features in the preceding month to their admission for dissection.

**Conclusion** Recent minor mechanical trauma or strain to the head or neck appears to be associated with cervical arterial dissection. General cardiovascular risk factors with the exception of migraine were not important risk factors for dissection in this cohort. Preceding transient neurological symptoms appear to occur commonly and may assist in identification of this serious pathology.

**Level of Evidence** Prognosis, level 4. *J Orthop Sports Phys Ther*, Epub 21 May 2015. doi:10.2519/jospt.2015.5877

**Keyword:** cervical manipulation, internal carotid artery, neck, stroke, vertebral artery

### CRANIUM/TMJ

#### Comorbidity and TMJ

##### **Specific and number of comorbidities are associated with increased levels of temporomandibular pain intensity and duration**

The Journal of Headache and Pain, 05/28/2015

**D**ahan H, et al. – This study shows that the number of comorbidities is positively associated with TMD pain duration and intensity. The presence of specific conditions, such as migraine and chronic fatigue syndrome, is associated with an increase in TMD intensity and duration.

#### Methods

- The sample included 180 people seeking TMD treatment at Boston and Montreal clinics.
- TMD was diagnosed using the Research Diagnostic Criteria for TMD.
- A Numerical Pain Rating Scale assessed TMD pain intensity and participants provided their TMD pain duration in a study questionnaire.
- The comorbidities of migraine, chronic fatigue syndrome, irritable bowel syndrome, interstitial cystitis and restless leg syndrome were diagnosed by 5 validated diagnostic questionnaires.
- The associations were analyzed by linear regression, controlling for confounders.

#### Results

- There was a positive association between the number of comorbidities present and TMD pain intensity (p?)
- The presence of migraine was positively associated with TMD pain intensity (p?)
- When TMD patients were separated into groups, these associations did not change for the myofascial pain group, whereas in the non-myofascial pain group, the relationship between number of comorbidities and TMD pain duration was the only one still present.

## CONCUSSIONS

## Concussion or what else?

Clin J Sport Med. 2015 May;25(3):237-42. doi: 10.1097/JSM.0000000000000128.

**Brain or strain? Symptoms alone do not distinguish physiologic concussion from cervical/vestibular injury.**

Leddy JJ<sup>1</sup>, Baker JG, Merchant A, Picano J, Gaile D, Matuszak J, Willer B.  
Author information

Abstract

**OBJECTIVE:**

To compare symptoms in patients with physiologic postconcussion disorder (PCD) versus cervicogenic/vestibular PCD. We hypothesized that most symptoms would not be equivalent. In particular, we hypothesized that cognitive symptoms would be more often associated with physiologic PCD.

**DESIGN:**

Retrospective review of symptom reports from patients who completed a 22-item symptom questionnaire.

**SETTING:**

University-based concussion clinic.

**PATIENTS:**

Convenience sample of 128 patients who had symptoms after head injury for more than 3 weeks and who had provocative treadmill exercise testing.

**INDEPENDENT VARIABLES:**

Subjects were classified as either physiologic PCD (abnormal treadmill performance and a normal cervical/vestibular physical examination) or cervicogenic/vestibular PCD (CGV, normal treadmill performance, and an abnormal cervical/vestibular physical examination).

**MAIN OUTCOME MEASURES:**

Self-reported symptoms. Univariate and multivariate methods, including t tests, tests of equivalence, a logistic regression model, k-nearest neighbor analysis, multidimensional scaling, and principle components analysis were used to see whether symptoms could distinguish PCD from CGV.

**RESULTS:**

None of the statistical methods used to analyze self-reported symptoms was able to adequately distinguish patients with PCD from patients with CGV.

**CONCLUSIONS:**

Symptoms after head injury, including cognitive symptoms, have traditionally been ascribed to brain injury, but they do not reliably discriminate between physiologic PCD and cervicogenic/vestibular PCD. Clinicians should consider specific testing of exercise tolerance and perform a physical examination of the cervical spine and the vestibular/ocular systems to determine the etiology of postconcussion symptoms.

**CLINICAL RELEVANCE:**

Symptoms after head injury, including cognitive symptoms, do not discriminate between concussion and cervical/vestibular injury. PMID:25051194

**GLENOHUMERAL/SHOULDER****Morphology and dislocations**

J Shoulder Elbow Surg. 2015 May 7. pii: S1058-2746(15)00165-2. doi: 10.1016/j.jse.2015.03.024. [Epub ahead of print]

**Differences in glenohumeral joint morphology between patients with anterior shoulder instability and healthy, uninjured volunteers.**

Peltz CD<sup>1</sup>, Zauel R<sup>2</sup>, Ramo N<sup>2</sup>, Mehran N<sup>3</sup>, Moutzouros V<sup>3</sup>, Bey MJ<sup>2</sup>.  
Author information

Abstract

**BACKGROUND:**

Traumatic glenohumeral joint (GHJ) dislocations are common, resulting in significant shoulder disability and pain. Previous research indicates that bony morphology is associated with an increased risk of injury in other joints (eg, the knee), but the extent to which bony morphology is associated with traumatic GHJ dislocation is unknown. This study assessed GHJ morphology in patients with anterior GHJ instability and in a control population of healthy volunteers.

**METHODS:**

Bilateral computed tomography scans were used to measure GHJ morphology in both shoulders of 11 patients with instability and 11 control subjects. Specific outcome measures included the glenoid radius of curvature (ROC) in the anterior/posterior (A/P) and superior/inferior (S/I) directions, humeral head ROC, A/P and S/I conformity index, and A/P and S/I stability angle.

**RESULTS:**

Compared with the control subjects, the glenoid of the instability the injured shoulder in patients with instability was flatter (ie, higher ROC) in the A/P ( $P = .001$ ) and S/I ( $P = .01$ ) directions and this finding was also true for uninjured, contralateral shoulder (A/P:  $P = .01$ , S/I:  $P = .03$ ). No differences in GHJ morphology were detected between the instability patients' injured and contralateral shoulders ( $P > .07$ ). Similarly, no differences in GHJ morphology were detected between the control subjects' dominant and nondominant shoulders ( $P > .51$ ).

**CONCLUSIONS:**

There are significant differences in GHJ morphology between healthy control subjects and both shoulders (injured and uninjured, contralateral) of patients diagnosed with anterior instability after GHJ dislocation. These findings are important clinically because they suggest that glenoid morphology may influence the risk of GHJ dislocation.

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**KEYWORDS:**

Glenohumeral instability; anterior instability; bony morphology; glenoid morphology; humeral head morphology; radius of curvature; traumatic instability

PMID: 25958216

## Dislocations

Br J Sports Med. 2015 Apr 21. pii: bjsports-2014-094342. doi: 10.1136/bjsports-2014-094342.

**Risk factors which predispose first-time traumatic anterior shoulder dislocations to recurrent instability in adults: a systematic review and meta-analysis.**

Olds M<sup>1</sup>, Ellis R<sup>2</sup>, Donaldson K<sup>1</sup>, Parmar P<sup>1</sup>, Kersten P<sup>3</sup>.

Author information

Abstract

**BACKGROUND:**

Recurrent instability following a first-time anterior traumatic shoulder dislocation may exceed 26%. We systematically reviewed risk factors which predispose this population to events of recurrence.

**METHODS:**

A systematic review of studies published before 1 July 2014. Risk factors which predispose recurrence following a first-time traumatic anterior shoulder dislocation were documented and rates of recurrence were compared. Pooled ORs were analysed using random-effects meta-analysis.

**RESULTS:**

Ten studies comprising 1324 participants met the criteria for inclusion. Recurrent instability following a first-time traumatic anterior shoulder dislocation was 39%. Increased risk of recurrent instability was reported in people aged 40 years and under (OR=13.46), in men (OR=3.18) and in people with hyperlaxity (OR=2.68). Decreased risk of recurrent instability was reported in people with a greater tuberosity fracture (OR=0.13). The rate of recurrent instability decreased as time from the initial dislocation increased. Other factors such as a bony Bankart lesion, nerve palsy and occupation influenced rates of recurrent instability.

**CONCLUSIONS:**

Sex, age at initial dislocation, time from initial dislocation, hyperlaxity and greater tuberosity fractures were key risk factors in at least two good quality cohort studies resulting in strong evidence as concluded in the GRADE criteria. Although bony Bankart lesions, Hill Sachs lesions, occupation, physiotherapy treatment and nerve palsy were risk factors for recurrent instability, the evidence was weak using the GRADE criteria-these findings relied on poorer quality studies or were inconsistent among studies.

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**KEYWORDS:**

Epidemiology; Meta-analysis; Recurrent; Risk factor; Shoulder

PMID: 25900943

**HIP****IMPINGEMENT****Pelvic tilt and impingement**

Am J Sports Med. 2014 Oct;42(10):2402-9. doi: 10.1177/0363546514541229. Epub 2014 Jul 24.  
**Effect of changes in pelvic tilt on range of motion to impingement and radiographic parameters of acetabular morphologic characteristics.**

Ross JR1, Nepple JJ2, Philippon MJ2, Kelly BT3, Larson CM4, Bedi A5.

**BACKGROUND:**

The current understanding of the effect of dynamic changes in pelvic tilt on the functional acetabular orientation and occurrence of femoroacetabular impingement (FAI) is limited.

**PURPOSE:**

To determine the effect of changes in pelvic tilt on (1) terminal hip range of motion and (2) measurements of acetabular version as assessed on 2- and 3-dimensional imaging.

**STUDY DESIGN:**

Controlled laboratory study.

**METHODS:**

Preoperative pelvic computed tomographic scans of 48 patients (50 hips) who underwent arthroscopic surgery for the treatment of FAI were analyzed. The mean age of the study population was 25.7 years (range, 14-56 years), and 56% were male. Three-dimensional models of the hips were created, allowing manipulation of the pelvic tilt and simulation of hip range of motion to osseous contact. Acetabular version was measured and the presence of the crossover sign, prominent ischial spine sign, and posterior wall sign was recorded on simulated plain radiographs. Measurements of range of motion to bony impingement during (1) hip flexion, (2) internal rotation in 90° of flexion, and (3) internal rotation in 90° of flexion and 15° adduction were performed, and the location of bony contact between the proximal femur and acetabular rim was defined. These measurements were calculated for -10° (posterior), 0° (native), and +10° (anterior) pelvic orientations.

**RESULTS:**

In native tilt, mean cranial acetabular version was 3.3°, while central version averaged 16.2°. Anterior pelvic tilt (10° change) resulted in significant retroversion, with mean decreases in cranial and central version of 5.9° and 5.8°, respectively ( $P < .0001$  for both). Additionally, this resulted in a significantly increased proportion of positive crossover, posterior wall, and prominent ischial spine signs ( $P < .001$  for all). Anterior pelvic tilt (10° change) resulted in a decrease in internal rotation in 90° of flexion of 5.9° ( $P < .0001$ ) and internal rotation in 90° of flexion and 15° adduction of 8.5° ( $P < .0001$ ), with a shift in the location of osseous impingement more anteriorly. Posterior pelvic tilt (10° change) resulted in an increase in internal rotation in 90° of flexion of 5.1° ( $P < .0001$ ) and internal rotation in 90° of flexion and 15° adduction of 7.4° ( $P < .0001$ ), with a superolateral shift in the location of osseous impingement.

**CONCLUSION/CLINICAL RELEVANCE:**

Dynamic changes in pelvic tilt significantly influence the functional orientation of the acetabulum and must be considered. Dynamic anterior pelvic tilt is predicted to result in earlier occurrence of FAI in the arc of motion, whereas dynamic posterior pelvic tilt results in later occurrence of FAI, which may have implications regarding nonsurgical treatments for FAI.

© 2014 The Author(s). **KEYWORDS:** acetabular version; computed tomography; computer modeling; femoroacetabular impingement; pelvic tilt



**KNEE****Kinesio Tape and force**

Clin J Sport Med. 2015 May;25(3):284-90. doi: 10.1097/JSM.0000000000000132.

**Acute effects of kinesio taping on knee extensor peak torque and electromyographic activity after exhaustive isometric knee extension in healthy young adults.**

Yeung SS<sup>1</sup>, Yeung EW, Sakunkaruna Y, Mingsoongnern S, Hung WY, Fan YL, Iao HC.

Author information

Abstract

**OBJECTIVE:**

To evaluate the effect of Kinesio Tex tape and its method of application, Kinesio Taping (KT) on knee extensor performance before and after an exhaustive isometric knee extension exercise.

**DESIGN:**

Single-blinded, randomized control trial.

**SETTING:**

Centre for Sports Training and Rehabilitation at The Hong Kong Polytechnic University.

**PARTICIPANTS:**

Twenty-six healthy volunteers with no history of knee injuries.

**INTERVENTIONS:**

Subjects were randomized to either the KT or sham taping group.

**MAIN OUTCOME MEASURES:**

The effects of KT on the neuromuscular performance of the knee extensors were measured before and after KT application, and immediately and 5 and 10 minutes after an exhaustive isometric knee extension exercise.

**RESULTS:**

Within-group analyses revealed a significant effect of time on the peak torque in isometric knee extension ( $F_{2,73,65.44} = 24.5$ ,  $P < 0.001$ ), but no significant group ( $F_{2,73,65.44} = 2.13$ ,  $P = 0.11$ ) or interaction ( $F_{1,24} = 0.59$ ,  $P = 0.45$ ) effect. A significant time effect ( $F_{2,52,60.14} = 3.75$ ,  $P = 0.02$ ) and a significant time  $\times$  group interaction ( $F_{1,24} = 4.59$ ,  $P = 0.04$ ) was found for the rate of peak torque development. Post hoc comparisons revealed significantly higher rates in the intervention group ( $F_{1,24} = 4.594$ ,  $P = 0.04$ ) over all 5 tests. No significant effects of time ( $F_{4,96} = 0.88$ ,  $P = 0.48$ ;  $F_{2,56,61.35} = 2.75$ ,  $P = 0.06$ ), group ( $F_{4,96} = 0.56$ ,  $P = 0.69$ ;  $F_{2,56,61.35} = 1.16$ ,  $P = 0.33$ ), or time  $\times$  group interaction ( $F_{1,24} = 2.77$ ,  $P = 0.11$ ;  $F_{1,24} = 0.20$ ,  $P = 0.66$ ) were found for either the electromechanical delay or electromyographic results, respectively.

**CONCLUSIONS:**

The present study suggests that KT shortens the time required to generate peak torque during isometric knee extension, which has important implications for sports performances that require the rapid generation of peak muscular force.

**CLINICAL RELEVANCE:**

Kinesio taping is commonly seen in the sports arena. The popularity is presumably due to the general belief in its injury prevention and enhancement of muscle performance. The results of the present findings suggested that KT shortens the time to reach peak torque generation. Aside from this, there is no other significant positive effect on muscle performance. Further investigation on the effects of KT on muscle performance is warranted. PMID: 25010152

## Exercise to improve mechanics

BMC Musculoskelet Disord. 2015 May 3;16:105. doi: 10.1186/s12891-015-0563-9.

**A randomised trial into the effect of an isolated hip abductor strengthening programme and a functional motor control programme on knee kinematics and hip muscle strength.**

Palmer K<sup>1</sup>, Hebron C<sup>2</sup>, Williams JM<sup>3</sup>.

Author information

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- <sup>3</sup>Faculty of Health and Social Sciences, Bournemouth University, Royal London House, Christchurch Road, BH1 3LT, Bournemouth, Dorset, UK. jwilliams@bournemouth.ac.uk.

**Abstract**

**BACKGROUND:**

Dynamic knee valgus and internal femoral rotation are proposed to be contributory risk factors for patellofemoral pain and anterior cruciate ligament injuries. Multimodal interventions including hip abductor strengthening or functional motor control programmes have a positive impact of pain, however their effect on knee kinematics and muscle strength is less clear. The aim of this study was to examine the effect of isolated hip abductor strengthening and a functional motor control exercise on knee kinematics and hip abductor strength.

**METHODS:**

This prospective, randomised, repeated measures design included 29 asymptomatic volunteers presenting with increase knee valgus and femoral internal rotation. Participants completed either isolated hip abductor strengthening or a functional motor control exercise for 5 weeks. Knee kinematics were measured using inertial sensors during 2 functional activities and hip abductor strength measured using a load cell during isometric hip abduction.

**RESULTS:**

There were no significant differences in dynamic knee valgus and internal rotation following the isolated hip abductor or functional motor control intervention, and no significant differences between the groups for knee angles. Despite this, the actual magnitude of reduction in valgus was 10° and 5° for the functional motor control group and strengthening group respectively. The actual magnitude of reduction in internal rotation was 9° and 18° for the functional motor control group and strengthening group respectively. Therefore there was a tendency towards clinically significant improvements in knee kinematics in both exercise groups. A statistically significant improvement in hip abductor strength was evident for the functional motor control group (27% increase;  $p = 0.008$ ) and strengthening group (35% increase;  $p = 0.009$ ) with no significant difference between the groups being identified ( $p = 0.475$ ).

**CONCLUSIONS:**

Isolated hip strengthening and functional motor control exercises resulted in non-statistically significant changes in knee kinematics, however there was a clear trend towards clinically meaningful reductions in valgus and internal rotation. Both groups demonstrated similar significant gains in hip abductor strength suggesting either approach could be used to strengthen the hip abductors.

PMID: 25935843

## KNEE/ACL

## Star balance test for return to sports

**Performance on the Modified Star Excursion Balance Test at the Time of Return to Sport Following Anterior Cruciate Ligament Reconstruction**

**Authors:** Sarah Clagg, PT, DPT, SCS, AT<sup>1</sup>, Mark V. Paterno, PT, PhD, SCS, AT<sup>2</sup>, Timothy E. Hewett, PhD, FACSM<sup>3</sup>, Laura C. Schmitt, PT, PhD<sup>4</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, Ahead of Print **Pages:** 1-25 [doi:10.2519/jospt.2015.5040](https://doi.org/10.2519/jospt.2015.5040) **Study Design** Cross-sectional.

**Objectives** To compare performance on the modified star excursion balance test (SEBT) between participants with anterior cruciate ligament reconstruction (ACLR) at the time of return to sport and uninjured control participants.

**Background** The modified SEBT is a clinical tool to assess neuromuscular control deficits. Deficits in dynamic stability and neuromuscular control persist after ACLR, but assessment with the modified SEBT in this population at the time of return to sport has not been reported.

**Methods** Sixty-six participants (mean age: 17.6 years) at the time of return to sport following unilateral primary ACLR (ACLR group) and 47 uninjured participants (mean age: 17.0 years) serving as a control group (Control group) participated. For the modified SEBT, the anterior, posteromedial, and posterolateral reach distances were recorded. Lower extremity muscle strength was quantified with isokinetic dynamometry. Independent samples t-tests were used to evaluate performance differences between the ACLR and Control groups and between ACLR sub-groups. In the ACLR group, bi-variate correlations determined the association of modified SEBT performance with time since surgery and lower extremity muscle strength.

**Results** The ACLR group had lower anterior reach distance on the involved and uninvolved limbs compared to the Control group. There were no differences observed between groups in reach distances for the posteromedial and posterolateral directions or limb symmetry indices for any of the reach directions. In the ACLR group, time from surgery and meniscal status at the time of ACLR did not influence modified SEBT performance while participants with patellar bone-tendon-bone grafts had lower posterolateral reach distance compared to those with hamstring grafts. In the ACLR group, involved limb hip abduction strength positively correlated with all reach distances and quadriceps strength positively correlated with posterolateral reach.

**Conclusion** At the time of return to sport, participants post-ACLR demonstrated reduced modified SEBT anterior reach in both involved and uninvolved limbs compared to uninjured participants, with no other group differences. In the ACLR group, modified SEBT reach distance was associated with lower extremity muscle strength, but not with time from reconstruction or meniscal status at the time of ACLR. Lower extremity muscle strength and graft type may interact to influence modified SEBT posterior reach performance but this requires further study.

**Level of Evidence** Prognosis, level 2b-. *J Orthop Sports Phys Ther*, Epub 21 Apr 2015. [doi:10.2519/jospt.2015.504](https://doi.org/10.2519/jospt.2015.504) **Keyword:** ACL, ACL reconstruction, dynamic stability, knee, performance

**PATELLA****Deep squat and VMO activation**

Physiother Res Int. 2015 May 11. doi: 10.1002/pri.1631. [Epub ahead of print]

**The Effect of Altering Knee Position and Squat Depth on VMO : VL EMG Ratio During Squat Exercises.**

Jaberzadeh S<sup>1</sup>, Yeo D<sup>2</sup>, Zoghi M<sup>3</sup>.

Author information

Abstract

**BACKGROUND:**

Patellofemoral pain syndrome is an extremely common condition, believed to be caused by altered activation of vastus medialis obliquus (VMO), leading to maltracking of the patella.

**AIM:**

This study aimed to investigate the effect of altering knee movement and squat depth on the ratio of VMO and vastus lateralis (VMO : VL) during squat exercises.

**METHOD:**

Eighteen (7 male and 11 female) healthy, asymptomatic participants performed semi-squat exercises with three squat depths (20°, 50° and 80° of knee flexion) while following three knee movement paths (neutral, varus or valgus). Normalized VMO : VL ratio from linear envelope surface electromyography was analysed.

**RESULTS:**

No significant effect was found for gender ( $p = 0.87$ ), leg dominance ( $p = 0.99$ ) or knee position ( $p = 0.44$ ). A significant effect was found for squat depth ( $p < 0.001$ ) with both the 50° and 80° squats showing increases in VMO : VL ratio ( $p = 0.031$  and  $p = 0.028$ ), respectively. The VMO : VL ratio was not influenced by gender, leg dominance or knee position in semi-squat exercises.

**DISCUSSION AND CONCLUSION:**

Increases in relative VMO activation did occur in 'deeper' squat depths (50° and 80° knee flexion) compared with the 20° condition. Further research is needed in this area concerning the effects of such exercise modifications on a symptomatic patellofemoral pain syndrome population.

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**KEYWORDS:**

patellofemoral joint; squat exercises; vastus lateralis; vastus medialis obliquus

PMID: 25962352

### **KNEE/EXERCISE**

#### **Ex for medial instability**

Sports Med Arthrosc. 2015 Jun;23(2):104-9. doi: 10.1097/JSA.000000000000057.

#### **Nonsurgical management and postoperative rehabilitation of medial instability of the knee.**

Weber AE<sup>1</sup>, Kopydlowski NJ, Sekiya JK.

Author information

#### Abstract

The medial ligaments of the knee are the most frequently injured structures of the knee joint. The decisions regarding the treatment of medial knee injuries must take into account the severity of injury to the entire knee, the chronicity of the injury, and the patient goals and activity level. The treatment and rehabilitation of the medial structures of the knee is largely reliant on the healing potential of these structures. Studies have shown that these medial, extra-articular ligaments may possess the ability to heal by both intrinsic and extrinsic properties. The goals of nonoperative treatment should include healing of the injured medial structures while controlling edema, restoring full knee motion, and preserving muscle strength. In cases of continued medial instability after an isolated grade III injury or in cases of combined multiligamentous knee injuries, the medial structures of the knee may be treated operatively with repair or reconstruction.

The goals of rehabilitation following surgical intervention are the same as for nonoperative treatment; however, the progression of activity is more gradual to allow for repaired or reconstructed tissue to heal. If the objectives of early edema control, restoration of knee motion, gradual resumption of weight bearing, and return of muscle strength are followed, patients should return to full activity following medial injuries to the knee.

PMID: 25932880

## OSTEOARTHRITIS/KNEE

## Ultrasound diagnostics

Ann Rheum Dis. 2015 Apr 22. pii: annrheumdis-2014-206774. doi: 10.1136/annrheumdis-2014-206774

**An OMERACT reliability exercise of inflammatory and structural abnormalities in patients with knee osteoarthritis using ultrasound assessment.**

Bruyn GA<sup>1</sup>, Naredo E<sup>2</sup>, Damjanov N<sup>3</sup>, Bachta A<sup>4</sup>, Baudoin P<sup>1</sup>, Hammer HB<sup>5</sup>, Lamers-Karnebeek FB<sup>6</sup>, Moller Parera I<sup>7</sup>, Richards B<sup>8</sup>, Taylor M<sup>9</sup>, Ben-Artzi A<sup>9</sup>, D'Agostino MA<sup>10</sup>, Garrido J<sup>11</sup>, Iagnocco A<sup>12</sup>; Ultrasound Task Force.

Author information

Abstract

**OBJECTIVE:**

To assess whether ultrasonography (US) is reliable for the evaluation of inflammatory and structural abnormalities in patients with knee osteoarthritis (OA).

**METHODS:**

Thirteen patients with early knee OA were examined by 11 experienced sonographers during 2 days. Dichotomous and semiquantitative scoring was performed on synovitis characteristics in various aspects of the knee joint. Semiquantitative scoring was done of osteophytes at the medial and lateral femorotibial joint space or cartilage damage of the trochlea and on medial meniscal damage bilaterally. Intra- and interobserver reliability were computed by use of unweighted and weighted  $\kappa$  coefficients.

**RESULTS:**

Intra- and interobserver reliability scores were moderate to good for synovitis (mean  $\kappa$  0.67 and 0.52, respectively) as well as moderate to good for the global synovitis (0.70 and 0.50, respectively). Mean intra- and interobserver reliability  $\kappa$  for cartilage damage, medial meniscal damage and osteophytes ranged from fair to good (0.55 and 0.34, 0.75 and 0.56, 0.73 and 0.60, respectively).

**CONCLUSIONS:**

Using a standardised protocol, dichotomous and semiquantitative US scoring of pathological changes in knee OA can be reliable.

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**KEYWORDS:**

Knee Osteoarthritis; Synovitis; Ultrasonography

PMID: 25902788

**Pain and usage**

Osteoarthritis Cartilage. 2015 May 20. pii: S1063-4584(15)01159-0. doi: 10.1016/j.joca.2015.05.002

**Is long-term physical activity safe for older adults with knee pain?: A systematic review.**

Quicke JG<sup>1</sup>, Foster NE<sup>2</sup>, Thomas MJ<sup>3</sup>, Holden MA<sup>4</sup>.

Author information

Abstract

**OBJECTIVE:**

To determine whether long-term physical activity is safe for older adults with knee pain.

**DESIGN:**

A comprehensive systematic review and narrative synthesis of existing literature was conducted using multiple electronic databases from inception until May 2013. Two reviewers independently screened, checked data extraction and carried out quality assessment. Inclusion criteria for study designs were randomised controlled trials (RCTs), prospective cohort studies or case control studies, which included adults of mean age over 45 years old with knee pain or osteoarthritis (OA), undertaking physical activity over at least three months and which measured a safety related outcome (adverse events, pain, physical functioning, structural OA imaging progression or progression to total knee replacement (TKR)).

**RESULTS:**

Of the 8614 unique references identified, 49 studies were included in the review, comprising 48 RCTs and one case control study. RCTs varied in quality and included an array of low impact therapeutic exercise interventions of varying cardiovascular intensity. There was no evidence of serious adverse events, increases in pain, decreases in physical function, progression of structural OA on imaging or increased TKR at group level. The case control study concluded that increasing levels of regular physical activity was associated with lower risk of progression to TKR.

**CONCLUSIONS:**

Long-term therapeutic exercise lasting three to thirty months is safe for most older adults with knee pain. This evidence supports current clinical guideline recommendations. However, most studies investigated selected, consenting older adults carrying out low impact therapeutic exercise which may affect result generalizability.

**SYSTEMATIC REVIEW REGISTRATION:**

PROSPERO 2014:CRD42014006913.

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**KEYWORDS:**

Exercise; Knee pain; Osteoarthritis; Physical activity; Safety; Systematic review

PMID:26003947

**PRP injections**

Br J Sports Med. 2015 May;49(10):657-672. doi: 10.1136/bjsports-2014-094036. Epub 2014 Nov 21.

**Efficacy of platelet-rich plasma injections in osteoarthritis of the knee: a systematic review and meta-analysis.**

Laudy AB<sup>1</sup>, Bakker EW<sup>2</sup>, Rekers M<sup>3</sup>, Moen MH<sup>4</sup>.

Author information

Abstract

**BACKGROUND:**

The effectiveness of platelet-rich plasma (PRP) injections for osteoarthritis (OA) is still controversial. We investigated the effect of PRP injections in patients with knee OA based on decreasing pain, improving function, global assessment and changes regarding joint imaging.

**METHODS:**

We performed a comprehensive, systematic literature search in computerised databases (MEDLINE, EMBASE, CINAHL, CENTRAL, Web of Science and PEDro) until June 2014 for randomised or non-randomised controlled trials. These were graded for risk of bias and a level of evidence was provided. If possible, meta-analysis was performed.

**RESULTS:**

Ten trials were included. In these, intra-articular PRP injections were more effective for pain reduction (mean difference (MD) -2.45; 95% CI -2.92 to -1.98; p value <0.00001 and MD -2.07; 95% CI -2.59 to -1.55; p value <0.00001, single and double PRP injections, respectively) compared with placebo at 6 months postinjection. Intra-articular PRP injections were compared with hyaluronic acid and showed a statistically significant difference in favour of PRP on pain reduction based on the visual analogue scale and numeric rating scale (standardised mean difference -0.92; 95% CI -1.20 to -0.63; p value <0.00001) at 6 months postinjection. Almost all trials revealed a high risk of bias.

**CONCLUSIONS:**

On the basis of the current evidence, PRP injections reduced pain more effectively than did placebo injections in OA of the knee (level of evidence: limited due to a high risk of bias). This significant effect on pain was also seen when PRP injections were compared with hyaluronic acid injections (level of evidence: moderate due to a generally high risk of bias). Additionally, function improved significantly more when PRP injections were compared with controls (limited to moderate evidence). More large randomised studies of good quality and low risk of bias are needed to test whether PRP injections should be a routine part of management of patients with OA of the knee.

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**KEYWORDS:**

Cartilage; Muscle; Sports medicine; Tendon

PMID: 25416198



## Exercise and pain

*Knee*. 2015 May 4. pii: S0968-0160(15)00066-6. doi: 10.1016/j.knee.2015.03.014.

**The effectiveness of an exercise programme on knee loading, muscle co-contraction, and pain in patients with medial knee osteoarthritis: A pilot study.**

Al-Khlaifat L<sup>1</sup>, Herrington LC<sup>2</sup>, Hammond A<sup>2</sup>, Tyson SF<sup>3</sup>, Jones RK<sup>2</sup>.

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- <sup>2</sup>School of Health Sciences, University of Salford, Salford M66PU, UK.
- <sup>3</sup>School of Nursing, Midwifery and Social Work, University of Manchester, M13 9PL, UK.

Abstract

**BACKGROUND:**

Knee loading, muscle co-contraction, and pain are increased in knee osteoarthritis (OA). Exercises decreased pain in knee OA, yet OA is a mechanical disease and biomechanical changes need to be explored as well. Therefore, this study aims to investigate the effectiveness of an exercise programme on these outcomes in people with medial knee osteoarthritis.

**METHODS:**

Cohort pilot study design. Nineteen participants with knee OA attended group exercise sessions, integrated with self-management education, once a week for six weeks, with additional home exercises. Outcomes assessed pre- and post-exercise programme were: External Knee Adduction Moment (EKAM), Knee Adduction Angular Impulse (KAAI), knee antagonist muscle co-contraction during gait, and the pain-subscale of the Knee injury and Osteoarthritis Outcome Score (KOOS).

**RESULTS:**

Fourteen participants completed the study. Post-exercise intervention, the EKAM and KAAI did not change significantly ( $p=0.21-0.7$ ,  $p=0.56$ , respectively). Muscle co-contraction between the vastus-lateralis and biceps-femoris muscles decreased in early-stance (64.78 (44.35) compared to 38.10 (23.10),  $p=0.01$ ) and mid-stance (27.62 (32.12) compared to 14.94 (17.40),  $p=0.04$ ). A corresponding significant pain reduction was seen ( $p=0.00$ ) with a median and range of 51.50 (47.00-62.50) at week six compared to 34.50 (29.25-41.25) at baseline.

**CONCLUSION:**

This is the first known study to explore the effect of an exercise programme on knee loading and muscle co-contraction in knee OA. Although EKAM did not change, the findings suggest a reduction in vastus-lateralis and biceps-femoris co-contraction might be a mechanism by which pain is reduced in knee OA.

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**KEYWORDS:**

Co-contraction; Exercise; Loading; Osteoarthritis

PMID: 25953672

**ACHILLES TENDON****Exercise and strength**

Scand J Med Sci Sports. 2015 May 5. doi: 10.1111/sms.12469.

**Achilles tendon structure improves on UTC imaging over a 5-month pre-season in elite Australian football players.**

Docking SI<sup>1,2</sup>, Rosengarten SD<sup>3</sup>, Cook J<sup>1,2</sup>.

Author information

**Abstract**

Pre-season injuries are common and may be due to a reintroduction of training loads. Tendons are sensitive to changes in load, making them vulnerable to injury in the pre-season. This study investigated changes in Achilles tendon structure on ultrasound tissue characterization (UTC) over the course of a 5-month pre-season in elite male Australian football players. Eighteen elite male Australian football players with no history of Achilles tendinopathy and normal Achilles tendons were recruited. The left Achilles tendon was scanned with UTC to quantify the stability of the echopattern. Participants were scanned at the start and completion of a 5-month pre-season. Fifteen players remained asymptomatic over the course of the pre-season. All four echo-types were significantly different at the end of the pre-season, with the overall echopattern suggesting an improvement in Achilles tendon structure. Three of the 18 participants developed Achilles tendon pain that coincided with a change in the UTC echopattern.

This study demonstrates that the UTC echopattern of the Achilles tendon improves over a 5-month pre-season training period, representing increased fibrillar alignment. However, further investigation is needed to elucidate with this alteration in the UTC echopattern results in improved tendon resilience and load capacity.

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**KEYWORDS:**

Achilles tendon; Australian football; ultrasound; ultrasound tissue characterization

PMID: 25943892

## MANUAL THERAPY

## Shoulder OA and MT

**Orthopaedic Manual Physical Therapy for Shoulder Pain and Impaired Movement in a Patient With Glenohumeral Joint Osteoarthritis: A Case Report**

**Authors:** Michael S. Crowell, PT, DSc<sup>1,2</sup>, Bradley S. Tragord, PT, DSc<sup>3</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, Ahead of Print **Pages:** 1-37 [doi:10.2519/jospt.2015.5887](https://doi.org/10.2519/jospt.2015.5887)

**Study Design** Case report.

**Background** Comprehensive treatment strategies are needed for individuals with glenohumeral joint (GHJ) osteoarthritis (OA), especially when they are young and active. Prior dislocation with or without subsequent shoulder stabilization surgery complicates the clinical presentation and increases the risk of OA progression. The purpose of this case report is to describe an orthopedic manual physical therapy approach used in a patient with GHJ OA who presented with shoulder pain and impaired movement.

**Case Description** A 38-year-old male military officer presented with a 2 month duration of left shoulder pain, unrelieved with a subacromial injection. He reported a history of anterior-inferior dislocation with subsequent stabilization surgery 15 years prior and arthroscopic subacromial decompression 2 years prior. Physical examination demonstrated painful limitations in shoulder elevation and internal/external rotation movements, stiffness with testing using accessory glides, and rotator cuff and scapular musculature weakness associated with pain.

**Outcomes** Treatment consisted of 5 sessions provided over 4 weeks. The plan of care included manual physical therapy, exercises, and progressive functional activities specifically tailored to the patient's clinical presentation. Shoulder pain and disability index (SPADI) scores decreased from 43% to 17% and the patient specific functional scale (PSFS) average score improved from 3.0 to 7.25. After 4 additional weeks of a home exercise program, the SPADI score was 4% and PSFS average score was 9.0. Improvements in self-reported function were maintained at 6 months. Four "booster" treatment sessions were administered at 9 months contributing to sustained outcomes through 1 year.

**Discussion** In a young, active patient with GHJ OA, clinically meaningful short-term improvements in self-reported function and pain, maintained at 1 year, were observed with manual physical therapy and exercise.

**Level of Evidence** Therapy, level 4. *J Orthop Sports Phys Ther*, Epub 30 Apr 2015. [doi:10.2519/jospt.2015.5887](https://doi.org/10.2519/jospt.2015.5887)

**Keyword:** exercise, manual therapy

## T spine manipulations

### Thoracic Spine Manipulation in Individuals With Subacromial Impingement Syndrome Does Not Immediately Alter Thoracic Spine Kinematics, Thoracic Excursion, or Scapular Kinematics: A Randomized Controlled Trial

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**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, Ahead of Print **Pages:** 1-34 doi:10.2519/jospt.2015.5647

**Study Design** Randomized controlled trial.

**Objectives** To determine if thoracic spinal manipulative therapy (SMT) alters thoracic kinematics, thoracic excursion, and scapular kinematics compared to a sham-SMT in patients with subacromial pain syndrome, and also to compare changes in patient-reported outcomes between treatment groups.

**Background** Prior studies indicate that thoracic SMT can improve pain and disability in individuals with subacromial pain syndrome. However, the mechanisms underlying these benefits are not well understood.

**Methods** Participants with shoulder impingement symptoms (n=52) were randomly assigned to receive a single session of thoracic SMT or sham-SMT. Thoracic and scapular kinematics during active arm elevation and overall thoracic excursion were measured before and after the intervention. Patient-reported outcomes measured were: pain (numeric pain rating scale [NPRS]), function (Pennsylvania Shoulder Score [Penn]), and global rating of change (GROC).

**Results** There were no significant differences between groups in changes post-intervention for thoracic kinematics or excursion, shoulder kinematics, or patient-reported outcomes ( $P > .05$ ). Both groups showed an increase in scapular internal rotation during arm raising (mean of  $0.9^\circ$ , 95% CI [ $0.3^\circ$ ,  $1.6^\circ$ ],  $P = .003$ ) and lowering ( $0.8^\circ$ , 95% CI [ $0.0^\circ$ ,  $1.5^\circ$ ],  $P = .041$ ), as well as improved NPRS (1.2 points, 95% CI [ $0.3$ ,  $1.8$ ],  $P < .001$ ) and Penn (9.1 points, 95% CI [ $6.5$ ,  $11.7$ ],  $P < .001$ ) scores.

**Conclusion** Thoracic spine extension and excursion did not change significantly following thoracic SMT. There were small, but likely not clinically meaningful changes in scapular internal rotation in both groups. Patient-reported pain and function improved in both groups, however there were no significant differences in the changes between the SMT and the sham-SMT groups. Overall, patient-reported outcomes improved in both groups without meaningful changes to thoracic or scapular motion.

**Level of Evidence** Therapy, level 1b-. *J Orthop Sports Phys Ther*, Epub 21 May 2015. doi:10.2519/jospt.2015.5647

**Keyword:** biomechanics, manual therapy, thrust

### STRETCHING/MUSCLES

#### Stretching does not change pain sensitivity

#### **Local and systemic changes in pain sensitivity after 4 weeks of calf muscle stretching in a nonpainful population: a randomized trial**

Pain Practice, 05/29/2015

**B**artholdy C, et al. – The aim of this study is to investigate whether 4 weeks of unilateral stretching of the calf muscles would affect local and central pain sensitivity. Four weeks of regular stretching of the calf muscles does not affect pressure pain sensitivity, suggesting that pressure pain sensitivity is unaffected by stretching in a healthy population. The mechanisms underlying any benefits of regular stretching remain to be explained.

#### Methods

- This study was a randomized assessor-blinded clinical study. Healthy participants (age 18 to 40) were included and randomized.
- Participants in the intervention group were instructed to perform 2 stretching exercises targeting the calf muscles; 3 times 30 seconds, 7 days a week for 4 weeks on the dominant leg. Participants in the control group were instructed not to do any stretching for 4 weeks.
- Pressure pain threshold (PPT) and temporal summation (TS) of pressure pain were measured on the stretched calf, the contra-lateral calf, and contra-lateral lower arm using a computerized cuff algometer.
- Analyses of variance on the per-protocol population (defined as participants that adhered to the protocol) were used to assess group differences in the changes from baseline.

#### Results

- Forty healthy volunteers were included, of which 34 participants adhered to the protocol (15 intervention group/19 control group).
- No statistically significant group differences in the changes from baseline were found regarding PPT and TS measurements for the stretched calf, the contra-lateral calf, and the arm.

## MUSCLES

## Hamstring tear and eccentric exercise

**Conservative Treatment of Subacute Proximal Hamstring Tendinopathy Using Eccentric Exercises Performed With a Treadmill: A Case Report**

**Authors:** Daniel Cushman, MD<sup>1</sup>, Monica E. Rho, MD<sup>2</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, Ahead of Print **Pages:** 1-24  
[doi:10.2519/jospt.2015.5762](https://doi.org/10.2519/jospt.2015.5762)

**Study Design** Case report.

**Background** Proximal hamstring tendinopathy (PHT) in runners is characterized by pain with passive hip flexion with the knee extended, active hip extension, and pain with sitting. Relatively little literature exists on the condition and publications on non-surgical treatment protocols are even more scarce. Surgical intervention, which comprises the majority of literature for treatment of this condition, is an option for cases that fail to respond to non-surgical treatment.

**Case Description** The patient was a 34-year old otherwise healthy male triathlete with unilateral PHT diagnosed by ultrasound, who had pain only with running and prolonged sitting. After he failed to respond to 4 weeks of eccentric knee flexion and core strengthening exercises, an eccentric hip extensors strengthening program using a treadmill was initiated. This exercise was performed on a daily basis, in addition to a lumbopelvic musculature strengthening program.

**Outcomes** The patient noted a decrease in pain within 2 weeks of initiating the new exercise, was able to return to gradual running in 4 weeks, and speed training in 12 weeks. He returned to competition shortly thereafter and has not had a recurrence 12 months post-therapy-initiation. His score on the Victorian Institute of Sport Assessment-Proximal Hamstring Tendons (VISA-H) improved from 23 on initial presentation to 83 at 12 weeks post-therapy-initiation.

**Discussion** We describe the management of a triathlete with subacute PHT, who responded well to non-surgical treatment using eccentric hip extension strengthening using a treadmill.

**Level of Evidence** Therapy, Level 4. *J Orthop Sports Phys Ther*, Epub 21 May 2015.  
[doi:10.2519/jospt.2015.5762](https://doi.org/10.2519/jospt.2015.5762)

**Keyword:** running, tendon, triathlete

**EXERCISE****MET for pain**

Physiother Res Int. 2015 May 25. doi: 10.1002/pri.1632.

**Medical Exercise Therapy for Treating Musculoskeletal Pain: A Narrative Review of Results from Randomized Controlled Trials with a Theoretical Perspective.**

Lorås H<sup>1</sup>, Østerås B<sup>1</sup>, Torstensen TA<sup>2,3</sup>, Østerås H<sup>1</sup>.

Author information

Abstract

**BACKGROUND AND PURPOSE:**

The purpose of this narrative review is to present an overview and theoretical rationale of medical exercise therapy (MET) as a physiotherapeutic rehabilitation treatment for musculoskeletal pain conditions. Results from randomized controlled trials (RCTs) conducted on MET are also presented.

**METHODS:**

Computerized searches for any RCTs were conducted on the MET concept in the databases PubMed, Medline, Embase and ISI Web of science up to 2013.

**RESULTS:**

Overall findings from five included MET RCTs are long-term ( $\geq 1$  year) reductions in pain and improved physical and functional capabilities. These results are interpreted in the context of the biopsychosocial model, advancing the view of a dynamic interaction among physiologic, psychological and social factors that influence pain modulation.

**DISCUSSION:**

MET is a biopsychosocial treatment that reduces pain and improves activities of daily living in patients with a musculoskeletal pain condition. Pain modulation is a key feature of MET, and an important area for further research is to elucidate the specific mechanisms behind the treatment effects. Copyright © 2015 John Wiley & Sons, Ltd.

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**KEYWORDS:**

biopsychosocial model; exercise therapy; musculoskeletal; pain

PMID: 26010

**POSTURE****Pelvic Tilt**

Am J Sports Med. 2014 Oct;42(10):2402-9. doi: 10.1177/0363546514541229. Epub 2014 Jul 24.

**Effect of changes in pelvic tilt on range of motion to impingement and radiographic parameters of acetabular morphologic characteristics.**

Ross JR1, Nepple JJ2, Philippon MJ2, Kelly BT3, Larson CM4, Bedi A5.

**Author information**

**Abstract**

**BACKGROUND:**

The current understanding of the effect of dynamic changes in pelvic tilt on the functional acetabular orientation and occurrence of femoroacetabular impingement (FAI) is limited.

**PURPOSE:**

To determine the effect of changes in pelvic tilt on (1) terminal hip range of motion and (2) measurements of acetabular version as assessed on 2- and 3-dimensional imaging.

**STUDY DESIGN:**

Controlled laboratory study.

**METHODS:**

Preoperative pelvic computed tomographic scans of 48 patients (50 hips) who underwent arthroscopic surgery for the treatment of FAI were analyzed. The mean age of the study population was 25.7 years (range, 14-56 years), and 56% were male. Three-dimensional models of the hips were created, allowing manipulation of the pelvic tilt and simulation of hip range of motion to osseous contact. Acetabular version was measured and the presence of the crossover sign, prominent ischial spine sign, and posterior wall sign was recorded on simulated plain radiographs. Measurements of range of motion to bony impingement during (1) hip flexion, (2) internal rotation in 90° of flexion, and (3) internal rotation in 90° of flexion and 15° adduction were performed, and the location of bony contact between the proximal femur and acetabular rim was defined. These measurements were calculated for -10° (posterior), 0° (native), and +10° (anterior) pelvic orientations.

**RESULTS:**

In native tilt, mean cranial acetabular version was 3.3°, while central version averaged 16.2°. Anterior pelvic tilt (10° change) resulted in significant retroversion, with mean decreases in cranial and central version of 5.9° and 5.8°, respectively ( $P < .0001$  for both). Additionally, this resulted in a significantly increased proportion of positive crossover, posterior wall, and prominent ischial spine signs ( $P < .001$  for all). Anterior pelvic tilt (10° change) resulted in a decrease in internal rotation in 90° of flexion of 5.9° ( $P < .0001$ ) and internal rotation in 90° of flexion and 15° adduction of 8.5° ( $P < .0001$ ), with a shift in the location of osseous impingement more anteriorly. Posterior pelvic tilt (10° change) resulted in an increase in internal rotation in 90° of flexion of 5.1° ( $P < .0001$ ) and internal rotation in 90° of flexion and 15° adduction of 7.4° ( $P < .0001$ ), with a superolateral shift in the location of osseous impingement.

**CONCLUSION/CLINICAL RELEVANCE:**

Dynamic changes in pelvic tilt significantly influence the functional orientation of the acetabulum and must be considered. Dynamic anterior pelvic tilt is predicted to result in earlier occurrence of FAI in the arc of motion, whereas dynamic posterior pelvic tilt results in later occurrence of FAI, which may have implications regarding nonsurgical treatments for FAI.

© 2014 The Author(s). **KEYWORDS:** acetabular version; computed tomography; computer modeling; femoroacetabular impingement; pelvic tilt



### ATHLETICS

#### Overuse injury from throwing in adolescents

Curr Sports Med Rep. 2015 May-Jun;14(3):209-14. doi: 10.1249/JSR.0000000000000155.

#### **Overuse throwing injuries in skeletally immature athletes - diagnosis, treatment, and prevention.**

Mautner BK<sup>1</sup>, Blazuk J.

Author information

#### Abstract

The number of skeletally immature athletes participating in organized sport is near an all-time high. For nearly half a century, the medical community has investigated the link between shoulder and elbow injuries with repetitive throwing. Despite substantial literature and research, several controversies still exist, including when to begin throwing breaking pitches. Furthermore, despite introduction of pitch recommendations for youth baseball, misconceptions, poor understanding of, and adherence to these guidelines persist. High-velocity and high-volume throwing and throwing while fatigued are significant risk factors for injury. Improved awareness and adherence to throwing guidelines should limit the number of injuries.

Proper identification and treatment of injuries when they do occur can allow our skeletally immature athletes to safely return to overhead sports activities.

PMID: 25968854

**Groin pain**

Br J Sports Med. 2015 Apr 23. pii: bjsports-2015-094807. doi: 10.1136/bjsports-2015-094807.

**Terminology and definitions on groin pain in athletes: building agreement using a short Delphi method.**

Weir A<sup>1</sup>, Hölmich P<sup>2</sup>, Schache AG<sup>3</sup>, Delahunt E<sup>4</sup>, de Vos RJ<sup>5</sup>.

Author information

Abstract

**BACKGROUND:**

Groin pain in athletes occurs frequently and can be difficult to treat, which may partly be due to the lack of agreement on diagnostic terminology.

**OBJECTIVE:**

To perform a short Delphi survey on terminology agreement for groin pain in athletes by a group of experts.

**METHODS:**

A selected number of experts were invited to participate in a Delphi questionnaire. The study coordinator sent a questionnaire, which consisted of demographic questions and two 'real-life' case reports of athletes with groin pain. The experts were asked to complete the questionnaire and to provide the most likely diagnosis for each case. Questionnaire responses were analysed by an independent researcher. The Cohen's  $\kappa$  statistic was used to evaluate the level of agreement between the diagnostic terms provided by the experts.

**RESULTS:**

Twenty-three experts participated (96% of those invited). For case 1, experts provided 9 different terms to describe the most likely diagnosis; for case 2, 11 different terms were provided to describe the most likely diagnosis. With respect to the terms provided for the most likely diagnosis, the Cohen's  $\kappa$  was 0.06 and 0.002 for case 1 and 2, respectively. This heterogeneous taxonomy reflects only a slight agreement between the various diagnostic terms provided by the selected experts.

**CONCLUSIONS:**

This short Delphi survey of two 'typical, straightforward' cases demonstrated major inconsistencies in the diagnostic terminology used by experts for groin pain in athletes. These results underscore the need for consensus on definitions and terminology on groin pain in athletes.

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**KEYWORDS:** *Consensus; Groin; Methodological; Muscle; Tendon*

PMID: 25907180

**Adductor groin pain**

Br J Sports Med. 2015 May;49(10):681-91. doi: 10.1136/bjsports-2014-093710. Epub 2014 Dec 15.

**MRI findings in soccer players with long-standing adductor-related groin pain and asymptomatic controls.**

Branci S<sup>1</sup>, Thorborg K<sup>2</sup>, Bech BH<sup>3</sup>, Boesen M<sup>4</sup>, Nielsen MB<sup>3</sup>, Hölmich P<sup>5</sup>.

Author information

Abstract

**BACKGROUND:**

Soccer players are commonly affected by long-standing adductor-related groin pain (ARGP), but the clinical significance of MRI findings in these athletes is largely unknown. Our aims were (1) to evaluate whether MRI findings are associated with long-standing ARGP in soccer players, (2) to assess MRI findings in asymptomatic soccer players and non-soccer playing controls.

**METHODS:**

This cross-sectional study included 28 male soccer players with long-standing ARGP, 17 male asymptomatic soccer players and 20 male asymptomatic non-soccer playing athletes of matching age and athletic exposure. Participants underwent identical standardised and reliable clinical examination, and MRI scans (3 T) of the pelvis performed by a blinded observer. Images were consensus rated by three blinded radiologists according to a standardised MRI evaluation protocol. The associations between clinical adductor-related findings and pathological MRI findings were investigated with  $\chi^2$  statistics and OR.

**RESULTS:**

Central disc protrusion ( $p=0.027$ ) and higher grades of pubic bone marrow oedema (BMO;  $p=0.027$ ) were significantly more present in symptomatic players than asymptomatic players. However, up to 71% of asymptomatic soccer players displayed different positive MRI findings, and asymptomatic soccer players had significantly higher odds (OR ranging from 6.3 to 13.3) for BMO, adductor tendinopathy and degenerative changes than non-soccer players.

**CONCLUSIONS:**

ARGP in soccer players was associated with central disc protrusion and higher grades of pubic BMO. Moreover, positive MRI findings were significantly more frequent in soccer players compared with non-soccer players irrespective of symptoms, suggesting that these MRI changes may be associated with soccer play itself rather than clinical symptoms.

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**KEYWORDS:**

Groin; Lower extremity; MRI; Soccer; Sporting injuries

PMID:25512059

## GAIT

## Gait and hip DJD

**Gait Characteristics, Symptoms and Function in Persons With Hip Osteoarthritis: A Longitudinal Study With 6-7 Years Follow-Up**

**Authors:** Ingrid Eitzen, PT, PhD<sup>1,2</sup>, Linda Fernandes, PT, PhD<sup>1,3</sup>, Heidi Kallerud, PT, MSc<sup>1</sup>, Lars Nordsetten, MD, PhD<sup>2</sup>, Brian Knarr, PhD<sup>4</sup>, May Arna Risberg, PT, PhD<sup>1,5</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, Ahead of Print **Pages:** 1-28 doi:10.2519/jospt.2015.5441

**Study Design** Longitudinal laboratory study.

**Objectives** 1) To compare gait characteristics between individuals with early stage hip osteoarthritis who later underwent total hip replacement (THR), and persons who did not undergo THR. 2) To evaluate whether gait characteristics, function, or symptoms declined among persons who did not undergo THR during a 6-7 year follow-up.

**Background** The natural history of symptoms, function, and gait changes secondary to hip osteoarthritis, including potential differences at an early stage of disease, is unknown.

**Methods** Forty-three individuals (mean age 58.9 years) with radiographic and symptomatic hip osteoarthritis participated. Outcome measures included 3D-gait analysis, self-reported pain, stiffness and function, hip range of motion and the 6-minute walk test. Baseline comparisons between individuals who later underwent THR and those who did not undergo THR were made using independent t-test/Mann-Whitney U-test. Comparison of baseline measures and 6-7 year follow-up for the non-operated individuals were conducted with paired samples t-test/Wilcoxon's Sign Rank Test ( $p < 0.05$ ).

**Results** Twelve of the 43 individuals initially evaluated (27.9%) had not undergone THR at the 6-7 year follow-up. At baseline, these individuals had larger sagittal plane hip and knee joint excursions, larger joint space width, lower body mass index, and superior self-reported function, compared with the individuals who later underwent THR. At the 6-7 year follow-up, the individuals who did not undergo THR exhibited no decline in gait characteristics, minimum joint space, or overall function. Furthermore, their self-reported pain had significantly reduced ( $p = 0.024$ ).

**Conclusions** Individuals who did not undergo THR during a 6-7 year follow-up period did not exhibit a decline in gait, function or symptoms compared to those who underwent THR. These findings are suggestive of a phenotype of hip osteoarthritis with a very slow disease progression, particularly in regards to pain.

**Level of Evidence** Prognosis, level 1b. *J Orthop Sports Phys Ther*, Epub 21 May 2015.

doi:10.2519/jospt.2015.5441 **Keyword:** biomechanics, joint deterioration, motion analysis, non-operative natural history ead

**More:** <http://www.jospt.org/doi/abs/10.2519/jospt.2015.5441#.VWODEGTBwXA>

## RUNNING

## Runners with LBP

**Low Back and Lower Limb Muscle Performance in Male and Female Recreational Runners With Chronic Low Back Pain**

**Authors:** Congcong Cai, MSc<sup>1,2</sup>, Pui W. Kong, PhD<sup>1</sup>

**Published:** *Journal of Orthopaedic & Sports Physical Therapy*, Ahead of Print **Pages:** 1-30 doi:10.2519/jospt.2015.5460

**Study Design** Controlled Laboratory Study; Cross-sectional.

**Objective** To compare lumbar extensor muscle fatigability, lumbar muscle activation, and lower limb strength between male and female runners with chronic low back pain (LBP) and healthy runners.

**Background** Little is known about muscle performance in runners with chronic LBP.

**Methods** 18 recreational runners with chronic LBP (9 males and 9 females; mean age = 27.8 years) and 18 healthy recreational runners (9 males and 9 females; mean age = 24.6 years) were recruited. The median frequency slopes for bilateral iliocostalis and longissimus were calculated from electromyographic signals captured during a 2-minute Sorenson Test. The thickness changes of the transversus abdominis and lumbar multifidus between resting and contraction were measured using an ultrasound scanner. Peak concentric torque of the bilateral hip extensors, hip abductors, and knee extensors were measured using an isokinetic dynamometer at 60°/s. The average values for both sides were used for statistics analysis.

**Results** When averaged across genders, peak knee extensor torque was 12.2% lower in the LBP group compared to the healthy group [mean difference (95% CI) = 0.29 (0.06-0.53) Nm/kg,  $p = .016$ ]. Male runners with chronic LBP exhibited smaller lumbar multifidus thickness changes compared to healthy male runners [mean difference (95% CI) = 0.13 (0.01-0.25) cm,  $p = .033$ ]. No other group differences were observed.

**Conclusion** Runners with chronic LBP exhibited diminished knee extensor strength compared to healthy runners. Male runners with chronic LBP demonstrated additional deficits in lumbar multifidus activation. *J Orthop Sports Phys Ther*, Epub 21 Apr 2015. doi:10.2519/jospt.2015.5460

**Keyword:** electromyography, isokinetic strength, muscle activation, rehabilitative ultrasound image **Read More:** <http://www.jospt.org/doi/abs/10.2519/jospt.2015.5460#.VWOHKGtBwXA>

## PAIN

## Chronic pain training

**Treatment Outcomes after Combination Interventional and Cognitive Motivational Counseling on Analgesic Medication Use in Patients with Chronic Spine Pain  
Retrospective Case Series**

John Jerome, PhD, Ryan Topham, MD, Anna Dematatis, PhD, and Josh Corteville, BS  
Pain Physician, 05/26/2015

**BACKGROUND:** Pain interventionists can interrupt pain through anesthetic blockade of neural transmission to virtually any part of the body. Temporary pain relief can be achieved by the direct application of targeted anesthetic. Diagnostically, nerve blocks help identify specific pain generators, refine differential diagnosis, and disrupt the neural transmission mechanisms to stop pain generation peripherally.

**OBJECTIVE:** This study of patients with chronic spine pain was conducted to test the hypothesis that decreasing pain through interventional techniques coupled with cognitive motivational counseling can be highly effective in reducing chronic pain interference, reliance on prescription opioids, and enhancing overall function and quality of life.

**STUDY DESIGN:** Retrospective case series. **SETTING:** Rehabilitation center. **METHODS:** Patients: This study involved a retrospective cohort of 78 consecutive patients with spine pain that underwent interventional procedures and cognitive motivational counseling, as well as a comparison group of 77 consecutive patients that underwent interventional procedures only.

**OUTCOME MEASURES:** Pain intensity (DoD VAS), Functional capacity (DoD SS), Global Appraisal (PGIC), Pain site measurement (Drawing), and prescription medication use questionnaires were administered at initial evaluation and after treatment. Pre- and post-treatment changes were compared using paired t-tests. Chi-squared analysis was performed pre- and post-treatment for medication use.

**RESULTS:** The pre- and post-treatment scores for pain intensity, function, and global appraisal demonstrated significant response to treatment ( $P < 0.001$ ) for the combined interventional and cognitive motivational group ( $P < 0.001$ ) and the interventional only group ( $P < 0.05$ ). Compared to initial intake, opioid ( $P < 0.01$ ), benzodiazepine ( $P < 0.01$ ), muscle relaxant ( $P < 0.05$ ), and antidepressant/antianxiolytic ( $P < 0.05$ ) use only decreased for the combined interventional and cognitive motivational group. **LIMITATIONS:** This is a retrospective study using medical records and patient self-reported symptoms with possible missed coding and no true random selection, assignment, or genuine control group comparison.

**CONCLUSION:** This study's results support the hypothesis that a combined interventional and cognitive motivational counseling treatment program can be effective in decreasing spine pain, reducing prescription pain medication use, and improving overall quality of life

in chronic spine pain patients.

## FIBROMYALGIA

### **Cognitive Performance Is Related to Central Sensitization and Health-related Quality of Life in Patients with Chronic Whiplash-Associated Disorders and Fibromyalgia Case Control Study**

Iris Coppieters, MSc, Kelly Ickmans, PhD, Barbara Cagnie, PhD, Jo Nijs, PhD, Robby De Pauw, MSc, Suzie Noten, MSc, and Mira Meeus, PhD

Pain Physician, 05/26/2015

**BACKGROUND:** A growing body of research has demonstrated that impaired central pain modulation or central sensitization (CS) is a crucial mechanism for the development of persistent pain in chronic whiplash-associated disorders (WAD) and fibromyalgia (FM) patients. Furthermore, there is increasing evidence for cognitive dysfunctions among these patients. In addition, chronic WAD and FM patients often report problems with health-related quality of life (QoL). Yet, there is limited research concerning the interrelations between cognitive performance, indices of CS, and health-related QoL in these patients. **OBJECTIVES:** (1) Examining the presence of cognitive impairment, CS, and limitations on health-related QoL in patients with chronic WAD and FM compared to healthy controls. (2) Examining interrelations between performance-based cognitive functioning, CS, and self-reported health-related QoL in these 3 study groups. **STUDY DESIGN:** A case-control study was conducted. **SETTING:** The present study took place at the University Hospital Brussels, the University of Brussels, and the University of Antwerp. **METHODS:** Fifty-nine patients (16 chronic WAD patients, 21 FM patients, and 22 pain-free volunteers) filled out the Short Form 36 item Health Survey (SF-36), a self-reported psychosocial questionnaire, to assess health-related QoL. Next, they were subjected to various pain measurements (pressure hyperalgesia, deep-tissue hyperalgesia, temporal summation [TS], and conditioned pain modulation [CPM]). Finally, participants completed a battery of performance-based cognitive tests (Stroop task, psychomotor vigilance task [PVT], and operation span task [OSPAN]). **RESULTS:** Significant cognitive impairment, bottom-up sensitization, and decreased health-related QoL were demonstrated in patients with chronic WAD and FM compared to healthy controls ( $P < 0.017$ ). CPM was comparable between the 3 groups. Cognitive performance was significantly related to central pain modulation (deep-tissue hyperalgesia, TS, CPM) as well as to self-reported health-related QoL ( $P < 0.05$ ). Decreased cognitive performance was related to deficient central pain modulation in healthy controls. Further, significant correlations between decreased cognitive performance and reduced health-related QoL were revealed among all study groups. Additionally, FM patients showed correlations between cognitive impairment and increased health-related QoL. Remarkably, impaired selective attention and working memory were related to less TS, whereas impaired sustained attention was correlated with dysfunctional CPM in FM patients. **LIMITATIONS:** Based on the current cross-sectional study no firm conclusions can be drawn on the causality of the relations.

**CONCLUSION:** In conclusion, this paper has demonstrated significant cognitive deficits, signs of CS, and reduced health-related QoL in chronic WAD and FM patients compared to healthy individuals. Significant relations between cognitive performance and CS as well as

## ABSTRACTS

health-related QoL were demonstrated. These results provide preliminary evidence for the clinical importance of objectively measured cognitive deficits in patients with chronic WAD and FM.